



**REPORT OF 14th US/EUROPE DATA EXCHANGE
MEETING**

Hosted by the

Met Office

at

**Met Office College,
Shinfield Park, Reading. U.K.**

16-18 May 2001

Report dated 17 June 2001

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1. Introduction

The meeting was chaired by Dr John Eyre who is the head of Satellite Applications at the Met Office in Bracknell, U.K. He opened the 14th meeting by welcoming the group to the Met Office College at Shinfield Park in Reading. He reminded the group of the importance of these annual meetings as a forum to refine the data requirements of the NWP centres and also to consider the means of getting the data from the data providers to the NWP centres. Referring to the agenda (attachment I) he emphasised the main work of the group was on the second day when the requirements of both the US and Europe were reviewed in detail. The list of participants is given in attachment II.

The group also discussed the terms of reference of the group and the chairman agreed to draft some text for consideration. This was the second meeting that the Meteorological Service of Canada (MSC) had attended and it was agreed that Canada should become a formal member of the group. As a consequence future meetings would be renamed the North American/Europe data exchange meetings.

This report consists of the detailed US and European requirements documents tabled at this meeting in sections 2 and 3. The Canadian requirements are all common to the European and US lists and so a table is provided in section 4 referring to the corresponding items in sections 2 and 3. The actions formulated during this meeting are in section 5 and the review of actions from the previous meetings is given in section 6. The status reports from the satellite agencies, NWP centres and telecommunication groups which were provided by the presenters are included as attachments to this report. There are also PowerPoint presentation files available from Roger Saunders (roger.saunders@metoffice.com) for some of the status reports as indicated in the heading for each report. There are also several other attachments provided in response to actions from the previous meetings.

2. U.S. Requirements

This document presents the combined United States status of, and requirements for, data and products from the European communities satellite, NWP, oceanographic, and other related activities. Unless otherwise specified, the stated requirement represents a common requirement of two or more U.S. centers.

A key requirement common to all the products listed below is the reliable exchange of information on any changes impacting any of the transmitted products. Timely exchange of information will help in explaining anomalies in the monitoring and, if assimilated, in forecast trends.

It is expected that the responses to all of the following requests for new and/or additional data will fall within the bounds established by WMO Resolution 40.

1. POLAR SATELLITES: ORBIT-BY-ORBIT DATA/PRODUCTS

1.1 ERS-2

1.1.1 Wind speed, wind direction, significant wave height and dynamic sea surface height data

Status: Dedicated line from ESA to NESDIS. Received and used operationally.

Comments: NCEP processes raw backscatter data into ocean surface wind speed and direction for use as input to and validation of numerical meteorological and oceanographic models.

Note: Request ice edge/ice roughness (age) information for production of ice graphics if it becomes available. Wind speed and direction not used since Nov. 2000 and not received since Jan. 2001

Requirement: Yes.

1.2 ENVISAT-1

1.2.1 Radar Altimeter 2 (RA-2)

Status: Launch date is October 2001. Not received.

Comments: Maps ocean topography, sea ice, polar ice sheets, and most land surfaces. Also wind speed and significant wave height at sea. Data to be used for assimilation into meteorological and oceanographic models.

Requirements: Yes, for real-time data, when launched and available.

1.2.2 Advance Synthetic Aperture Radar (ASAR)

Status: Launch date is October 2001. Not received.

Comments: Identification of frontal features and estimation of wave spectra.

Requirements: No current requirement.

1.2.3 MEDium Resolution Imaging Spectrometer (MERIS) Instrument

Status: Launch date is October 2001. Not received.

Comments: Estimation of ocean optical properties. Also, cloud height, total water vapor column, and aerosol load over land.

Requirement: Yes, when launched and available.

1.2.4 Advance Along Track Scanning Radiometer (AATSR)

Status: Launch date is October 2001. Not received.

Comments: Sea surface temperature. Data to be used for assimilation into oceanographic models and identification of frontal features.

Requirement: Yes, for real-time data, when launched and available.

1.2.5 Global Ozone Monitoring by Occultation of Stars (GOMOS)

Status: Launch date is October 2001. Not received.

Comments: Data to be used for climate modeling, ozone assimilation, model validation.

Requirements: Yes, when launched and available.

1.2.6 MicroWave Radiometer (MWR)

Status: Launch date is October 2001. Not received.

Comments: Integrated atmospheric water vapor column and cloud liquid water content. Also surface emissivity, soil moisture over land, and ice characterization.

Requirement: No, but possibly useful for water vapor and cloud liquid water initialization.

1.3 METEorological OPERational/EUMETSAT Polar System (METOP/EPS)

Status: A separate agreement with EUMETSAT is in place for the receipt of all European acquired data from all instruments.

Comments: Launch date is 2003. Not received. Radiances, temperatures of the

land and ocean surface on a global basis, ozone monitoring, ocean wind flow. METOP will become NOAA's morning mission.

Requirement: Yes, when launched and available.

2. GEOSTATIONARY SATELLITES: DATA/PRODUCTS

2.1 METEOSAT

2.1.1 METEOSAT imagery (visible, IR, water vapor)

Status: Received from METEOSAT-5 and METEOSAT-7 by NESDIS and used operationally.

Comments: Imagery is used for Atlantic and Indian Ocean forecasts, quality control of model output, synoptic analyses, tropical cyclone analyses, cloud-track wind generation.

Requirement: Yes.

2.1.2 METEOSAT cloud-track winds from IR imagery

Status: Transmitted on GTS. Received from METEOSAT-5 and METEOSAT-7 and used operationally.

Comments: Winds are used as input to and validation of numerical meteorological models.

Requirement: Yes.

2.1.3 METEOSAT cloud-track winds from visible imagery

Status: Transmitted on GTS. Received from METEOSAT-5 and METEOSAT-7 and used operationally.

Comments: Winds are used as input to and validation of numerical meteorological models.

Requirement: Yes.

2.1.4 METEOSAT cloud-track winds from water vapor imagery

Status: Transmitted on GTS. Received from METEOSAT-5 and METEOSAT-7 but not yet used operationally.

Comments: Winds to be used as input to and validation of numerical meteorological models.

Requirement: Yes.

2.2 **GOMS (Elektro) imagery (visible, IR)**

Status: Visible imagery from GOMS-1 can't be received due to problems with the sensor package. IR imagery from GOMS-1 is supposed to be posted on the internet.

Comments: IR imagery could be downloaded from internet for examination.

Requirement: No.

3. **NON-SATELLITE OBSERVATIONS**

3.1 **Upper-air observations**

3.1.1 **RAWIN, radiosonde, PIBAL**

Status: Transmitted on GTS. Received and used operationally.

Comments: Data are used as input to and validation of numerical meteorological models, and for analysis and climate.

Requirement: Yes.

3.1.2 **EUMETNET-ASAP (Automated Shipboard Aerological Program)**

Status: Planned to go operational in 2001 with all data transmitted on GTS. Not received.

Comments: Provide vertical profiles of wind, temperature and humidity from ships in data-sparse areas. First on a route within the Mediterranean or between the Eastern Mediterranean and the Eastern Seaboard of North America, and later on a route between the English Channel or the Irish Sea and the Eastern Seaboard of North America. Data to be used as input to and validation of numerical meteorological models, and for analysis and climate.

Requirement: Yes, when available.

3.1.3 **Profilers/VAD Winds**

Status: A few received.

Comments: Provide vertical profiles of wind with high frequency in time.

Requirement: Yes, when available.

3.2 **Surface observations**

3.2.1 **Synoptic and METAR**

Status: Transmitted on GTS. Received and used operationally.

Comments: Highest time frequency required is hourly. Data are used as input to and validation of numerical meteorological models, and for analysis and climate.

Requirement: Yes.

3.2.2 EUMETNET-AWS (Automated Weather Stations)

Status: Not received.

Comments: Real time transmission of relative humidity, atmospheric pressure, wind speed and direction, air temperature, and precipitation amount (plus more) from various meso-networks across Europe consisting of agricultural and climatological sites as well as airports. Highest time frequency required is hourly. Data to be used as input to and validation of numerical meteorological models, and for analysis and climate.

Requirement: Yes.

3.2.3 Rain, snowfall, snow depth observations, river flow data

Status: Not received.

Comments: River flow data may be available at gauging stations. Data to be used for snow analysis, rainfall assimilation, Land Data Assimilation System (LDAS), and climate database. Desired Format is BUFR, but will also accept SHEF (Standard Hydrological Encoded Format).

Requirement: Yes.

3.2.4 Soil moisture and temperature observations

Status: Not received.

Comments: Data to be used as input to and validation of numerical meteorological models.

Requirement: Yes, if ever available.

3.2.5 Surface energy/water flux- observations

Status: Not received.

Comments: Data to be used as validation of numerical models. These type of observations will be taken at international "FLUXNET" stations being installed around the world to monitor the global carbon cycle.

Requirement: Yes.

3.2.6 Additional surface observations (e.g., mesonets, surface rainfall measurements, offshore oil rig obs.)

Status: Not received.

Comments: Mesonet data could become increasingly important with higher resolution forecast system. Rainfall assimilation techniques are increasing the need for precipitation observations. Observations on offshore oil rigs could be very useful in data space regions.

Requirement: Yes.

3.3 **Fixed and drifting buoy, ship, tidal data, and ocean/littoral currents**

Status: Transmitted on GTS. Received and used operationally.

Comments: Highest time frequency required is hourly. Data are used as input to and validation of numerical meteorological models, and for analysis and climate.

Requirement: Yes.

3.4 **Aircraft observations**

3.4.1 **PIREPS, AIREPS, SIGMETS and AIRMETS**

Status: Transmitted on GTS. Received and used operationally.

Comments: Wind and temperature data are used as input to and validation of numerical meteorological models, for aviation support, and for filling gaps in coverage world-wide. Data also support AWC's international WAFS product requirements and backup requirements.
Note: There appears to be an absence of data beyond 10 degrees west longitude.

Request reporting of Concorde data.

Requirement: Yes.

3.4.2 **AMDAR**

Status: Transmitted on GTS. Received and used operationally.

Comments: In addition to reports currently received, request ASDAR and ACARS wind and temperature ascent/descent measurements over the territory of EUMETNET members, aiming at an average spacing of 250 km and a time spacing of every 3 hours. For all reports, request humidity measurements as they become available. Current wind and temperature data used as input to and validation of numerical meteorological models, for aviation support, and for filling gaps in coverage world-wide. Data also support AWC's international WAFS product requirements and backup requirements.

Also, we are requesting the extension of the reporting of AMDAR data to the Caribbean, Central and South America from European

carriers.

Requirement: Yes.

3.4.3 Automatic Dependent Surveillance (ADS) data

Status: Transmitted on GTS. Received and used operationally.

Comments: Data are currently available only on North Atlantic flights, but geographic coverage is expected to expand in near future. Data are used as input to and validation of numerical meteorological models, for aviation support, and for filling gaps in coverage world-wide.

Requirement: Yes.

3.5 Weather radar Data/Imagery

3.6.1 OPERA (Operational Program for the Exchange of Weather RADar Information)

Status: In planning stage. Not received.

Comments: EUMETNET program to harmonize and improve the operational exchange of weather radar information between national meteorological services in the European community.

Requirement: No current requirement.

3.7 Sea, Lake, and Land Surface temperature and state observations

3.7.1 Lake Temperatures

Status: Not received.

Comments: Higher resolution surface temperature analyses require lake temperature and state information (e.g., frozen, etc.). These analyses have a significant impact on higher resolution forecast models.

Requirement: Yes.

3.8 Lightning data from the UKMO

Status: Transmitted on GTS. Received and used.

Comments: Data are used for climate database, and products.

Requirement: Yes, including data from networks outside of UK also.

3.9 Wind Profiler and Radio-Acoustic Sounding System (RASS) data

Status: Some wind profiler data are transmitted on GTS as PILOT (PIBAL)

reports. These are received and used operationally. Other wind profiler and RASS data may be available but are not received.

Comments: All wind profiler reports should be transmitted in BUFR under a wind profiler header on GTS. Data to be used to augment upper-air data (both surface and satellite based) as input to and validation of numerical meteorological models and for aviation support.

Requirement: Yes, for both wind profiler and RASS data.

3.10 **Solar observations and forecasts**

Status: Not received.

Comments: Data to be used to support space operations and communications.

Requirement: Yes.

3.11 **Ground-based GPS-Integrated Precipitable Water (GPS-IPW)**

Status: Not received.

Comments: Data could potentially be used for validation of numerical meteorological models.

Requirement: No current requirement.

4. **FORECAST AND ANALYSIS FIELDS**

4.1 **Meteorological model output fields**

4.1.1 **ECMWF**

Status: Transmitted on GTS. Received and used.

Comments: Currently receive a small set of selected analyzed and forecast standard meteorological output fields at standard levels on 2.5 degree grid in forecast increments of 24 hours for forecasts to 6 days. Would prefer to receive a more complete set of analyzed and forecast fields in forecast increments of 6 hours on 1x1 degree grid or in spectral coefficients for forecasts to 7 days, and at a lower resolution for forecasts to 10 days (with an extension to 16 days if it becomes available). Requested fields include:

- a) Air temperature; vapor pressure; u, v, w components of the wind; and geopotential height at 1013.2, 1000, 975, 950, 925, 900, 850, 800, 700, 500, 400, 300, 250, 150, 100, 70, 50, 30, 20, and 10 mb.
- b) u, v, components for the wind stress; latent heat flux; sensible heat flux; IR heat flux, solar heat flux; and 12-hour accumulated total precipitation at the surface.
- c) air temperature; vapor pressure; and u, v components of the wind at 19.5 meters above the surface.
- d) atmospheric pressure at mean sea level.

Fields are used for direct comparison and cross validation with U.S. models, and for generating analyzed and forecast tropical cyclone

tracks.

Requirement: Yes.

4.1.2 UKMO

Status: Transmitted on GTS. Received and used.

Comments: Currently receive selected analyzed and forecast standard meteorological output fields at standard levels on 2.5 degree grid in forecast increments of 12 hours for forecasts to 6 days. Would prefer to receive a more complete set of analyzed and forecast fields on 1x1 degree grid or in spectral coefficients in forecast increments of 6 hours for forecasts to 6 days. Requested fields include:

- a) air temperature; vapor pressure; u, v, w components of the wind; and geopotential height at 1013.2, 1000, 975, 950, 925, 900, 850, 800, 700, 500, 400, 300, 250, 150, 100, 70, 50, 30, 20, and 10 mb.
- b) u, v, components for the wind stress; latent heat flux; sensible heat flux; IR heat flux; solar heat flux; and 12-hour accumulated total precipitation at the surface.
- c) air temperature; vapor pressure; and u, v components of the wind at 19.5 meters above the surface.
- d) atmospheric pressure at mean sea level.

Fields are used for direct comparison and cross validation with U.S. models, and for generating analyzed and forecast tropical cyclone tracks. WAFS grids provide aviation backup.

Requirement: Yes.

4.1.3 DWD

Status: Not received.

Comments: Requested fields include:

- a) air temperature; vapor pressure; u, v, w components of the wind; and geopotential height at 1013.2, 1000, 975, 950, 925, 900, 850, 800, 700, 500, 400, 300, 250, 150, 100, 70, 50, 30, 20, and 10 mb.
- b) u, v, components for the wind stress; latent heat flux; sensible heat flux; IR heat flux; solar heat flux; and 12-hour accumulated total precipitation at the surface.
- c) air temperature; vapor pressure; and u, v components of the wind at 19.5 meters above the surface.
- d) atmospheric pressure at mean sea level.

Fields to be used for direct comparison with U.S. models, for validation, and for statistical study.

Requirement: Yes.

4.1.4 METEO-FRANCE

Status: Not received.

Comments: Requested fields include:

- a) air temperature; vapor pressure; u, v, w components of the wind; and geopotential height at 1013.2, 1000, 975, 950, 925, 900, 850, 800, 700, 500, 400, 300, 250, 150, 100, 70, 50, 30, 20, and 10 mb.
 - b) u, v, components for the wind stress; latent heat flux; sensible heat flux; IR heat flux; solar heat flux; and 12-hour accumulated total precipitation at the surface.
 - c) air temperature; vapor pressure; and u, v components of the wind at 19.5 meters above the surface.
 - d) atmospheric pressure at mean sea level.
- Fields to be used for direct comparison with U.S. models, for validation, and for statistical study.

Requirement: Yes.

4.2 **Oceanographic model output fields from both the ECMWF operational global wave model, and from the UKMO operational Forecasting Ocean/Atmosphere Model (FOAM)**

Status: Not received.

Comments: Selected analyzed and forecast standard oceanographic output fields. Preferred at model resolution if available, otherwise grid spacing of 1 x 1 degrees.

ECMWF global wave model: Fields to be made available in forecast increments of 6 hours for forecasts to 6 days. Requested fields include significant wave height, primary wave period, primary wave direction, sea height/period/direction, and swell height/period/direction. Fields to be used for direct comparison and cross validation with U.S. models.

UKMO FOAM model: Fields to be made available at standard depth levels in forecast increments of 24 hours for forecasts to 5 days. Requested fields include temperature; salinity; and u,v components of current at depths of 0, 12.5, 25, 50, 75, 100, 125, 150, 200, 300, 400, 500, 600, 700, 800, 900, 1000, 1100, 1200, 1300, 1400, 1500, 2000, 2500, 3000, 4000, and 5000 meters. Fields to be used for direct comparison and cross validation with U.S. models.

Requirement: Yes.

4.3 **Coupled model output fields from ECMWF and UKMO**

Status: Not received.

Comments: Selected analyzed and forecast standard atmospheric, oceanographic, land surface and ice output fields. Preferred at model resolution, if available, otherwise grid spacing of 1 x 1 degrees.

For atmospheric and oceanographic fields see desired fields in 3.1 and 3.2. For land surface would like soil moisture (frozen and u frozen), soil temperature, snowpack density and content, total runoff, surface runoff, surface evaporation, sensible heat flux, ground heat flux, downward and upward longwave radiation, downward and upward

shortwave radiation, vegetation class and soil class grids).

Requirement: Yes.

4.4 **Selected meteorological output fields from the ECMWF Ensemble Prediction System**

Status: Received via ftp download from ECMWF server and used.

Comments: Selected meteorological output fields in forecast increments of 12 hours for forecasts to 10 days. Requested fields include 12-hour accumulated total precipitation at the surface; air temperature at 2 meters above the surface and 850 mb; geopotential height at 1000 and 500 mb; u,v wind components at 19.5 meters above the surface and 200 mb; and atmospheric pressure at mean sea level. Fields are used for research and evaluation as well as for direct comparison and cross validation with U.S. models, per fall 2000 letter.

Requirement: Yes, including similar fields from other Met. Services

4.5 **Forecast tropical cyclone tracks from the UKMO**

Status: Transmitted on GTS. Received and used.

Comments: Request tropical cyclone positions to be made available in forecast increments of 6 hours for forecasts to 3 days. Tracks are used for direct comparison and cross validation with U.S. models.

Requirement: Yes.

4.6 **Sea surface temperature, wind direction/speed, wave height, sea ice analyses and forecast products**

Status: Not received.

Comments: Data could potentially be used for forecasts, analyses, validation, and climate.

Requirement: No.

3 European Requirements

Version dated: 21/05/2001

This document presents the combined status of and requirements for data and products from NOAA for operational NWP and related activities in Europe. Unless otherwise specified, the stated requirement represents a common requirement of two or more centres.

A key requirement common to all the products listed below is the reliable exchange of information on any changes impacting any of the transmitted products. Timely exchange of information will help in explaining anomalies in the monitoring and if assimilated in forecast trends. For planned changes to operationally used datasets the agreement on the ATOVS level 1b update policy is welcomed.

The European Met. Services referred to in this document together with the abbreviations used are:

DNMI: Norwegian Meteorological Institute

DWD: German Weather Service

KNMI: Royal Netherlands Meteorological Institute

ECMWF: European Centre for Medium Range Weather Forecasting

METEO-FRANCE: Météo-France

UKMO: Met Office (U.K.)

- 1. POLAR SATELLITES: ORBIT-BY-ORBIT DATA/PRODUCTS
- 1.1 TOVS
- 1.1.1 RTOVS in BUFR (retrievals and clear radiances)
- Status: No longer transmitted on GTS.
- Comments: ECMWF: RTOVS data received but no longer assimilated, and no longer required
UKMO: No longer required, as replaced by NOAA-16 1b data, *unless NOAA-16 fails.*
METEO-FRANCE: NOAA-14 data used operationally in data assimilation.
DWD: Will NESDIS replace all data from TOVS with ATOVS soon?
- Requirement: Yes.
- 1.1.2 500 km TOVS SATEMs (retrievals only)
- Status: Received and used operationally.
- Comments: METEO-FRANCE: Received but not used.
ECMWF: Received but not used.
UKMO: Not required.
DWD: Used operationally, sole TOVS source for NWP at present monitored with feedback to NESDIS.
- Requirement: Yes.
- 1.1.3 Level 1B TOVS data

Status:	Data routinely copied from NESDIS via dedicated link to UKMO. Data passed to ECMWF who encode the 1B data into BUFR. Access given to other European Met. Services.
Comments:	ECMWF: TOVS 1B radiances (HIRS channel 12) from NOAA-14 are assimilated operationally (MSU received and monitored as back-up). TOVS 1B from NOAA-11 received and monitored, SSU from NOAA-11/14 are received and monitored. METEO-FRANCE: Research work into total ozone retrievals.
Requirement:	Yes.
1.2	<u>ATOVS</u>
1.2.1	<u>ATOVS 120km retrievals and clear radiances in BUFR</u>
Status:	Available on GTS.
Comments:	DWD: Intend to perform impact studies (retrievals) with a view towards operational use. METEO-FRANCE: NOAA-15 data used operationally in assimilation.
Requirement:	Yes.
1.2.2	<u>ATOVS level 1B data</u>
Status:	Data copied from NESDIS via dedicated link to UKMO who encode the 1B data into BUFR(1C data). Access given to other European Met. Services and ECMWF. There is a continuing requirement to receive AMSU data in 1B form as the AMSU housekeeping information is monitored by UKMO.
Comments:	UKMO: NOAA-15 and 16 1B HIRS (on NOAA-16 only), AMSU-A and AMSU-B assimilated and monitored routinely. Plots available on the UKMO www site: (http://www.metoffice.com/sec5/NWP/NWPSAF/monitatorvs.html). The number of late orbits is being reviewed at UKMO and continuing discussions are underway with Meteo-France and EUMETSAT on possible solutions. Insertion of locally received data into the global dataset fills E. Atlantic gaps. ECMWF: 1C radiances (AMSU) from NOAA-15 and 16 assimilated operationally. METEO-FRANCE: Research into total ozone retrievals. Planned switch from ATOVS 120 km to ATOVS level 1B for assimilation in summer 2001. DWD: Intend to monitor with a view towards operational use in 1D-Var retrieval.
Requirement:	Yes.
1.2.3	<u>ATOVS 1b files (AMSU-A, AMSU-B and HIRS) derived at NOAA/NESDIS from HRPT data received at Fairbanks</u>
Status:	Not received.

Comments: Product with strict timeliness requirement (<60 minutes after completion of pass). Service proposed by Nordic Countries. Proposal is presented to EUMETSAT member states in coming months for agreement in June. Approach for transmitting the data to Europe is TBD. Planned usage for short-range NWP in Europe. A reciprocal arrangement is suggested where US would get access to HRPT data from Søndre Strømfjord (Greenland), Tromsø and Maspalomas (Canary Islands).

Requirement: Yes.

1.2.4 AVHRR products on HIRS grid, derived as part of NESDIS ATOVS processing

Status: NOAA-16 data now copied via dedicated link to UKMO.

Comments: UKMO: Plan to use these data to assist the HIRS cloud clearing. Currently on-going research looking at these data.
ECMWF/DWD: Plan to use these data from NOAA-15 and 16 to assist the HIRS cloud detection.
METEO-FRANCE: Plans to use data as ECMWF but with a delay, for use by forecasters if resolution is sufficient to detect volcanic ash.

Requirement: Yes.

1.3 Ozone retrieved profiles and/or total column from SBUV on NOAA

Status: BUFR dataset copied routinely via internet from NESDIS. Point of contact established with J.Smith, NESDIS (johnny.smith@noaa.gov). New BUFR template for ozone defined by ECMWF and is being considered by WMO for approval. Also data transferred to UKMO on dedicated link.

Comments: ECMWF: Plan to use these data operationally in near future.
UKMO: Interested to assimilate for future improvements to stratospheric analysis. Will use BUFR files in new ECMWF template as current NESDIS files do not conform to standard BUFR conventions.
DWD: Vertical profile information in near real time would be of value for modelling of ozone transport and UVB prognosis.
METEO-FRANCE: Validation of chemical transport model.

Requirement: Yes.

