Environment Canada Environnement Canada

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Emergencies Science and Technology Division, Environment Canada

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Environmental Emergency

- An uncontrolled, unplanned or accidental release of a substance into the environment or the reasonable likelihood of such a release that:
  - has or may have an immediate or long-term harmful effect on the environment;
  - constitutes or may constitute a danger to the environment on which human life depends; or
  - constitutes or may constitute a danger in Canada to human life or health.

Wabamun Lake, Alberta 2005.

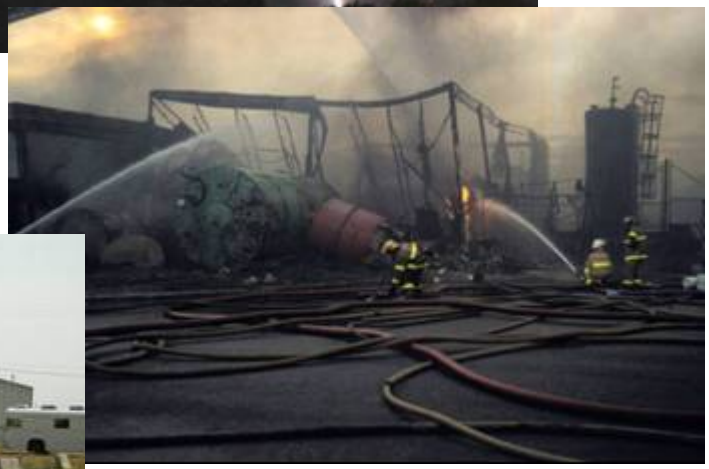
Hurricane Juan 2003, Halifax, N.S.

Canadian Spills Overview - 2003

- There were ~25,000 incidents per year:
- ~5000 were in areas of federal concern (CEPA or FA)
- Response S&T support was provided by EC for ~ 1,000 incidents
- <50% of incidents are less than 1 tonne; 2% are greater than 100 tonnes
- Largest Spill – 150,000 litres of mineral oil and grease, Pickering Ontario
- Of the total number of reported incidents , petroleum products account for 60%, others/chemicals 40%

Types of Emergencies

- **Technological events**
  - transportation
  - industrial facilities
  - federal facilities / lands
  - radiological releases
  - Canada/US transboundary incidents
  - international pollution incidents
- **Natural events**
  - Leading to an environmental emergency
- **Terrorist-related events** (CBRN)
  - Leading to an environmental emergency



Environmental Emergencies Program

Mission

To prevent or reduce the frequency, severity and consequences of environmental emergencies

All hazard planning approach

The Program is organized into four principal areas of activity:

