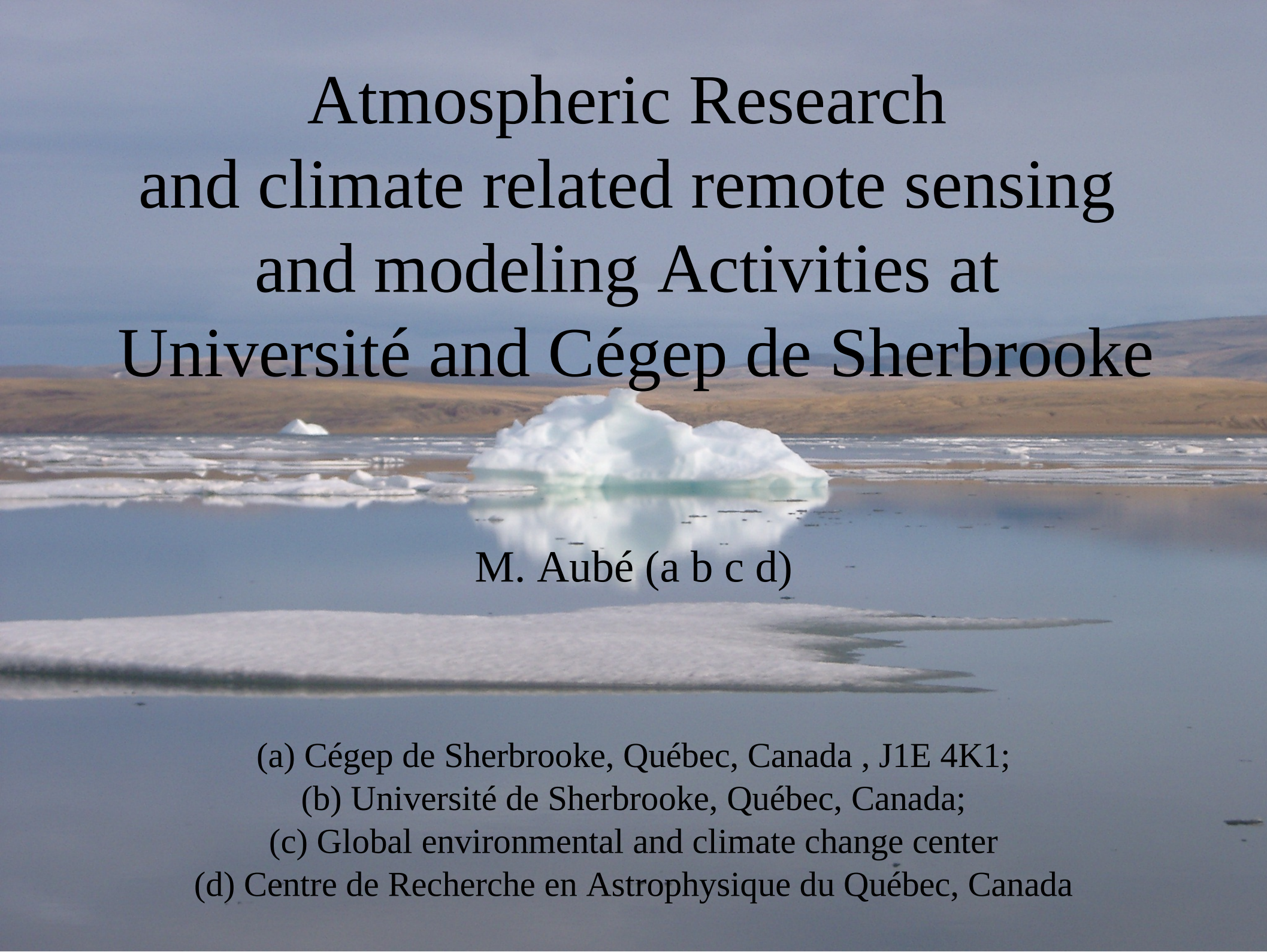


Atmospheric Research and climate related remote sensing and modeling Activities at Université and Cégep de Sherbrooke

M. Aubé (a b c d)

(a) Cégep de Sherbrooke, Québec, Canada , J1E 4K1;
(b) Université de Sherbrooke, Québec, Canada;
(c) Global environmental and climate change center
(d) Centre de Recherche en Astrophysique du Québec, Canada

