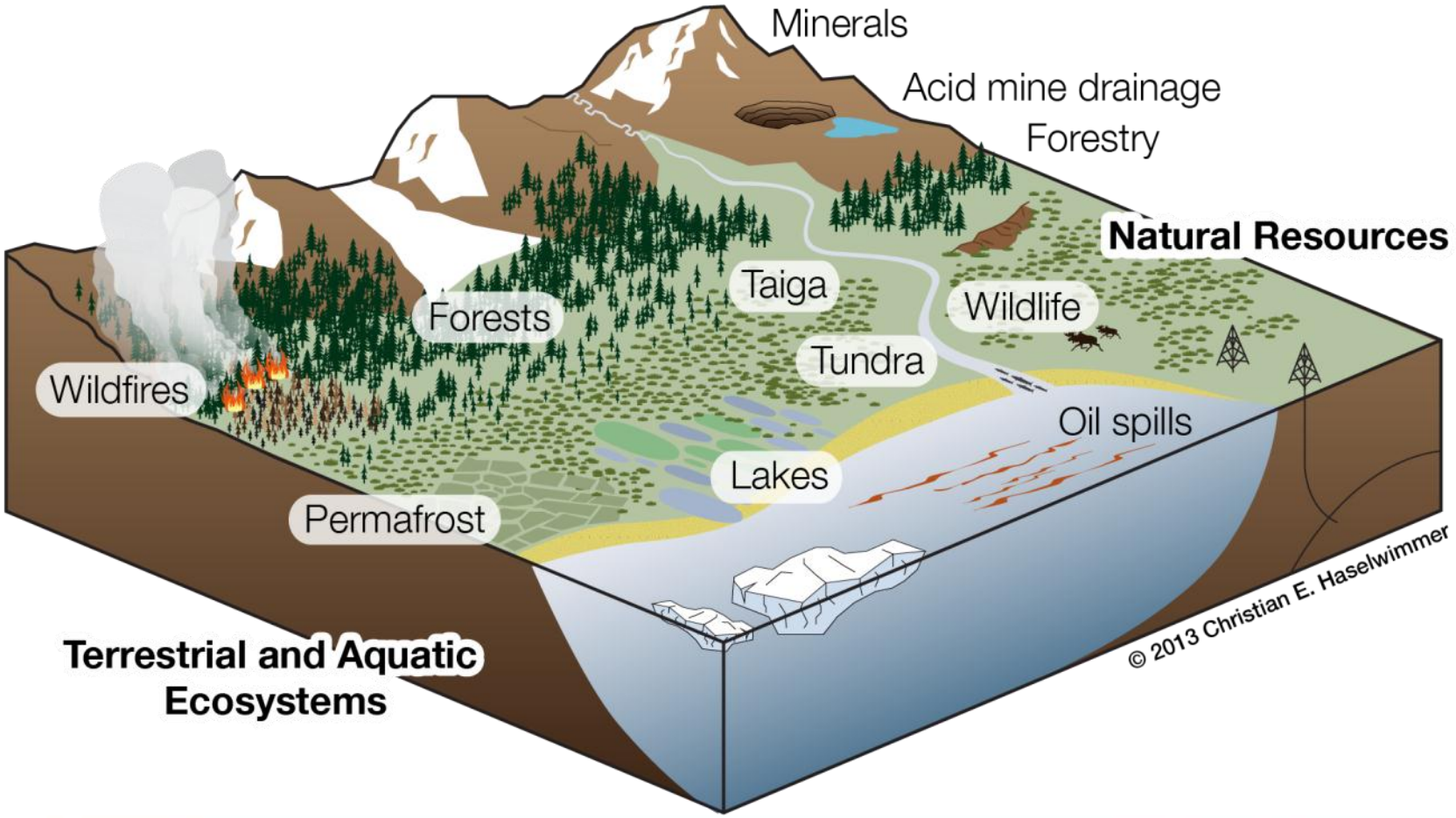
Remote Sensing for Arctic Oil Spill Research