1.4 SeaWinds Scatterometer Data

Status: QuikScat launched in May 1999. 25km BUFR format approved by WMO. BUFR data available on NESDIS server since Feb 00. ECMWF accessing BUFR data via internet. Gene Legg is NESDIS contact point (glegg@nesdis.noaa.gov). The NESDIS to Bracknell link will shortly be upgraded to carry the SeaWinds data. ADEOS-II expected to launch spring 2002 and request same products from SeaWinds on this platform.

Comments: QuikSCAT data received and monitored.
ECMWF: Interest in the data for operational assimilation. Assimilation in research mode under way.
UKMO: Winds monitored, plan to run assimilation trials soon and if successful data will be used operationally in 2001/02. Note however current timeliness of data (via internet) is unacceptable for operations.
METEO-FRANCE: For usage in marine forecast (visualisation by

	forecasters, input to wave model) and longer term for NWP.
	DWD: For usage in marine forecasts and for impact studies in NWP.
	KNMI and DNMI also have expressed an interest in these data.
Requirement:	Yes, in real-time within 3 hours of observation time.
1.5	<u>SSM/I and SSM/IS</u>
1.5.1	<u>SSM/I brightness temperatures</u>
Status:	F-13, F-14 and F-15 data received from NESDIS server. Data passed to ECMWF where they are BUFR-encoded and returned to UKMO for onward transmission to other European centres. Fully operational service requires BUFR encoding at NESDIS.
Comments:	ECMWF: Data from the three satellites are received and monitored. Currently F13 and F14 are assimilated operationally. F15 to replace F14 late 2001 (F15 is currently monitored). UKMO: Monitored routinely and processed via a 1D-Var scheme to retrieve total column water vapour (TCWV), sea-surface wind speed and cloud liquid water. Operational assimilation of F-13 and F-15 wind speed. Assimilation of TCWV still being tested. METEO-FRANCE: Used to retrieve products for forecasters: sea ice, rain rate, wind speed, total column water vapour and snow. Plans to process via a 1D-Var scheme. EUMETSAT: It is planned to use SSM/I derived rain rates for calibration of an NRT rain rate product from METEOSAT.
Requirement:	Yes
1.5.2	<u>SSM/I retrieved products</u> (surface wind speed (WS), total column water vapour (TCWV), cloud liquid water (CLW), rain rate, others?)
Status:	Available on NESDIS server to be copied via Internet
Comments:	ECMWF/UKMO/METEO-FRANCE: Currently using 1.5.1 to derive the products. These product files are primarily useful for comparison. Any updated information on the status of these products and the algorithms is requested. UKMO is member on SSM/I algorithm review panel. DWD: For verification and research.
Requirement:	Yes
1.5.3	<u>SSM/IS</u>
Status:	Launch March 2002
Comments:	ECMWF: Envisage radiance assimilation of SSM/IS similar to AMSU. UKMO: The SSMI(S) BUFR format has been defined with USN. It is assumed these BUFR data will pass through NESDIS and on to the dedicated line when the data is made available after launch. Negotiations underway with FNMOC as to when the initial data will be released to NWP centres. Radiances similar to AMSU and SSM/I will be used. METEO-FRANCE: Plans to monitor and eventually use in assimilation.
Requirement:	Yes, when available.

1.6	<u>Altimeter data (TOPEX/POSEIDON/JASON)</u>
1.6.1	<u>Altimeter wave/wind data</u>
Status:	Not received.
Comments:	ECMWF: Interest in receiving and monitoring the data with a view towards assimilating the data. UKMO: Altimeter wave heights AND wind speeds required with timeliness of < 3 hours. We do not receive any TOPEX/Poseidon real time data. DWD: Intention to use the data (wave heights and wind speed) for verification and later on in a wave model (timeliness of <3 hours). METEO-FRANCE: Required for wave model within 3 hours.
Requirement:	Yes.
1.6.2	<u>Altimeter sea surface height data</u>
Status:	Not received in near real-time. Delayed mode data received via DUACS project (Toulouse).
Comments:	ECMWF: The DUACS data products, based on ERS and TOPEX POSEIDON data, are now used regularly. Fast-delivery altimeter data are also required. UKMO: Intention is to use data within operational FOAM from May/June2001. Data source will either be DUACS (Toulouse) or Navocean Altimeter Data Fusion Center (Mississippi, USA).
Requirements:	Yes
1.7	<u>TERRA and AQUA data (previously EOS)</u>
1.7.1	<u>AIRS+AMSU-A+HSB data</u>
Status:	Planned by NASA for launch in early 2002. NESDIS have plans for processing in near-real time. European centres in regular contact with M. Goldberg (NESDIS) and tests have been made with simulated AIRS data in BUFR.
Comments:	UKMO/ECMWF/METEO FRANCE: Strong interest in monitoring these data and providing feedback to NASA and NOAA, and in their operational use. The minimum requirement is for a sampled set of AIRS radiances within 3 hours of measurement + separate AMSU-A and HSB full resolution datasets. DWD: Requirements for retrievals
Requirement:	Yes, in near real-time.
1.7.2	<u>MODIS clear-sky radiance data</u>
Status:	Launched on TERRA-1 in Dec. 1999.
Comments:	ECMWF/METEO-FRANCE: A near-real time 50km cloud cleared radiance dataset for the infrared temperature and water vapour sounding channels would be of interest for monitoring and possible operational assimilation (at ECMWF). Please update status of any plans for a real-time MODIS product. These data also of interest for cloud detection for

AIRS on AQUA

Requirement: Yes, in near real-time.

1.8 Windsat/CORIOLIS

Status: Launch planned for July 2002

Comments: ECMWF/UKMO: Interest in receiving real-time wind products for evaluation. More information requested on when data will be available and in what format.

2. POLAR SATELLITES: MAPPED PRODUCTS (not orbit-by-orbit)

2.1 SSM/I Products

2.1.1 Ice/snow gridded field derived from SSM/I data

Status: Received routinely via Washington-Bracknell link. Contact point J. Tesmer (tesmerj@fnoc.navy.mil).

Comments: ECMWF: Data received from F13 and in addition F15 is required. Used operationally to define sea-ice coverage. Request information when product processing is changed.
METEO-FRANCE: Interest for verification and research.

Requirement: Yes.

2.1.2 NCEP sea-ice analysis

Status: Data currently accessed by FTP transfer via internet from NCEP on a non-operational server.

Comments: UKMO: Used operationally in global NWP model from summer 1999 and plans to use in Ocean model. Plan to put data on dedicated link. Cannot reliably decode GTS product and so request data for FTP transfer be put on an operational server.
ECMWF: Has interest in this dataset to replace 2.1.1 end of May 2001.
DWD: Used operationally.
METEO-FRANCE: Interest for verification.

Requirement: Yes.

2.2 AVHRR

2.2.1 AVHRR SST retrievals as SATOBs

Status: Received. Used operationally at UKMO within SST analysis. Contact John Sapper (jsapper@nesdis.noaa.gov)

Comments: UKMO: In addition to operational SATOBs, 100km and 50km AVHRR SSTs are being received from NESDIS via operational link for assimilation in FOAM model.
METEO-FRANCE: Interest for research in SST analysis.

Requirement: Yes at UKMO and METEO-FRANCE. UKMO also has requirement for level 2 SST products at higher horizontal resolution.

2.2.2	<u>AVHRR/MODIS products (eg vegetation indices, aerosol optical depth)</u>
Status:	Products available from internet. Note that MODIS products are replacing AVHRR products.
Comment:	ECMWF/DWD/METEO-FRANCE: Potential interest in these datasets in the future. Information on availability of these products requested and NESDIS point of contact. Research requirement for monthly datasets of aerosol optical depth for model validation. Also interested in previous years if available. UKMO: Strong requirement for global 1km Leaf Area Index product via FTP updated weekly from MODIS for hydrological models. Interest in global 1x1 deg aerosol product (but not in real time) and land cover and cover change from MODIS.
Requirement:	Access to datasets on server via FTP on internet.
2.3	<u>Mapped imagery</u>
Status:	Daily or sometimes twice daily composites received by UKMO. Contact point cduda@nesdis.noaa.gov
Comments:	UKMO: Requirement is for 6 hourly AVHRR GAC composites from NESDIS DWD: Needed for different application areas. METEO-FRANCE: Interest to complement global geo-stationary satellite imagery.
Requirement:	Yes.
3.	<u>GEOSTATIONARY SATELLITES: DATA/PRODUCTS</u>
3.1	<u>GOES cloud-tracked VIS/IR/WV winds</u>
Status:	High density (HD) product on GTS
Comment:	ECMWF: The HD winds are used operationally thinned to one wind per 1.25 deg box. BUFR data with qc indicators have been evaluated, ready to assimilate the data operationally when received via GTS. ECMWF has successfully decoded the data, however, there are still some problems with the length of the messages. The quality control information is being checked out. Very high priority. UKMO: Product obtained via FTP not GTS on dedicated link. HD IR winds are used operationally and thinned to one wind per 2x2 deg box. Sample decoding of test BUFR message showed that local descriptors were being used in BUFR messages which conflict with UKMO internal descriptors. For operational status, global descriptors are required, and the 5th Winds Workshop endorsed a common BUFR template for both NESDIS and EUMETSAT winds. Plan to use HD WV winds in coming year. DWD: Used operationally in thinned (model dependent) form. METEO-FRANCE: The winds are used operationally but thinned to one per 2.5 deg. box.
Requirement:	Yes. Would prefer data on GTS in BUFR format without segmentation of bulletins to allow use of qc information.

- 3.2 GMS cloud-tracked VIS/IR/WV winds processed at NESDIS
 Status: Not received
 Comments: UKMO: Interested to have more information about these winds and their availability.
- 3.3 Cloud cleared radiances from GOES-E and GOES-W
 Status: Product under development in NESDIS (CIMSS).
 Comments: ECMWF has a requirement for an hourly cloud cleared radiance product from GOES infrared channels with a resolution of 50km and full disk coverage (cf. METEOSAT WV radiance product) for assimilation in 4D-Var. Further experimentation is underway and a liaison meeting in CIMMS is planned for mid June 2001.
 UKMO interested to use this product when 4DVar is available (~2003). Samples of the product would be of interest before this.
 Requirement: Yes
- 3.4 Radiances from GIFTS
 Status: Launch planned in 2004
 Comments: ECMWF/UKMO interested in receiving radiances in real-time for evaluation with a view towards possible operational use
- 3.5 Digital imagery from GOES-E, GOES-W and GMS
 Status: Not received from NESDIS. GOES-E, GOES-W and GMS retransmitted via METEOSAT 0E which satisfies current European requirements for imagery.
 Comments: UKMO: Receive 8 km resolution full-disk GOES-E and GOES-W images 3-hourly from CMC, Dorval. Receive 10 km resolution GOES-E images re-transmitted via METEOSAT (via CMS Lannion). Receive 10 km resolution GMS images from BoM, Melbourne. From mid 2001 only GMS data will pass through UKMO and GOES data will go directly to Lannion.
 DWD/ECMWF: Receive images re-transmitted via METEOSAT.
 METEO-FRANCE: Involved in EUMETSAT initiative to co-ordinate transfer of these data to European Met. Services via Lannion.
 Requirement: Yes but currently met by METEOSAT.
- 3.6 Other geostationary imagery
 Status: Imagery from INSAT and Feng-Yung not available. GOMS (Elektor) data is available via METEOSAT dissemination. METEOSAT-5 is at 63E and hourly images are available on the 0E dissemination from July 1998 to 2003. An extension of the mission is technically possible but depends on an expressed user need.
 Comments: UKMO/DWD/METEO-FRANCE/ECMWF: Interested in continuing 3-6 hourly data from METEOSAT-5 to fill gap over Indian Ocean and Central Asia.

Requirement: Yes

4. NON-SATELLITE DATA

4.1 NCEP SST gridded field

Status: Data received via GTS once a day and used operationally. Current resolution is 1 degree to be replaced by .5 degree product in May 2001.

Comments: ECMWF: Used operationally as input to sea surface temperature field.
Information on any planned changes to the products is requested.
Plan to use the .5 degree SST as soon as available.

EUMETSAT: Operational requirement for calibration of the METEOSAT IR channel.

DWD: Used operationally, accessed via GTS.

UKMO: Received via ECMWF for occasional evaluation.

METEO-FRANCE: Used operationally as climatological relaxation to sea surface temperature field.

Requirement: Yes

4.2 U.S. Profiler data

Status: Received in BUFR.

Comments: ECMWF: Data assimilated operationally since July 1999.

UKMO: Data assimilated operationally since Feb 2001.

DWD/METEO-FRANCE: Interested to monitor with a view to operational assimilation.

Requirement: Yes (hourly).

4.3 ACARS data

Status: Received and used operationally. Contact point R. Peterson (NCEP)

Comments: UKMO: All available ACARS data received, assimilated operationally with a thinning to one report in a 4D box of 100km x 100km x 50hPa x 2hrs

METEO-FRANCE: Assimilated operationally with a 1 in 5 thinning factor.

DWD/ECMWF: Used and monitored.

Requirement: Yes.

4.4 Tropical cyclone data

Status: Received in tabular form on GTS.

Comment: UKMO: Currently use plain text TC advisories from NHC, Miami which is satisfactory. If NCEP (or NHC) decide to start issuing bulletins in CREX format we will then store and process them and use them as appropriate.

ECMWF/METEO-FRANCE: These data are used for comparisons with the analyses.

DWD: Needed for research in typhoon bogussing and global

- man/machine mixed analysis.
- Requirement: Yes, any machineable form, preferably BUFR and enhanced to include radii of stronger winds when applicable.
- 4.5 Snow cover analysis for N. Hemisphere
- Status: Samples of ASCII and GIF files received at UKMO via Internet (Contact point B. Ramsay bramsay@nesdis.noaa.gov)
- Comments: Digitised analysis of satellite and surface observations.
ECMWF/UKMO/METEO-FRANCE: Have an interest in this composite product for model validation and improving surface fields.
DWD: Used operationally since March 2001.
- Requirement: Yes.
- 4.6. Doppler radar wind data over USA
- Status: Not received. Contact point is Fred Branski.
- Comments: UKMO: Interest in evaluating winds 3-hourly but low priority until 4DVar available.
METEO-FRANCE: Interest for use in 4D-Var system.
- Requirement: Yes.
- 4.7 US hourly surface observations
- Status: Hourly METAR data are received but do not contain station level pressure. This can be computed if station height known.
- Comments: UKMO: Future requirement for use in data assimilation.
ECMWF: Requirement for use in 4DVAR.
METEO-FRANCE: Requirement for use in 4D-Var system.
- Requirement: Yes.
- 4.8 US Soil temperature data on GTS
- Status: The Climate Prediction Center providing soil temperature data on server. ECMWF has been given access to these data, which are transferred routinely via FTP.
- Comments: Current use at ECMWF is for model validation.
METEO-FRANCE has same interest.
- Requirement: Yes at ECMWF.
- 4.9 N. American ozone soundings on GTS
- Status: Few soundings are available on the GTS.
- Comments: Current use at ECMWF is for model validation. UKMO will have the same requirement from 2001.
METEO-FRANCE: Interest for model validation.
- Requirement: Yes.

4.10 TAO array data, XBT and PALACE float
Status: Available on the GTS in BUOY, BATHY and TESAC code, received and used in Europe.
Comments: ECMWF: Requirement for ocean analysis in seasonal forecasting.
 UKMO: Requirement for ocean model.
 METEO-FRANCE: Interest for ocean model.
Requirement: Yes.

Table of European Met Service Data Requirements from NOAA

		ECMWF	MET. OFFICE	DWD	METEO- FRANCE	EUMETSAT
POLAR SATELLITES ORBIT BY ORBIT						
1.1.1	RTOVS	-	-	-	1	-
1.1.2	SATEMS	-	-	1	-	-
1.1.3	TOVS 1B	1	-	-	1	-
1.2.1	ATOVS product 120km	-	-	2-1	1	-
1.2.2	ATOVS 1B	1	1	2-1	1	-
1.2.3	ATOVS 1B from HRPT	-	-	-	-	1
1.2.4	AVHRR	2	2	-	2	-
1.3	SBUV	1	2	2	2	-
1.4	SeaWinds	1	1	2	1	-
1.5.1	SSM/I BT SDR	1	1	-	1	-
1.5.2	SSM/I products EDR	3	3	2-3	3	-
1.5.3	SSM/IS	1-2	2	-	2	-
1.6.1	Altimeter wind/wave	2-3	2	2-3	1	-
1.6.2	Altimeter surface ht	-	2	-	2	-
1.7.1	AIRS data	1	2	2	2	-
1.7.2	MODIS data	1	-	-	2	-
1.8	Windsat/CORIOLIS	2-3	3	-	-	-
POLAR SATELLITES MAPPED PRODUCTS						
2.1.1	Mapped SSM/I	1	-	-	2	-
2.1.2	NCEP sea-ice analyses	1	1	1	2	-
2.2.1	AVHRR SST	-	2	-	2	-
2.2.2	AVHRR/MODIS products	3	2	1	3	-
2.3	AVHRR imagery	3	1	1	1	-
GEOSTATIONARY SATELLITE PRODUCTS						
3.1	GOES VIS/IR/WV winds	1	1	1	1	-
3.2	GMS NESDIS winds	-	3	-	-	-

		ECMWF	MET. OFFICE	DWD	METEO- FRANCE	EUMETSAT
3.3	Cloud cleared radiances	2	3	-	-	-
3.4	GIFTS Radiances	2-3	3	-	-	-
3.5	GOES/GMS imagery	3	1	1	1	-
3.6	Other global imagery	-	1	1	1	-
NON-SATELLITE DATA						
4.1	1° SST Analysis(0.5°)	1	3	1	1	1
4.2	Profiler data	1	1	2	2	-
4.3	ACARS data	1	1	1	1	-
4.4	Tropical cyclones	1	1	1	1	-
4.5	Snow analysis	2	3	1	2	-
4.6	Doppler radar winds	-	3	-	2	-
4.7	US hourly SYNOPS	2	2	-	2	-
4.8	US soil temperature	3	-	-	3	-
4.9	Ozone soundings	1	3	-	2	-
4.10	Ocean data	1	1	-	2	-

1 = High priority required for operations

2 = Medium priority to investigate possibility for future operational use

3 = Low priority for research

4 = For backup

4 Table of Meteorological Service of Canada Data Requirements

FROM EUROPEAN REQUIREMENTS DOCUMENT		MSC	FROM UNITED STATES REQUIREMENTS DOCUMENT		MSC
POLAR SATELLITES ORBIT BY ORBIT			POLAR SATELLITES ORBIT BY ORBIT		
1.1.1	RTOVS	-	1.1.1	ERS-2 (WIND, ATSR)	2
1.1.2	SATEMS	1	1.2.1	RADAR ALTIMETER 2	2
1.1.3	TOVS 1B	1	1.2.2	ASAR	2
1.2.1	ATOVS product 120km	-	1.2.3	MERIS	3
1.2.2	ATOVS 1B	1	1.2.4	AATSR	1
1.2.3	ATOVS 1B from HRPT	2	1.2.5	GOMOS	2
1.2.4	AVHRR	2	1.2.6	MWR	-
1.3	SBUV	2-3	1.3	METOP	1
1.4	SeaWinds	2			
1.5.1	SSM/I BT SDR	1			
1.5.2	SSM/I products EDR	3			
1.5.3	SSM/IS	1-2			
1.6.1	Altimeter wind/wave	3			
1.6.2	Altimeter surface ht	-			
1.7.1	AIRS data	1-2			
1.7.2	MODIS data	2			
1.8	Windsat/CORIOLIS	2-3			
POLAR SATELLITES MAPPED PRODUCTS			GEOSTATIONARY SATELLITE DATA		
2.1.1	Mapped SSM/I	-	2.1.1	METEOSAT IMAGERY	1
2.1.2	NCEP sea-ice analyses	2	2.1.2	WINDS (IR)	1
2.2.1	AVHRR SST	1	2.1.3	WINDS (VIS)	1
2.2.2	AVHRR/MODIS products (SST)	2	2.1.4	WINDS (WV)	1
2.3	AVHRR imagery	3	2.2	GOMS IMAGERY	-
GEOSTATIONARY SATELLITE PRODUCTS			NON-SATELLITE DATA		
3.1	GOES VIS/IR/WV winds	1	3.1.1	RAWIND-PIBAL	1

FROM EUROPEAN REQUIREMENTS DOCUMENT		MSC	FROM UNITED STATES REQUIREMENTS DOCUMENT		MSC
3.2	GMS NESDIS winds	2	3.1.2	EUMETNET ASAP	1
3.3	Cloud cleared radiances	2 (local)	3.1.3	PROFILERS	2
3.4	GIFTS Radiances	2-3	3.2.1	SYNOP-METAR	1
3.5	GOES/GMS imagery	1	3.2.2	EUMETNET-AWS	2
3.6	Other global imagery	2	3.2.3	RAIN-SNOW	1
			3.2.4	SOIL MOISTURE-TT	1
			3.2.5	SFC ENER/WATER FLUX	2
			3.2.6	SURFACE OBS	1
			3.3	BUOY-SHIP	1
			3.4.1	PIREP-AIREP	1
			3.4.2	AMDAR	1
			3.4.3	ADS	1
			3.5	RADAR	-
			3.6.1	OPERA	-
			3.7.1	LAKE TT/ICE	2
			3.8	LIGHTNING	-
			3.9	PROFILER-RASS	1
			3.10	SOLAR OBS/FCST	-
			3.11	GPS-IPW	2
NON-SATELLITE DATA			FORECAST-ANALYSIS		
4.1	1° SST Analysis(0.5°)	2	4.1.1	ECMWF	1
4.2	Profiler data	2	4.1.2	UKMO	1
4.3	ACARS data	1	4.1.3	DWD	2
4.4	Tropical cyclones	1	4.1.4	METEO-FRANCE	2
4.5	Snow analysis	3	4.2	ECMWF-UKMO WAVE	2
4.6	Doppler radar winds	2	4.3	COUPLED MODELS	2
4.7	US hourly SYNOPS	1	4.4	ECMWF-EPS	2
4.8	US soil temperature	3	4.5	TROP.CYCLONE TRACKS	2

FROM EUROPEAN REQUIREMENTS DOCUMENT		MSC	FROM UNITED STATES REQUIREMENTS DOCUMENT		MSC
4.9	Ozone soundings	2	4.6	SST, ICE	2
4.10	Ocean data	1			

1 = High priority required for operations

2 = Medium priority to investigate possibility for future operational use

3 = Low priority for research

4 = For backup

5 Actions from 14th Meeting

All the actions from previous meetings were closed as indicated below in section 6 and where necessary new actions have been opened in the list below. The numbering of the actions below refer to the US and European requirements given in sections 2 and 3 of this meeting report. There are in addition some actions not directly related to the requirements lists and these are labeled as miscellaneous under section 5.3 below.

5.1 Actions related to United States requirements

1. POLAR SATELLITES: ORBIT-BY-ORBIT DATA/PRODUCTS

1.1 ERS-2

1.1.1 Wind speed, wind direction, significant wave height and dynamic sea surface height data

No Scatterometer data at present. ESA is trying to get Scatterometer back by July.

US request sea-ice information but general consensus was that it would not be available. MetF stated priority was to keep satellite going to overlap with ENVISAT indicating mid 2002 end of life.

Meteo France to provide information on Scatterometer and sea ice products (real time and non-real time) to NOAA e.g. IFREMER

ACTION MetF-Lannion

1.2 ENVISAT

UKMO confirmed that all NRT products are in BUFR and the BUFR definitions are all available. NOAA requested access to BUFR test data; this will be produced by ESA. ECMWF to advise all Centres when test data in BUFR from ENVISAT instruments is available and its location (currently expected July 2001).

ECMWF to provide BUFR descriptors to NOAA-NCEP and MSC

ACTION ECMWF

1.2.3 MEdium Resolution Imaging Spectrometer (MERIS) Instrument

1.2.4 Advance Along Track Scanning Radiometer (AATSR)

Products from AATSR, MERIS and Ozone will be produced in near real time. Concern is whether the data would be made available to NOAA in near real time. Issue needs to taken up within WMO context for the provision of near-real time data from Research Space Agencies. UKMO to make proposal to ESA to make AATSR data available on GTS in near real time.

ACTION UKMO

1.2.6 MicroWave Radiometer (MWR)

UKMO stated product comes as part of the radar altimeter message.

1.4 NOAA Polar Orbiter satellite data

1.4.1 NOAA Blind Orbit data

NOAA-NCEP and MSC to reiterate the US/Canadian requirements for the blind orbit data to NOAA-NESDIS.

ACTION NOAA-NCEP

NOAA-NESDIS to investigate possible methods of receiving NOAA blind orbit data e.g. obtaining locally received STIP from Lannion or data from Svalbard.