Sherbrooke's team

Centre d'application et de recherche en télédétection (CARTEL)

Global environmental and Climate Change Center (GEC3)

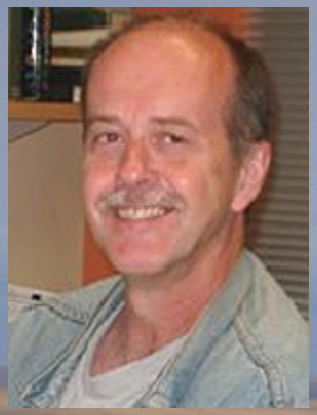
Norm T. O'Neill, Alain Royer, Martin Aubé

3 post-doctorate

6 doctorate students

5 master students

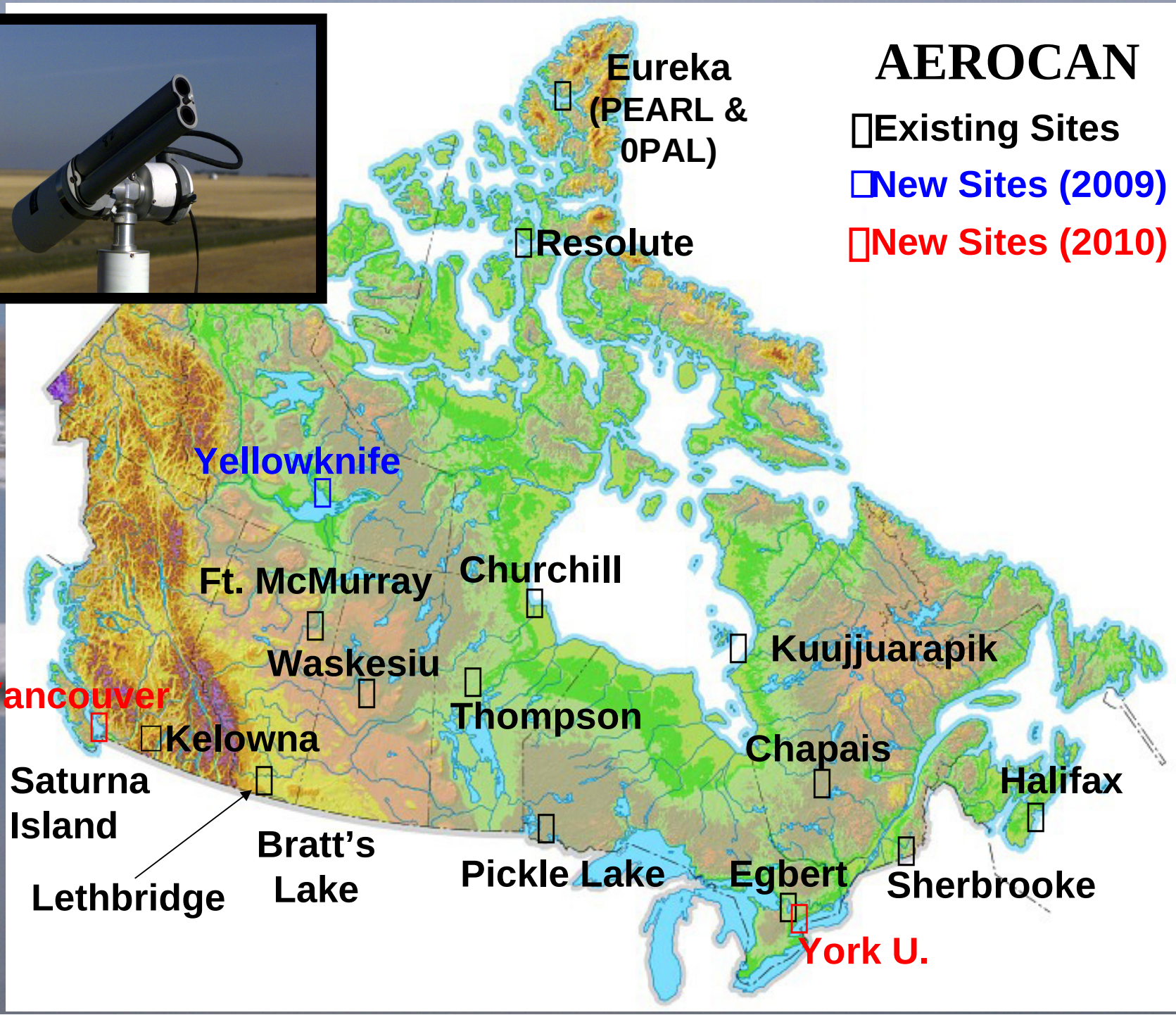
Norm T. O'Neill current research



http://callisto.si.usherb.ca/~noneill/

- Canadian Aerosol Optical Network
- Arctic Aerosol Research

Canadian Aerosol Optical Network



Canadian Aerosol Optical Network

Canadian automated Lidar network - CORAL Net

Canada