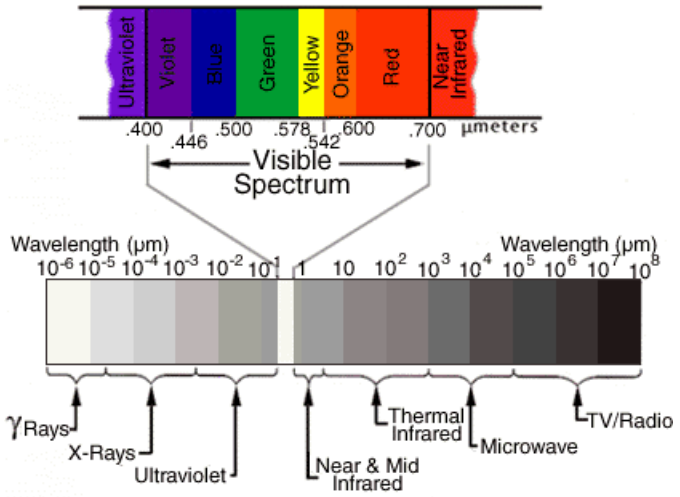
Jessica Garron
Senior Science Consultant

Arctic Ecosystems



Oil Sensing Sensors

- Visible
- Infrared
- Ultraviolet
- Fluorosensors
- Radar (land-based; GPR)
- SAR
- Hyperspectral
- Multibeam Sonar



Spaceborne vs. Airborne

- Repeat Coverage
- Wide Swath
- Coarse resolution
- Weather Independent
- Long-term deployment

- Discrete Flight Lines
- Narrow Swath
- Fine resolution
- Weather Dependent
- Short-term deployment

UAF Remote Sensing Assets

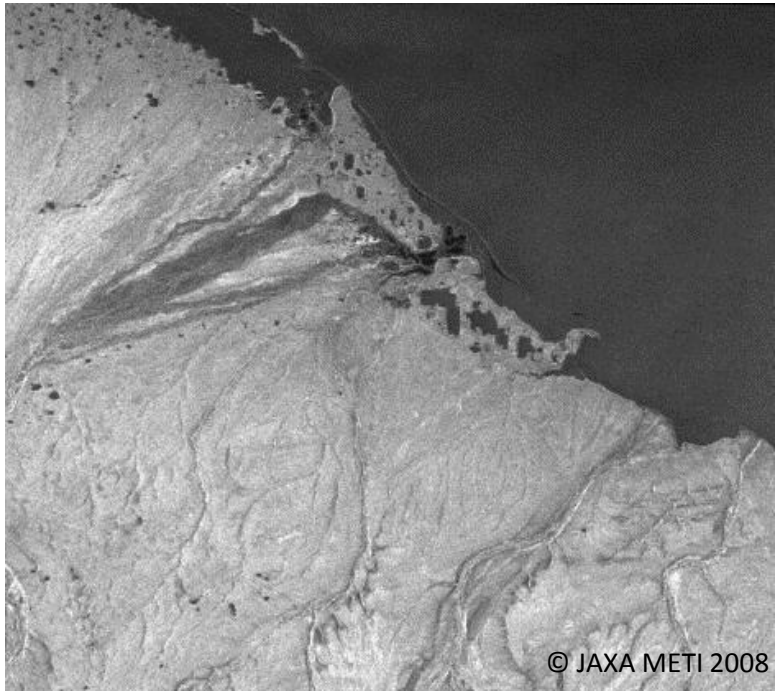
- Alaska Satellite Facility (ASF)
- Geographical Information Network of Alaska (GINA)
- UAF Hyperspectral Imaging Lab (HyLab)
- Alaska Center for Unmanned Aerial Systems Integration (ACUASI)
- Underwater (future under ice) *
- Shore-based: radar, optical

Alaska Satellite Facility (ASF)