ACTION NOAA-NESDIS

1.4.2 ATOVS 1c BUFR Data

NOAA-NESDIS to consider production of level 1c data for NCEP.

ACTION NOAA-NESDIS

UKMO to provide level 1c BUFR encoder to NOAA-NESDIS

ACTION UKMO

2. GEOSTATIONARY SATELLITES: DATA/PRODUCTS

2.1 METEOSAT

2.1.1 METEOSAT imagery (visible, IR, water vapor)

US interested in rapid scan information for Tropical Prediction Centre (TPC). EUMETSAT presentation indicated that rapid scan will be produced quasi-operationally from Sept 2001 (using backup processing equipment) from just North of the Equator to 70 North.

NCEP to clarify requirements for rapid scan Meteosat data

ACTION NCEP

EUMETSAT to propose the mechanism for sending the rapid scan data from EUMETSAT to US involving Meteo-France if necessary.

ACTION EUMETSAT

2.2 GOMS (Elektro) imagery (visible, IR) To be renamed to INSAT Imagery and Winds (SATOBS)

No product from GOMS, therefore, no requirement for GOMS data.

Requirement is METEOSAT Indian Ocean and INSAT. Meteosat Indian Ocean covered by 2.1.

NOAA receives INSAT imagery and winds (SATOBS) with timeliness problems. ECMWF confirmed SATOBS from INSAT arrive at ECMWF with a 5-7 hours delay.

EUMETSAT as CGMS secretariat and NOAA-NCEP to raise issue of timeliness of INSAT winds at the next CGMS meeting in 2001.

ACTION NOAA-NCEP EUMETSAT

2.1 METEOSAT SECOND GENERATION

EUMETSAT to clarify policy on data distribution to NOAA-NESDIS and MSC

ACTION EUMETSAT

3. NON-SATELLITE OBSERVATIONS

3.1 Upper-air observations

3.1.2 EUMETNET-ASAP (Automated Shipboard Aerological Program)

E-ASAP data are on GTS; there is only one unit operating in the Mediterranean, a further unit will operate in the North Atlantic later in 2001.

3.1.3 Profilers/VAD Winds

UKMO to provide list of profiler data in UKMO message switch.

ACTION UKMO

UKMO to report on the availability of VAD Winds from Scandinavia in real time.

ACTION UKMO

3.2 Surface observations

3.2.1 SYNOPSIS and METAR

There is a requirement for the distribution of hourly SYNOPSIS which is currently subject to bilateral arrangements.

NOAA and MSC to make a request for the data to individual nations.

ACTION NOAA, MSC

3.2.2 EUMETNET-AWS (Automated Weather Stations)

The specifications of AWS standards will be available as part of the EUMETNET-AWS project and could be supplied to US when available.

ACTION ECMWF

3.2.3 Rain, snowfall, snow depth observations, river flow data

All NWP centres to provide information on what data is available, on format and whether it is real time.

ACTION UKMO, DWD, MetF, MSC

3.2.4 Soil moisture and temperature observations

All Met. Centres to provide information on what data is available, on format and whether it is real time.

ACTION UKMO, DWD, MetF, MSC

3.2.5 Surface energy/water flux- observations

All Met. Centres to provide information on what data is available, on format and whether it is real time.

ACTION UKMO, DWD, MetF, MSC

3.2.6 Additional surface observations (e.g., mesonets, surface rainfall measurements, offshore oil rig obs.)

All Met. Centres to provide information on what data is available, on format and whether it is real time.

ACTION UKMO, DWD, MetF, MSC

3.4 Aircraft observations

3.4.1 PIREPS, AIREPS, SIGMETS and AIRMETS

Lack of AIREPS East of 10W may be due to data not being transcribed onto GTS when the Aircraft is within range of Air Traffic Control Centres.

The issue should be raised with the CAAs by the WAFCS

ACTION UKMO NOAA

UKMO to provide information on the reception and distribution of data from Concorde

ACTION UKMO

3.4.2 AMDAR

US request that the E-AMDAR area is expanded to include South America, Central America and the Caribbean. UKMO to pass the request on to E-AMDAR project and provide information on plans to expand the area to NOAA. UKMO to provide any additional AMDAR data that becomes available on GTS.

ACTION UKMO

3.4.3 Automatic Dependent Surveillance (ADS) data

Data from ADS going to CAAs. CAAs have responsibility to pass on the ADS data to their local Met. Authority who then need to pass it on to a WAFC. NOAA receives some information from UKMO on a trial basis.

WAFC Met. Services to investigate whether all available ADS data is being exchanged.

ACTION UKMO NOAA-OPS

Non WAFC Met Services to explore the monitoring and collection of the ADS data from their National Met. Authorities via their CAAs. The National Met. Services to put any ADS data collected on the GTS or send to a WAFC.

ACTION MetF, DWD and MSC

3.6 Weather radar Data/Imagery

3.6.1 OPERA (Operational Program for the Exchange of Weather RADar Information)

NOAA-OPS gave presentation on comms issues with NEXRAD full scan data.

3.7 Sea, Lake, and Land Surface temperature and state observations

3.7.1 Lake Temperatures

Needed to support 1/8 degree SST analysis for mesoscale models. US are interested in all forms of in-situ sea and Lake Data as well as satellite data. Met F may have satellite based lake temperatures data using GOES.

Information on work of Ocean Sea ice SAF to be provided to NOAA by Meteo-France

ACTION MetF

3.8 Lightning data

US have UK data, and are interested in any other data in Europe. MetF confirmed that there was data available from a French Company owned by Met F.

Met. Centres to provide info on what data is available and its format

ACTION MetF/DWD/MS

3.9 Wind Profiler and Radio-Acoustic Sounding System (RASS) data

Partially covered under 3.1.3

For wind profiler actions see 3.1.3

MetF have data in a non-standard format from nuclear sites.

Met. Centres to provide info on what data is available and its format

ACTION MetF/DWD/MS

3.10 Solar observations and forecasts

Request on what solar monitoring data can be made available in real time. Primarily space based observations. Earlier meeting action on EUMETSAT confirmed no data currently available in Europe.

3.11 Ground-based GPS-Integrated Precipitable Water (GPS-IPW)

There is a programme to establish a European wide ground based system to measure total column Integrated Precipitable water. Real time data exchange experiments going on and UKMO and DWD are doing impact studies.

UKMO to provide information on European ground based system as it becomes available and put data on the GTS.

ACTION UKMO

This data is being collected in US, needs to be added to European requirements and US to consider distribution on GTS.

ACTION NOAA-OPS

4. FORECAST AND ANALYSIS FIELDS

4.1 Meteorological model output fields

4.1.1 ECMWF

ECMWF have recently expanded the distribution of their products on GTS, these are received by NOAA. Not all fields in the requirement document are currently being received.

A Request from NOAA-NCEP to ECMWF for a wider use of real time ensemble output is currently being considered by ECMWF.

NOAA-NCEP and MSC to be provided with advice if any additional procedures are required for obtaining the data requested in the US requirements document.

ACTION ECMWF

4.1.2 UKMO

NOAA-NCEP and MSC to be provided with advice if any additional procedures are required for obtaining the data requested in the US requirements document.

ACTION UKMO

4.1.3 DWD

NOAA-NCEP and MSC to be provided with advice if any additional procedures are required for obtaining the data requested in the US requirements document.

NOAA-NCEP and MSC to be provided with a list of available products.

ACTION DWD

4.1.4 METEO-FRANCE

NOAA-NCEP and MSC to be provided with advice if any additional procedures are required for obtaining the data requested in the US requirements document.

NOAA-NCEP and MSC to be provided with a list of available products.

ACTION MetF

4.2 Oceanographic model output fields

4.2.1 Oceanographic model output fields from both the ECMWF operational global wave model

NOAA-NCEP and MSC to be provided with advice if any additional procedures are required for obtaining the data requested in the US requirements document.

NOAA-NCEP and MSC to be provided with a list of available products.

ACTION ECMWF

4.2.2 Oceanographic model output fields from the UKMO operational Forecasting

Ocean/Atmosphere Model (FOAM)

NOAA-NCEP and MSC to be provided with advice if any additional procedures are required for obtaining the data requested in the US requirements document.

NOAA-NCEP and MSC to be provided with a list of available products.

ACTION UKMO

4.3 Coupled model output fields from ECMWF and UKMO

NOAA to clarify the requirement.

ACTION NOAA

4.4 Selected meteorological output fields from the ECMWF Ensemble Prediction System

US is getting data from ECMWF Ensemble prediction System for research use. Letter to ECMWF Director is request for operational use (see 4.1.1)

MSC produce ensemble products and NOAA are in discussions to obtain.

4.5 Forecast tropical cyclone tracks from the UKMO

Received in text format, NOAA would like in CREX. Timescale for provision in CREX to be provided to NOAA

ACTION UKMO

4.6 Sea surface temperature, wind direction/speed, wave height, sea ice analyses and forecast products

Ocean Sea Ice SAF led by MetF produces products. Information on products is on Ocean Ice SAF web site. Web site address is provided in MetF status report.

Ice data is available from MSC Ice Centre in Ottawa and is already received by NOAA

Available forecast parameters are included in 4.2

5.2 Actions related to European requirements

1. POLAR SATELLITES: ORBIT-BY-ORBIT DATA/PRODUCTS

1.1 TOVS

1.1.1 RTOVS in BUFR (retrievals and clear radiances)

RTOVS will be removed from GTS on 21st May. Centres need to start using NOAA-16 data.

1.1.3 Level 1B TOVS data

MetF need access to data for overlap between NOAA-14 and NOAA-16. NESDIS stated NOAA-15 and 16 will have priority so data may be late.

1.2 ATOVS

1.2.1 ATOVS 120km retrievals and clear radiances in BUFR

NOAA-16 data to be added on May 21st

1.2.2 ATOVS level 1B data

Outstanding problems with AMSU-A moon correction, UKMO and NOAA-NESDIS to discuss possible solutions.

ACTION UKMO NOAA-NESDIS

1.2.3 ATOVS 1b files (AMSU-A, AMSU-B and HIRS) derived at NOAA/NESDIS and MSC from HRPT data received at Fairbanks & Halifax

EUMETSAT has paper on European proposal distributed at meeting

User requirements to be discussed with EUMETSAT and incorporated into European proposal
ACTION EUMETSAT, ECMWF, DWD, MetF, UKMO

If proposal is approved then EUMETSAT will contact NOAA and MSC to discuss implementation of proposal.

ACTION EUMETSAT

NOAA-NESDIS will circulate proposal for comment within NOAA.

ACTION NOAA-NESDIS

1.2.4 AVHRR products on HIRS grid, derived as part of NESDIS ATOVS processing
NOAA-16 AVHRR products now available via the link.

1.3 Ozone retrieved profiles and/or total column from SBUV on NOAA

WMO paper ICT/DR&C/Doc 4.9 dated 10-14 April defines the format for this data. The data is currently not provided in this format.

ECMWF to provide information on the format to NESDIS contact point Johnny Smith (johnny.smith@noaa.gov).

ACTION ECMWF

NOAA-NESDIS to consider encoding the data in the format defined.

ACTION NOAA-NESDIS

1.4 SeaWinds Scatterometer Data

SeaWinds Data on Quikscat to be put on dedicated link

ACTION UKMO

There may be an issue with timeliness. NESDIS to check timeliness of SeaWinds data on Quikscat and confirm what the delay in the data processing is.

ACTION NOAA-NESDIS

NESDIS confirmed the access to SeaWinds data on ADEOS2 would be the same as for Quikscat.

Concern on the availability of AMSR data on ADEOS2. There is a potential benefit in using AMSR data to remove rain contamination from SeaWinds data but NOAA-NESDIS stated there are no current plans to receive AMSR data on ADEOS2 in real time

NOAA-NESDIS to revisit the feasibility of getting the AMSR data in real time and using it to improve the quality of the SeaWinds data on ADEOS2. Information to be provided in mid-year review if possible.

ACTION NOAA-NESDIS

1.5 SSM/I and SSM/IS

1.5.1 SSM/I brightness temperatures

NOAA to confirm the plans for the continuation of the operational status of DMSP satellites and their products

ACTION NOAA-NESDIS

1.5.2 SSM/IS

Launch March 2002.

NOAA-NESDIS to confirm data reception timetable from the US Navy and when they would start providing the data to UKMO.

ACTION NESDIS

UKMO will liaise with other members of the Cal/Val team in Europe for onward distribution of the data.

ACTION UKMO

1.6 Altimeter data (TOPEX/POSEIDON/JASON)

European centres to clarify user requirements individually in terms of timeliness, format and access route and provide information to each other.

ACTION UKMO ECMWF DWD MetF

Some uncertainties over JASON plans. Met F on behalf on European Centres to confirm JASON plans in terms of timeliness, format and access route.

ACTION MetF

1.7 TERRA and AQUA data (previously EOS)

1.7.1 AIRS+AMSU-A+HSB data

TERRA launched, AQUA launch early 2002. UKMO, ECMWF and MetF involved in Cal/Val.

1.7.2 MODIS clear-sky radiance data

On TERRA, no real time data available, products available on Internet.

1.8 Windsat/CORIOLIS

July 2002 Launch. Request for information when data may be available. European centres are interested in being involved in the Cal/Val similar to SSM/IS. Point of contact is Gene Legg.

NOAA to explore expanding the shared processing MOU with the Navy to include European and MSC participation in the Cal/Val phase.

ACTION NOAA-NESDIS

2. POLAR SATELLITES: MAPPED PRODUCTS (not orbit-by-orbit)

2.1 SSM/I Products

2.1.2 NCEP sea-ice analysis

UKMO to put file currently retrieved from the NCEP server over the Internet on the dedicated link.

ACTION UKMO

UKMO to investigate getting the file from the NOAA-OPS operational server.

ACTION UKMO

2.2 AVHRR

2.2.1 AVHRR SST retrievals as SATOBs

NCEP use Navy product rather than NESDIS product. NESDIS confirmed UKMO were receiving the NESDIS product. Point of contact for Navy product is Jean Theabaux

(jean.theabaux@noaa.gov).

UKMO to investigate if there is a requirement for the Navy product.

ACTION UKMO

2.3 Mapped imagery

UKMO to determine whether the transmission of the continually updated product is required 4 times a day.

ACTION UKMO

MetF to provide info to UKMO on product from Ingrid Guch

ACTION METF

3. GEOSTATIONARY SATELLITES: DATA/PRODUCTS

3.1 GOES cloud-tracked VIS/IR/WV winds

NESDIS to produce BUFR data in files smaller than 15K for transmission on the GTS.

EUMETSAT are willing to provide assistance

ACTION NOAA-NESDIS

As an interim solution to the segmentation problem NESDIS to send the BUFR data over the dedicated link to UKMO as a single file.

ACTION NOAA-NESDIS UKMO

3.2 GMS cloud-tracked VIS/IR/WV winds processed at NESDIS

GMS winds available 4 times a day in BUFR format on DUC6 server.

Directory: /pub/bufrwinds/

File name: satwnd.bufr[cdft|wvap].gms5M.DyydddThh.mm.ssZ

3.3 Cloud cleared Imager radiances from GOES-E and GOES-W

ECMWF to determine, during the visit to University of Wisconsin, what could be available and notify NESDIS of any operational data requirements.

ACTION ECMWF

3.4 Radiances from GIFTS

NOAA-NESDIS and NOAA-NCEP to provide information on progress obtaining the data

ACTION NOAA-NESDIS, NOAA-NCEP

4. NON-SATELLITE DATA

4.1 NCEP SST gridded field

Interest in whether the future 1/8 degree product will cover lakes when available. NCEP are developing a plan for that. NCEP to provide information.

ACTION NOAA-NCEP

4.2 U.S. Profiler data

Trans Pacific Profiler Network (TPPN) to be made available by NOAA on the GTS. Probably in PILOT code rather than BUFR.

ACTION NOAA OSO

Other agencies in the US have boundary layer profilers NOAA to advise when data are available.

ACTION NOAA-OPS

US profiler demonstration network has portion of the spectrum at 404MHz allocated. Systems will need to be upgraded to 449MHz but no funding allocated. There is a risk that the allocation of the 404MHz frequency could be terminated. Three of the four new Alaska profilers are 449MHz.

4.4 Tropical cyclone data

Received in text format, European Centres would like data in CREX. Timescale for provision in CREX to be provided to European Centres

ACTION NOAA-NCEP NOAA-OSO

4.5 Snow cover analysis for N. Hemisphere

Northern Hemisphere snow cover product is operational at DWD, Southern Hemisphere snow cover product is now available.

UKMO to check Southern Hemisphere data

ACTION UKMO

No snow depth data is available from NOAA. There are snow depth data product at US Air Force and MSC. NOAA-NCEP and MSC to provide information on the products.

ACTION NOAA-NCEP, MSC

4.6. Doppler radar wind data over USA

UKMO to investigate utility of US winds from OSO server. Point of Contact is Fred Branski. Also Canadian radar winds. Point of contact at MSC is Gilles Verner.

ACTION UKMO

4.7 US hourly surface observations

The issue of METAR metadata (e.g. elevation information) and the process for updating METAR metadata needs to be taken forward with WMO/ICAO by NOAA and UKMO as WAFCs .

ACTION UKMO NOAA

ECMWF to provide data coverage maps for hourly SYNOPS and METARS and information on METAR metadata (station dictionary).

ACTION ECMWF

NOAA and UKMO as WAFCs to take this information and present it to ICAO and pursue the issue of global exchange of all METARS on the GTS for the purpose of improving aviation forecasts.

ACTION UKMO NOAA

NOAA-NCEP has info on how the METAR altimeter data can be interpreted for use in NWP models. This information to be passed to European centres.

ACTION NOAA-NCEP

4.8 US Soil temperature data on GTS

All centres to lobby nationally to make data available for NWP on a routine basis.

Action: DWD/METEO-FRANCE/UKMO/NOAA/MS

NOAA-OPS to provide information to ECMWF on which standard depths the temperatures refer to and which stations comply with these standard depths.

ACTION NOAA-OPS

4.9 N. American ozone soundings on GTS

All centres to lobby nationally to make data available for NWP on the GTS on a routine basis in near real time.

Action: DWD/METEOFRANCE/UKMO/NOAA

MS already provides ozone sounding data on the GTS in near real time.

NOAA to make the ozone sounding data they currently collect available on the GTS in near real time.

ACTION NOAA

5.3 Miscellaneous Actions

A.1. Data transfers between UKMO and NOAA-OPS

UKMO and NOAA-OPS to pursue operational data exchange using WMO TCP Sockets

ACTION UKMO NOAA-OPS

A.2. NESDIS-UKMO link

The requirement backing up the link and also the data processing system at UKMO should be considered.

A proposal to be produced by UKMO for backing up the link by end June 2001

Action: UKMO

Proposal to be reviewed by NOAA-OPS and NOAA-NESDIS.

Action: NOAA-OPS NOAA-NESDIS

A.3. Notification of Significant Instrument problems

The NOAA-NESDIS alerts on instrument problems currently provided to the NCEP SDM (Senior Duty Meteorologist) should be sent directly by NESDIS on the GTS to UKMO as a new NOxx message. Assistance to be provided by NOAA-OPS. UKMO will arrange distribution of message to other European centres.

ACTION NOAA UKMO

UKMO to take the lead in collaboration with other centres to produce a document defining what constitutes an alert and provide to NOAA-NESDIS.

ACTION UKMO

A.4. Additional data to be added to European Requirements Documents

ARGO floats and ground based GPS total precipitable water to be added to European requirements list.

ACTION ECMWF

Noting the potential for the production and transmission of duplicate products NESDIS and EUMETSAT to review and rationalise the distribution of all products from the Initial Joint Polar Orbiting System.

ACTION NESDIS and EUMETSAT

A.5 Reporting of operational problems to NESDIS

If an operational problem report is sent to NESDIS then it should be copied to all members of the group.

ACTION All Centres

A.6 AMDAR Aircraft Humidity data

NOAA-NCEP to provide information on this data

ACTION NOAA-NCEP

A.7 Purpose of the Meeting and Composition of the Group

It was agreed the scope and composition of the next meeting should be basically the same as the present one.

A proposal to change the name to North American/Europe data exchange meeting to reflect the participation of Canada was agreed.

Information on the location of documentation on the US Pacific Satellite data Exchange and Utilisation meeting to be provided to group members.

ACTION NOAA

UKMO agreed to prepare a draft proposal for the title and purpose of the group and circulate it for comments. The agreed purpose to be incorporated at the beginning of the US and European requirements documents.

ACTION UKMO

A.8 Next meeting to be arranged by NOAA

Next meeting to be hosted by NOAA in May 2002

ACTION NOAA

A.9 Mid-term Status Update on Actions from the 14th meeting

ACTION ECMWF

6. Review of Actions from Previous Meetings

The format of the actions review was discussed. The chairman proposed that there should be one set of actions carried forward from one meeting to the next. The actions should be divided into those relating to the US Data requirements and those relating to the European data requirements. The numbering of the actions should be the numbering of the relevant section in the respective data requirement documents. This was agreed and so all the outstanding actions listed below from previous meetings were closed but with an indication of their status. Where necessary new actions were raised under section 5 of this report.

6.1 Review of actions from 12th meeting

Actions related to United States data requirements

With reference to the sequence numbers of the requirements given in Attachment 2 of the 13th meeting report the following list of actions was established:

2.2.1 INSAT imagery and cloud drift winds

EUMETSAT and NESDIS to pursue and liaise on the acquisition of imagery.

Action: EUMETSAT/NESDIS

Status:

EUMETSAT: EUMETSAT has received 24 hours of data from NESDIS and are investigating its usability.

NESDIS: NESDIS has access to both the INSAT imagery and cloud drift winds but has problems with timeliness of the data. A possible route of NESDIS receiving the data over the Lannion link is being explored.

CLOSED a new action added to US requirements

3.15 Aerosol measurements

Not available at present. The plans for provision of such data from ENVISAT and MSG missions to be explored.

Action: EUMETSAT

Status

EUMETSAT: EUMETSAT study on MSG is available on the EUMETSAT web site. Aerosol measurements are not currently on the product list for MSG. ENVISAT products planned but not in real time.

CLOSED

Actions related to European data requirements

The document presenting the combined requirements for data and products from NOAA was introduced and discussed. It is given in Attachment III of the 13th meeting report. With reference to the sequence number of the requirements given in Attachment V of the 13th meeting report, the following list of actions was established. These actions or similar ones also appear in the list for the 13th meeting and so it was agreed that the status is given within the 13th meeting action review at 15.2.

1.1.3 Level 1b TOVS data

Blind orbit data from Atlantic are received at NESDIS with a delay, additional time is added since several orbits need to be processed simultaneously. In the future, blind orbit support will be provided in the framework of EPS. An interim solution should be explored with some urgency. EUMETSAT to be kept informed.

**Action:METEO-FRANCE/
UKMO/NESDIS**

Status:
See new Actions from 13th meeting below for update
CLOSED

1.5.1 SSM/I brightness temperatures

BUFR encoding in Washington is being checked-out in liaison with ECMWF. Additional encoding of satellite zenith angles and satellite azimuth angles are expected, but should not delay provision of BUFR encoded data to Europe.

Action: NESDIS

Status:
See new Actions from 13th meeting below for update
CLOSED

1.5.3 SSM/IS

The follow-on system is expected to provide data from a similar processing chain with some file structure, information content etc. NESDIS to provide information when available.

Action: NESDIS

Status:
See new Actions from 13th meeting below for update
CLOSED

3.1.1/2 GOES winds

Quality control information for all three types VIS/IR/WV is desirable. BUFR encoded data should be checked out. ECMWF and UKMO can provide feedback. SATOB code could be applied to thinned data only.

Action: NESDIS/UKMO/ECMWF

Status:
See new Actions from 13th meeting below for update
CLOSED

Feasibility of BUFR data distribution on GTS to be clarified with urgency.

Action: NESDIS/OSO/UKMO/ECMWF

Status:
See new Actions from 13th meeting below for update
CLOSED

Status: Open. EUMETSAT and NESDIS to co-ordinate encoding.

Action: NESDIS

Status:
See new Actions from 13th meeting below for update
CLOSED

5.2 NESDIS-UKMO link

The requirement backing up the link and also the data processing system at UKMO should be considered.

Action: UKMO

Status:
See new Actions from 13th meeting below for update
CLOSED

5.7 Monitoring and feedback to NESDIS

NESDIS accepts that centres only monitor and provide feedback on data which are used in the operational assimilation system at each of the centres. Distribution of monitoring results via web

based systems should be considered.

Any operational queries concerning NESDIS data and products can be addressed to Ellen Brown with copy to Barbara Banks. Emily Harrod is the contact for Level 1b radiance data.