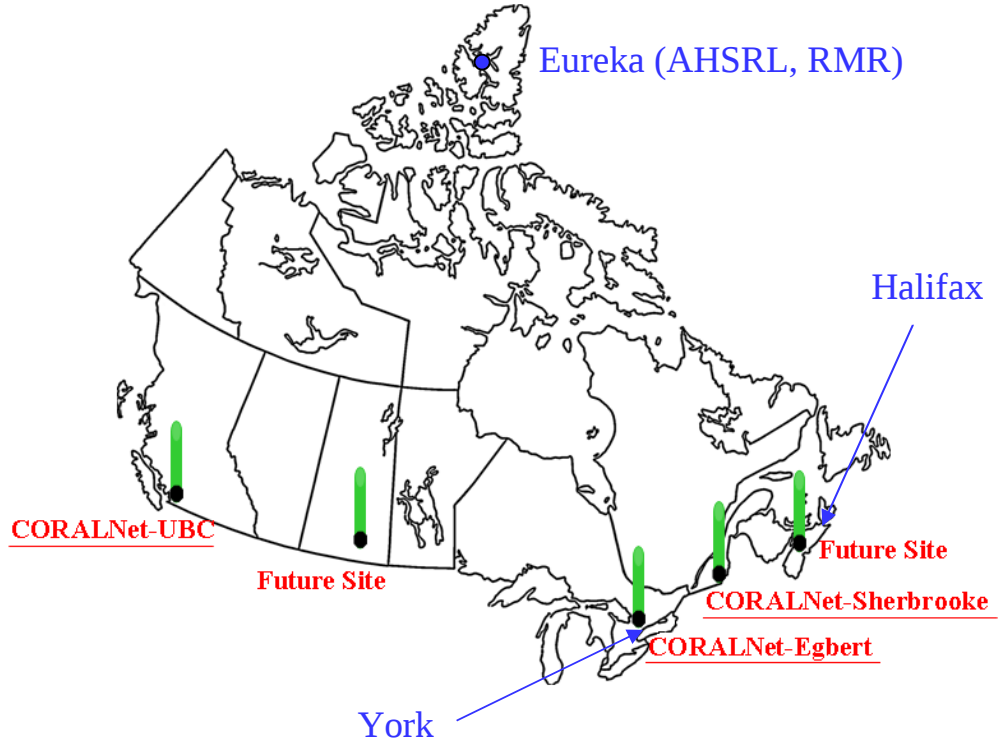
Environnement Canada Environment Canada

CORAL Net

The Canadian Observational Research Aerosol Lidar Network

CORALNet - Home | About CORALNet | Lidar Basics | Create Login | Contact

Select a CORAL Net Site :



Arctic Aerosol Research

PEARL Station

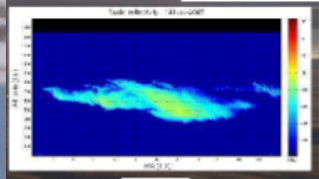
Eureka, North Canada (80N, 86W)

MICROWAVE RADIOMETER (MWR)

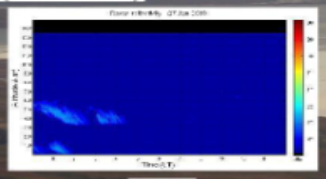
RADIOSONDE

SUN-PHOTOMETER

RADAR (MMCR)



TIC 2

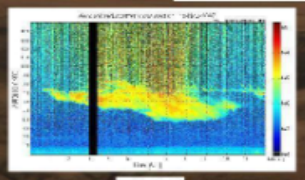


TIC 1

PEARL

STAR-PHOTOMETER

LIDAR (AHSRL)



