NOAA Climate Test Bed Seminar Series
Kingtse Mo, CPC; Michael Ek, EMC; Randal Koster, GSFC
Objective Drought Monitoring and Prediction

Kingtse Mo, NCEP/CPC: *Drought monitoring and Prediction: The recent efforts to forecast the meteorological drought.*

The Standardized Precipitation Index (SPI) has been used to classify the meteorological drought. The advantage is that the SPI can be derived from precipitation (P) time series alone without the need of a land-surface model. Before predicting SPI, the P forecasts from a coarse resolution global model have to be downscaled to a regional grid. Four different methods of statistical downscaling and error correction are tested. We down scaled the P forecasts from the CFS climate model, which has 250 km horizontal resolution to a regional grid at a 50km resolution. The four methods are: linear interpolation, a bias correction and spatial downscaling based on the probability distribution functions (BCSD) developed by the University of Washington group, a linear regression method by John Schaake and the Bayesian method used by the Princeton University group. The Bayesian method is more skillful because it takes into consideration of hindcast skill and model spread.

The EMC Regional Spectral Model (RSM) group has been performing the dynamic downscaling of the CFS outputs by nesting the RSM in the CFS forecasts. The RSM has the same physics and dynamical core as the CFS and has the resolution of 50 km. While the RSM improves the P climatology, there is no significant gain in skill in comparison with the Bayesian corrected T62 CFS ensemble P forecasts.

The downscaled CFS P forecasts out to 6 months were appended to the precipitation analyses to form an extended P data set. The SPI was calculated from this extended time series to forecast the meteorological drought. The skill is regionally and seasonally dependent. Overall, the 6 month SPI is skillful out to 3 months.

Michael Ek, NCEP/EMC: *NLDAS Support for Drought Monitoring and Seasonal Prediction*

The NCEP Environmental Modeling Center and its NOAA Climate Prediction Program for the Americas partners developed the North American Land Data Assimilation System (NLDAS) which is used to support the NCEP/Climate Prediction Center and the National Integrated Drought Information System in drought and flood monitoring and seasonal hydrological forecasting.

NLDAS drought monitoring consists of a 29-year (1979-2007) retrospective and a companion near real-time extension, with hourly water and energy fluxes and state variables (e.g. soil moisture, snowpack, runoff, evaporation) at 1/8th degree resolution over CONUS from four land surface models (NCEP/Noah, NASA/Mosaic, OHD/SAC, and Princeton/VIC). Land model forcing is from NCEP's retrospective and real-time

North American Regional Reanalysis System (NARR), except precipitation which uses daily gauge-based precipitation disaggregated to hourly using radar and satellite data.

The NLDAS seasonal hydrological prediction system uses three different sources for generating downscaled ensemble seasonal forecasts of surface forcing to drive the VIC land model in an uncoupled mode which yields one to six month ensemble seasonal hydrological predictions (of e.g. streamflow, etc).

Randal Koster, NASA/GSFC: *Recent Analyses of Drought Character and Prediction*

This talk will briefly describe three recent studies on drought structure and prediction at NASA/GSFC. First, a series of offline, century-long integrations across the continental U.S. indicate the relative degrees to which meteorological prediction and soil moisture persistence contribute to the subseasonal forecast of soil moisture. Second, the observational record is mined to identify asymmetries in the character of drought and pluvial periods over a broad range of time scales. Finally, observational streamflow data covering a substantial portion of the U.S. West is examined alongside model runoff simulations to isolate the contributions of soil moisture and snowpack information to streamflow prediction at seasonal time scales.