Action: All NWP centres

Status:

See new Actions from 13th meeting below for update

CLOSED

6.2 Review of actions from 13th meeting

Actions related to United States data requirements

The document presenting the combined United States requirements for data and products from European agencies was introduced and discussed. It is given in Attachment IV of the 13th meeting report.

With reference to the sequence numbers of the requirements given in Attachment 2 of the 13th meeting report the following list of actions was established:

1.2.1 ENVISAT-1 Radar Altimeter-2

Requirement when launched and available. UKMO is to clarify what products are available after ESA meeting in September 2000.

Action: UKMO

Status

UKMO: There was a list of ENVISAT meteo products presented at the meeting in September which will be available to Met Centres in near real time (3 hours). The list was emailed to the group. The list will be put in the report of the 14th meeting (as attachment VI). There is a meeting on the planned products on July 5th. where product requirements need to be stated. Latest ENVISAT launch date is October 2001 which looks fairly firm.

For AATSR products an on-line form needs to be filled in to get access to the data on a FTP server other data such a scatterometer and altimeter are available on the GTS.

ESA policy is to make data available to the WMO community, the data policy is to be tested by UKMO who will request AATSR data for the U.S. in real time.

CLOSED new action carried forward

2.1.1 METEOSAT Imagery.

On-going requirement. NESDIS and EUMETSAT to investigate requirements for rapid scan capability from METEOSAT-6. NESDIS POC is John Paquette.

**Action:
EUMETSAT/NESDIS**

Status

EUMETSAT provided their plans for providing rapid scan data in their status report.

CLOSED new action under US requirements

3.1.1 ECMWF, Meteorological model output fields. NCEP to provide consolidated set of requirements.

Action: NCEP

CLOSED, requirement in US requirements document

3.1.2 UKMO, Meteorological model output. NCEP to provide consolidated set of requirements.

Action: NCEP

CLOSED, requirement in US requirements document

3.1.3 DWD, Meteorological model output fields from non-satellite data. NCEP to provide consolidated set of field requirements.

Action: NCEP

CLOSED, requirement in US requirements document

3.1.4 METEO-France, Meteorological model output fields from non-satellite data. NCEP to provide consolidated set of field requirements.

Action: NCEP

CLOSED, requirement in US requirements document

3.2 Oceanographic model output fields. UKMO POC is Mike Bell. NCEP to provide clarification to European Centres. Requirements to be clarified.

Action: NCEP

CLOSED, requirement in US requirements document

3.6.2 EUMETNET-AWS. ECMWF to provide information.

Action: ECMWF

Status:

ECMWF: The AWS programme in EUMETNET has been set up with Italy as the responsible member to prepare the specifications for a standard European system of automatic surface observation platforms. Three different levels of performance and capability of the platforms are envisaged ranging from the simple data logger to a potential replacement of the human observer. Within EUCOS, which is the EUMETNET Composite Observing System programme, it is envisaged that initially use will be made of the existing automatic stations, which have been deployed according to national requirements. Anything that will be provided with the initial service will be based on existing AWS systems so no new AWS data is to be made available initially. The specifications of AWS standards will be available as part of the project and could be supplied to US when available.

CLOSED new action under US requirements

3.6.3 Rainfall, snow depth, river flow data. European centres to confirm what data can be supplied.

Action: ECMWF/DWD/METEO-FRANCE/UKMO/EUMETSAT

Status

DWD: The GLOBAL RUNOFF DATA CENTRE (GRDC) operates under the auspices of the WMO and disseminates worldwide river data. It is a part of the Bundesanstalt für Gewässerkunde (BfG) in Koblenz (Germany). The BfG collects the national river data not belonging to meteorological data in Germany.

Info on GRDC: www.bafg.de/grdc.htm

UKMO The UKMO has climate data that includes rainfall and snow depth from the following sources:

- ◆ SYNOPS The main synoptic stations (WMO RBSN) provide SYNOP data which is currently being sent to the US on the GTS. In addition there are SYNOPS from other UK stations that are not sent on the GTS.
- ◆ NCMs These contain more detailed climate data from UK stations and are in a UK proprietary code called NCM.
- ◆ Paper returns: Climate data sent in paper format if non-real time

UKMO can obtain river flow data from the Institute of Hydrology (details are at:

<http://www.nwl.ac.uk/ih/www/products/iproducts.html>)

CLOSED New action under US requirements.

3.8.1 Aircraft data: PIREPS and AIREPS. UKMO to determine if data is available within Europe beyond 10 degrees West.

Action: ECMWF/DWD/METEO-FRANCE/UKMO/EUMETSAT

Status

UKMO: UKMO checked and all the data is provided.

CLOSED New action under US requirements

3.1.3 Wind profilers and RASS. METEO-FRANCE to provide information on profiler systems in Europe. UKMO to provide information on the exchange of profilers on GTS.

Action: METEO-FRANCE/UKMO

Status

UKMO: A list of wind profiler data in the UKMO message switch was provided at the meeting and will

be attached to the report (attachment-IV).

METEO-FRANCE: Information on European profilers is provided as attachment-V of this report.

CLOSED

New Actions related to European data requirements

The document presenting the combined requirements for data and products from NOAA was introduced and discussed. It is given in Attachment III of the 13th meeting report. With reference to the sequence number of the requirements given in Attachment V of the 13th meeting report, the following list of actions was established:

1.2.2 TOVS/ATOVS Level 1B data

Blind orbit data from Atlantic are received at NESDIS with a delay, additional time is added since several orbits need to be processed simultaneously. In the future, blind orbit support will be provided in the framework of EPS. An interim solution should be explored with some urgency. EUMETSAT to be kept informed.

Status: Open pending launch of NOAA-16.

Action:METEO-FRANCE/UKMO/NESDIS

Status:

UKMO The UKMO presentation showed that the delays are being experienced due to blind orbits. In the UK the locally received data is being used to replace blind orbit data and EUMETSAT has produced a proposal to use a network of European HRPT stations in order to get the data close to Europe quicker than the 6 hour delay.

NESDIS: If the data from Lannion were delivered identically to that from Fairbanks, NESDIS proposed at the 13TH US/European meeting to process and send the delayed unfiltered data to UKMO. This will result in UKMO receiving occasional duplicate orbits. NESDIS is awaiting a response.

NESDIS have been developing a proposal involving Lannion would send blind orbits to NESDIS. With NOAA 15 the STIP was not activated over Lannion with NOAA 16 STIP is available. AVHRR GAC is not available from STIP.

NCEP: It was recognised that NCEP will also not have the blind orbits and need to receive them, therefore this issue needs to be discussed in the US requirements as well. NCEP to reiterate the US/Canadian requirements for the blind orbit data to NESDIS

CLOSED new actions in the European requirements and the US requirements

All parties to consider the requirement for Level 1C data in BUFR format from NESDIS.

Action: ECMWF/DWD/METEO-FRANCE/UKMO/EUMETSAT/NESDIS

Status

UKMO: There is a continuing requirement to receive AMSU data in 1B form as the housekeeping information is monitored by UKMO. They are producing the level 1c data from the level 1b data received from NESDIS. It was confirmed that the data processing is reliable but there were concerns over system support out of normal working hours. It was agreed that the present solution was acceptable.

NESDIS: NESDIS does not have the resources to generate the level 1C data in BUFR.

NCEP: NCEP have an internal requirement for level 1c data in BUFR, New action for NESDIS to consider production of level 1c data for NCEP. UKMO to provide BUFR encoder.

CLOSED new action under US Requirements

1.3 Ozone retrieved profiles and/or total column from SBUV

NESDIS to investigate encoding data in new BUFR format.

Action: NESDIS

Status

NESDIS: The BUFR table B was updated by NEDIS with new descriptors on December 18, 2000.

ECMWF: Original action referred to code for retrievals in BUFR for atmospheric gases defined in WMO paper ICT/DR&C/Doc 4.9 dated 10-14 April. ECMWF confirm that NESDIS data is not in format in WMO document.

CLOSED New action under European Requirements

1.4 QuikSCAT Scatterometer data

UKMO confirmed that WMO headers are not required. NESDIS and UKMO to move data to dedicated link. UKMO to confirm that the link upgrade is required for QuikSCAT and NOAA-16 together, but should not be required for QuikSCAT only.

Action: NESDIS/UKMO

Status

NESDIS NESDIS reported QuickScat data is transferred daily to UKMO in BUFR format. The file sizes are about 9MB (approximately half-orbit). Each day about 214MB of data is transferred.

UKMO UKMO reported that the NOAA-16 data is on the dedicated link but the Quikscat data is not. The Quikscat data was being delayed pending the link upgrade now scheduled for June 18th 2001. UKMO have decided to add the Quikscat data before the link is upgraded as the increase in data volume is relatively small.

CLOSED New action under European requirements

1.5.1 SSM/I brightness temperatures

NESDIS to investigate BUFR encoding of these data.

Action: NESDIS

Status

NESDIS NESDIS has assigned a new Product Area Lead who is now responsible for the SSM/I product and for investigating BUFR encoding of these data.

Given the remaining relatively short lifetime of SSM/I it was felt that NESDIS effort to put SSM/IS data in BUFR would be more productive.

CLOSED

1.5.3 SSM/IS

UKMO/USN to continue pursuing BUFR encoding of these data, including satellite viewing angles. The follow-on system is expected to provide data from a similar processing chain with same file structure, information content etc. NESDIS to provide information when available.

Action: UKMO

Status

NESDIS: SSM/IS data is not yet available. Launch of satellite expected in Spring of 2002. Access to the data is not anticipated until approximately Launch+1 year. NESDIS has plans to generate BUFR formats of SSM/IS data.

UKMO SSM/IS BUFR format has been defined with the US Navy. It is assumed that real time access to available and the data will be in BUFR. The UKMO is on the cal/val team and would need access to the data prior to its operational production in NESDIS. UKMO needs access earlier.

NESDIS: NESDIS are expecting to deliver the operational data but will give access to the data to the cal/Val team through the satellite active archive. NESDIS need to confirm data reception from the US Navy and whether they would push the data to UKMO. New action on NESDIS. UKMO will liase with other members of the cal/val team in Europe.

CLOSED New action in European requirements

1.6.1 Altimeter wave/wind data and 1.6.2 Altimeter sea surface height data

European centres to reiterate requirements for JASON

Action: All European centres

Status

UKMO: Definitely want the JASON-1 data. Funding for JASON-2 is currently under discussion.
ECMWF: Strong interest in the data.

UKMO reiterated the requirement as part of the 6 monthly review as did ECMWF. NCEP said that the background to the original action was that US were not sure whether JASON would fly & needed support for funding, however, it now confirmed that JASON will fly.

CLOSED

2.1.1 Ice/snow gridded fields derived from SSM/I data

NESDIS to provide information on plans for DMSP F-15 availability.

Action: NESDIS

Status

NESDIS: DMSP F-15 snow and ice data in gridded fields is available in real-time. Contact Ingrid.Guch@noaa.gov .

ECMWF: ECMWF no longer require data set, need to revisit the status in the European requirements documents.

CLOSED

2.1.2 NCEP sea/ice analysis

UKMO and NESDIS to co-ordinate putting data on the dedicated link.

Action: UKMO/NESDIS.

Status

UKMO: UKMO Currently get data over the Internet from the NCEP server. The NCEP server is not operational. UKMO cannot reassemble the segmented product on the GTS. Plan to put the file taken from the Internet from the NCEP server over the dedicated link.

DWD DWD get the data via the Internet.

NOAA-OPS stated that the GTS product is seen as operational by NOAA and is available as a file on the NOAA-OPS server and could be pulled by UKMO.

TCP sockets connections between the UKMO and NOAA-OPS message switches could be to be investigated as an alternative to segmentation

CLOSED New actions under European requirements

3.1 GOES winds

NESDIS and EUMETSAT to investigate transfer of high-density winds avoiding segmentation; liaise on the use of BUFR global tables version 7.

**Action:
NESDIS/EUMETSAT**

Status

NESDIS: BUFR files are being disseminated on GTS (Cloud drift IR, Water Vapor, Visible, Sounder CH 10 and Sounder CH 11). EUMETSAT QI not yet implemented into NESDIS operations. Code has been tested however. Expecting a late June implementation. NESDIS working with FNMOC and SSEC to standardize BUFR encoder (including upgrade to version 9 of tables). This is expected to address issues relating to quality control parameters. The issues relating to file sizes and segmentation remain unresolved at this time.

ECMWF: ECMWF has successfully decoded the data, however, there are still some problems with the length of the messages. The quality control information is being checked out.

UKMO: UKMO presently pull SATOB files from the NESDIS server over the dedicated link. These files do not have quality control information. UKMO cannot reassemble the segmented product on the GTS.

EUMETSAT: No progress made on solution to segmentation issue which was to produce files containing the data that were less than 15K. Ricky Irvine is the contact. EUMETSAT have the software to split up the BUFR data into files of less than 15Kbytes which have been supplied to Ricky Irvine.

NOAA-OPS stated that the BUFR product was available as a file on the NOAA-OPS server. It was suggested that the data was available as a single large file on a NESDIS server and could be sent to UKMO over the dedicated link as an interim measure.

CLOSED New actions under European Requirements

3.4 Other geostationary imagery

NESDIS to clarify reception and use of data from INSAT and FY-2 satellites.

Action: NESDIS

Status

NESDIS: INSAT products received every 3 hours. Navigation errors routinely 20km. Data reliability 97%. Joint NOAA/NASA team established to improve navigation (June 2001). FY-2 is not working.

CLOSED

4.1 TAO Array data

Noted that data is now reported in buoy code, message format "SSVX" bulletins. Reception of data in Europe to be verified.

Action: ECMWF/DWD/METEO-FRANCE/UKMO/EUMETSAT/NOAA

Status

ECMWF: Received and used.

UKMO: We do receive TAO data as buoys and now use them.

DWD: "SSVX KARS" bulletins (and other SSVX are received).

CLOSED

4.4 Tropical cyclone data

UKMO and NCEP to investigate using CREX format for distributing data.

Action: UKMO/NCEP

Status

NCEP: Tropical Prediction Centre (TPC) had agreed to produce the data in CREX in principle but no implementation plans are known.

UKMO No action is being taken to pursue this as we are currently happy with receipt of the National Hurricane Center text warnings and these will continue indefinitely. However, if NCEP (or NHC) decide to start issuing bulletins in CREX format we will then store and process them and use them as appropriate.

CLOSED New action under European and US Requirements

4.5 Snow cover analysis for Northern Hemisphere

Additional interest in southern hemisphere data; combined snow cover and snow depth data. NESDIS to investigate availability.

Action: NESDIS

Status

NESDIS: Both Northern and Southern gridded files are produced daily.

NCEP: NCEP stated that snow depth is not available for either hemisphere. NCEP get their snow depth product from the Air Force.

European centres to investigate the Air Force data and split the requirement into snow cover and snow depth.

CLOSED New action under European Requirements

4.6 Doppler radar winds

UKMO to investigate utility of US winds from OSO server; Canada radar winds. Point of contact at CMC is Gilles Verner.

Status

UKMO: No action to date

CLOSED New action under European Requirements

4.7 Global hourly surface observations

Currently received in METAR format. All centers to pursue global exchange via GTS through appropriate WMO channels.

Action: ECMWF/DWD/METEO-FRANCE/UKMO/NOAA

Status

DWD: METARS are also provided via GTS.

METARS are not globally exchanged so aim was to exchange METARS through bilateral agreements. WMO responsibility is for code formats. Responsibility of distribution of METARS is ICAO. ECMWF could produce availability of SYNOPS and METARS and provide list of stations and the station metadata.

There is also a scientific problem of how to interpret elevation information in METARS. This issue of elevation information needs to be taken forward with WMO/ICAO by NOAA and UKMO as WAFCs . NCEP has information on how altimeter information in the METAR data can be interpreted for use in NWP models which he will pass to the group.

CLOSED New actions under European Requirements

4.8 Soil temperature data

All centers to lobby nationally to make data available for NWP on a routine basis.

Action: ECMWF/DWD/METEO-FRANCE/UKMO/NOAA/CMC

Status

NCEP: NCEP have been lobbying with a number of mesonets around the US. Some data was collected and distributed but they were only provided for test and not for redistribution. On going efforts to make data available.

CLOSED New action under European and US requirements

4.9 Ozone soundings on GTS

All centers to lobby nationally to make data available for NWP on a routine basis.

Action: ECMWF/DWD/METEO-FRANCE/UKMO/EUMETSAT/NOAA/CMC

Status

DWD: Ozone sounding data (ground based measurements) are sent to the archive of the Norwegian Institute for Air Research in near real-time. ECMWF has access to the archive. Data are inhomogeneous in time and space. KNMI is deriving ozone profiles from GOME satellite data. In the future ozone profiles of sufficient quality can hopefully be derived from SCIAMACHY data (ENVISAT).

UKMO: Nothing to report.

NCEP: No Ozone soundings from NOAA on GTS RP said they are being produced but on a research basis.

MSC: MSC provide soundings on the GTS

CLOSED New action under US and European requirements

5.2 NESDIS-UKMO link

The requirement backing up the link and also the data processing system at UKMO should be considered.

Action: UKMO/NESDIS

Status

NESDIS: For a resilient data communication network, circuit path diversity is a requirement. NESDIS is in agreement with UKMO on this subject area. UKMO funded and procured the present dedicated circuit between UKMO and NESDIS. It is for UKMO to plan for this whole concept of the link backup. NESDIS is willing to support UKMO in conceptual planning phase of the project. The backup link is a UKMO funded, budgeted item and as such requires planning in advance.

UKMO: No action to date, UKMO will take the lead in proposing a solution

CLOSED New Action under European requirements

5.7 Monitoring and feedback to NESDIS

NESDIS accepts that centres only monitor and provide feedback on data which are used in the operational assimilation system at each of the centres. Distribution of monitoring results via web based systems is encouraged.

Any operational queries concerning NESDIS data and products can be addressed to Ellen Brown with copy to Barbara Banks. Emily Harrod is the contact for Level 1b radiance data.

Action: All NWP centres

Status

Feedback has been provided. All centres are requested to send troubleshooting messages to all other centres
UKMO: ATOVS 1b radiances and SATOB winds monitoring is on the UKMO web site.

CLOSED New action under European requirements

5.9 Next meeting to be arranged by UKMO.

Action: UKMO

Status:

UKMO: Possible dates in May/June 2001 to be circulated to group in January 2001. The venue will be the Met Office College at Shinfield, which now has reasonable hotel like accommodation on site next to ECMWF.

CLOSED

Miscellaneous Actions

A.1. NCEP/NESDIS to investigate alerting of instrument problems that impact NWP models.

Action: NESDIS/NCEP

Status

NESDIS The following web sites have the information:

<http://www.oso.noaa.gov/operation/index.htm>

<http://psbsgi1.nesdis.noaa.gov:8080/EBB/ml/specialbull.html>

NESDIS has also made an effort to pass on instrument information to its level1B user list by email.

UKMO stated that this mechanism works OK during normal working hours. Problem is how to perform the notification of serious problems outside normal working hours.

NESDIS alerts the SDM (Senior Duty Meteorologist) in NCEP of problems. NOAA-OPS suggested use of new browser based input that could generate the message NOUS CNES (CNES means from NESDIS).

UKMO suggested that some consideration of what faults were significant was necessary.

CLOSED New actions under European Requirements

A.2. All parties to investigate feasibility of alerting using existing messages, such as the "NOUS " series of messages.

Action: ECMWF/DWD/METEO-FRANCE/UKMO/EUMETSAT/NESDIS

Status

NESDIS: NESDIS is co-ordinating with NWS/OSO to regularly use NOUS and NOXX messages to notify users about issues, problems, etc.

UKMO: We receive the NOUS01 KWBC message from Washington so this could be used as a mechanism for alerting our operational staff to data problems. (ECMWF: we agree)

DWD: The parties have to consider new identifiers for the NOXX series for different purposes to supplement the existing.

CLOSED New action under European Requirements

A.3. Mid-term status update on actions from the 13th meeting. **Action: ECMWF**

Status

ECMWF: Done.

ATTACHMENT I

14th US-Europe Data Exchange Meeting



**Met Office College, Shinfield Park, Reading U.K.
16-18 May 2001**

Agenda

Wednesday 16 May 2001

- 09:00 Welcome (J. Eyre)
- 09:05 Approval of agenda (All)
- 09:10 NESDIS status reports (V. Tabor)
- 10:10 NCEP status report (R. Petersen)
- 10:40 *Coffee break*
- 11:00 Meteorological Service Canada status report (G. Verner)
- 11:30 EUMETSAT status report (S. Elliot)
- 12:00 MétéoFrance status report (B. Lacroix/H. Roquet)
- 12:30 *Lunch in college restaurant*
- 14:00 Deutscher Wetterdienst status report (T. Böhm)
- 14:30 ECMWF status report (H. Böttger/J-N. Thépaut)
- 15:00 *Coffee break*
- 15:30 Met Office status report (R. Saunders)
- 16:00 OSO telecomms report (F. Branski)
- 16:30 Met Office telecomms report (D. Tinkler)
- 19:30 *Meeting Dinner at Colleys Supper Rooms in Reading as guest of Met Office
(dress smart casual, no jeans)*

Thursday 17 May 2001

- 09:00 Review of actions from 13th meeting
- 10:30 *Coffee break*
- 11:00 Review of U.S. requirements (R. Petersen)
- 12:30 *Lunch in college restaurant*
- 14:00 Review of European requirements (H. Böttger)
- 15:00 *Coffee break*
- 15:30 Continue discussion of European requirements

Friday 18 May 2001

- 09:00 Draft actions available for review
- 09:30 Review of actions
- 10:30 *Coffee break*
- 11:00 Review format of meetings and membership
- 11:30 Plans for next meeting
- 12:00 Close of meeting

ATTACHMENT-II

14th U.S.-Europe Data Exchange Meeting , Met Office College, Reading List of Participants

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ATTACHMENT-III

Status report from NOAA-NESDIS (Vince Tabor)

ppt file available

1.0 Introduction

This report presents a summary of the status of the NOAA meteorological satellite and non-NOAA satellites whose data we receive and retransmit. Events of the past year will be covered, as well as the current status of the operational satellites and plans for next few years.

2.0 NOAA POES Program Status

The most significant event of the past year was the successful launch of NOAA-16 (at the time NOAA-L) on September 21, 2000. While all the instruments were turned on and are operating nominally, there were some significant technical issues which needed to be addressed. These are

1. Failure of one of the tape recorders, 8 remain functional.
2. Spacecraft pointing anomaly, believed to be caused by a spacecraft and/or ground timing problem coupled with how it is handled in processing (this is still under investigation). NESDIS has compensated for this by making adjustments in the 1b data processing; this change obviously will not help direct broadcast users who must make their own compensations.
3. The APT transmitter is non-operational; the probable component failure has been identified.
4. The HIRS appears to be offset in the roll axis by one scan position (1.8°). A ground software fix has been implemented to correct this. Again, this change obviously will not help direct broadcast users.

Most of the products from NOAA-16 are operational. The ATOVS sounding products will become operational on May 21, 2001 and the Microwave Surface Precipitation Product System (MSPPS) will become operational in June 2001.

NOAA-15 continues as the primary morning satellite. The AVHRR instrument continues to be semi-operational due to the phasing problem. The instrument is currently commanded to re-phase daily. NESDIS is considering twice - a - day re-phasing. The impact on products is being assessed. The HIRS filter wheel performance has stabilized and is being considered for reintroduction into the operational products. Given the status of the AVHRR and HIRS, the Sea Surface Temperature and Radiation Budget products continue to be non-operational. ATOVS processing continues with only the AMSU-A instrument. NOAA-14 is the backup afternoon satellite and NOAA-12 is the backup morning satellite.

The ATOVS processing continues to address returning the HIRS instrument to the NOAA-15 operational processing. Parallel testing has been successful and operational implementation is expected to be in late June. NOAA-16 ATOVS will be operational on May 21. Once these implementations are in place, we will focus on the AMSU-A first guess regression work (already in place for the stratospheric levels) and the addition of AMSU-B to the ATOVS system. The RTOVS system will continue to be processing in real time through June to support a parallel archive with ATOVS from NOAA-16 and operational needs of the Fleet Numerical Meteorological and Oceanographic Center. Delayed processing for the climate archive through August is being considered. The RTOVS system will remain on the computer should NOAA-16 ATOVS fail. ATOVS and AMSU-B processing systems are being ported to an IBM SP computer. Test AMSU-B data are being provided to Deutscher Wetterdienst and the Japan Meteorological Agency for evaluation and consideration for operational use.

In the pre-product processing area, work has been done to address the AMSU-B moon anomaly. Under the current algorithm for detecting moon in the space view, we noticed that during the peak of the moon occurrence that three out of the four space view samples per scan are showing moon glint contamination. When this occurs for more than four continuous scans, no calibration coefficients are computed for that channel. Channel 16 is affected the most, 17 to a lesser extent, and we haven't noticed a loss of data in 18, 19, or 20. We've noted that space view (spot) 1 of the 4 appears unaffected as compared to scans of surrounding good data during this anomaly. We are open to suggestions for possible fixes. One possibility could be to use scan spot 1 when the other 3 are out of tolerance. The anomaly must be investigated further.