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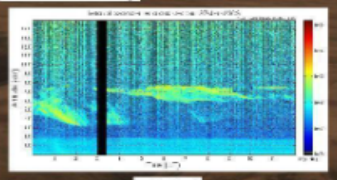
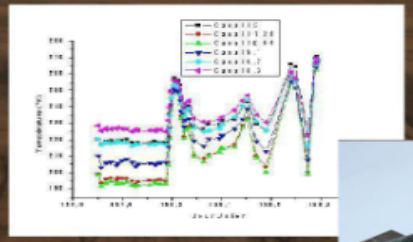
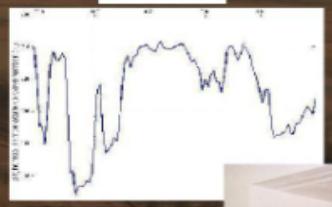


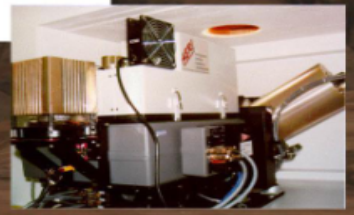
TIC 1

THERMAL INFRARED RADIOMETER (TIRR)



P-AERI





Arctic Aerosol Research

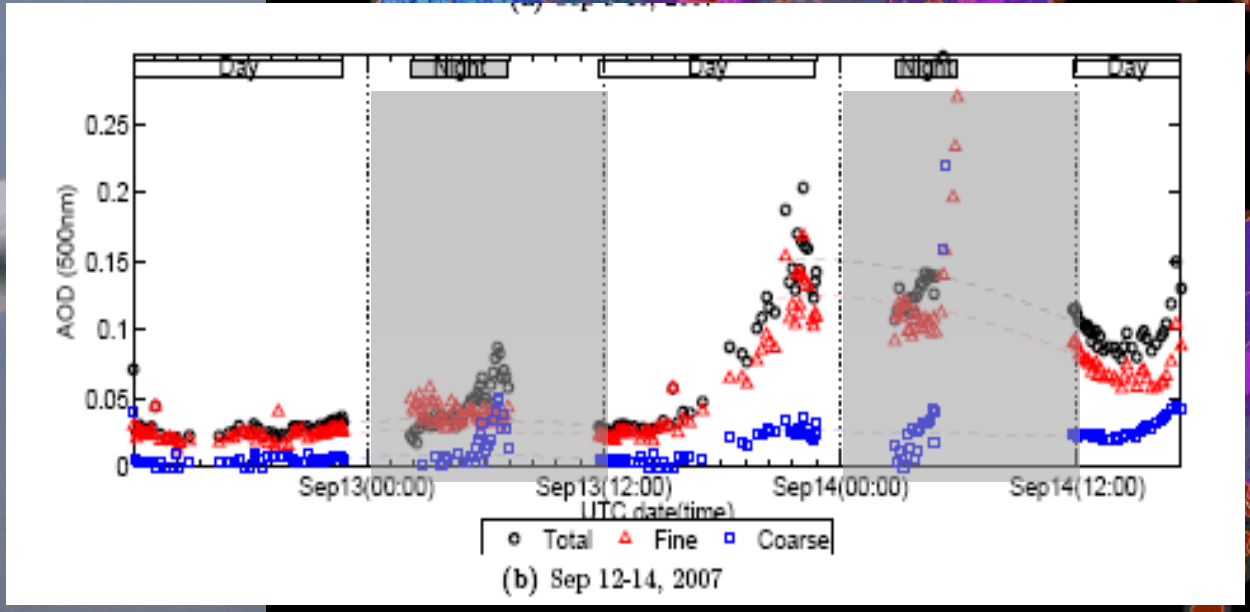
Starphotometer STAR01 (S & P) and 3.2 m Baader observation dome at Koldewey-Station on Spitsbergen (Norway)