Global Data and Services

Dr. Nettie La Belle-Hamer, Director
Scott Arko, Deputy Director

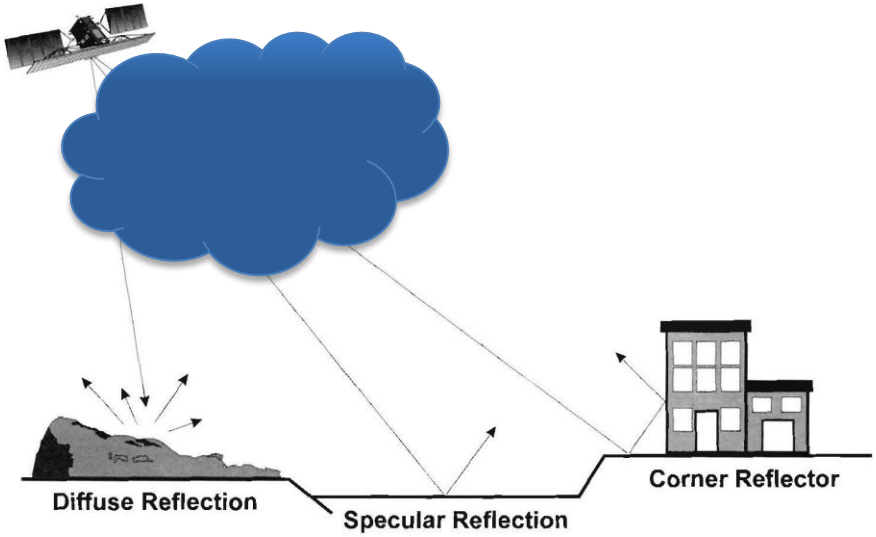
- Synthetic Aperture Radar (SAR), PRISM, AVNIR
- Software tools
- Satellite ground station
- Historical aerial photography
- Vertex



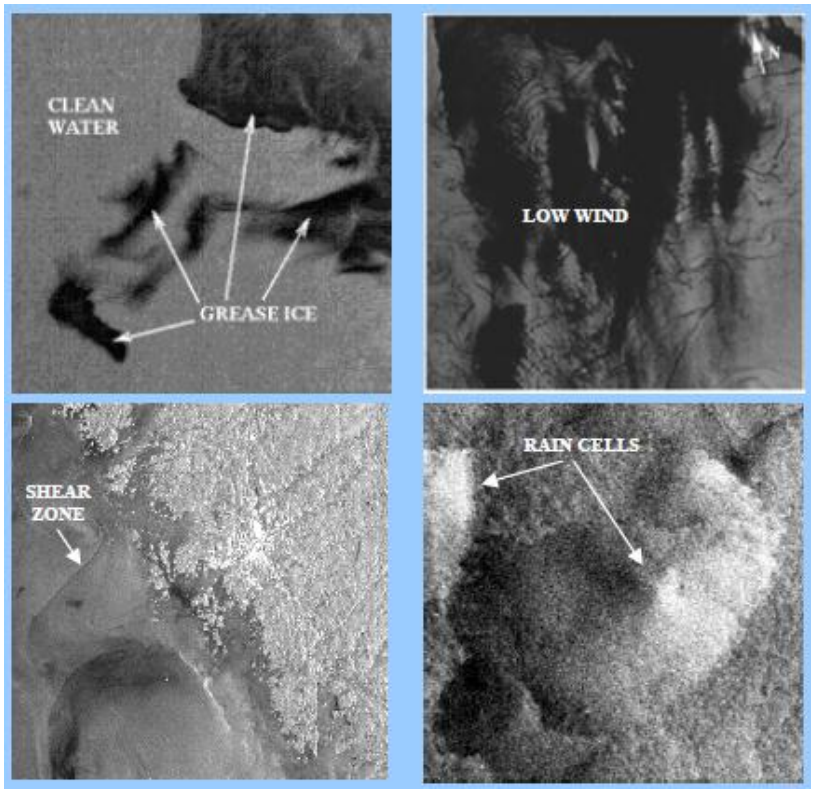
Stains River Delta, Camden Bay, AK
ALOS PALSAR, September, 2008

