Environment Canada Environnement Canada

Canada's National Air Quality Forecast Program

Program Update

NOAA AQ Focus Group Meeting
September 7, 2006

Canada

Current Program Status: Daily Air Quality Forecasts and related health information are now accessible to 75% of the Canadian population

The AQFP "early warning system" is composed of three complementary products :

- **Daily Forecast Program (FLCN's)** – a two-day forecast of predicted levels of ground-level ozone/fine particulates. The bulletin includes numerical and categorical values. The categories are; "Good", "Fair", "Poor" and "Very Poor". The forecast is issued twice a day regardless of the values expected
- **Air Quality Advisory/Warning Program (WLCN's)** - issued when smog levels threaten to become detrimental to the health of the general population i.e. "Poor" category
- **Air Quality Observations (SQCN's/AIRNOW)** – near real-time observations available on an hourly basis provided in partnership with provincial and/or municipal governments

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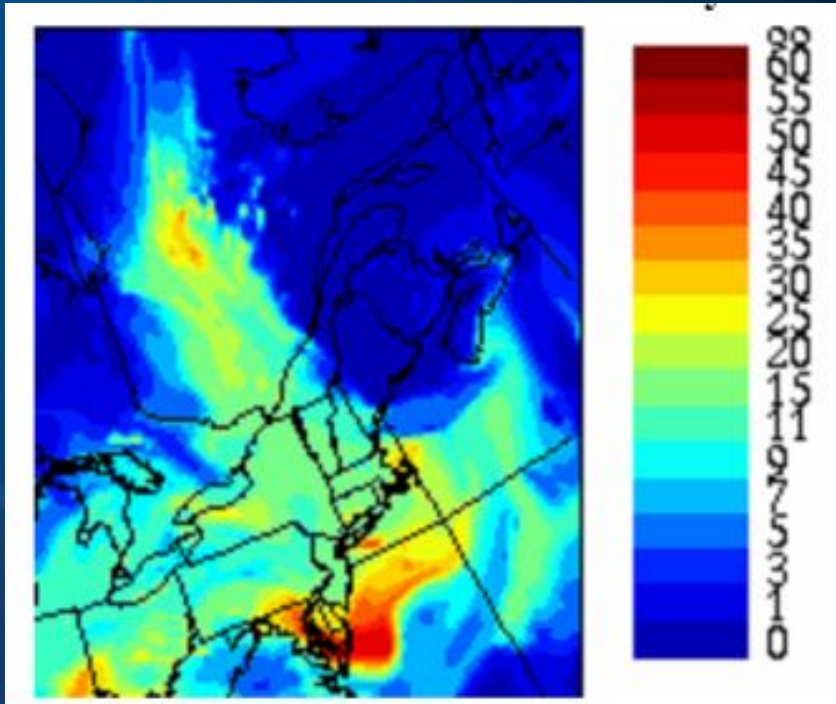
Special Air Quality Products

Also responsible for the provision of other AQ products based on regional needs

- Ventilation Forecasts
  - Various regions
- Smoke Control/ “Burning Windows” Forecasts
  - British Columbia/Yukon
- Special Air Quality Advisories
  - PM forecasts due to forest fire smoke
  - CANERM
    - SPC contacts CMC Operations to request CANERM run



CHRONOS with forest fire emission

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Critical Elements of Canada's AQ Forecast Program

Systematic observations

Prediction

Service Delivery

Super Computing Facility (CMC)

Storm Prediction Centres

Partners

Ontario MOE

Research & Development

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AQFP Vision

AQFP "vision" will see the Air Quality Forecast "Early Warning System" become "mainstream"

- Primary focus will be to ***"standardize"*** service from coast-to-coast while recognizing regional differences and partners' requirements
  - Direct forecaster intervention in all jurisdictions
  - Year-round service issued 2X per day
- Incorporate new tools/improve others
  - Data Assimilation – 2006
  - Dataflow Reorganization – 2006
    - Develop data-sharing MOU with EPA (under discussion)
  - BUFR Data Standard (Format Standardization) – 2007
    GEM MACH (CHRONOS Replacement) – late 2007
  - Air Quality Health Index – planned 2008

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AQFP Vision

- UMOS-AQ (Statistical Post Processing) – 2008
- SCRIBE-AQ (Forecaster Workstation Interface) – 2008
- New AQHI to be inserted directly into the Public Forecast transitioning the traditional "**weather forecast**" to an "**environmental forecast**" – 2008

Public Forecast example:

"Today….Mainly sunny. Wind southwest 15 km/h. High 32. ***AQHI 5 or moderate risk***. UV 7."