AEROCAN
&
STARPHOTOMETER

Eureka

Sherbrooke

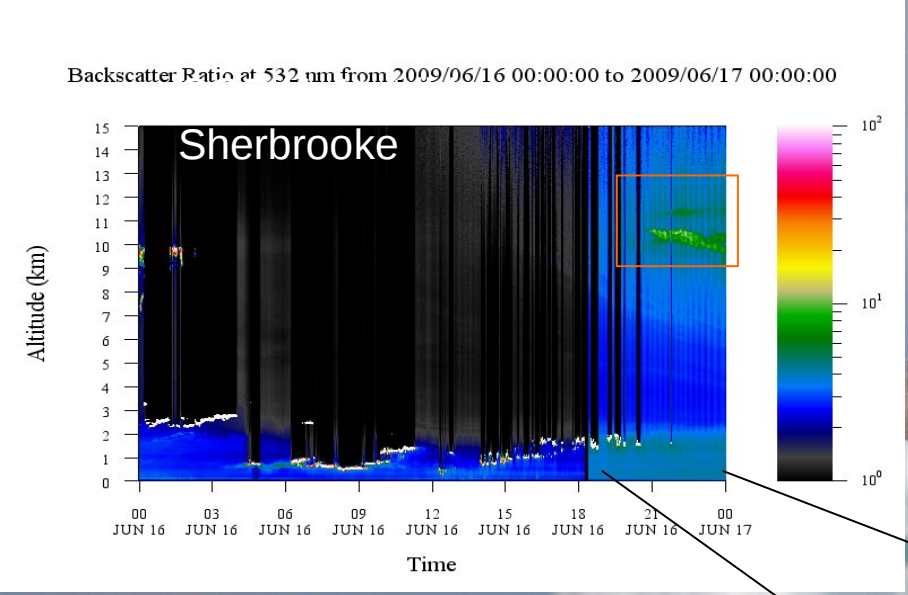
Egbert

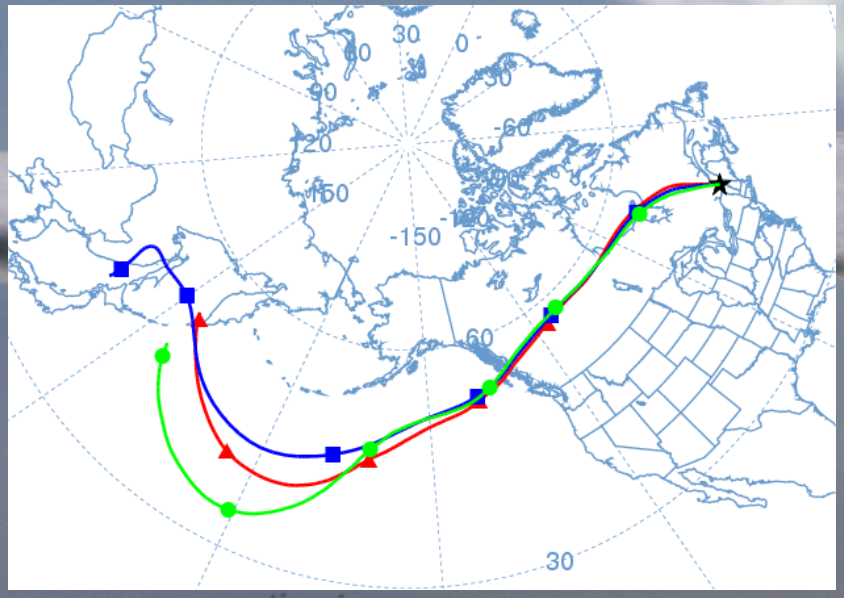


(b) Sep 12-14, 2007

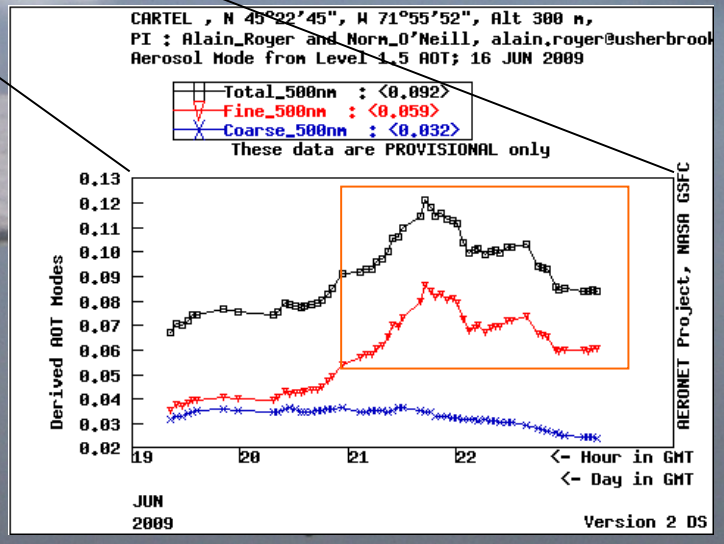
Arctic Aerosol Research

Sarychev volcano plume measured at Sherbrooke June 16, 2009





HYSPLIT (NOAA) backtrajectories



AEROCAN - Sherbrooke

Alain Royer current research
CARTEL's Director

- Monitoring the environment