SAR Benefits in Oil Spill Scenario

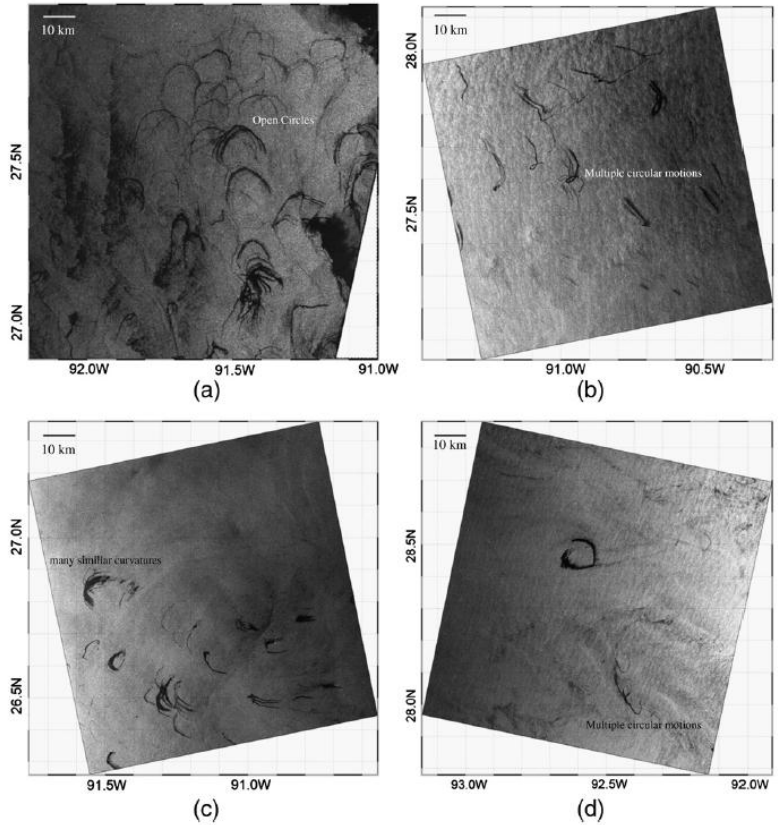
All weather
Day/night
Coverage
Data Fusion



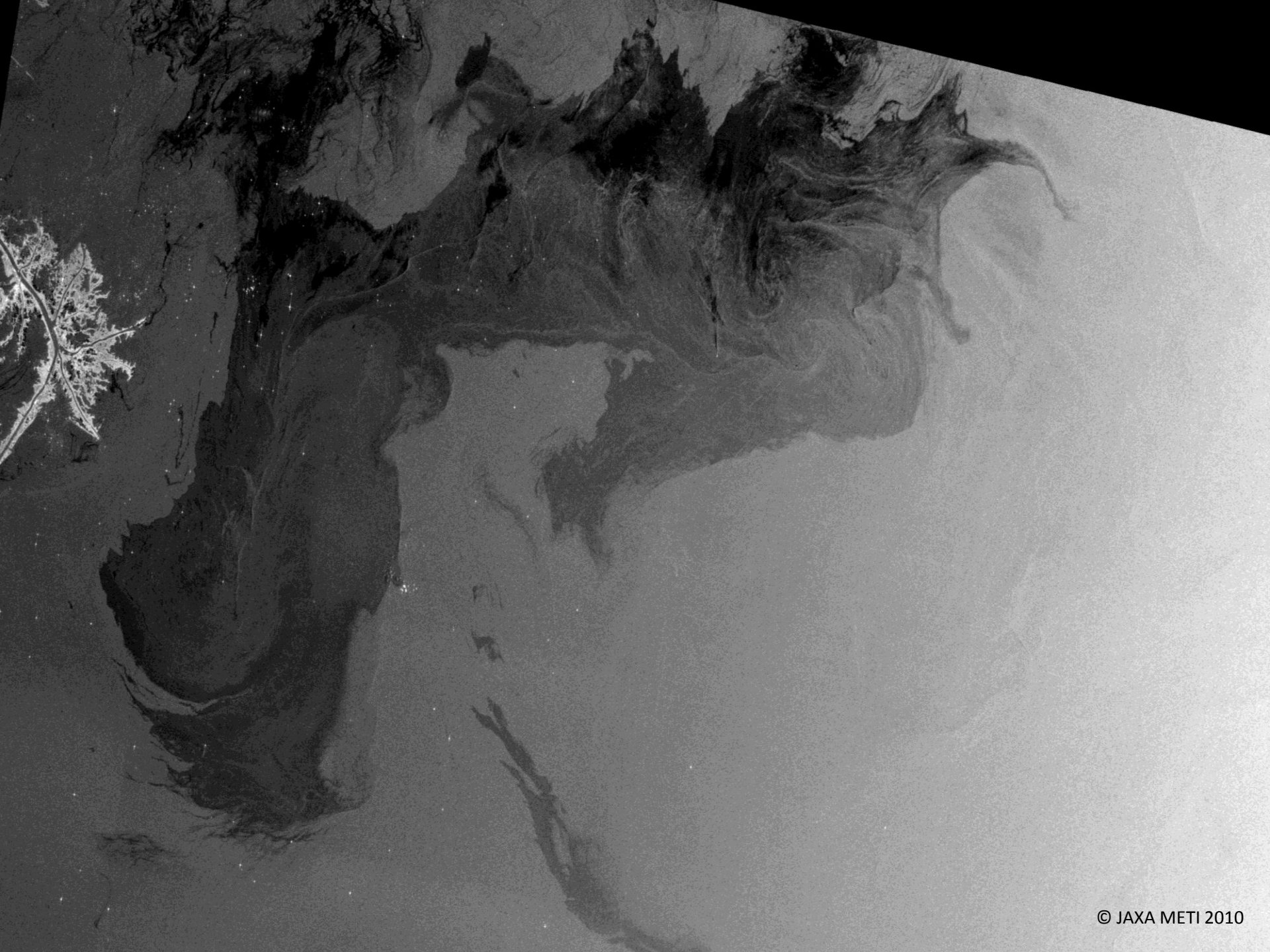
Is It or Is it Not Oil?