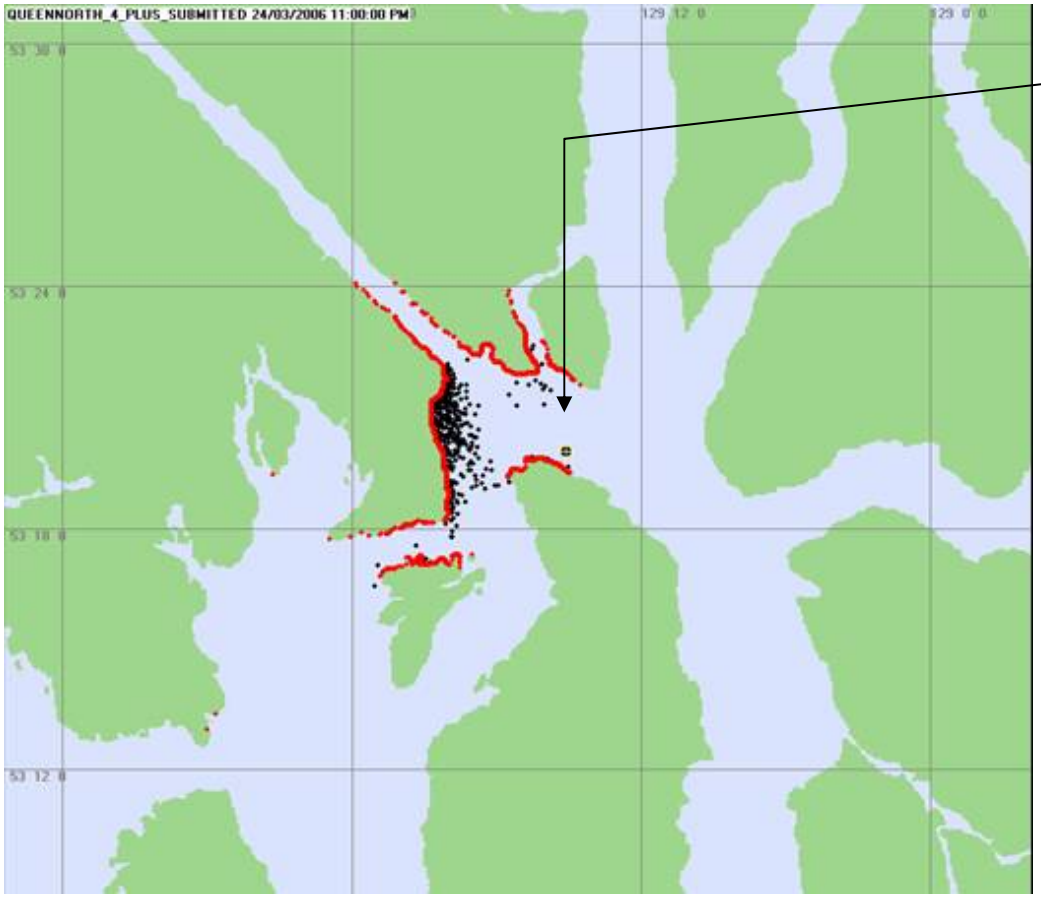
- Prevention
- Preparedness
- Response
- Recovery

Research and Development, through the Emergencies Science & Technology Division is fundamental to the Program

Roles and Responsibilities – ESTD R&D and RSA

- Provides specialized scientific and technical advice on oil and chemical properties and incident countermeasures
- Assists during emergencies by providing trained personnel, specialized field analytical and sampling equipment, and aerial remote sensing capabilities
- Oil/chemical spill modelling, air plume modelling (short-range), fire and explosion modelling
- Provides laboratory support for analysis of samples (petroleum products and chemicals)
- Chemical response (Scientific Support Team)

Oil Spill Modelling – OilMap

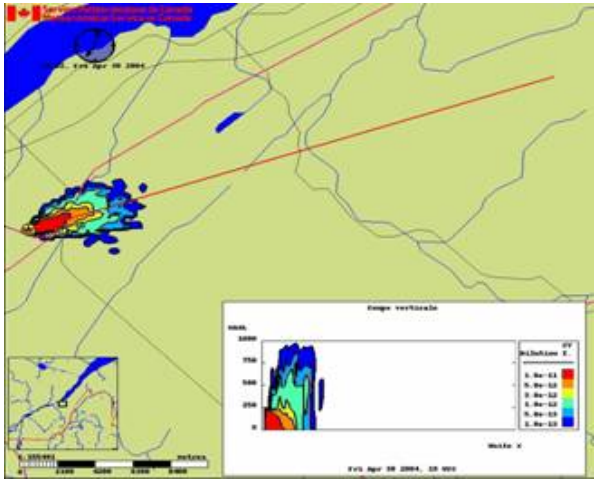


Air Dispersion Modelling for Chemicals in the Short Range

- Breeze and Aloha

Roles and Responsibilities – CMC/MSC

- Meteorological data, specialized forecasts and warnings
- Mobile weather stations
- Long-range atmospheric dispersion modeling for radiological releases
- Air plume modeling (long-range)



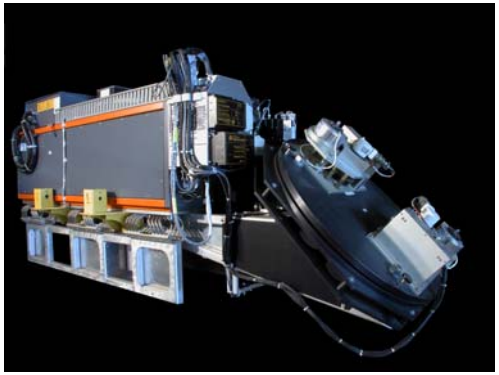
Derailment (BLEVE) Belleville, Ontario, 2002