- Climate change remote sensing

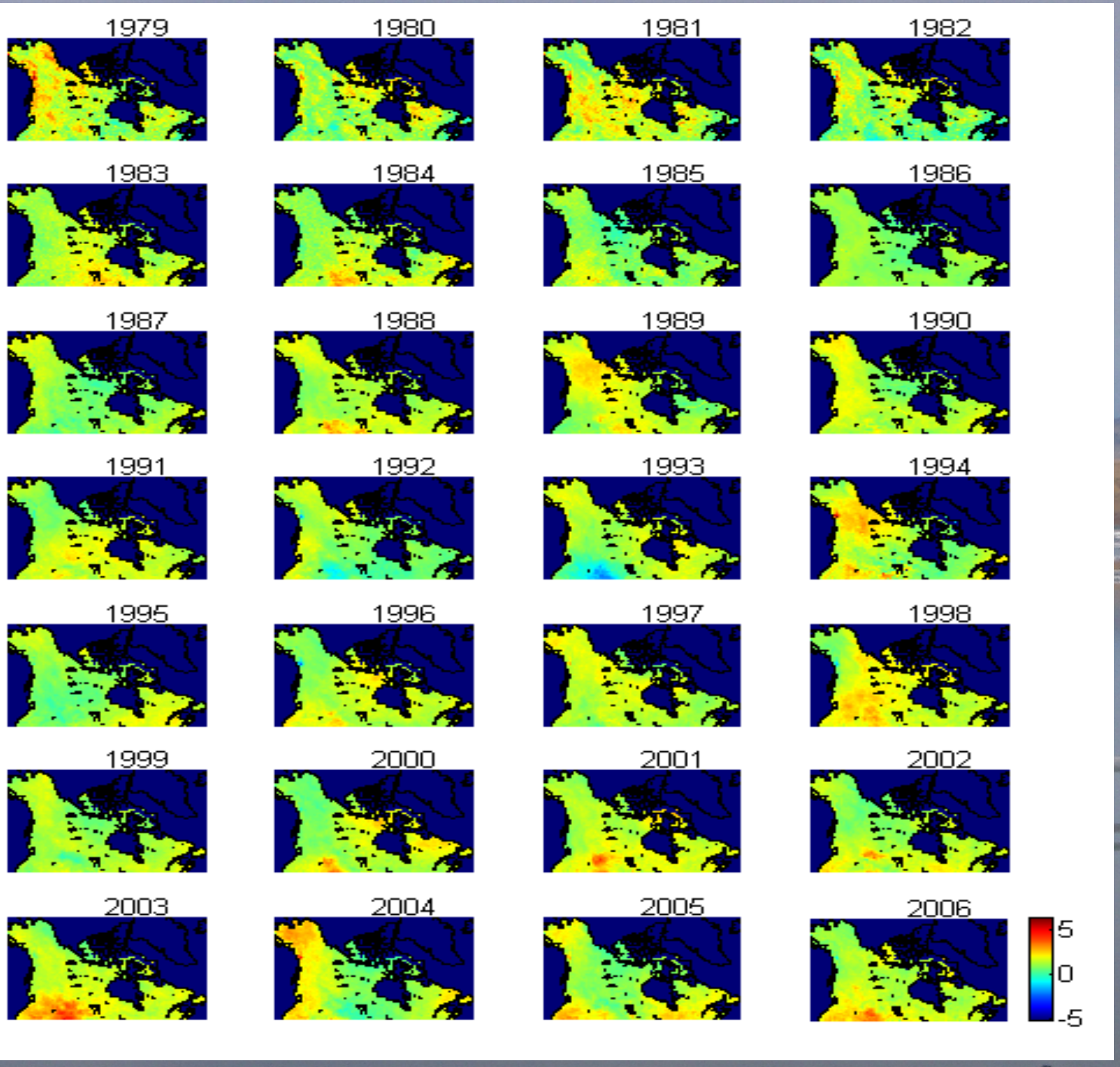
Monitoring the environment

Observed parameters

- Vegetation activity (beginning, end, growth)
- Snow (beginning and end of snow cover, water content)
  - MODIS
  - SSM/I
  - AMSR-E
  - QuickScat
  - in-situ microwave radiometer
- Surface temperature (climatic anomaly)
  - Microwave radiometer
- Atmosphere (Thin ice clouds)