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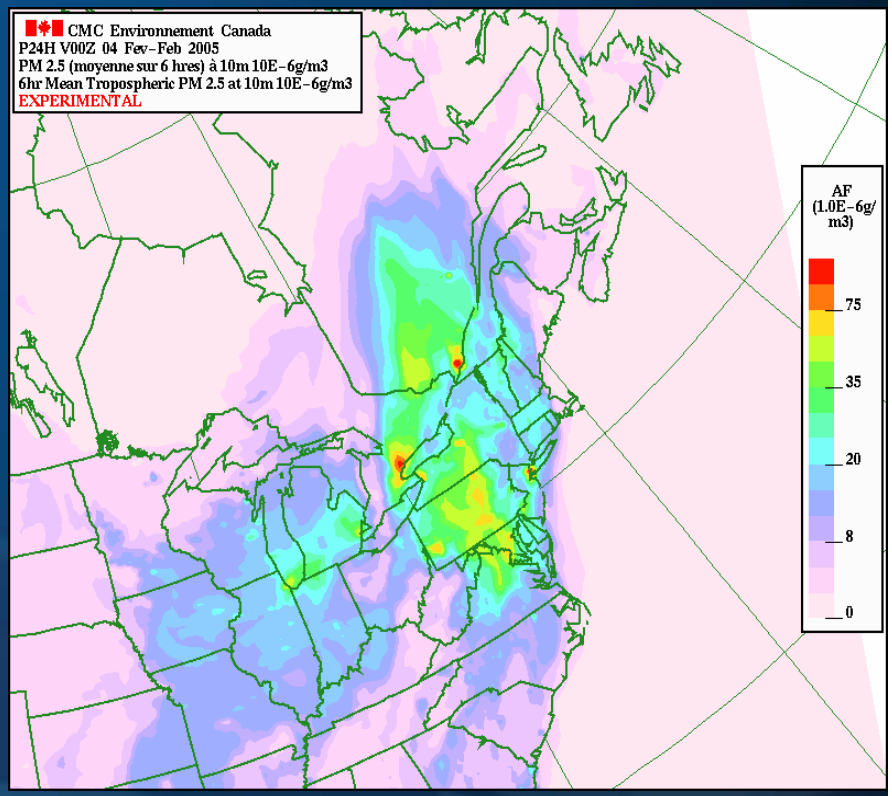
CHRONOS (Canadian Hemispheric Regional Ozone and NOx System)

- Primary guidance
- Operational since 2001
- Added fine particles and ozone objective analysis in 2003
- Issued twice per day/continental domain
- 21 km resolution
- Future development focused on new GEM-MACH



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GEM-MACH: Environment Canada's Next Generation AQFM

Objectives:

- Replace existing CHRONOS with increased performance model by fall of 2007
- Build a system that will support future technological advances & scientific developments in AQ modelling
- Improve delivery capabilities i.e. time and services

Technological information:

- Off –line GEM/CHRONOS system to On-line GEM-MACH architecture
- 2007 version will match existing capabilities:
  - Forecasts at 00 & 12Z
  - Hourly output for O_3, $PM_{2.5}$, NO_2, SO_2 and AQHI;
  - Covering Canada, continental U.S., parts of Mexico;
  - 21km resolution or lower

Status Update:

- Release of 2nd prototype with area emissions interface – Sept 2006
- Release of 3rd prototype with oxidant chemistry – Nov 2006

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GEM-MACH 2007

Canada's new AQ Forecast Model System with science capability equivalent to ***CHRONOS***

« online model »