Remote Sensing Operations

- DC-3 and CV-580 aircraft
- Primary Focus on Oil Spill Remote Sensing
  - Sensor R&D
    - Scanning Laser Environmental Airborne Fluorosensor (SLEAF)
    - Laser Ultrasonic Remote Sensing of Oil Thickness (LURSOT)
  - Operational Oil Spill Response to Spills of National Significance
- Advanced Synthetic Aperture Radar (SAR) R&D in conjunction with other Federal Departments

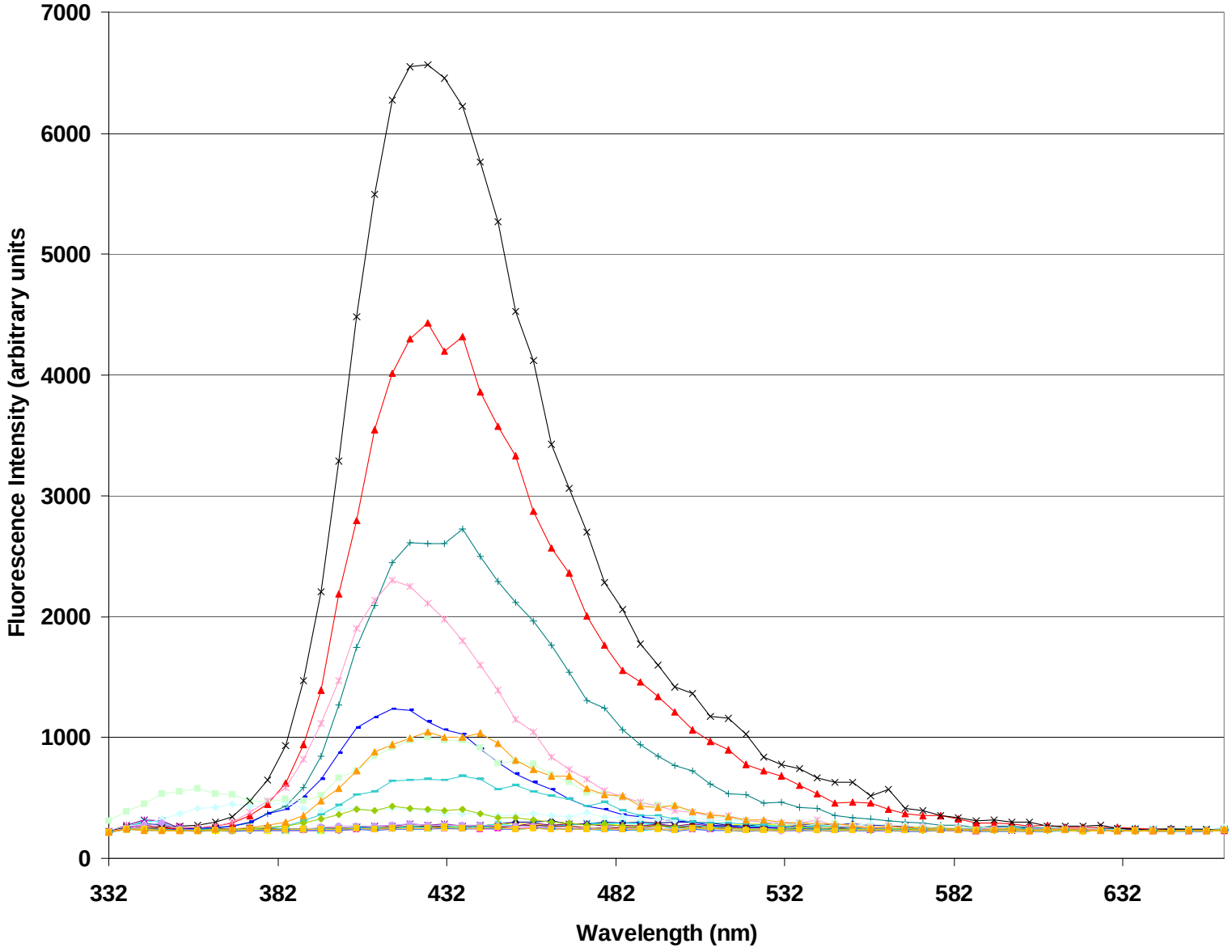