Surface temperature anomaly

(1979-2008)



SMMR and SSM/I-DMSP F8, F11 et F13

Atmospheric monitoring

- Remote sensing of thin ice clouds (TIC)
  - Thermal infrared radiometer
- Design of a dedicated satellite TICFIRE

Martin Aubé current research

http://cegepsherbrooke.qc.ca/~aubema/index.php/Prof/Page

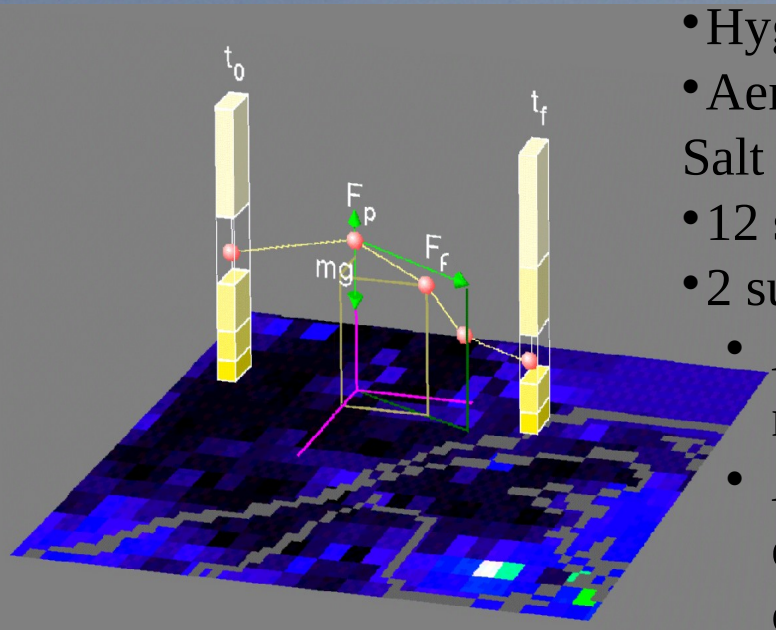
- Night time aerosol remote sensing
  - Light pollution spectrometer
  - Lunar photometry
- Spatio-temporal analysis of aerosol optical depth

Aerosol Optical Depth Spatio-temporal Model

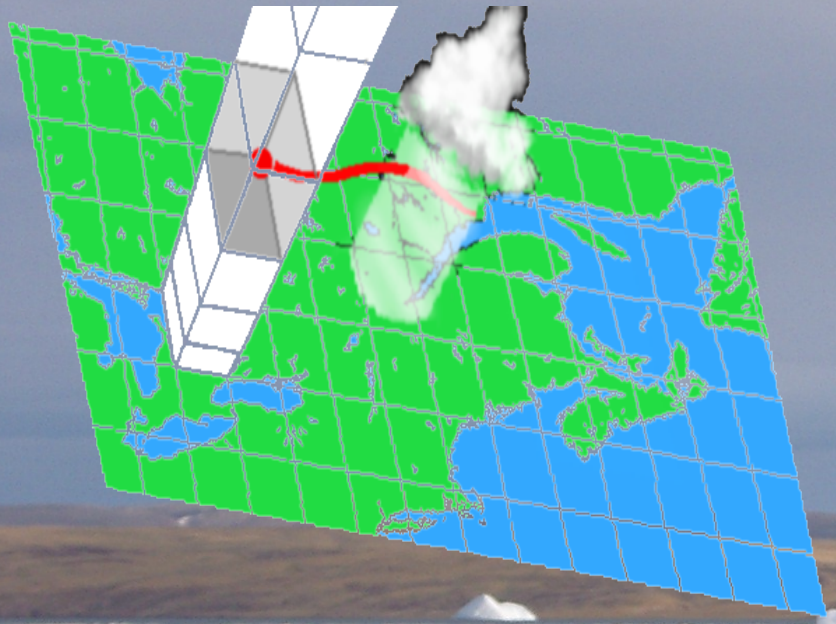
(AODSEM 2.0, http://cegepsherbrooke.qc.ca/~graphycs/site/html/NOMAD/index.html)