Under future events, NOAA-M is planned for launch in March 2002. NOAA has entered into an agreement with EUMETSAT for participation on the Initial Joint Polar System (IJPS). Both agree to operate their Polar-orbiting satellite in a manner beneficial to both parties and the world's meteorological community. NOAA will operate the afternoon polar orbiting satellites (NOAA-N and N') and EUMETSAT will fly the morning satellites (MetOp 1 and 2).

The National Polar-orbiting Operational Environmental Satellite System (NPOESS) merges the Department of Defense (DoD) and Department of Commerce (DOC) meteorological systems into a single national asset. This was done to provide a national, operational, polar-orbiting, environmental remote sensing capability which achieves National Performance Review (NPR) savings by converging DoD and DOC/NOAA satellites programs. Additional goals include incorporating new technologies from NASA and encouraging international cooperation.

3.0 **NOAA GOES Program Status**

The GOES-8 satellite is the operational East satellite located at 75E West. While there are signs of wear (using second Attitude & Orbit Control Electronics, electronics on Momentum Wheel #1 has failed, Redundant Earth Sensor needs to be use, etc), the satellite continues to serve NESDIS well; there are no immediate plans to replace it. The GOES-9 satellite, however did not fair as well and is currently stored at 105E West as a limited-capability on-orbit spare. There was significant current increase in the Momentum Wheel #1 and #2; this has degraded the imager visible channels.

GOES-10 is the operational West satellite located at 135E West. The spacecraft is operating nominally in the inverted mode. This resulted from the need to improvise the deployment of the solar array. The solar array did not fully deploy after launch. It was commanded to rotate, a yaw flip, and the solar array was successfully commanded into reverse mode. About a year later, July 1998, the GOES-10 replaced GOES-9 as the operational West satellite. GOES-11 was launched on May 3, 2000. It went through a two month Systems Performance and Operational Testing period, science testing was conducted during the same period. It was placed in storage mode on August 17. The GOES-M launch is still on schedule for July 12, 2001. A delay beyond this date will result in increased risk and cost. GOES-N is planned for launch in early 2003.

4.0 **NON-NOAA Satellite Opportunities**

NOAA has requirements for data from non-NOAA satellites to meet NOAA's global observing needs not otherwise supported. These satellites provide 'risk reduction' for planning future NOAA satellites and support enhanced operations which use the improved data. These satellites must provide near-real time data, have a long term continuity of measurements, provide global or U.S. coastal coverage or provide hazard support. There are a number of

Prototype Operational Instruments (POI) on NASA missions of key interest to NOAA; TOMS, NSCAT, SeaWinds, MODIS, AIRS and the RADAR altimeter are a few of these. The primary applications for non-NOAA satellites are ocean color and biology, all-weather imaging, ocean height, ocean surface winds and atmospheric measurements.

Web sites to Bookmark:

NOAA POES Program: <http://www.osd.noaa.gov>

NASA POES Program Office: <http://poes.gsfc.nasa.gov>

NOAA KLM User's Guide: <http://www2.ncdc.noaa.gov/docs/klm/>

Operational Suite: <http://psbsgi1.nesdis.noaa.gov/OSDPD/OSDPD2.html>

Experimental Demo: <http://orbit-net.nesdis.noaa.gov/ora>

Integrated Program Office (IPO): <http://www.ipa.noaa.gov>

Product Systems Branch Calibration Monitoring Homepage:

<http://psbsgi1.nesdis.noaa.gov/PSB/PPP/CALIB/home.html>

Initial Joint Polar Systems (IJPS): <http://discovery.osd.noaa.gov/IJPS/>

NOAA Satellite Active Archive: <http://www.saa.noaa.gov>

NOAA Special Events Imagery: <http://www.osei.noaa.gov>

NOAA Satellite Products Inventory: <http://osdaccess.nesdis.noaa.gov:8081/satprod>

Archive Data: <http://www.ncdc.noaa.gov>

On Line Satellite Training: <http://www.comet.ucar.edu>

ATTACHMENT-IV

Status report from NOAA-NCEP (Ralph Petersen)

1. INTRODUCTION

Over the past five years, NCEP/EMC has made substantial advances in the development of numerical weather, water and climate forecast systems to support operational forecast services for the NWS and the international community. With improved computing capacity, numerical forecast systems are able to run at higher resolution, with more sophisticated physics and assimilating more observations to increase the accuracy of initial conditions. In addition, new forecast products will be coming online in the next year to provide improved services to users. The challenges ahead include use of the increasing number of satellite observations in data assimilation systems for the atmosphere, ocean and land surface; implementation of a coupled atmosphere/ocean/land surface climate forecast system for seasonal-to-interannual time scales; operational non-hydrostatic modeling for mesoscale forecasting of severe weather; and an operational coastal ocean forecast system.

Strategically, to improve scientific interactions with the research community and accelerate improvements to operational systems, EMC is actively engaged in development of community-based models (with the Weather Research and Forecast, WRF, effort) and a community-based global model and data assimilation system. A partnership with the NASA Data Assimilation Office (DAO), the NOAA Laboratories, and the National Center for Atmospheric Research has been established to form a Joint NASA/NOAA Center for Satellite Data Assimilation (JCSDA). The JCSDA will develop and test new techniques for data assimilation and modeling in operational NCEP and research DAO data assimilation systems.

2. IMPROVED NUMERICAL FORECAST SYSTEMS

2.1 Global System

A summary of NCEP global numerical forecast system changes may be found at: http://sgi62.wwb.noaa.gov:8080/research/model_changes.html. Two examples will be given here. In March

1999, NCEP began to use high resolution Advanced Microwave Sounding Unit-A (AMSU-A) Level 1B radiance data from the NOAA-15 satellite. Standard 500 hPa anomaly correlation scores for Northern and

Southern Hemisphere (Table 1) indicate resulting forecast improvements of 3-6 hours in the Northern Hemisphere and 6-7 hours in the Southern Hemisphere. Since long term trends of global forecast system performance show 24 hours of forecast improvement per decade (P. Caplan, personal communication) it is clear that AMSU-A has provided a significance improvement to NCEP's global forecasts.

In July 2000, a vortex relocation algorithm (Liu et al) replaced the Synthetic Data System for initializing tropical cyclones in the NCEP global model. In the summer of 2000, hurricane track forecasts from the NCEP global model and GFDL hurricane model were the best performers (Fig. 1).

2.2 Mesoscale System

The Mesoscale (Eta) model will be operational at 12 km over the North American domain (Fig. 2) by November 2001. Currently, high resolution 10 km nests are being run from the operational 22 km Mesoscale model to preview this autumn's implementation. High resolution modeling should be more effective at forecasting topographically forced precipitation events

such as occurred during the 1997-98 (El Nino) winter.

2.3 Wave Modeling

The new NCEP Wavewatch III model was implemented on NCEP computers in March 2000. The model was developed at NCEP (Tolman and Chalikov, 1994, Tolman, 1998) and has proven to be more accurate for high wind/wave events globally. New applications of this model have been implemented for the Alaskan region including the Bering Sea and the North Slope and the Northwest Atlantic (NWA) region (including the Caribbean Sea and Gulf of Mexico). Also, using a combination of global "Aviation" model and GFDL hurricane model winds, the NWA model will be run to provide hurricane generated wave forecasts for the Atlantic region whenever hurricanes occur. Further information on NCEP wave model runs is found at: <http://polar.wwb.noaa.gov/omb/products.html#waves>.

2.4 Global Real-Time Sea Surface Temperature Analysis

Information on this new global analysis is found at: <http://polar.wwb.noaa.gov/sst/Welcome.html>. It is available on a 0.5x0.5 degree latitude/longitude grid with a data window of 24 hours. It uses inhomogeneous correlation functions inversely proportional to the climatological SST gradients, which allows for improved definition of the Gulf Stream, Gulf of Mexico loop currents and high SST gradients on the continental shelf.

2.5 Land Surface Data Assimilation (LDAS)

The NCEP/Oregon State University/Air Force/NWS Office of Hydrologic Development (NOAH) Land Surface Model (LSM) has been developed by these contributors and other community partners, including NESDIS, universities, and GCIP-sponsored PIs. The NOAH LSM is operational in the NCEP Mesoscale (Eta) model, and in the near-future it will be replace legacy versions in NCEP global models. Toward the goal of improving the initial land states in the NOAH LSM component of NCEP mesoscale and global models, an improved offline version of the NOAH LSM has been used as the backbone of NCEP's newly emerging, realtime, prototype national Land Data Assimilation System (N-LDAS), with a global counterpart (G-LDAS) being developed in partnership with NASA/GSFC. The N-LDAS assimilates 1) GOES estimates of hourly, 0.5-degree surface insolation and 2) hourly, 0.125-degree multi-sensor gage/radar analyses of precipitation (including the hourly "Stage IV" precipitation analysis) to derive initial land states, including LDAS surface skin temperature. Skin temperatures from LDAS and from the Mesoscale model (Eta/EDAS) 3-hour forecasts (using the previous generation of NOAH) have been compared to independent GOES retrievals of skin temperature (Fig. 3).

2.6 Seasonal Climate Modeling

The Climate Modeling Branch and the Climate Prediction Center (CPC) are implementing a T62L28 climate AGCM for operational production of ensemble seasonal climate forecast guidance to support CPC's operational seasonal climate forecasts. This AGCM will be run once a month in ensemble mode (20 members) to produce probabilistic forecasts two seasons into the future. In addition, ensemble hindcasts (10 members) initiated in the same month of each calendar year over the 20 year period 1979-1998 allow CPC to estimate the model climatology for forecasts initiated in this month.

The seasonal prediction model performance was examined in detail with various combinations of physical parameterizations. The land surface physics package was also upgraded to include globally varying vegetation cover and soil type. We plan to further upgrade the land surface physics using the NOAH land model. Further information on NCEP climate forecast system is

found at: <http://www.emc.ncep.noaa.gov/cmb>.

3. THE JOINT NASA/NOAA CENTER FOR SATELLITE DATA ASSIMILATION (JCSDA)

The number of satellite observations available to operational Numerical Weather Prediction (NWP) will increase by five orders of magnitude in the next 10 years and the number of different instruments will be three times the present number (Fig. 4).

The JCSDA has been established to enable NASA research and NCEP operations to utilize a common modeling and data assimilation infrastructure for satellite instruments being developed over the next 10 years. A community-based forward radiative transfer model for satellite data assimilation will be developed and applied to a large variety of projects spanning use of current instruments, advanced sounders (e.g. AIRS) and Observing System Simulation Experiments (OSSEs) for instruments still in the planning stages (e.g. a Doppler Wind Lidar). A Terms of Reference, a well-defined management structure, and funding of infrastructure projects (e.g. maintenance of data assimilation systems) and ongoing scientific projects (e.g. testing QUIKSCAT data for operational implementation at NCEP) are now complete.

4. THE WEATHER RESEARCH AND FORECAST (WRF) MODEL SYSTEM

The WRF Model system is being designed to provide a high-resolution, non-hydrostatic forecast system to improve significant weather prediction over a broad range of scales, with particular emphasis on precipitating systems. It will contain advanced numerics for the model solver, and several new prototypes will be evaluated as candidate architectures. A parallel implementation for the model is being designed within a single source code that is flexible, extensible, and efficient across a diverse spectrum of computer architectures. A new variational data assimilation system will be developed for WRF, first using 3D-Var, followed by 4D-Var techniques. The broad research community will be actively solicited in developing and evaluating improved physics for these high-resolution applications. NCEP/EMC plays a significant role on nearly all WRF activities, and it plays the key role in operational implementation (also by AFWA) in the 2004 time frame.

NCEP's contributions to the WRF model include: a semi-Lagrangian prototype using forward trajectories to achieve better temporal accuracy, cascade interpolation for efficient high order spatial interpolation, compact differencing for the pressure gradient and divergence terms for higher spatial accuracy, interpolation formulations that will preserve conservation, and shape-preserving limiters to produce more accurate interpolations, low-storage versions of 3rd- and 4th-order Runge-Kutta time integration schemes to include a semi-implicit treatment of the high-frequency acoustic components. NCEP is also playing a major role in a) designing and applying advanced techniques for the 3D-VAR analysis, including development of Bayesian statistical techniques for estimating spatially varying covariances and b) providing physical parameterizations including cloud microphysics, deep and shallow convection, land surface and planetary boundary layer (PBL), and c) operational data handling and post processing (product generation) modules.

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ATTACHMENT-V

Status report from the Meteorological Service of Canada (Gilles Verner)

ppt file available

1 Data assimilation and NWP models (CMC)

Current operational system

Global model is GEM (global environmental multiscale) at 0.9 degree uniform resolution with 28 eta levels. Forecasts to day 10 at 00 UTC and to day 6 at 12 UTC. Analyses done using incremental 3D-Var on model levels at T108, forecast error statistics based on NCEP 24-48 method (this version of 3D-Var was implemented on June 14th 2000).

Regional model is GEM in variable resolution configuration at 24-km resolution over North America and 28 eta levels. Forecasts to 48-hour at 00 and 12 UTC. Analyses done with incremental 3D-Var on model levels at T108, using a 12-hour intermittent spin-up cycle. Still uses forecasts error statistics from global system (3d-var on model levels was implemented on January 11th 2001).

HIMAP version of GEM at 10-km resolution, 35 eta levels (Eastern/Western Canada windows). Initialized with 6-hr forecasts from regional model. Forecasts to 30-hours at 06 and 18 UTC.

Global ensemble forecasting system has 16 members using two models at similar horizontal resolution (~150 km). Perturbed analyses (OI) are obtained from perturbed assimilation cycles. Different model options are used for both models. Forecasts are done once a day to 10 days.

A series of surface analyses are also performed. The main analyses are: air surface temperature, surface dew point depression, SST, snow depth, ice cover, deep soil temperature, albedo and soil moisture. An ice thickness analysis is under development, using data provided by the Canadian Ice Services (CIS).

Recent/future developments

Data assimilation: Direct assimilation of TOVS/ATOVS (AMSU-A) radiances and AMDAR/ACARS winds have been implemented in the global system on September 18th, 2000 and in the regional system on January 11th, 2001. A 2-month data assimilation experiment as well as parallel testing for 3 months have shown a large positive impact in both systems. Significant improvements were obtained for QPF in Regional system.

Significant progress has been made with the direct assimilation of ATOVS Level 1b (AMSU-A) radiances for NOAA-15 and 16. A 2-month data assimilation experiment has shown a slight but positive impact. This is currently being tested in a parallel run and should be operational by the end of May 2001, for both the global and regional systems.

Work is underway to add temperature data from aircraft, significant level temperature data from radiosondes, surface pressure and temperature data from surface stations and improved data selection procedures (aircraft and cloud motion winds (from BUFR high density winds)). A revision to the quality control procedures (background check and variational quality control) will be implemented at the same time. Planned implementation is fall 2001 for both global and regional systems.

Work is also underway to add mid and lower troposphere, as well as stratospheric AMSU channels. In addition, work as started on the assimilation of IR channels from HIRS, as well as from locally received GOES 8 and 10 data. This will replace our HUMSAT system for global upper troposphere humidity. Planned implementation is mid-2002.

Development of 4D-Var is progressing well. TLM and adjoint codes are now available and sensitivity studies are underway. PALM approach used for interface between direct model, observation operators and adjoints. Planned implementation during 2003.

Regional model: Resolution to increase to 12-16 km, 35-45 levels, with new convection scheme (Kain-Fritsch), mixed-phase condensation scheme and ISBA surface scheme. Planned implementation is summer 2001 (parallel testing beginning in June) for ISBA and January 2002 for the higher resolution version of the model, including MPI code. HIMAP version will evolve toward LAM, with resolution near 4-km by Summer 2002.

Global model: New hybrid vertical coordinate, increased vertical resolution (42 levels), hyper-diffusion (∇^6), lid at 1 hPa and MPI code planned for March 2002. ISBA surface scheme, 0.35 degree horizontal resolution, lid at 0.1 hPa, Kain-Fritsch convection scheme and mixed-phase stratiform scheme (effectively porting the regional model physics into the global model), planned for 2003.

Ensemble prediction system: Development of Ensemble Kalman Filter is underway. Will use as much as possible the 3D/4D-Var infrastructure (e.g. observation operators). The EKF will be the base for the EPS and will provide flow-dependent forecast error statistics to 3D/4D-Var and to EPS.

2 Canadian Ice Service (CIS) - Activities and International Data Exchange

The Canadian Ice Service (CIS) utilises a variety of remotely-sensed data in its sea ice monitoring program. These data come from a variety of national and international airborne and satellite systems. The C-band Synthetic Aperture RADAR sensor on board the Canadian RADARSAT satellite is the prime data source. As part of the Meteorological Service of Canada, CIS obtains NOAA AVHRR multi-spectral optical data from MSC receiving stations at Edmonton, Alberta and Dartmouth, Nova Scotia. Additionally, CIS uses a dedicated Dash-7 aircraft, equipped with a dual-sided Slide-looking Airborne RADAR (SLAR), for tactical reconnaissance.

These data are supplemented through the exchange of data with other countries, particularly the United States. A partial T1 link between Washington and Ottawa is used to exchange data and information products with the CIS counterpart south of the border - the National NOAA/Navy Ice Centre (NIC). CIS provides RADARSAT imagery for the Great Lakes area in exchange for RADARSAT imagery acquired by the U.S. data acquisition facility at Fairbanks, Alaska. In addition, CIS receives from Washington, through its U.S. Navy links, Special Sensor Microwave Imager (SSM/I) and Operational Line Scanner data (OLS) data from the Defence Meteorological Satellite Program (DMSP) satellite.

CIS also receives C-band active microwave data from the Earth Resources Satellite (ERS2) managed by the European Space Agency (ESA). These data are received by Canada Centre for Remote Sensing (CCRS) receiving stations at Prince Albert, Saskatchewan and Gatineau, Quebec. Data are transmitted via a dedicated T1 link to CIS in near real-time - as is the case with RADARSAT.

All these data are received in near-real time on a daily basis, 365 days per year. A team of image analysts and ice forecasters integrate this information into a variety of image, chart and alphanumeric products for marine operators. The prime, but by no means sole, customer is the Icebreaking Service of the Canadian Coast Guard. Ice Analysis Charts are produced on a daily basis for each area in which marine activities are occurring. Additionally, a set of weekly and monthly regional charts are maintained year-round for all marine areas in Canada affected by sea ice. These charts are used for long-term planning of marine activities, for maintaining a climatology of ice conditions in Canadian waters, and for climate change studies.

Exchange of data also occurs with the International Ice Patrol (IIP), Groton, Connecticut. The IIP, an arm of the U.S. Coast Guard, was formed shortly after the Titanic disaster as an internationally funded organisation tasked with monitoring the transatlantic shipping lanes from Europe in order to provide mariners with warnings of iceberg activity. Both CIS and IIP acquire data from iceberg reconnaissance aircraft flights (SLAR RADAR and visual), ship reports and shore sightings. A dedicated partial T1 link between CIS and IIP is used to exchange alphanumeric berg sighting messages, iceberg drift and deterioration model results, and information products. The CIS produces daily iceberg messages and population charts in season, which are distributed to mariners in both North America and Europe, to assist in the safe navigation of these waters.

In future, CIS will be relying on a mix of active and passive microwave, and optical, sensors flying on board satellites launched by Space Agencies from Canada (CSA), the United States (NASA), Europe (ESA), and possibly Asia (NASDA). CIS will definitely utilise the new generation of SAR systems such as ENVISAT ASAR and RADARSAT2. The use of other sensors, such as MERIS (onboard ENVISAT), MODIS (onboard Terra EOS AM-1), and the Japanese PALSAR (onboard ALOS) will depend upon the development of a ground infrastructure in Canada to acquire the data in support of fast-turnaround applications.

Contact: Bruce Ramsay (613-996-4671)

3 Data usage

SATEM

500 km retrievals from NOAA-14 and NOAA-15 are received but are no longer assimilated in the operational analyses. However, they are still used as part of the Ensemble forecasting system. NOAA-16 will replace NOAA-14 during May 2001. SATEM data are planned to be used in ensemble system for another 2 years.

TOVS/ATOVS

BUFR (level 1d) data received regularly from GTS, monitored and assimilated.

Work is almost completed to migrate to the use of the ATOVS level 1b data. Level 1b data for NOAA-15 and 16 are currently received from NESDIS and are processed with the AAPP package (obtained from Eumetsat) and converted to level 1c for assimilation. The target date to migrate to the 1b data is end of May 2001. Channels 6-19 of AMSU-A will be directly assimilated in the operational data assimilation system. Data is thinned to 250 km before assimilation.

We also have the TeraScan software (from Seaspace) which is used in MSC regional offices for the processing of the locally received HRPT data (MSC operates 3 HRPT stations for AVHRR imagery (Halifax, Gander and Edmonton). We have started to investigate the feasibility of acquiring and assimilating ATOVS 1b data from the MSC HRPT sites, at least

for the regional data assimilation system. Discussions were also held with Eumetsat about exchange of these data.

SSM/I

TDR files from F13, F14 and F15 are received regularly at CMC from NESDIS or NIC (National Ice Centre, arrangements with CIS). Ice cover data are derived from SSM/I brightness temperatures and used in the operational ice analyses (both at CIS and CMC). Total column water vapor are also retrieved and work is underway to assimilate the retrievals in the 3D-Var. SSM/IS data to be obtained as soon as available. Assimilation of integrated water vapor and surface winds from SSM/I and SSM/IS is planned for 2002.

The MSC Climate Research Branch also make use of remote-sensing data (SSM/I, AVHRR, ERS) for the assessment and monitoring of the Cryosphere, and for understanding and modelling of cold climate processes. SSM/I data is used for studies of soil moisture and snow water equivalent. Would like to obtain access to AMSR (Aqua and ADEOS-II), MODIS and eventually SMOS.

Atmospheric motion winds

Low density cloud motion winds in SATOB code are assimilated (Meteosat and GMS, INSAT is blacklisted). Plan is to move to the use of the high density winds (HDW) in BUFR, including the use of the quality indicators. Impact tests have been done during the spring and have shown small but positive results. Should be implemented as part of the next major update to the 3d-var, in the fall 2001. Would like to see the Nesdis experimental BUFR HDW become operational, and to get similar high density winds for GMS.

Imagery - Geostationary satellites

CMC operates 3 GOES reception stations, including a hot spare. 3-hourly GOES West images (3 channels) are transmitted to UKMO and are uplinked to Meteosat via Lannion. 3-hourly Meteosat images (3 channels) and 3-hourly GMS images (1 channel) are received via UKMO. Moisture profiles are generated from GOES imagery and are assimilated (CMC HUMSAT system). Overall, MSC operates about 20 GOES direct readout stations. Work is underway to directly assimilate the GOES radiances in the 3d-var. Would like to obtain more channels from GMS (and eventually MTSAT-1R). Interested in obtaining MSG imagery and radiance when available.

GOES imagery as well as NOAA-AVHRR data are used for volcanic ash detection as part of CMC's mandate as Volcanic Ash Advisory Centre.

SST

SST retrievals produced by Nesdis (MCSST in SATOB code) are received and are used in the global SST anomaly analyses. Some locally produced (in Edmonton) SST data from HRPT/AVHRR over a number of Canadian lakes are also assimilated. Interested in obtaining SST data from ERS-ATSR (now obtained from Web), ENVISAT-AATSR and from MODIS.

Scatterometer

ERS-2 data received but not assimilated. Data impact studies done with previous versions of the analysis were not conclusive. More studies will be done in the coming year. Interested in obtaining QuikScat, ADEOS-II and ASCAT data. Should be implemented during 2002.

AMDAR

AMDAR/ACARS data received via GTS. Wind data now assimilated operationally. Thinning is 1.5 degree boxes, 16 vertical layers, 3 hour time window. Temperature data will be added later this fall, with better data selection algorithm.

Significant progress currently being made in the implementation of a Canadian AMDAR program. Clear interest from regional carriers (Air Nova) and also Air Canada. Expect first down-link by mid-summer 2001 (to be received at CMC), beginning with only a few aircraft, but the full Air Nova DASH-8 fleet (about 25 aircraft) to report by end of summer. A real-time data processing system, with quality control, needs to be developed before the data can be used. Once available, the data will be monitored, assimilated and will be distributed (BUFR or AMDAR code) on GTS.

Radar

USA radar data now received at CMC via NOAAPORT dish. Canadian radar data can be made available, MSC contact is Steve Lapczak (Steve.Lapczak@ec.gc.ca) and NWS contact is Rich Lane (Richard.Lane@noaa.gov). Some Canadian radar data are transmitted to NWS via internet.