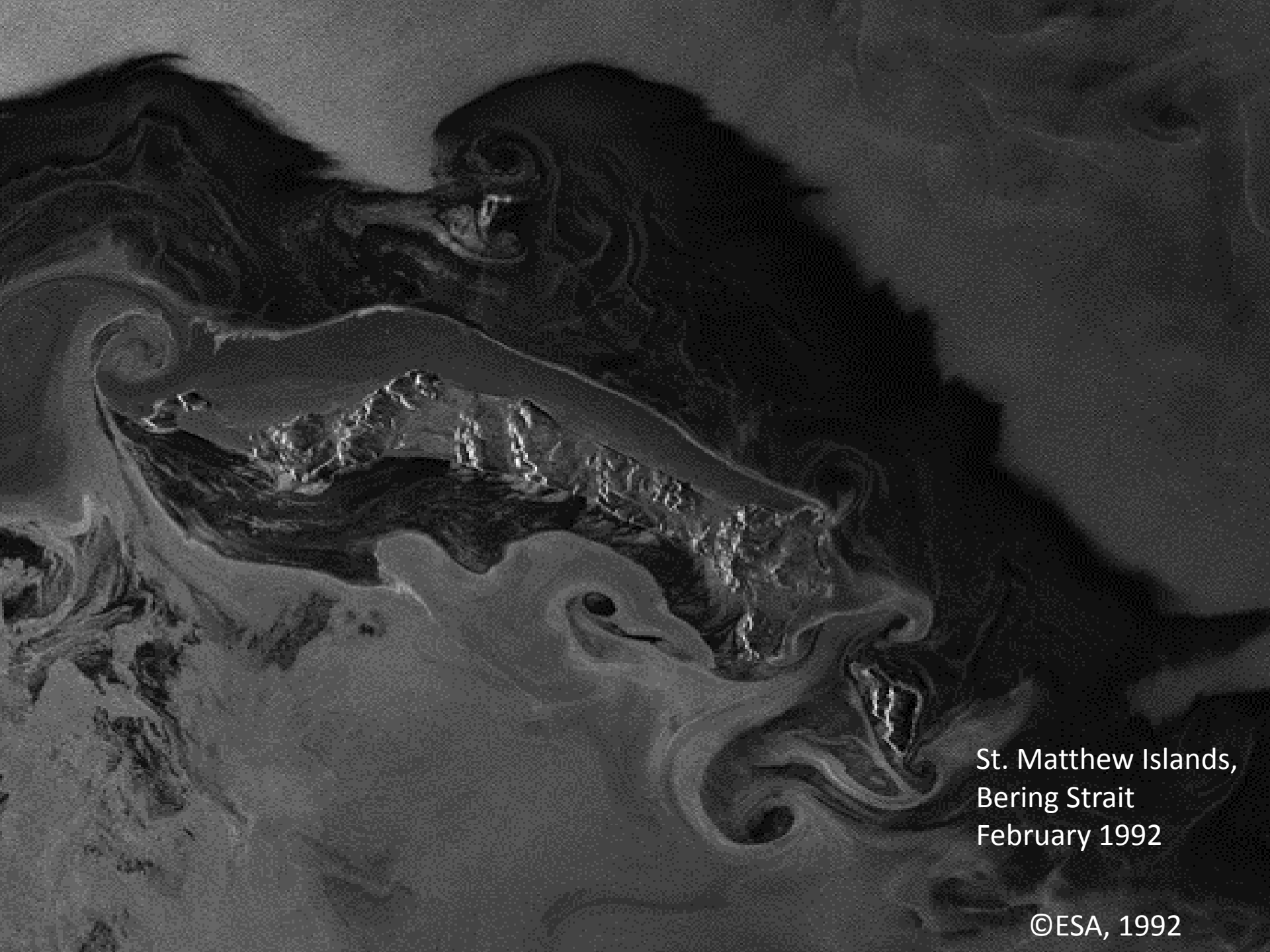


Natural conditions similar in appearance to oil slicks imaged by ERS-2 from the *MARSAIS Slick ERS Fact Sheet*