Meteorological Model with Chemistry
GEM-MACH 2007

Emissions Processing System
SMOKE

Forecasts
O_3, $PM_{2.5}$, PM_{10}, NO_2, SO_2, AQHI, etc

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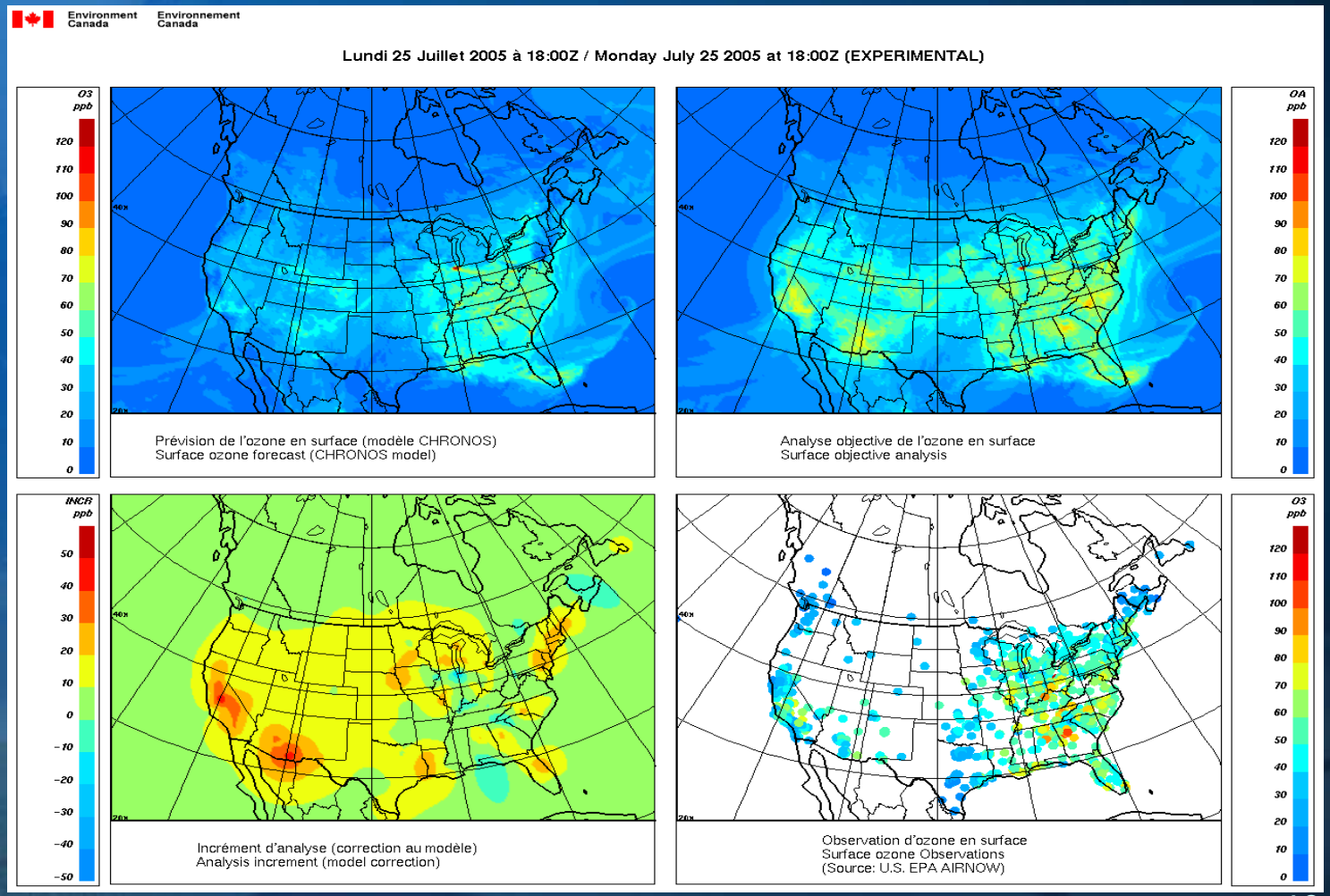
CHRONOS – Objective Analysis



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What is the Air Quality Health Index

- Communicates the combined, short-term health risk associated with multiple pollutants (current formulation based on **O_3, $PM_{2.5}$, NO_2, SO_2)**
- Information tool that empowers Canadians to protect their health from the risks of air pollution
- Communicates health risks of current & forecast air quality conditions at community level
- The AQHI is the *first of its kind* in the world developed to be
  - Health-based
  - User-friendly
  - Nationally-consistent
  - Regionally-flexible