Ice analyses

CMC Global ice analyses are done once a day (00 UTC), at roughly 35 km resolution, using SSM/I retrievals as well as data from analyses produced by the Canadian Ice Service (CIS) using Radarsat and ERS-2 SAR data, as well as AVHRR and DMSP (SSM/I and OLS) data. CIS data are received daily on a 10 km grid covering limited areas following the ice edge. Typically, they cover the Gulf of St-Lawrence, Labrador and Newfoundland coasts, Davis Strait, Baffin Bay and the Great Lakes, depending on the time of year. Data volume is about 1200 points a day. In addition, CIS provide weekly ice cover data over 128 selected Canadian lakes.

The ice analysis received by CMC from CIS also contain information about the ice stage. This information can be converted into ice thickness for use in the new CMC ice thickness analysis. The ice thickness climatology has been derived from GCM runs. (Greg Flato, MSC Climate Modelling and Analysis Division)

Canadian ozone sounding data

Ozone soundings are done at 6 Canadian stations, usually once a week (Wednesday mornings, weather permitting). The soundings can be delayed by a day on occasions. An experimental system has been set-up to transfer the data from the WODC in Downsview to CMC, where they are re-encoded into CREX format. The CREX bulletins (KULA01 CWAO) are then transmitted on the GTS. The stations are: YYR (Goose Bay), YXD (Edmonton), YLT (Alert), YEU (Eureka), YYQ (Churchill) and YRB (Resolute).

Other data of interest to MSC/CMC, when available:

SSM/IS

AIRS+AMSU-A+HSB

AMSR-E on AQUA (EOS-PM) and AMSR on ADEOS-II

MODIS products (SST, snow)

ENVISAT data and products (AATSR, ASAR (ice) and GOMOS)

METOP data (IASI+AMSU+MHS+HIRS+AVHRR+ASCAT+GRAS+GOME)
GMS imagery, (MTSAT-1R: imagery and radiance)
MSG data (imagery and radiance)
SMOS data (soil moisture)

4 Supercomputer and telecommunications

MSC supercomputer system now consists of 2 SX-4/32 and 2 SX-5/16. CMC operational suite on SX-5's since mid-February 2001.

GTS link with NWS/OSO is at 64 kbps. There is also a 256 kbps link (NAIL) between CIS and NIC (exchange of SSM/I and Radarsat data). A third link at 64kbps between UKMO and CMC for exchange of METEOSAT/GMS/GOES imagery, and CMC Ice analysis in GRIB (400x200). The 64k GTS link is now heavily used A new link with NWS or NESDIS (T1) is to be established during 2001, discussions are underway.

ATTACHMENT-VI
EUMETSAT status report (Simon Elliot)

ppt file available

1 Satellite status

METEOSAT-5

The orbital inclination of METEOSAT-5 is around 2.5° and slowly increasing. The present hydrazine reserve will allow nominal station keeping manoeuvres and attitude control to May 2005, with a possible further continuation of up to one year. Currently a mandate for the mission only exists until the end of 2003, but the EUMETSAT council will discuss an extension.

METEOSAT-6

METEOSAT-6, located at 10°W, is currently the standby spacecraft.

The spacecraft will be used to provide a quasi-operational rapid scan service from September 2001. A region covering a large part of Europe and the Northern Atlantic will be scanned 3 times per 30 minute slot. The rapid scanning will be performed for 72 hours, followed by 12 hours of full disk imaging. This process will repeat on a twice weekly cycle. Wind products will be extracted every 30 minutes and it is planned to disseminate them on the GTS in BUFR.

METEOSAT-7

METEOSAT-7, located at 0° is currently the operational spacecraft supporting all missions, namely, image taking, image dissemination, including the relay of foreign satellite data from the two American GOES satellites, the Japanese GMS and the Russian GOMS satellites. In addition to these imaging missions, METEOSAT satellites continue to support the Data Collection System (DCS) and the Meteorological Data Dissemination (MDD) mission.

2 Operational mission status

New meteorological products

The operational production of the High resolution Water Vapour Winds (HWW) began in March 2000. These winds are cloud tracked WV winds derived by using a target area of 16 x 16 pixels, half the size of the target for the current WV winds. The operational production of Clear Sky Radiances (CSR) is scheduled for May 2001. These data are cloud cleared EBBTs from the IR and WV channels in 16 x 16 pixel resolution, together with associated cloud fraction information and quality control values. The long migration of CSR to an operational status has been due to the necessary updates in the calibration method for METEOSAT-5 and -7 summarised at the end of this section.

All EUMETSAT BUFR wind products are encoded using the template agreed between ECMWF, EUMETSAT and NOAA, and formally adopted by the WMO. The Clear Sky Radiance products use a similar BUFR template, also adopted by the WMO, and these templates will also be common to the MSG radiance and wind products.

Future meteorological products

A Multi-sensor Precipitation Estimate (MPE) product is being developed, based on an algorithm from NRL in Monterey. The rain rate is estimated using METEOSAT infrared imagery, and then calibrated by co-located SSM/I data. The operational implementation of MPE is planned for 2002.

As of June 2001, all EUMETSAT BUFR wind products will be disseminated with two parallel sets of quality control information. The existing quality control information will remain

unchanged, and will be augmented by a second set of values calculated without the use of first guess forecast data in the processing. This move is in response to users' requests for less dependence of quality control scores on forecast wind values.

Calibration

In May 2000, the on-board black bodies on METEOSAT-7 began to be used operationally for calibration. The results proved more stable than the vicarious radiosonde calibration, and showed a positive impact at ECMWF. From May 2001, METEOSAT-5 will rely on cross calibration with METEOSAT-7. After a thorough validation phase this has also proven to provide a more reliable result.

3 ATOVS Re-transmission Service

Council approval is being sought for a service involving the reception of ATOVS data from five HRPT stations around the Atlantic and Arctic (nominally Fairbanks, Halifax, Tromsø, Maspalomas and Søndrestrømfjord), and the timely retransmission of these data via satellite. The service is being proposed in response to a formal request to EUMETSAT from SMHI on behalf of the NORDMET group.

4 METEOSAT second generation

The launch of MSG-1 is planned for June 2002. The MSG ground system installation and integration has started, and some facilities have been provisionally accepted. Detailed information about the MSG services can be found on the EUMETSAT WWW site at www.eumetsat.de. Wind, cloud and radiance products will become routinely available on the GTS after approximately 6 months of commissioning, using BUFR templates corresponding to those currently employed for METEOSAT products. It is envisaged that products from both MSG-1 and METEOSAT-7 will be available in parallel on the GTS for one year after the end of MSG-1 commissioning.

5 EUMETSAT polar system

The EPS programme has been finally approved. The core ground segment contract has been kicked off, and the procurement activities related to the other elements are under way. The planning currently assumes a launch of METOP-1 in 2005.

6 Electronic information system

The EUMETSAT WWW pages can be found on the web site: <http://www.eumetsat.de>. The information available on these pages includes latest operational news, METEOSAT orbital information, calibration information and limited amounts of near real-time image data. Also available is significantly expanded information on MSG, which provides more information to the EUMETSAT user community about the future operational services.

ATTACHMENT-VII
MétéoFrance (Toulouse) status report (Bruno Lacroix)

1 Supercomputer and models configuration

Nothing new since last meeting: A test of 41 levels configuration with a linear grid failed (The results were quite good but the system was numerically unstable).

- Fujitsu VPP5000 (8th February 2000): 31 processors, 21 with 8Gbyte memory each, 10 with 4 Gbyte
- ARPEGE global spectral model T199 C3.5 L31 with a 4D-VAR multi-incremental assimilation T42-63-95 C1L31 (20 June 2000), 6-hour window.
- ALADIN regional spectral model 9.5km L31 without assimilation
- Operational suite scheduling:

HH	0000 UTC	0600 UTC	1200 UTC	1800 UTC
long cut-off	0815 UTC	1250 UTC	2015 UTC	0050 UTC
short cut-off	1H50	3H	1H50	3H
ARPEGE range	96H	42H	72H	30H
ALADIN range	48H	42H	36H	30H

- ARPEGE-Indian Ocean T127C3.5L31 with 3DVAR assimilation T95 C1 L31 , at 00UTC.
- ARPEGE-Climat T63L31 10 times a month with NCEP SST.

2 Data used in global model assimilation

- All surface (SYNOP, SHIP, BUOY) and upper air in situ data (TEMP, TEMPSHIP, PILOT, AIREP, AMDAR, ACARS)
- All Cloud motion winds (GOES E and W, Meteosat 5 and 7, GMS) in SATOB code, and Meteosat high resolution visible wind in BUFR.
- TOVS and ATOVS 120 km radiances.

3 Telecoms

- Toulouse-Bracknell 128 kbit/s link:
 - All SMT bulletins,
 - No reception for the moment of GOES CMW in BUFR, waiting for a NESDIS-EUMETSAT standard format.
 - raw radiances files from NOAA14 (HIRS and MSU), NOAA15 and NOAA16 (HIRS, AMSU-A, AMSU-B), and DMSP F13 and F15 (SSM/I).
- Toulouse-Lannion **1Mbit/s** dedicated link: The geostationary satellites imagery received at Bracknell (3-hourly Visible and Infra-Red imagery for GMS from Melbourne, and GOES from Dorval) are transmitted to Meteosat via Lannion for redistribution among EUMETSAT countries. GOES-E being already received directly at Lannion and retransmitted to Meteosat.

- RMDCN links

PVC to	CIR (kbps) in	CIR (kbps) out
Belgium	32	96
Bulgaria	8	32
Czech Republic	16	128
Germany	48	48
Italy	16	16
Portugal	32	64
Spain	32	32
Switzerland	16	16
United Kingdom	128	64
ECMWF	512	256

4 Details on Use of US data

NOAA

- **No more use of SATEM 500km retrievals**
- TOVS and ATOVS 120km: The radiances from TOVS120 km (NOAA14) have been assimilated since 8 march 1999, as replacement to SATEM retrievals, and ATOVS (NOAA15) since 27 June 2000. The coefficients to unbias the calculated and observed radiances are updated each 6-hour. We stop using NOAA15 data this winter when HIRS data were wrong. We use now only HIRS, MSU and SSU from NOAA14 and AMSU-A from NOAA15.
- Level 1C HIRS: Ozone computations and comparison to other sources (ground stations, TOMS/Earth Probe and GOME/ERS-2) are performed globally on research mode. One goal is to compute global ozone climatology. Another product is partial column ozone (between 600 and 30hPa) to be used in model assimilation. To test SAF-ozone operational suite, an experimental product of HTO=Hirs/4 Total Ozone, which will be derived from Metop 1 and 2, is copied daily on cnrm-ftp.meteo.fr/pub-eram/o3saf. Focal point (Fernand.Karcher@meteo.fr).

GOES

- GOES SATOB winds: SATOBs (InfraRed, Visible and Water Vapour) monitored and used with a thinning (1 per 2.5 degree box, since 4 may 2000) to cope with high-resolution data in ARPEGE analysis.

DMSP

- SSM/I: Maps are produced 4 times a day for forecasters (humidity, wind speed, snow and flag of rain) and sea-ice once a day.

ACARS

- ACARS: Monitored and used operationally (wind and temperature) in the NWP system, but with a thinning (1 in 5, since 8 mars 1999). All phases (cruise, ascent and descent) are used.

PROFILERS

- Profilers: The transition to a 4D-Var system allows us to use the wind profilers, but the work has a relatively low priority: all the main actions on data assimilation at Météo-France have delay (raw radiances, scatterometer, SSM/I) so the wind profiler usage also.

SST

- SST analysis: The SST field is received once a day and used by ARPEGE model as relaxation to climatology in data sparse area. Very few problems on the reception of this product.

5 French data

Air France aircrafts:

- AMDAR messages on the GTS coming from 16 units based on ACARS. No cruise phase data are produced.

Profiler:

- The data are sent to the GTS on BUFR code, using the European sequence of descriptors.
- The VHF 52.05 MHz profiler installed end 1995 at La Ferté-Vidame (110km SW from Paris), has been declared non operational in 1997. Large bias in wind speed, still working in research mode.
- Two other profilers are available, in Nice and Clermont-Ferrand.

6 Future Plans

Data assimilation:

It is planned to use NOAA15 and 16 raw radiances (HIRS and AMSU-A) this summer and DMSP radiances (SSM/I using 1DVAR retrieval to produce integrated water vapour content and wind speed) this autumn.

Radiances monitoring statistics should be available via internet at the end of 2001.

JASON

Details about the transmission of data should be given at the end of June. The contact point for any information is Jean-Pierre.Bourdette@meteo.fr.

ATTACHMENT-VIII

MétéoFrance (Lannion) status report (Hervé Roquet) ppt presentation

1 New Foreign Satellite Data Support service for EUMETSAT/MSG

In answer to EUMETSAT requirements for foreign satellite data relay through MSG, Météo-France/CMS is currently implementing an upgraded (compared to the current one for MTP) service, in co-operation with the Met Office, NOAA and BoM. The following data are required under GSF format in less than 45 minutes by the MSG Ground Segment :

Mission	Channel	Rad. resolution	Hor. resolution
GMS-MTSAT	VIS WV IR	8 bits-10 bits	5 km
GOES-E	VIS WV IR	10 bits	4 km
GOES-W	VIS WV IR	10 bits	4 km

The GMS imagery is acquired and pre-processed at BoM (Melbourne) and transmitted to CMS (Lannion) via Bracknell and Toulouse, the GOES-W imagery is acquired and pre-processed at NOAA (Suitland) and transmitted directly to CMS (Frame Relay), and the GOES-E imagery is acquired directly and pre-processed at CMS. The output products are transmitted directly to MSG Data Dissemination Facility (DADF) in EUMETSAT Headquarters (Darmstadt) (Frame Relay). The timeliness requirements are met for GOES-E and GOES-W (< 30 minutes), and only marginally for GMS (46 minutes), due to long acquisition/pre-processing delays at BoM (28 minutes). Final Acceptance Review is planned at this end of summer 2001.

2 Pre-operational demonstration phase of EUMETSAT Ocean and Sea Ice SAF

In the framework of the development of the EUMETSAT Ocean and Sea Ice Satellite Application Facility (O&SI SAF), Météo-France/CMS is starting now producing 3-hourly SST, Surface Short wave irradiance (SSI) and Downward Long wave Irradiance (DLI) products, derived from GOES-8 Imager data acquired directly at CMS on a pre-operational basis. The products are available in less than 2 hours under GRIB format on a 0.1 x 0.1° grid over the domain 60°N-60°S-100°W-45°W. The eastern part of the domain should be covered once MSG-1 data are available. Information on products and near real-time quicklooks are available from <http://www.meteorologie.eu.org/safo>.

ATTACHMENT-IX

Deutscher Wetterdienst status report (Thomas Böhm)

1 Main events in nwp since the last report

MODEL SYSTEM AND ANALYSIS:

GME (Global Model): hydrostatic, icosahedral-hexagonal grid : mesh size 60 km; 31 layers
forecast range: 174h for 00,12
48h for 18

LM (Local Model): non-hydrostatic, rotated latitude-longitude grid: mesh size: 7 km; 35 layers
forecast range: 48h for 00,12,18

- The cut-off-time of the main-model-run was reduced to 2h 14min. So the begin of the run could be scheduled earlier. The pre-run was dropped consequently.

2 DATA USAGE

2.1 SATEM DATA

NESDIS 500km retrievals are the sole source of sounding information in NWP at DWD and continue to be used. On average about 20% (higher layers) and 50% (lower layers) of the SATEMs are filtered out by the quality checks performed in the data analysis.

During summer and autumn 2000 impact studies with SATEMs from NOAA 15 were continued:

- Due to instrumental problems of the NOAA-15 HIRS instrument it was not sure that the quality of the SATEM data was degraded. The SATEMs from NOAA-15 were excluded from the analysis with July, 26th. The impact study encouraged to carry on with using the data. So they have been included since October, 2nd.
- NESDIS had to change the SATEM-operations due to continued instrumental problems of the NOAA-15 HIRS and of the AMSU channel 14 in autumn. An additional study (October/November) indicated that the data had a positive impact on the model forecasts (southern hemisphere).

The impact of the new NOAA-16 SATEM data is to be investigated in an ongoing study. Results will be available soon.

2.2 ATOVS level 1B data

A project started to compare the ATOVS radiances to the model generated radiances in long term statistics. There are plans for the later use in 1D-VAR retrieval.

2.3 AAPP and IAPP processing software

The AAPP (ATOVS and AHVRR processing package) software continues to be used for processing the locally received HRPT-data. The IAPP package from CIMSS (University of Wisconsin) was implemented. Application areas are : total atmospheric ozone content for UV B prognosis, snow/ice cover; humidity profiles for future regional climate studies.

2.4 AIRS Data

DWD is interested in AIRS data (retrievals) and plans to perform impact studies with a view towards operational use.

2.5 *SeaWinds Scatterometer Data*

DWD intends to use the data in marine forecasts and in model impact studies.

2.6 *NCEP Sea-Ice Analysis*

The NCEP sea-ice analysis continues to be used operationally. The availability and quality are good. But there are some smaller areas where the analysis seems to be questionable. In the Polar Sea north of Canada between Victoria Island, Ellesmere Island and Sverdrup Island there are spots of classified open sea within the widespread area of ice cover during winter and spring season.

2.7 *AVHRR/MODIS products*

DWD requires the vegetation products updated every 7-10 days. Our regional vegetation products will be complemented by the global products.

2.8 *Mapped Imagery*

Our global geo-stationary satellite imagery may be complemented by AVHRR composites produced by NESDIS. More frequent imagery is required in near real time.

2.9 *Atmospheric Motion Winds*

The assimilation of GOES winds has been continued. The huge number of winds is thinned out. This thinning reduces the number of winds which enters the global data assimilation by 20 to 50%. The reduced number better represents the spatial resolution of the GME. Water vapour winds are used only below 400 hPa.

2.10 *NCEP SST gridded field*

DWD uses the fields accessed via the GTS operationally as a background field in the global SST-analysis.

2.11 *ACARS data*

ACARS data continue to be used and monitored.

2.12 *Snow cover analysis for N. Hemisphere*

Snow depth has been used operationally as a background field in the DWD global snow depth analysis since March 2001. The use of the data improved the model forecasts of screen level temperature especially in the vicinity of the snow cover edge over North America and Asia.

2.13 *Tropical cyclone data*

The data are used for global man machine mixed surface analysis by our central analysis and forecast office. A research project in co-operation with the University of Munich is going on. The impact of tropical cyclone bogus data in our global model GME is investigated.

3 PROJECTS

SAF on Climate Monitoring

The DWD is leading the EUMETSAT Satellite Application Facility (SAF) on Climate Monitoring in partnership with FMI, KMI, KNMI, SHMI and German research institutes. The aim of the SAF is to generate consistent radiation and cloud parameters, homogeneous data sets of SST and sea ice cover as well as a humidity composite product. There is a focus on regional climate applications. The phase of developments continues.

ATTACHMENT-X
ECMWF Status Report (Horst Böttger/Jean-Noel Thépaut)

Recent developments in the use of satellite data at ECMWF

1. NOAA polar system

1.1 ATOVS

Use of TOVS / ATOVS (NOAA-14, NOAA-15 and NOAA16)

- operational use of (1c) AMSUA/MSU in 4DVAR
- operational use of (1c) HIRS-12 from NOAA14
- close to operational use of tropospheric (1c) AMSUA/MSU over land thanks to an improved emissivity model.
- use of cloudy (1c) HIRS/MSU/AMSU data in model validation / improvement in advance of cloud assimilation
- use of (1c) window channels in model validation / improvement together with assimilation
- use of (1c) AMSU-B in support (validation) of HIRS-12 and new parallel assimilations will be performed.
- use of (1c) HIRS-9 for ozone model validation and parallel assimilation (remaining problems in the Jb formulation)
- use of all (1c) HIRS data in ERA-40 (future possible operational use)
- use of (1c) SSU data in ERA-40 (back corrected with AMSU-A)

1.2 AVHRR

- expected use of AVHRR Tb statistics on HIRS field of view for cloud flagging

1.3 SBUV

- use of ozone retrievals for ozone model validation (ERA 40) and parallel assimilation
- use of ozone retrievals for tuning assimilation of other data (e.g. HIRS-9)

2. Geostationary data

2.1 Retrieved wind products from GOES

- operational assimilation of 3hr bias corrected WV(clr), WV(cld), IR, and VIS winds with no QC info
- continuing experimentation to establish best assimilation tuning and configuration
- will use new (BUFR) products with QC and bias info as soon as the products are satisfactory (on GTS)

2.2 Radiance products from GOES

- Ready to use these when available

2.3 Retrieved wind products from METEOSAT

- operational assimilation of 1.5hr WV(cld), IR, and VIS winds with supplied QC info
- continuing experimentation to establish best QC thresholds
- improvement of the height assignement and of the observation operator

- plan to make experimental use of WV(clr) winds for comparison with assimilation of WV radiances
- initial experiments with wind speed bias corrections look promising

2.4 Radiance products from METEOSAT

- new black-body calibration (Met-7) represents a significant improvement (stability and accuracy) - Met-5 should be recalibrated at the date of the meeting
- 4DVAR assimilation of 6.3micron clear radiances being redone with new calibration and model/analysis. Comparisons with assimilation of WV(clr) winds will be made. Plan for operational implementation.
- clear radiance products extremely useful for model land surface validation leading to parameter assimilation
- new cloudy radiance products being used in conjunction with ATOVS for model cloud validation
- Rationalize the monitoring tools in view of MSG validation

2.5 Retrieved wind products from GMS

- operational assimilation of 3hr IR, and VIS winds with no QC or bias correction
- plan to experiment with wind speed bias correction

2.6 Radiance products from GMS. We are ready to use these when available

3 DMSP Polar system

3.1 SSM/I radiances

- operational assimilation of TCWV and surface wind speed from F13 and F14 (using 1DVAR retrieval)
- data from F15 are tuned up and ready to replace F14
- preparations being made for 4DVAR direct assimilation of SSM/I radiances. Unification of the radiative transfer codes.
- SSM/I radiances used to generate emissivity estimates in support of AMSU/MSU
- Preparation for SSMI/S. Plan for operational assimilation

3.2 SSM/I ice products

- operational use of mapped sea-ice product from F13 only

4 Data from research satellites

4.1 ERS-2

- operational use (when data available) of (ambiguous) wind vectors retrieved from scatterometer
- experiments continue to establish optimal bias correction and QC
- operational assimilation of altimeter (WH) retrievals in wave-model
- use of mapped ozone retrievals used to validate model and HIRS-9 assimilation

4.2 Quikscat

- routine monitoring of SeaWinds data established
- assimilation experiments continuing (rain QC has improved)

4.3 TRMM

- experimental assimilation of TMI rain-rate retrievals looks good
- operational assimilation of TMI radiances (similar to SSM/I) being considered
- TMI radiances used to generate emissivity estimates (as in SSM/I)
- Plans for monitoring rainy radiances from TMI/SSM/I

4.4 UARS

- mapped temperature retrievals from HALOE used to validate model and AMSU-14 assimilation

4.5 TOMS (*Earth Probe*)

- mapped total ozone retrievals used to validate model and HIRS-9 assimilation

5 Preparations for advanced sounders

5.1 AIRS

- Near real time AIRS/AMSUA/HSB (on AQUA) via NASA-NOAA/NESDIS agreement (hope to assist NASA in validation phase with NWP monitoring feedback)
- RTTOV/AIRS (7/8) has been developed and validated
- flow dependent channels selection scheme being developed
- cloud detection scheme based on an artificial neural network
- investigation of a combined standard / targeted assimilation in "sensitive" areas
- Assimilation experiments using NESDIS/NCEP simulated data have started.
- estimation of CO₂ burden over ocean from a combined use of AIRS and AMSU

5.2 IASI

- RTIASI continues to be improved (extension to minor gases)
- simulation of more observations in progress
- cloudy IASI data will be simulated to test cloud detection schemes

6 Use of in situ data at ECMWF

ECMWF makes full use of practically all the in situ observations of the atmosphere circulating on the GTS. The high resolution aircraft observations taken during take-off and landing and at flight level (ACARS, AMDARS) are assimilated in the 4D-Var system with the appropriate thinning. The 4D-Var system is expected to make good use of the asynoptic data, including hourly surface observations which have been requested for global exchange.

ATTACHMENT-XI

Met Office Status Report (Roger Saunders) *ppt presentation available*

1 Introduction

This report describes changes to the use of U.S. satellite and in-situ data in the Met Office NWP models and other forecasting systems since the last US-Europe Data Exchange Meeting in July 2000. Changes to the Met Office NWP models and assimilation systems are now regularly documented in the NWP gazette which is available on line at:

http://www.metoffice.com/research/nwp/publications/nwp_gazette/

A brief status report on the NWP Satellite Application Facility, which carries out satellite related activities, is also given below.