DC-3 C-GRSB

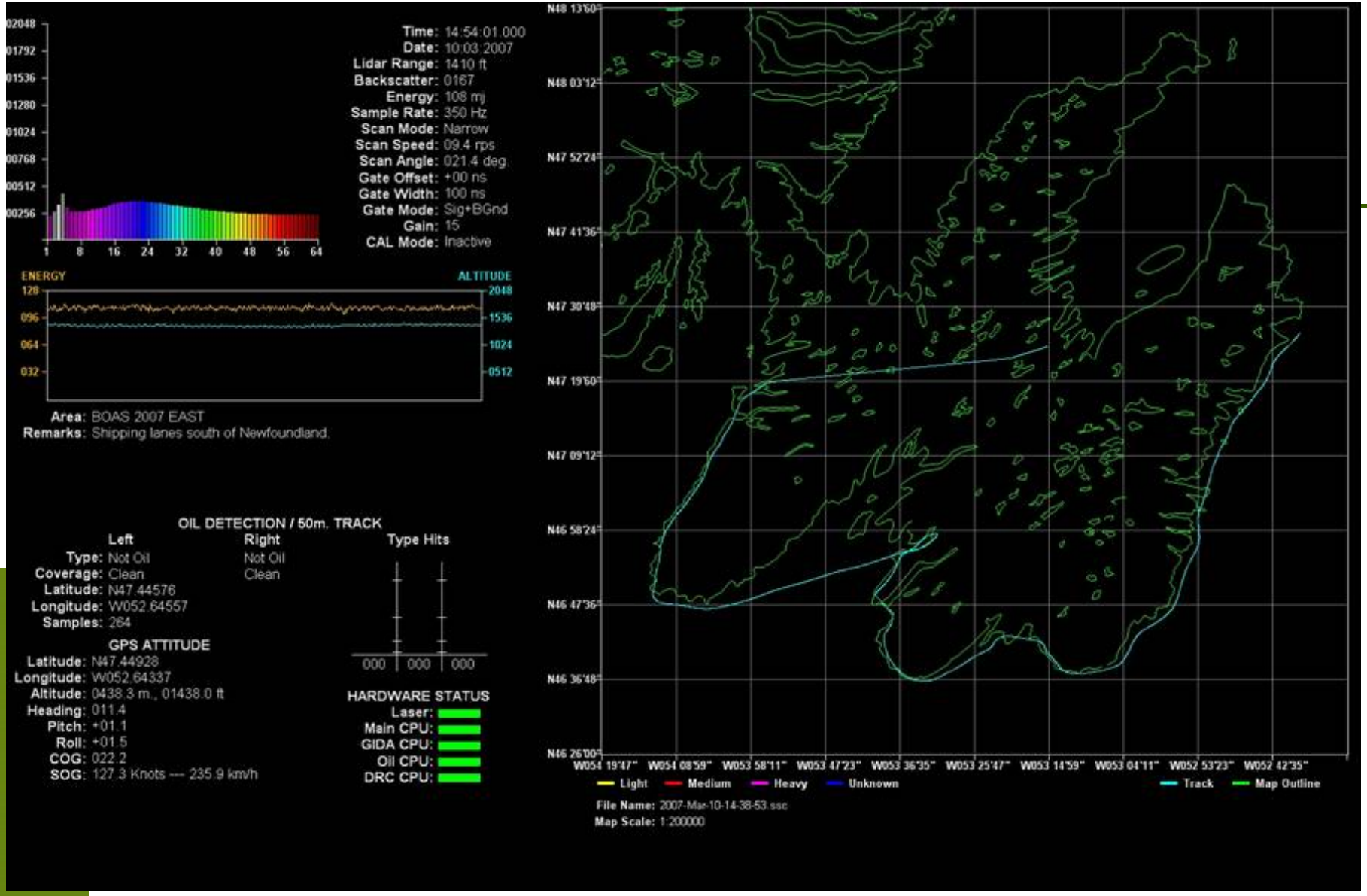
- Oil spill sensor R&D test-bed and operational response facility
- 5 large sensor bays
- Currently equipped with the following sensors:
  - Scanning Laser Environmental Airborne Fluorosensor (SLEAF)
  - Infrared/Ultraviolet cameras
  - Down-looking video cameras (2)
  - Nikon digital camera (time/position stamped)
  - Generation III night vision camera
  - 3D GPS (roll/pitch/yaw)