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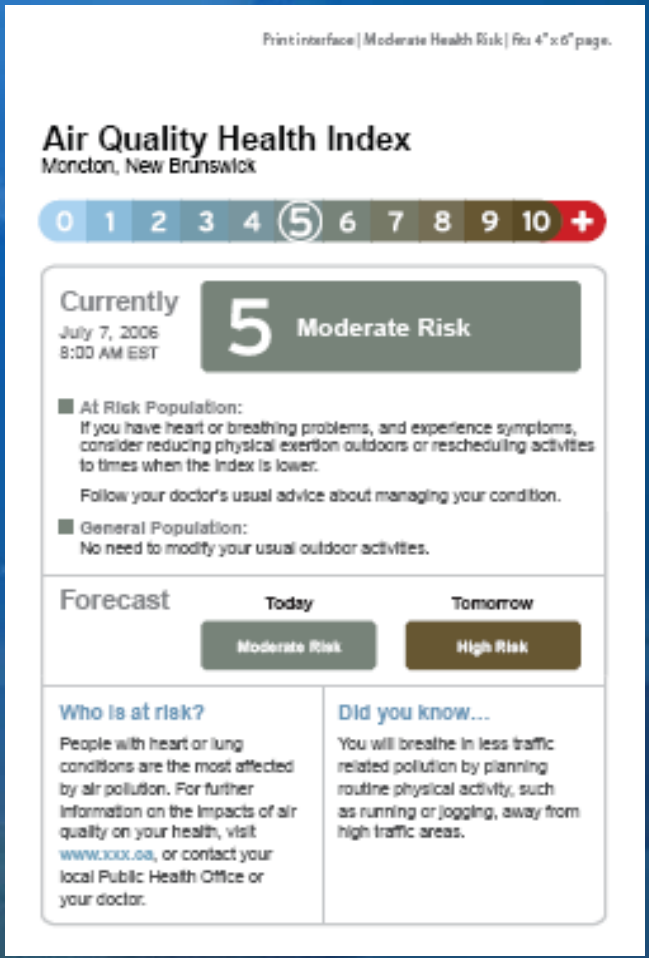
AQHI Presentation: Patterned on the UV Index



- Ilustrates level of health risk with **colour & number scale** of 0-10+
- **Labels the level of risk** as “low”, “moderate”, “high” or “very high”
- Currently **Forecasts** local air quality for next 24 hours
- **Empowers individuals** to decide how they might be at risk
- Provides multi-pollutant **health messaging** to tell Canadians—both general & at-risk populations—how to minimize their exposure

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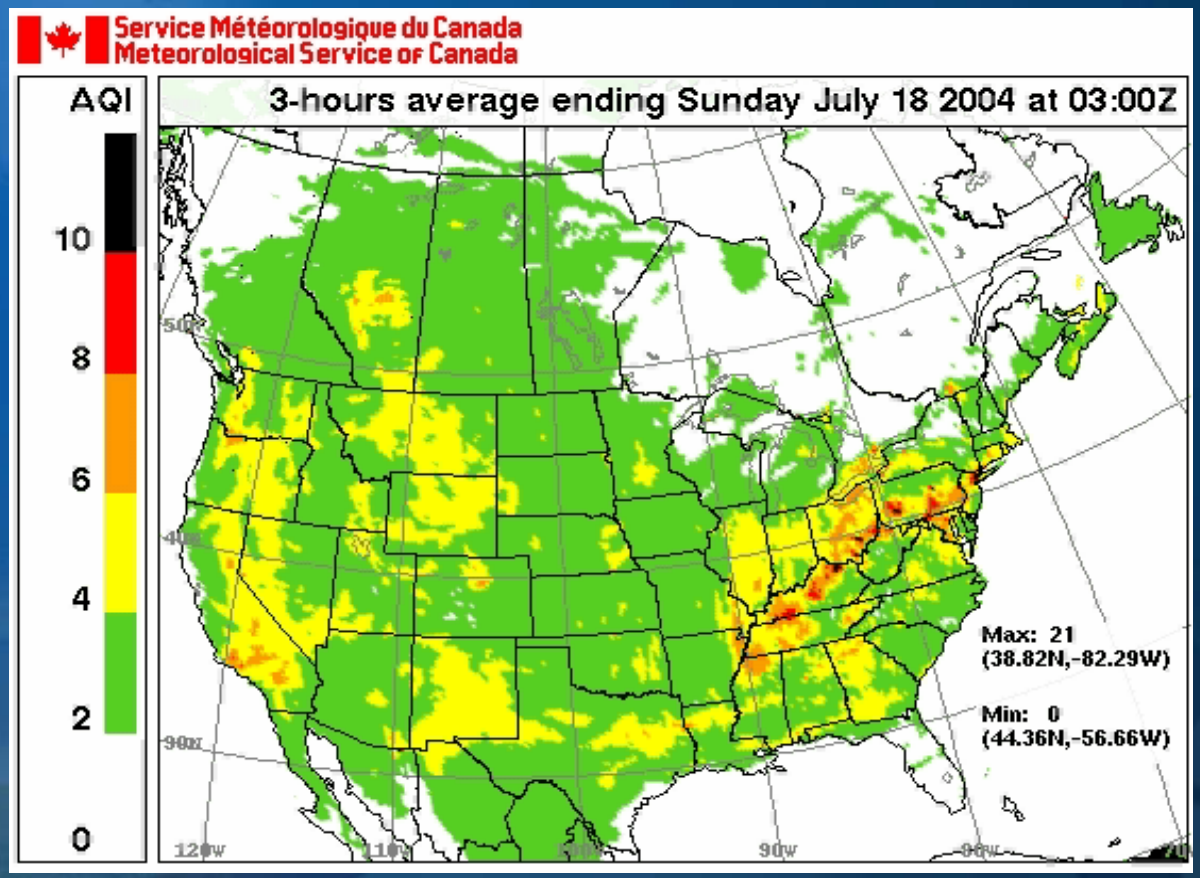
Air Quality Health Index