It is planned to relocate the Met Office headquarters building from Bracknell to Exeter (~200km to the south west) in late 2002/early 2003 so that all the links will be established at Exeter rather than Bracknell. The process of moving all the IT related equipment is being planned.

2 ATOVS

The brightness temperatures (BTs) in the Level 1B ATOVS datasets (HIRS, AMSU-A and AMSU-B) from NOAA-15 and 16, mapped to the HIRS fovs, are continuously monitored by comparing with calculated BTs from the 6 hour global forecast. The monitoring plots can now be viewed at: <http://www.metoffice.com/sec5/NWP/NWPSAF/monitovs.html>. Feedback on these plots is welcomed to stephen.english@metoffice.com. Monitoring of the instrument parameters is also performed for AMSU-A and AMSU-B.

The Met Office generates Level 1C ATOVS data sets (i.e. geolocated brightness temperatures), which are passed to ECMWF and MétéoFrance and are potentially available to other European NWP Centres (e.g. discussions are underway with DWD). The generation of level 1C NOAA-16 AVHRR parameters on the HIRS fields of view is about to recommence after the loss of HIRS and AVHRR on NOAA-15. In addition the level 1C data are pre-processed to level 1D (i.e. brightness temperatures of all ATOVS channels mapped on to the HIRS grid) which are then used in the Met Office global NWP models. There are still significant delays in the ATOVS 1B files at some periods of the day due to the 'blind orbit' delays. For NOAA-15 the worst delays appear to be around 09Z and for NOAA-16 around 02Z where delays of ~6hours are typical.

Since 18 April 2001 the NOAA-15/16 HIRS (N-16 only), AMSU-A and AMSU-B radiances have been directly assimilated into the operational analysis using 3D-Var, after quality checks and retrievals of stratospheric and surface parameters via a one-dimensional variational analysis (1D-Var). This change (replacing NOAA-14 with NOAA-16 and using AMSU-B for the first time) significantly improved the tropospheric mass and humidity fields and wind fields in the troposphere and stratosphere. Improvements were typically in the range 2-8% reduction in root mean square error. The largest improvement was to the short range (6 hours) humidity forecast, where the root mean square error verified against AMSU-B and the HIRS moisture radiances was halved. Some improvement was also achieved from a change on February 13 2001 when the number of cloudy AMSU channel 5 radiances assimilated was increased.

On the 14 November 2000 the stratospheric model was upgraded to use 3D-var with the direct assimilation of ATOVS radiances. The upgrade to use NOAA-16 (including the use of AMSU-B) was also switched on in the stratospheric model on 18 April 2001.

It is planned to start assimilating locally received AMSU radiances in the mesoscale model from July 2001 and to increase the use of ATOVS over land by analysing (in 1D-var) the microwave surface emissivity using a climatological first guess and a simple parameterisation of its spectral variation. Studies are also underway into increasing the use of AMSU in cloudy areas by analysing cloud liquid water, again only in 1D-var in the first instance.

Research into using the AVHRR data mapped on to the HIRS grid continues albeit on a limited dataset due to the failure of the HIRS and AVHRR on NOAA-15. However in April 2001 the NOAA-16 GAC data has started to be received although problems are being encountered with the matching up of the HIRS and AVHRR data. The main conclusions so far were that the AVHRR data could detect more cloud contaminated HIRS radiances than the operational 1D-Var and also potentially identify if the cloud was uniform, which may allow for a possible future assimilation of cloudy radiances. The calibration of the GAC data in the NESDIS ATOVS system was found to be inconsistent with the NESDIS SAA and AAPP calibrated AVHRR datasets. NESDIS are investigating this anomaly.

3 Advanced infra-red sounders (IASI, AIRS)

Simulated AIRS data from NESDIS in BUFR (M. Goldberg) have been received and will be used to test our data pre-processing for AIRS. This is proving an excellent way to prepare our assimilation software. The operational code is being prepared for assimilation of a limited number of clear sky AIRS radiances. The Met Office plans to provide monitoring statistics of the AIRS radiances to NOAA and NASA as part of our participation with the AIRS science team once the data become available in near real time.

A fast RT model for AIRS has been developed using L. Stowe's AIRS transmittances on 101 levels. There are plans to incorporate the science in RTTOV, the operational fast model used for ATOVS, so that RTTOV will be able to simulate AIRS radiances.

4 SSM/I & SSMI(S)

Orbit-by-orbit brightness temperatures are received from F-13, F-14 and F-15 in near real-time via the Washington-Bracknell link. These data are passed to ECMWF where they are BUFR-encoded and returned to UKMO for onward transmission to other European centres. A BUFR product from NESDIS will be used as soon as it becomes available. The brightness temperatures are monitored by comparing with the model equivalents as for ATOVS.

The brightness temperatures are processed through a 1D-Var analysis which provides retrieved total column water vapour, surface wind speed and cloud liquid water path. The surface wind speed from F13 has been subsequently assimilated in 3D-Var since 19 October 1999, and since February 13 2001 wind speeds from both F13 and F15 have been assimilated. Experiments are continuing with assimilating the total column water vapour. Difficulties have been encountered with how the model's hydrological cycle treats the additional water vapour amounts provided by the SSM/I retrievals.

At present there are no plans to switch to the direct assimilation of SSM/I radiances as cloud liquid water is not analysed in 3D-Var. However research continues to determine the best approach for handling cloudy microwave radiances.

It is planned to process SSMIS radiances as soon as they become available for comparison with the NWP model and ultimately to assimilate these radiances. The Met Office is co-operating with FNMOC on BUFR definitions for SSMIS.

5 Scatterometers

In early 2001, after extensive and successful OSE trials, the Met Office's operational assimilation system was upgraded to include ERS-2 re-processed, ambiguous winds, in 3D-Var. Unfortunately, with the ERS-2 platform problems, NRT scatterometer data is currently not available from ESA.

QuickScat data have been received via ECMWF since late June 2000. These data have now been monitored for several months and we are planning to assimilate the QuickScat winds, with additional quality control, possibly by late 2001.

6 Altimeters and in-situ ocean data

The Met Office has performed experiments assimilating along-track altimeter data into primitive equation ocean models with 10 and 30 km horizontal resolution. Currently no data is used in real time but ERS data are used for trials. For the future routine reception of data with adequate corrections (including orbital corrections) is required from all available satellites (TOPEX/Poseidon and Jason, ERS or ENVISAT, and GEOSAT Follow On (GFO)) within 2-3 days of real time. The data will be used in a model of the Atlantic and Arctic with 30km horizontal resolution which is planned to be made operational in late 2001 after a six month trial period.

7 SST products

Retrieved AVHRR SSTs obtained from NESDIS in SATOB format continue to be used in the operational global SST analysis. Plans are to use the 50km dataset in the FOAM ocean model when staff time permits.

NOAA-16 SSTs are retrieved from locally-received AVHRR data (covering N. Atlantic) for assimilation in the mesoscale model's SST analysis and also the FOAM ocean model over the N. Atlantic.

The ERS-2 (ATSR-2) and ENVISAT (AATSR) SST data in BUFR for dissemination in near-real time is still under development by ESA in collaboration with the Met Office. Met. Services have to submit a proposal to ESA to use these data as they will not be on the GTS. Access is via ftp on a dedicated link or the internet.

8 Sea-ice products

The NCEP sea-ice analysis continues to be used operationally in the global NWP systems.

More details can be found at:

http://www.metoffice.com/research/nwp/publications/nwp_gazette/mar01/operate.html

The product is transferred over the internet at present as the GTS product cannot be reliably decoded. It is planned to copy the data over the dedicated link in 2001 but the NCEP server on which the data resides is not operational leading to occasional outages in the product.

9 Cloud-tracked winds

Assimilation (and monitoring) of thinned GOES IR winds (one per 2-deg box) has continued. The GTS messages cannot be reliably decoded and so the data are transferred by ftp from the NESDIS server. Sample decoding of test BUFR messages showed that local descriptors were being used in BUFR messages which conflict with internal Met Office descriptors. For operational status, global descriptors are required, and the 5th Winds Workshop endorsed a common BUFR template for both NESDIS and EUMETSAT winds. During the coming year (2001) we plan to test the impact of GOES WV winds and NESDIS GMS winds if available. Also there is interest to assess the quality indicator when available.

10 Polar and Geostationary Imagery

We receive NOAA GAC polar composites once or twice a day at Bracknell and these are used by the forecasters. No change in our requirement for polar composites every 6 hrs though it is realised this is not possible until the launch of NOAA-M.

For geostationary imagery GMS-5 and GOES-W imagery continues to be relayed to Lannion for uplink to Meteosat-7 but later in 2001 the GOES-W data will go directly to Lannion with only the GMS data being passed through Bracknell.

11 Tropical cyclone data

The arrangements with the National Hurricane Center, Miami are running smoothly. We receive their text warnings which are automatically ingested and used for generation of bogus data in our model. They receive the Met Office TC forecast text guidance messages and also access the model fields for use in their forecasting process. Arrangements have also been made to ftp Met Office TC forecast positions to NHC in 'adeck' format in the 2001 season which can be input directly to NHC's ATCF system.

12 U.S. profiler data

The profiler data have been assimilated in 3D-Var since Feb 2001 the impact was neutral although more positive impact is expected with 4D-Var in the future.

13 NWP SAF

The Met Office is leading the EUMETSAT Satellite Application Facilities (SAFs) for NWP in partnership with ECMWF, MétéoFrance and KNMI. It is now into its third year. More details of the NWP SAF's activities can be found at:

<http://www.metoffice.com/sec5/NWP/NWPSAF/>

Anyone interested in any of the activities of the NWP SAF should contact the SAF manager Bryan Conway: (bryan.conway@metoffice.com)

Highlights for the second year of the NWP SAF's activities are:

- An updated version of the AAPP code (ATOVS and AVHRR Processing Package version 3) has been released to support NOAA-16, improve remapping to HIRS ifovs, add cirrus flag for AMSU-B data and correct a few bugs.
- The fast radiative transfer model code (RTTOV-6) has been further developed to include an improved microwave surface emissivity model (FASTEM-2) and the code rewritten in Fortran-90.
- Co-ordination of the monitoring of observations for NWP has been expanded:
 - Atmospheric motion winds with both ECMWF and Met Office monitoring plots available <http://www.metoffice.com/sec5/NWP/NWPSAF/monitsatwind.html>
 - ATOVS radiances: <http://www.metoffice.com/sec5/NWP/NWPSAF/monitativs.html> where links to the Met Office, ECMWF, CMS Lannion, NCEP and NESDIS ATOVS monitoring are all listed.
 - Plans for monitoring of scatterometer observations are presented at: http://www.metoffice.com/sec5/NWP/NWPSAF/scatter_report/
- 1D-Var retrieval modules for ATOVS and IASI have been developed and are available as a package to any interested users on request.
- Studies for the preparation of ICI retrieval software for IASI.
- A selection of reports related to use of satellite data in NWP:
 - Report on strategy for assimilation of IASI data

- Validation report on QuikScat
- Report on development of ICI retrievals for IASI
- RTTOV science and validation report

For the coming year it is planned to release a new version of the RTTOV model which will include the capability to simulate AIRS data, to further enhance the monitoring web pages, and to add pre-processing software to AAPP for advanced sounder data. The user requirements for the NWP-SAF will also be updated.

1.1 Links to NOAA

There are two links to NOAA, a Frame Relay link to NOAA-NESDIS and a 64KBits/sec leased line to the NOAA Office of Systems Operations (OSO).

1.1.1 Links to NOAA-OSO

The link to NOAA-OSO is a 64Kbits/Sec leased line. There are two separate X25 data streams described in Table 1. The X25 data is encapsulated into IP and sent over the leased line using a router. The link utilisation is shown in Appendix A.

Speed Bits/sec	Protocol	NOAA-OSO System	UKMO	Data
64 K	X25	NOAA-OSO Telecommunications Gateway	TROPICS	GTS
4.8K	X25	NOAA-OSO Telecommunications Gateway	TROPICS	T4 Fax Products

Table 1Details of the links between UKMO and NOAA-OSO

1.1.2 Links to NOAA-NESDIS

The Frame Relay link to NOAA-NESDIS is currently being used for the transfers of satellite sounding data. Details on the link is shown in Table 2, the utilisation is shown in Appendix A and the estimated daily volumes of data is shown in Table 5.

Speed Kbits/sec	Protocol	NOAA-NESDIS System	UKMO	Data
256 Access/ 64 CIR from NESDIS	FTP	CEMSCS	NETLINK	Satellite Sounding data and products, see Table 4
128 Access/ 16 CIR to NESDIS	FTP	CEMSCS	NETLINK	ERS-2 Data

Table 2Details of the links between UKMO and NOAA-NESDIS

The utilisation graph in Appendix A shows that the majority of the file transfers over the link take place at the access speed of the circuit rather than the Committed Information Rate (CIR). A link upgrade at the NESDIS end to 512KBits/Sec Access speed and 128KBits/Sec CIR was ordered from Worldcom, the provider in November 2000. At the present time (27/4/2001) they have still not successfully implemented this upgrade.

1.2 Links to ECMWF

The 2Mbits/Sec link to ECMWF is used to transmit files of data between UKMO and ECMWF using TCP/IP protocols. This data includes GTS Data, numerical modelling products and satellite data. UKMO users can also submit jobs to run on the ECMWF Cray and access data on ECMWF computer systems using their MARS and METVIEW software.

1.3 Links to RMDCN

The link from UKMO to the RMDCN network has an access speed of 384Kbits/Sec. Permanent Virtual Circuits (PVCs) are established across RMDCN to other National Meteorological Services (NMSs) in WMO region VI. The details of some of these are shown

below:

1.3.1 Links to Meteo-France

A PVC with a speed of 128Kbits/Sec out (UKMO to Meteo-France) and 64Kbits/Sec in (Meteo-France to UKMO) has been established.

The link is used for:

- ◆ Exchange of GTS and Radar data.
- ◆ Sending GOES and GMS satellite data to Lannion. This data is then sent from Lannion to METEOSAT for rebroadcast.
- ◆ Transmission of satellite sounding data such as the SSM/I and ATOVS data is sent to Meteo-France using this link.

The intention is to upgrade this link to 128Kbits/Sec from Toulouse to Bracknell and 256Kbits/Sec Bracknell to Toulouse so that the increased satellite imagery received from Melbourne can be sent to Lannion to be inserted in the METEOSAT broadcast.

1.3.2 Links to DWD

A PVC with a speed of 48Kbits/Sec in both directions has been established between the UKMO and DWD. The FTP problem reported at the last meeting has been fixed and GTS data between UKMO and DWD is now using FTP .

1.3.3 Other RMDCN Links

The UKMO has the following PVCs through RMDCN to other NMSs

National Meteorological Service	Protocol	PVC Speed Kbits/Sec	Status
Ireland (Dublin)	FTP	32 Both ways	Operational
Netherlands (De Bilt)	TCP Sockets	24 Both ways	Operational
Norway (Oslo)	TCP Sockets	16 Both ways	Operational
Denmark	TCP Sockets	16 Both ways	Operational
Italy (Rome)	FTP	16 Both ways	Operational
Belgium (Brussels)	FTP	16 Both ways	Operational
Portugal	X25 Over IP	16 Both ways	Operational
Spain	X25 Over IP	32 Both ways	Under test
Iceland (Reykjavik)	X25 Over IP	16 Both ways	Operational
Moscow	FTP	?	Planned

Table 3Details of RMDCN Links to other NMSs in WMO Region VI

1.4 Other International Links

In an effort to gain routine, reliable access to global imagery from geostationary satellites, the Met. Office has implemented links as described briefly below. The approach has generally sought to identify mutual benefit from the exchange of satellite data and, hence, sharing of the costs involved.

1.4.1 Australian Met. Service

A Frame Relay link has been established between the UK Met. Office and the Australian Bureau of Meteorology (BoM) in Melbourne. The access speed is 128Kbits/Sec at each end and the CIR is 16Kbits/Sec in both directions. The link is being used for the exchange of data in WMO bulletin format using TCP sockets with TROPICS, files of satellite imagery (METEOSAT from UK and GMS from Australia) and ATOVS level 1c data with NETLINK. In order to receive more satellite imagery from Melbourne it is planned to increase the CIR of this link to 64Kbits/Sec Melbourne to Bracknell and 32Kbits/Sec Bracknell to Melbourne.

1.4.2 Canadian Met. Service

A 32 Kbits/Sec Frame Relay link has been established between the UK Met. Office and the Canadian Met. Service (CMC) in Dorval. It is being used for the exchange of data in WMO bulletin format with TROPICS and files of satellite data (METEOSAT from UK and GOES from Canada) with NETLINK.

2 Met. Office Communication Computer Systems

There are two computer systems at the Met. Office that are used to send data to customers. The TROPICS message switch handles all communications involving X25 protocols and WMO messages, it also has the ability to send WMO messages using FTP or TCP/IP sockets. The NETLINK system has the ability to send files using FTP.

In general TROPICS is used for the transfer of low volume data, typically from 100 Bytes to 50 Kbytes, where high speed data switching is important. NETLINK is used for the distribution of higher volume data at slower data switching speeds.

2.1 NETLINK

The NETLINK computer system is responsible for the operational transfer of files of data between computers on the Met. Office Central Data Network (CDN) and computers on external networks. It consists of two identical Compaq Alpha Computers running OpenVMS, the main system is called NETTLE and its backup is called TEAZLE.

The NETTLE system is a Compaq Alpha 1200/533 with 256 Mbytes of memory running OpenVMS V7.2 operating system. Currently the system is switching 10,000 files per day, which is about 6.5 Gbytes of data.

Table 5 shows the data and its associated volumes sent to NETTLE over the Frame Relay link at present.

Requirements Description	Daily Data Volume (MBytes)
ATOVS Level 1B data	283.1
SSM/I Brightness temperatures	231.0
Level 1B TOVS Data	219.3
Ice/snow gridded field derived from SSM/I data	80.0
AVHRR Products on a HIRS Grid, derived as part of the	31.0
AVHRR 100km and 50Km SSTs	7.9
AVHRR Mapped Global Area Composites	6.3
GOES cloud-tracked VIS/IR/WV Winds	2.6
Ozone Retrieved profiles and/or total column from SBUV on	1.1
Total from NESDIS to UKMO	862.3

Table 4 Data Volumes from NESDIS to UKMO

Description	Daily Data Volume (Mbytes)
ERS-2 data	9
Total from UKMO to NESDIS	9

Table 5 Data Volumes from UKMO to NESDIS

Table 6 shows the anticipated increase in data volumes over the next few years based on the data in the present European requirements list and the expected increase in link capacity required to be able to accommodate that data. Over the past year the data volume on the link has increased from 650MBytes to 862 MBytes without an increase in link speed. No problems with the timing of received data have been reported. However, the present link runs at the

frame relay access speed but this speed could drop to the committed information rate (CIR) if the suppliers network becomes congested. It is proposed that the link is operated at a CIR similar to the average daily data rate with an access speed four times that value. As long as the network continues to operate at the access speed there should be sufficient bandwidth and if the network becomes congested and the data rate drops we can pay to increase the CIR (up to 80% of the access speed). With present predicted data volumes this means we would increase the link speed mid 2002 to accommodate the expected future data increases.

Date	Data Volume (Mbytes)	Average Link Speed (Kbits/Sec)	Link CIR (Kbits/Sec)	Link Access Speed (Kbits/Sec)	Additional Data Requirement
01/07/2000	650.0	60.2	64	256	
01/10/2000	862.3	79.8	64	256	NOAA-L
01/01/2001	862.3	79.8	64	256	
01/04/2001	862.3	79.8	64	256	
01/07/2001	1073.3	99.4	128	512	Quicksatt, NOAA-L AVHRR & NCEP Sea Ice
01/10/2001	1073.3	99.4	128	512	
01/01/2002	1473.3	136.4	128	512	SSM/IS, AIRS and AMSU on AQUA
01/04/2002	1473.3	136.4	128	512	
01/07/2002	1473.3	136.4	256	1024	
01/10/2002	1883.3	174.4	256	1024	SEAWINDS on ADEOS & WINDSAT
01/10/2003	1883.3	174.4	256	1024	

Table 6 Future Data Volumes on the NESDIS Frame Relay Link.

2.2 TROPICS

The TROPICS system at Bracknell is a multi-computer Tandem K2000 Himalaya system; one computer system called TROPICS(A) is used to meet our national and international message switching needs. As such it supports some communications links ranging from low speed asynchronous connections to 64KBits/s synchronous lines although increasing the connections are made through routers and data sent out via the Ethernet LAN interfaces.

The main messages are transferred using FTP, TCP sockets and X25 but there is also support for messaging via telex, ISO TP4 (over LAN) and X.400.

The TROPICS(A) message switch is an eight processor system with 128MBytes of memory per processor running the non-stop Kernel D45 release of operating system. Currently the system is switching 1.9 million half-messages per day, which is about 3.5 Gbytes. Peak rates are around 45 half-messages per second, which is about 133 Kbytes/sec.

With regard to the "alpha-numeric observational" and GRIB channels between Bracknell and NOAA-OSO the following tables show the change in daily traffic rates since the last meeting: -

Date	Washington to Bracknell		Bracknell to Washington	
	Data (Mb)	Msgs	Data (Mb)	Msgs
April 1996	9.2	14256	9.1	13651
May 1997	9.6	15535	10.4	14662
May 1998	13.2	16524	11.0	15884
May 1999	17.5	18036	12.4	19199
June 2000	21.3	22123	14.2	24359
April 2001	32.7	23011	16.4	28925

Table 6 GTS Link Alpha-Numeric Channel

Date	Washington to Bracknell		Bracknell to Washington	
	Data (Mb)	Msgs	Data (Mb)	Msgs
April 1996	72.8	19455	75.9	23463
May 1997	75.6	19220	77.3	23007
May 1998	80.1	19932	66.5	16259
May 1999	78.7	19876	68.7	16343
June 2000	83.1	20389	75.3	17763
April 2001	86.1	20740	86.6	20006

Table 7 GTS Link GRIB Channel

Date	Washington to Bracknell		Bracknell to Washington	
	Data (Mb)	Msgs	Data (Mb)	Msgs
April 2001	5.4	59	5.4	60

Table 7 GTS Link T4 Channel

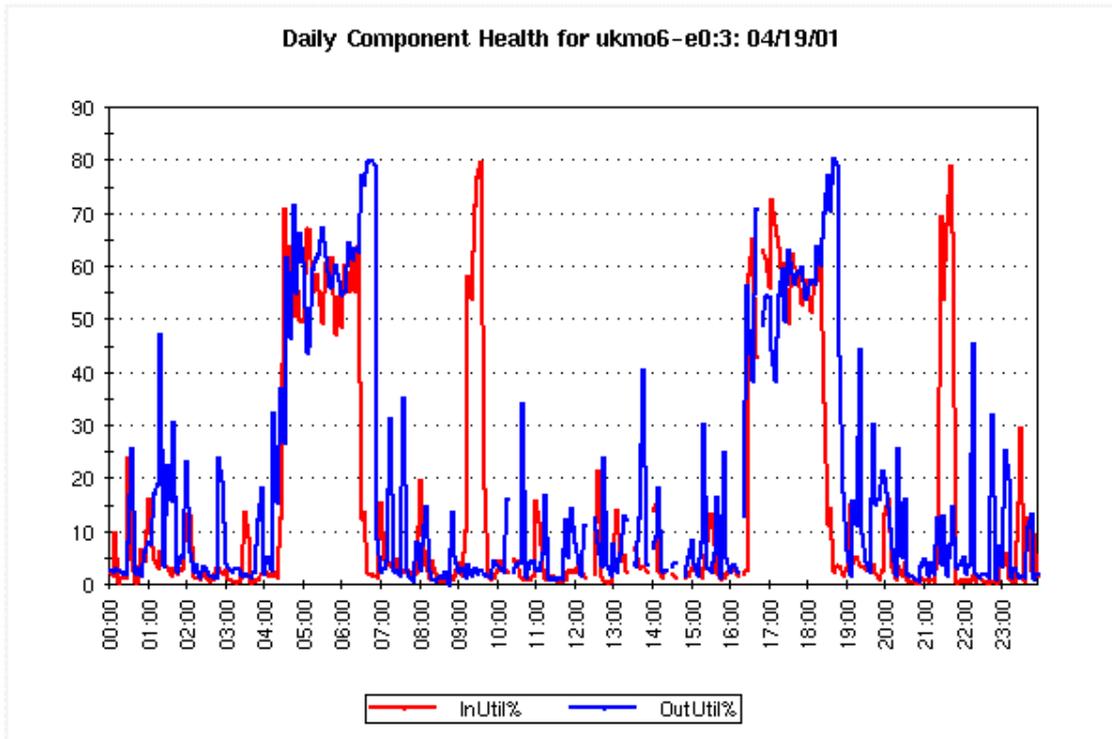
3 FROST

The Met Office is currently undertaking a project (name FROST) to replace the TROPICS message switches. It is expected that they will be replaced with a UNIX based system running packaged message switching software. It is hoped to award a contract for the supply of this new system in May or June 2001, subject to successful contract negotiations and an acceptable final cost. Assuming such a contract is awarded, the new system should be operational in the first quarter of calendar 2002. There should be little if any impact upon existing TROPICS links as all existing protocols and message formats will continue to be supported.