SLEAF

- Active sensor (day/night capabilities)
- Ultraviolet laser excitation of petroleum (308 nm)
- Sampling rate 390 Hz, real-time principal component analysis
- Characteristic fluorescence spectral signature (light/medium/heavy)
- Map display – flight path and oil contamination information


7000
6000
5000
4000
3000
2000
1000
0
Fluorescence Intensity (arbitrary units
332
382
432
482
532
582
632
Wavelength (nm)



Flight 7 – March 10, 2007

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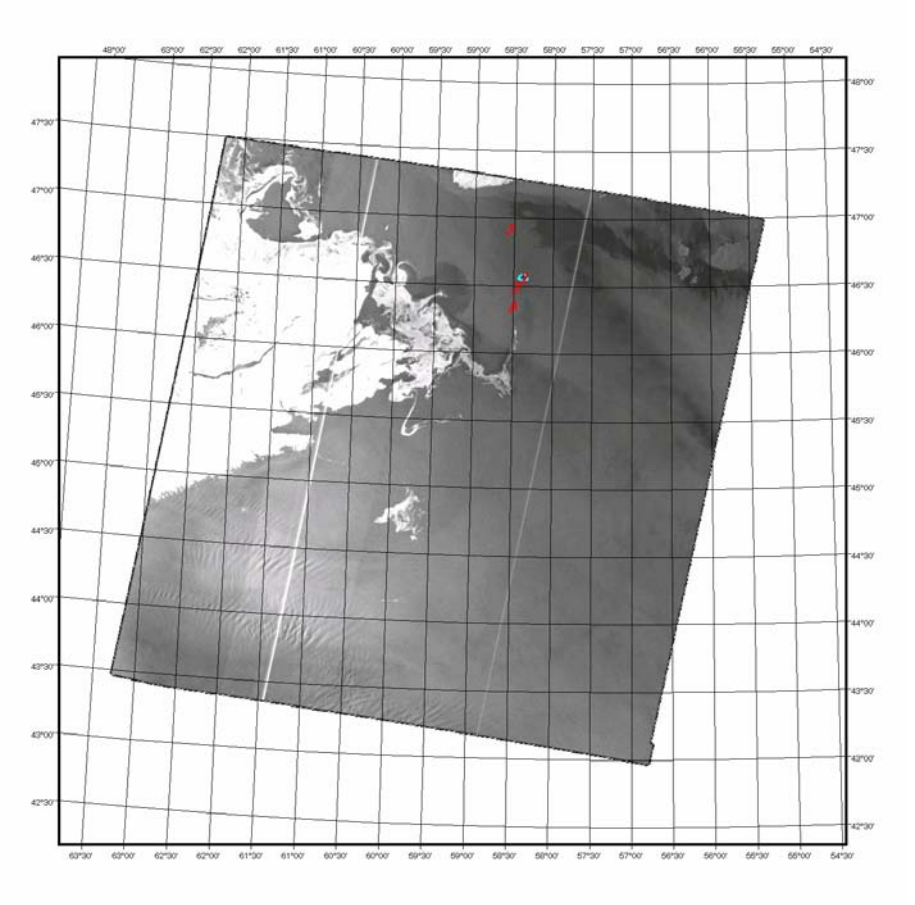
Laser Ultrasonic Remote Sensing of Oil Thickness (LURSOT)

- First Ever Absolute Measurement of Oil Slick Thickness from an Aircraft
- Provide Essential Information to Response Personnel
- Collaboration with National Research Council Canada and Imperial Oil Ltd.