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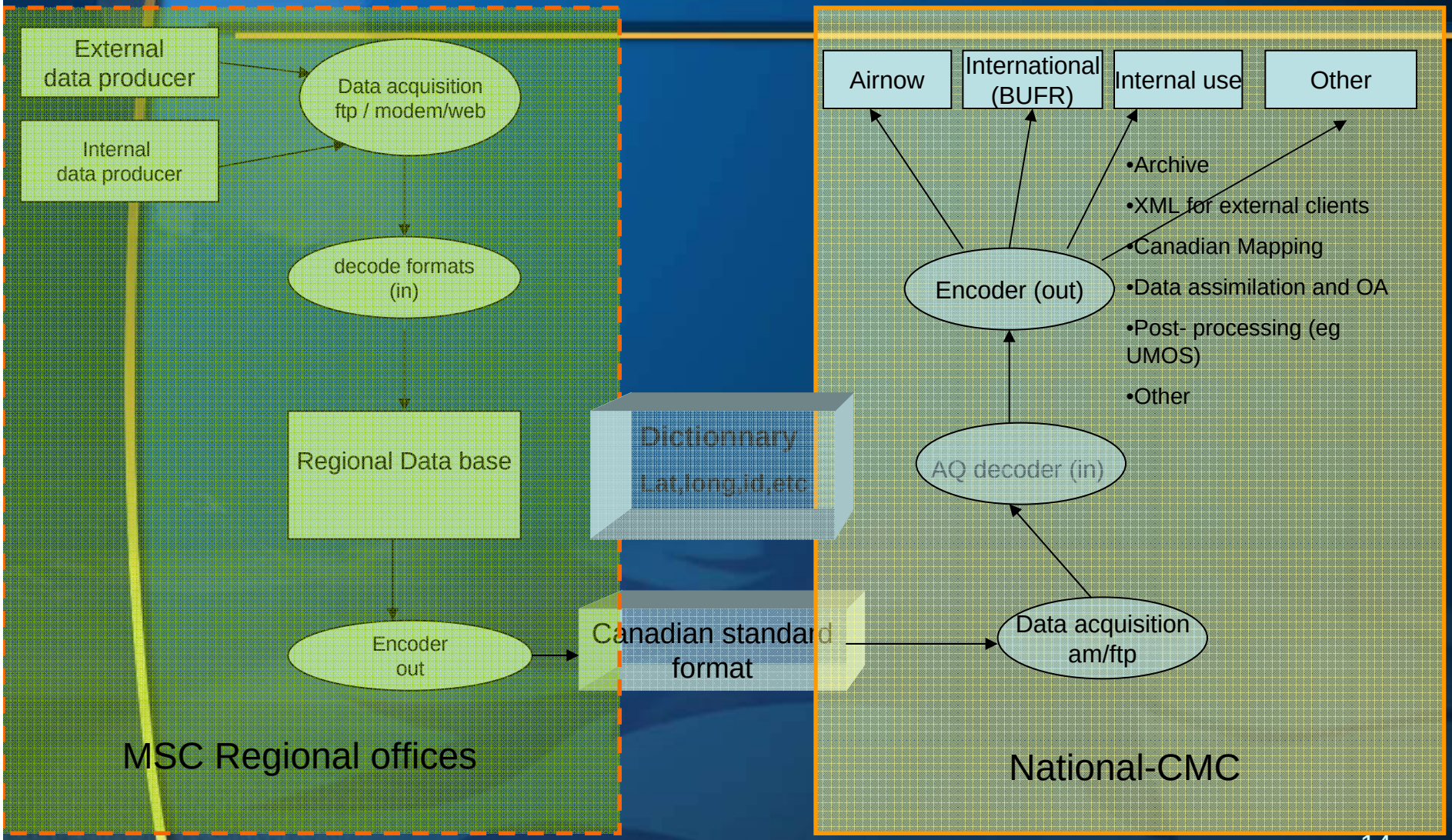
Proposed Air Quality Data Flow
Cheminement des données proposé



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Questions?

http://www.weatheroffice.ec.gc.ca

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