Appendix A Utilisation of UK Met. Office Links to NOAA

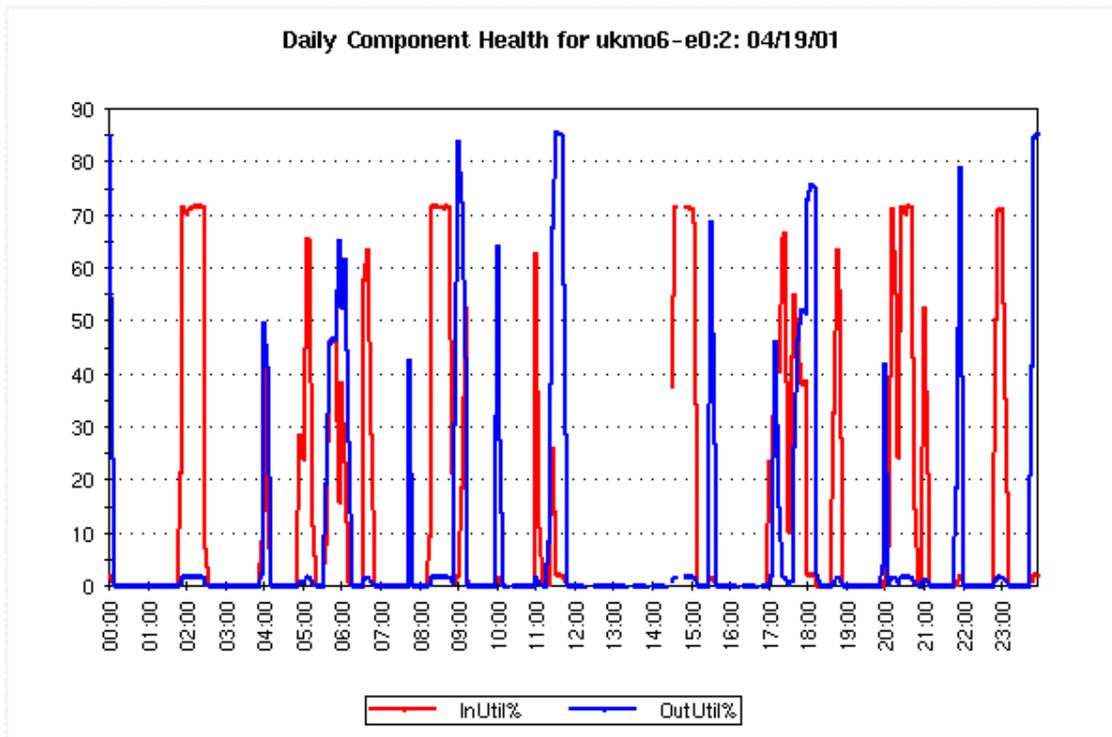
A1 Links to NOAA-OSO

A1.1 Utilisation of GTS Link between UKMO and NOAA-OSO



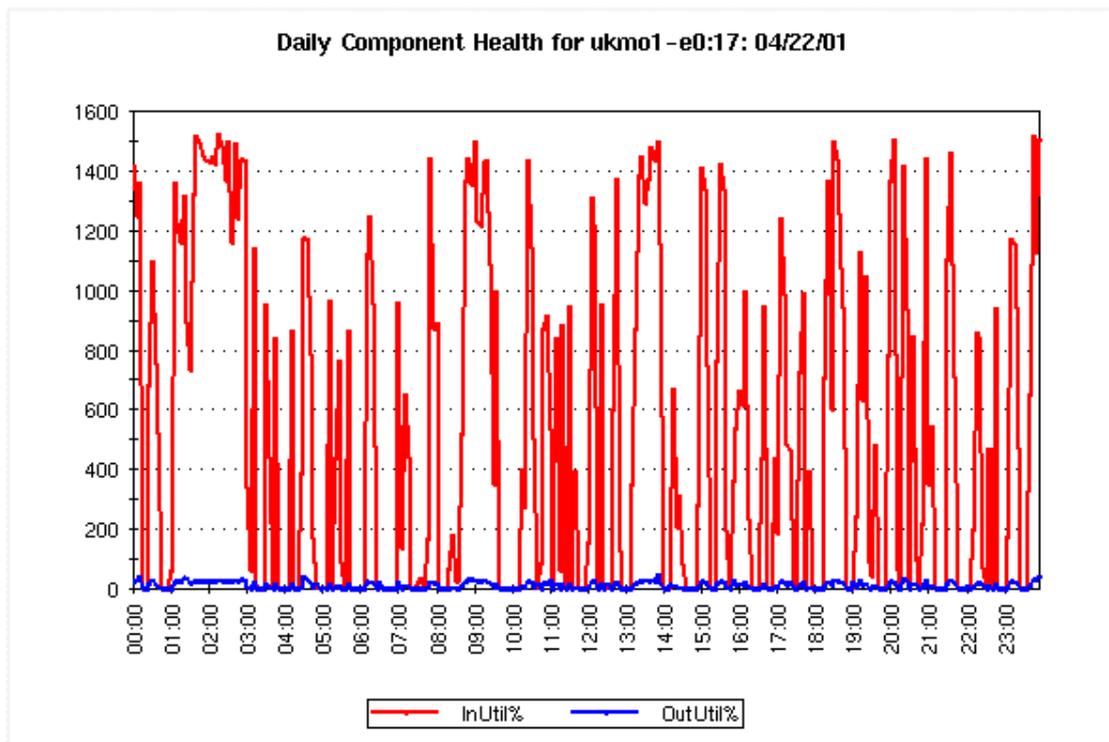
The graph shows the input and output utilisation of the GTS link to NOAA-OSO relative to the bandwidth of 64Kbits/Sec.

A1.2 Utilisation of the T4 Chart Link between UKMO and NOAA-OSO



The graph shows input and output utilisation of the T4 link to NOAA-OSO relative to the bandwidth of 4Kbits/Sec

A2 Frame Relay Link to NOAA-NESDIS



The graph shows the input and output utilisation of the Frame Relay link to NESDIS relative to a bandwidth of 16Kbits/Sec. This makes 1600% equivalent to 256Kbits/Sec.

ATTACHMENT-XIII

U.S. National Weather Service Office of Systems Operations Report (Fred Branski)

Following completion of reorganization the U.S. National Weather Service (NWS) Office of Systems Operations (OSO) is now the Office of Operational Systems (OPS). Likewise the former Systems Operations Center (SOC) is now the Telecommunication Operations Center (TOC). The Data Management Team is now part the Data Dissemination Branch.

Office of Operational Systems:	Chief - Walter Telesetsky
Telecommunication Operations Center:	Chief - William Brockman
Data Dissemination Branch:	Chief - Kenneth Putkovich
Data Management Team:	Team Leader - Fred Branski

Besides connections to the original Internet, The OPS is now connected to Internet2/Abilene. The fiber connection was completed and turned over to NOAA April 18. After testing, the connection was made live April 24. This and the additional previously established Internet connections are continuing to be monitored.

The OPS performed an in depth review of the impacts and lessons learned from the VERIZON communications outage experienced by the NWSTG/RTH Washington on November 29 to December 1. We have updated points of contact and escalation procedures and built impact templates to help us better understand and respond to any future service interruptions or product delivery problems. We are moving forward with establishing a second Point of Presence (POP) with a telecommunication service provider connected to a separate Central Office facility. We are also working to establish a SONNET ring (fiber optic) to carry high priority lines between the primary Central Office and us.

The TOC is currently evaluating replacing its existing three IBM mainframes and possibly some or all of its front-end communications processors with IBM MQX Series systems. We are working toward a parallel operational demonstration to test whether it will support the complete functionality we require and if it will be able to maintain the switching through put we need prior to committing full funding to this solution.

Work is also progressing on development of a geographically separated operational backup of the NWSTG/RTH Washington facility. We have identified a location at a NASA facility in West Virginia. A concept of operations plan is underway along with initial systems designs. We hope funding is likely to be approved in the next few years.

The OPS has expanded the satellite dissemination footprint of the Emergency Managers Weather Information Network (EMWIN) through partnership with the Pan-Pacific Education and Communications Experiment Group via their PEACESAT satellite. The entire Pacific basin is now covered.

We have also established two new data input services, FTP input and browser-based input. Both services are available to anyone with TCP/IP access to the NWS Telecommunication Gateway (NWSTG)/RTH Washington. This can be either via the Internet, GTS or other dedicated line connection. Establishment of either service requires pre-registration which is done via request through a web page.

When a request for access through the FTP input service is received an ID and password are established. Users of this service can place files containing one or more messages directly onto

established directories on our file servers where they are processed and introduced into our switching system.

The browser-based input service is similarly managed. A user uses their ID and password assigned during the registration process to access a web page via a browser that provides input boxes for the WMO heading and text of a message. The user can type or use cut and paste to enter data. When ready, the user submits the message via a button, some course validation is done of the heading and message formatting and the message is displayed in final form for a last review. If satisfied, the user then clicks a transmit button. The message is then picked up by the NWSTG/RTH Washington and introduced to our switching system.

The OPS is also working to field a Radiosonde Replacement System (RRS). Traditionally formatted TEMP and PILOT data will be available from the system. Also available, will be BUFR encoded data of greater density that will be made available to users with the capacity and capability to receive the data or access it via our FTP servers.

After many years, the digital facsimile (DIFAX) dissemination service was ended April 30. However, the existing products will continue to be available via Internet or direct FTP access from our web page and file servers.

The NWS replaced the NEXRAD Information Dissemination Service (NIDS) with the Radar Products Central Collection/Distribution Service (RPCCCDS) on January 1, 2001. The RPCCCDS allows for the full and open dissemination of U.S. RADAR (WSR-88D) products to the user community without restrictions on the use or redistribution of the products. An Operational Demonstration of the RPCCCDS was conducted between September 1 and October 18, 2000 with the following results.

- End to End Reliability - 99.1% of products generated at the RADAR were available to external users.
- End to End Timeliness - Products were available to external users within an average of 50.3 seconds.
- Number of Products Transmitted:

Maximum	800,668 per day
Minimum	530,838 per day
Average	636,033 per day

The RPCCCDS uses a national Wide Area Network (WAN) to collect a prescribed set of RADAR products from all WSR-88Ds in the United States, including the radars on Puerto Rico and Guam. OPS makes the products available via a multicast server, NOAAPort, a national dissemination system, as well as through the FTP servers. There are over 130,000 products per day with a volume exceeding 1.8 gigabytes.

All centrally collected products are available through the multicast server. Access is through a dedicated T1 line. Any user may also access products via anonymous FTP format directly from the FTP servers. Access is through a dedicated line or the Internet. Lastly, any user may access products through the NOAAPort satellite broadcast if they are within its footprint. A NOAAPort receiver is required. A subset of the centrally collected products intended to meet NWS operational needs is available.

Current Systems Status:

Main Frames and Front-End Communications Processors - 8 systems
Disk storage -over 400 gigabytes

Communication controllers -over 10 units
Communication lines -over 140
LANS & Routers -5 networks, 4 units

NWSTG Data & Model Products Servers

140 gigabytes storage
RAID architecture
4 Andrew File System (AFS) operated server-client data sets
2 FTP servers
 AFS Clients
3 Web data servers
 FTP and HTTP
 AFS Clients
1 HTTP Web page servers
 Documentation
4 Additional servers on order (some have arrived and are being configured)
Plan for 4 Web page and 4 HTTP servers

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KWBC Communications Control Center (CCC) - Tech Control
Point of contact 24 hours every day
Phone: +301 713 0902 Fax: +301 587 1773

ATTACHMENT-XIV

WIND PROFILER ROUTING HEADERS

As for 9th May 2001

UK

IUPA41 EGRR ABWWP	ECMWF,LFPW,EDZW,METDB,TROPE*, EHDB	
IUPA43 EGRR CM3WP,WATWP	MDB, ECMWF,LFPW, EDZW,EHDB	
IUPA44 EGRR DN3WP	MDB, ECMWF,LFPW, EDZW,EHDB	
IUPA45 EGRR	MDB, ECMWF,LFPW, EDZW,EHDB	-
IUPA46 EGRR AB3WP	MDB, ECMWF,LFPW, EDZW,EHDB	
IUPA47 EGRR** *WR	MDB, ECMWF,LFPW, EDZW,EHDB	
IUPA49 EGRR	MDB	-

ITALY

IUFR44 LFPW ROMWP	MDB,ECMWF,LFPW	
IUPA43 EGRR LAQWP	MDB,ECMWF,LFPW, EDZW,EHDB	

AUSTRIA

IUPA43 EGRR VIEWP,SZBWP	MDB ECMWF,LFPW, EDZW,EHDB	INNWP,
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SWEDEN

IUPA50 EGRR	MDB	KIRWP
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CABAUW

IUPD20 EHDB CABWP	ECMWF,LFPW,EDZW,METDB,TROPE*	
IUPD21 EHDB CABRS	ECMWF,LFPW,EDZW,TROPE*, GPCS8	
IUPD22 EHDB CB2WP	ECMWF,LFPW,EDZW,TROPE*	
IUPD23 EHDB	TROPE*	NEW VHF
IUPD24 EHDB	TROPE*	NEW VHF

GERMANY

IUPD40 EDZW	ECMWF,TROPE*, EHDB	LB1WP
IUPD41 EDZW	ECMWF,TROPE*, EHDB	LB2WP
IUPD42 EDZW	ECMWF,METDB,TROPE*, EHDB	LB3WP
IUPD45 EDZW	ECMWF,TROPE*, EHDB,GPCS8	
LB1RS		
IUPD46 EDZW	ECMWF,TROPE*, EHDB,GPCS8	
LB2RS		
IUPA48 EGRR	MDB	KARWP

FRANCE

IUFR40 LFPW	ECMWF,METDB,TROPE*, EHDB	LFVWP
IUFR41 LFPW	ECMWF,TROPE*, EHDB	
TOUWP		
IUFR42 LFPW	ECMWF,TROPE*, EHDB	
LANWP?		
IUFR43 LFPW	ECMWF,TROPE*, EHDB, MDB	
CLFWP		
IUFR46 LFPW	ECMWF,TROPE*, MDB	
TU2WP		
IUFR50 LFPW	TROPE* (NOT ECMWF)	
TOURS		
IUFR51 LFPW	TROPE*, MDB (NOT ECMWF)	
NI0WP		
IUFR52 LFPW	TROPE* (NOT ECMWF)	
NI1WP		
IUFR53 LFPW	ECMWF,TROPE*	MA0WP
IUFR54 LFPW	ECMWF,TROPE*	MA1WP

SWITZERLAND

IUPD41 LSSW	ECMWF,TROPE*, EHDB	
PAYWP,PY2WP		

* GPCS3 are routed through COSMOS 5 – then FTP'd to CWINDE account on rs0300.

** All weather radar VAD data is given IUPA47 EGRR.

E-mailed or FTP'd data is routed into the MDB.

ATTACHMENT-XV

MétéoFrance Report on European profilers

The map of the European WPR can be found at

<http://www.metoffice.com/sec5/CWINDED/cwinde99/cwindemape.html>

With respect to this map the following WPR classification can be made

regularly reporting	occasionally reporting	rarely or never reporting
Aberystwyth 50 MHz Aberystwyth 1 GHz Camborne 1 GHz Wattisham 1 GHz Lindenberg 400 MHz Lindenberg 1 GHz La Ferte-Vidame 50 MHz (at least for 2 more years) Nice 1 GHz Vienna 1 GHz Salzburg 1 GHz Innsbruck 1 GHz Cabauw 1 GHz Payerne 1 GHz	L'Aquila 1 GHz Rome mini-VHF 65MHz Clermont-Ferrand 50 MHz Toulouse 50 MHz Kiruna 50 MHz (not transmitted further than MetOffice)	Vgar (Airport) 1 GHz Bilbao 1 GHz Karlsruhe 1 GHz Lannemezan 50 MHz Andenes 50 MHz Kuhlungsborn 50 MHz Toulon (no real profiler behind)

The profilers are operated by various institutions (National Met Services, Universities or Research institutes, aeronautic institutions). The network has been initiated by the COST-76 action, without real operational commitment. Since the end of this action (March 2000) the network is still running "by continuity", thanks to the good will of the participants and of MetOffice in particular. A proposal of EUMETNET action for co-ordination of the "operational follow-on" is under discussion. Issues like data exchange with the US should be addressed after EUMETNET decision on the proposal: if it is positive then the action is the natural body for that, if it was negative then the network would rapidly disappear.

Nota:

- 1 GHz refers to the 0.9 - 1.4 GHz band (the profilers don't have all the same frequency)
- 400 MHz refers to the 400 - 500 MHz band (482 MHz in fact for Lindenberg)
- 50 MHz refers to the 45 - 55 MHz band (the profilers don't have all the same frequency)

ATTACHMENT XVI

MIGRATION TO DRIVEN CODE FORMS and RELATED ISSUES

During the most recent WMO Commission for Basic Systems (CBS) meeting, it was decided to continue the work performed over the last few years regarding transition to usage of table driven code forms (TDC) as the standard for data representation. Specifically, this refers to the usage of GRIB, BUFR and CREX as replacements for the other traditional code forms such as GRID, TEMP/PILOT, BOUY, SATOB/SATEM, CLIMAT, etc. Also, these TDCs are to be used for any new data encoding requirements. CBS directed the formation of a new Expert Team on Migration to Table Driven Code Forms (ET/MTDCF). The terms of reference for this team are:

- *to develop a detailed migration plan to table-driven representation forms to be presented to CBS-ext.(2002);*
- *to define a software project to specify, develop and distribute universal BUFR, CREX and GRIB 2 encoding/decoding software to all requesting countries;*
- *to define a training programme;*
- *to identify and analyze problems due to the migration of data representation at every step of the WWW data flow and develop proposals for solutions;*
- *to list in general terms the possible implications, due to the migration process, on WMO members' resources for development and operation, and propose solutions to mitigate the impact on members.*

To accomplish its work, the new ET/MTDCF will work very closely with the established the Expert Team on Data Representation and Codes (ET/DRC). Recently, meetings of both teams were held.

The meeting of the ET/DRC was held in the Météo-France International Conference Centre in Toulouse from 23 to 27 April 2001. The meeting of the ET/MTDC took place at WMO Headquarters in Geneva from 7 to 11 May 2001. Below are issues from the two meetings affecting migration and data exchange included here for information and action as needed by the organizations attending the U.S./Europe Data Exchange Meeting.

The status of encoding and decoding validation tests for the new FM 92 GRIB Edition 2 were reviewed. Further validation tests and experimental exchanges were recommended with a view to the use of GRIB 2 at the end of 2001/beginning of 2002, especially for the exchange of Ensemble Prediction System products. Organizations are being asked to review if they have performed additional encoding or decoding work or they would be willing to do so.

Additions to BUFR/CREX tables to support the transmission of automatic weather station (AWS) observations were developed for approval by CBS Ext. 02. Proposed BUFR/CREX templates for AWS data were also developed. Slovakia offered to perform validation of these templates. Templates to represent in BUFR/CREX, SYNOP, SHIP, BATHY/TESAC, BUOY, AMDAR, AIREP, TEMP/PILOT and METAR/SPECI were examined and further validations of these templates were recommended.

A new set of additions for oceanographic data to represent in BUFR/CREX XBT, XCTD and sub-surface float information was also recommended. This is of particular value to support the plans of the Data Buoy Cooperation Panel (DBCP) to make available all its drifting Buoy data in BUFR by 2003.

Because it would be very difficult to replace existing systems or modify them to use or produce table driven codes within a short time, it is urged organizations begin soon to introduce systems with software to handle data in BUFR (or CREX). Many organizations are looking at data format translation as an interim solution. The Secretariat was urged to contact manufacturers of observing systems and to solicit them for the development of systems that comply with the migration strategy and to provide Members with relevant information.

Organizations with their own BUFR/GRIB experts are urged to begin their own training programs

PRELIMINARY MIGRATION PLAN

- CBS (EXT)-2002 to review the migration plan;
- Training to be completed not later than 2005 (schedule below)
- L1: 2001 – General philosophy, table driven codes and migration overview
- L2: 2002 onward – Meteorological users, Data Managers, and those involved with application interfaces
- L3: 2004-2005 (as needed) – For encoder and decoder programmers (only needed if the software project is not implemented)
- Guide completed by the end of 2001;
- Templates completed by summer 2001 (current migration schedule foresees completion by March 2002).

The table below summarizes preliminary target dates for the migration process. Dates may need to be adjusted when new information from members or other organizations becomes available.

	Cat.1: common	Cat.2: satellite obs.	Cat.3: aviation	Cat. 4: maritime	Cat. 5: miscellaneous	Cat. 6: almost obsolete
Traditional code forms	SYNOP SYNOP MOBIL PILOT PILOT MOBIL PILOT SHIP TEMP TEMP MOBIL TEMP SHIP TEMP DROP CLIMAT CLIMAT TEMP CLIMAT TMPSPH	SAREP SATEM SARAD SATOB	METAR SPECI TAF CODAR AMDAR WINTEM ARFOR ROFOR	BUOY TRACKOB BATHY TESAC WAVEOB SHIP CLIMAT SHIP	RADOB RADREP IAC IAC FLEET GRID - >GRIB MAFOR HYDRA HYFOR RADOF ROCOB ROCOB SHIP	ICEAN GRAF NACLI etc. SFAZI SFLOC SFAZU
Start exp. exchange	Nov. 2002 Current at some places for upper air data	Current at some places	2006 Current at some places for AMDAR	2005 2003 for ARGOS data (BUOY)	2004	Not applicable (see below)
Start oper.	Nov. 2005	Current at	2008	2007	2006	Not

Exchange	Current at some places for upper air data	some places	Current at some places for AMDAR	2003 for ARGOS data (BUOY)		applicable (see below)
Migration complete	Nov. 2010	Nov. 2006	2015 2005 for AMDAR	2012 2008 for ARGOS data (BUOY)	2008	Not applicable (see below)

All dates above are meant as "not later than". However, members and organizations are encouraged to start experimental exchange, and, if all relevant conditions (see below) are satisfied, to start operational exchange as soon as possible.

Relevant condition to be satisfied before operational exchange may start:

- Training has been completed;
- All required software (encoding, decoding, viewing) is available;
- BUFR/CREX-tables and templates (if required) are available;

For all categories, codes need to be reviewed in order to decide whether or not they should be migrated to BUFR/CREX. Codes in category 6 are not to be migrated.

There are several categories where there are existing exchanges of data. The target dates are not intended to limit when exchange may begin. In fact it is strongly encouraged that migration on a test, experimental or bi-lateral basis begin as soon as possible. These targets are the dates the team feels it is important to have exchange of migrated data occurring no later than.

ATTACHMENT XVII

ENVISAT Near Real Time Products

The following is a list of ENVISAT 'meteo' products which are planned to be provided in BUFR format in near real time (< 3hrs from measurement) for use by operational meteorological forecast centres. More details on the data formats etc will be forthcoming from ESA before the ENVISAT launch. There is a forum planned on applications of ENVISAT near real time products at ESRIN, Frascati, Italy on 5 July 2001. The means of transmission for these products is continuing to evolve and a policy will be presented at this meeting.

Use of ENVISAT data for scientific purposes by Met. Services is considered to be "Category 1" within the ENVISAT Data Policy. The data policy documents, terms & conditions for the category-1 use of data and the prices for category-1 use can be found at <http://projects.esa-a.o.org/>.

Instrument	Products	Applications
ASAR	Wave cross spectra/direction	Ocean/Atmosphere Models
Radar Altimeter/ MWR	Wave height/Wind speed/water vapour (high accuracy over sea, low over land)	Ocean/Atmosphere Models
AATSR	Sea surface temp/ Br. Temps	NWP/Climate models
SCIAMACHY	Ozone total column (nadir retrieval).	NWP models
MIPAS	Ozone/temperature/water vapour/pressure vertical profiles (limb retrieval)	NWP models
MERIS	Total column water vapour (high accuracy over land, low over sea)/cloud thickness/cloud top height	NWP models
GOMOS	Temperature/ozone/water vapour profile (limb retrieval)	NWP models

The point of contact for information about these products is Guido Levrini (Guido.Levrini@esa.int)

End-of-Report

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