I-STOP

- Integrated Satellite Tracking of Polluters
  - Provide support in the form of periodic interpretation of SAR imagery



Convair 580 C-GRSC

- Advanced airborne SAR system
  - C- and X-band systems
  - 6 m resolution
  - Variable viewing geometry (nadir, narrow, wide)
- C-band fully polarimetric
  - HH, HV, VH, VV polarizations
- C-band interferometric modes (InSAR)
  - GMTI/Modex

Application Areas

- Oil Spills
- Emergency Response
- Sea Ice
- Ship Detection
- Snow
- Forestry
- Search and Rescue
- Agriculture

- Geology
- Urban DEMs / Land Use
- Coastal Zones

Images courtesy
CCRS/CCT

Questions?

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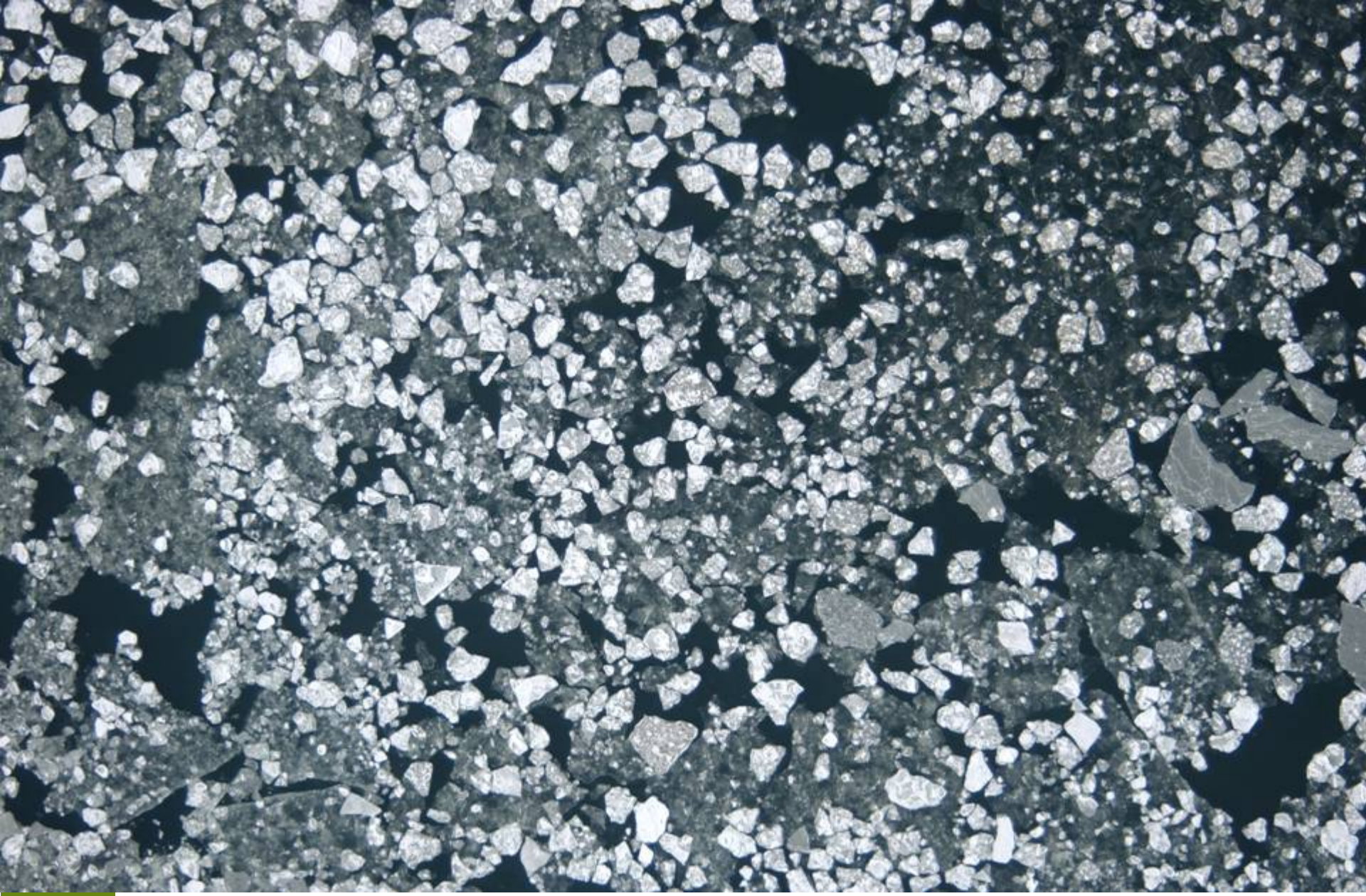