Target: intelligent interpolator for Aerosol Optical Depth datasets

MODEL OVERVIEW

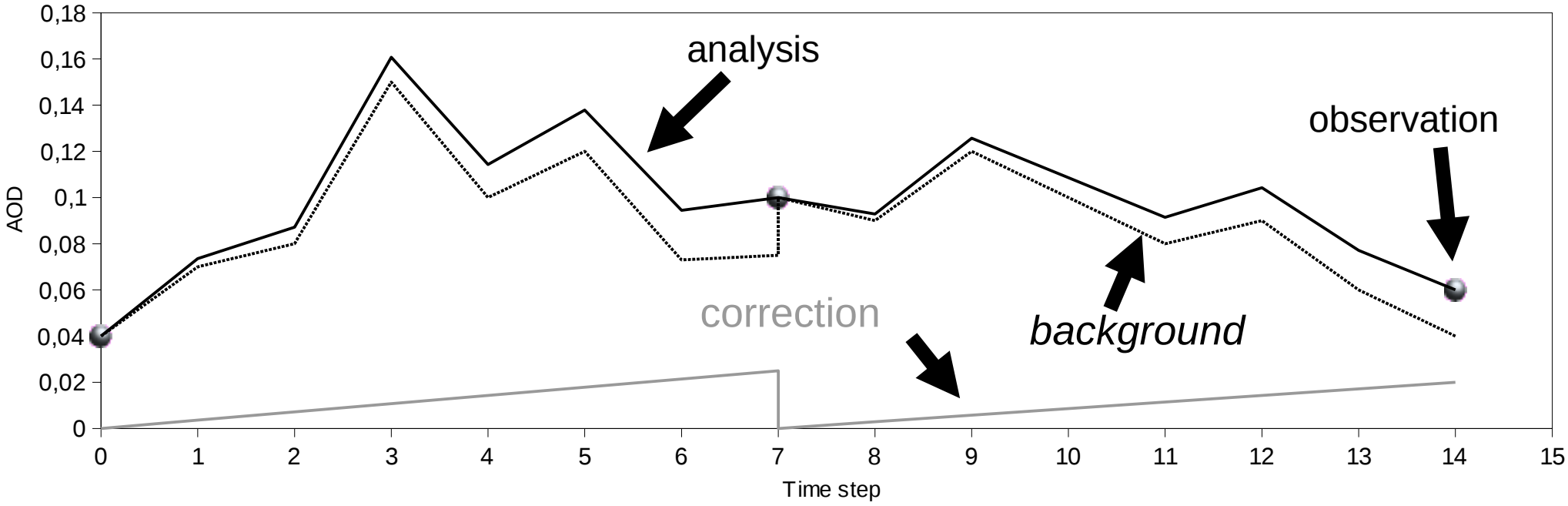


- Numerical integration based on a modified version of Euler scheme which uses a first guess trajectory to compute the mean wind velocity during the time step
- Dynamical computations using Global Environmental Multiscale (GEM, Côté *et al.* 1997) global meteorological analysis
- Hygroscopic growth (dynamical and optical)
- Aerosol types: Black Carbon, Organic Carbon, Sulfate, Sea Salt and Soil Dust.
- 12 size bins 0.005-20.24 mm
- 2 successive running phases
  - A coarse mode (1x1 deg.) where domain boundaries are nested by GADS aerosol climatology (Koepke *et al.* 1997)
  - A fine mode (0.4x0.4 deg.) on a smaller geographical domain where boundaries are nested by the coarse mode output



- Under-cloud scavenging (size dependent, Garcia Nieto *et al*. 1994)
- Sea salt emissions determined by near surface wind (Monahan *et al.* 1986)
- Sulfate emissions (2 levels, Voldner, Li *et al.)*, carbon aerosol (10 levels, Lavoué *et al.*, 2003 or 1 level from GEIA)
- In-cloud scavenging (Walton *et al*. 1988)
- Gravitational settling
- Brownian coagulation

AODSEM may be constrained by an integrated assimilation system that is a combination of the Cressman objective analysis approach and the incremental analysis update (IAU).



AODSEM spatial evaluation