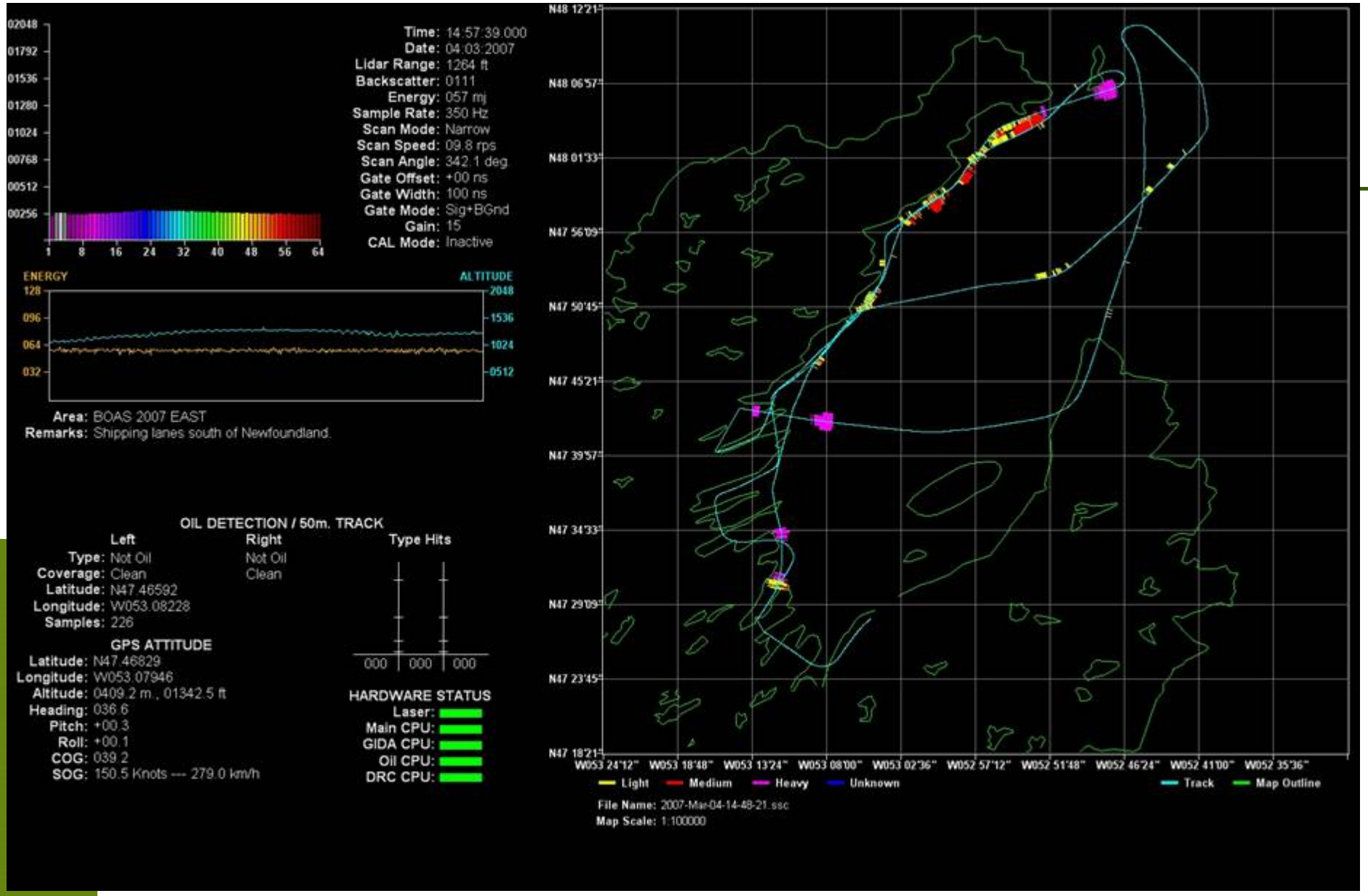

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