RADARSAT-1 images of oil seepage in the Gulf of Mexico. Li et al., 2013




St. Matthew Islands,
Bering Strait
February 1992
©ESA, 1992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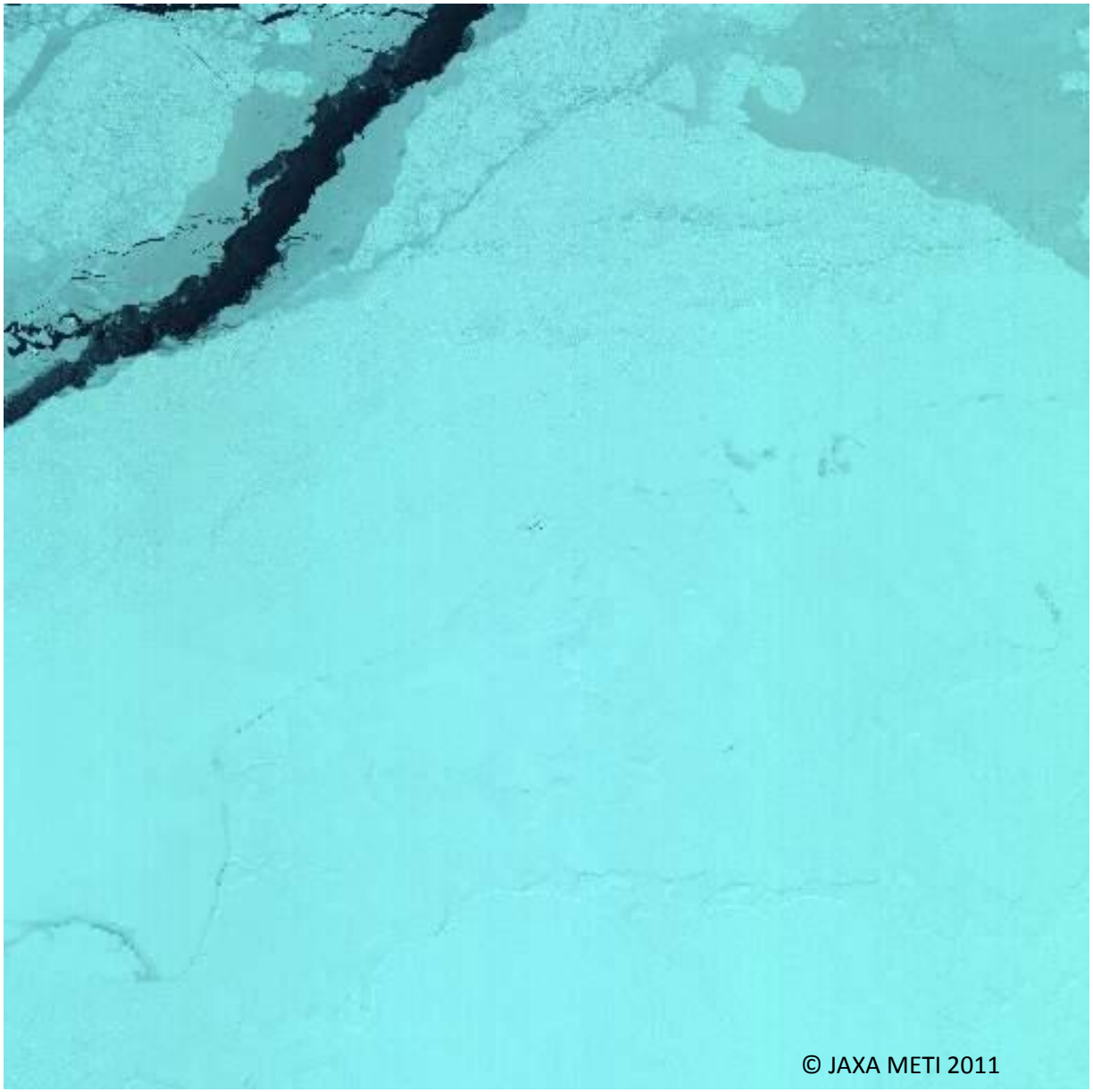
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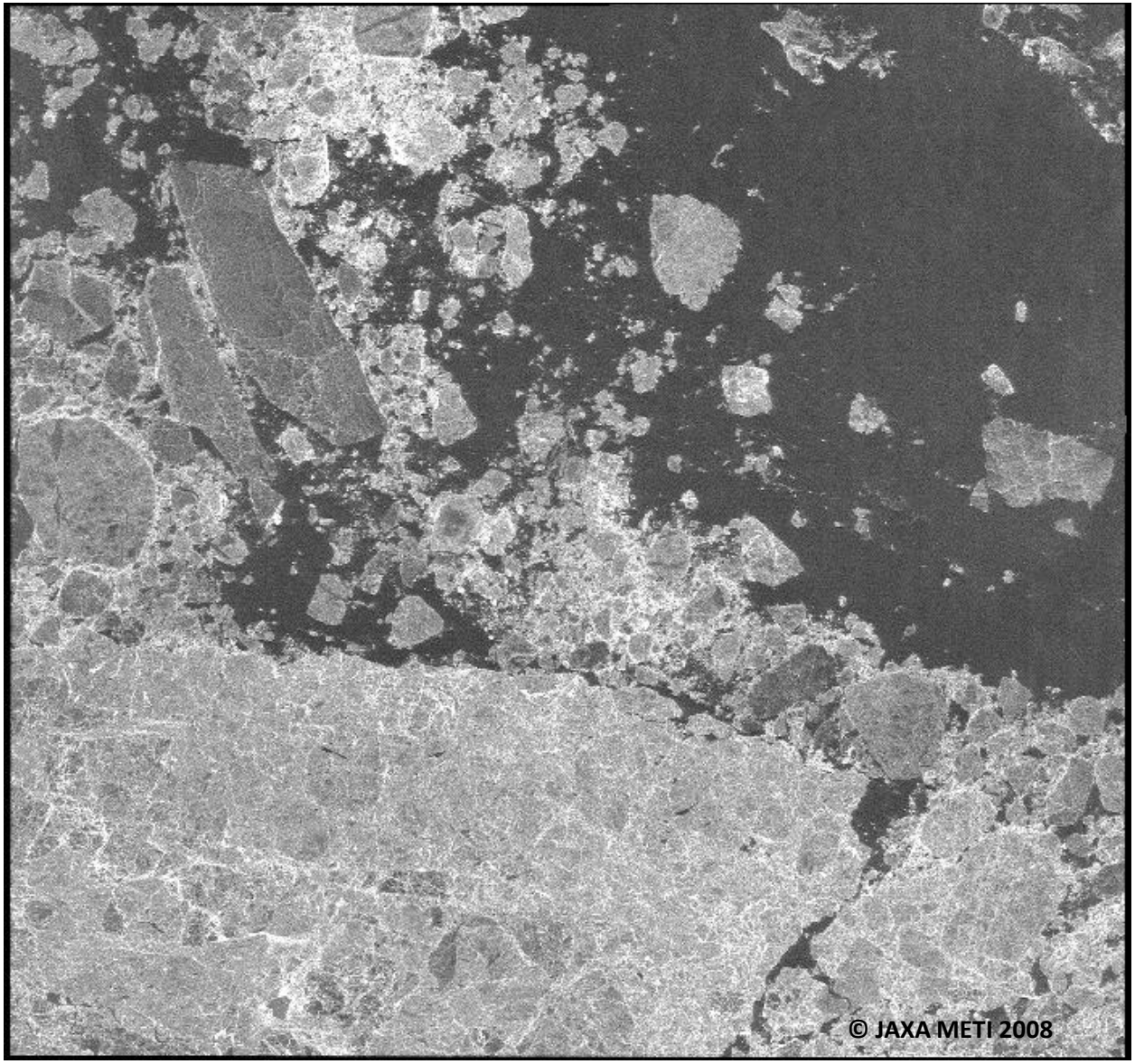
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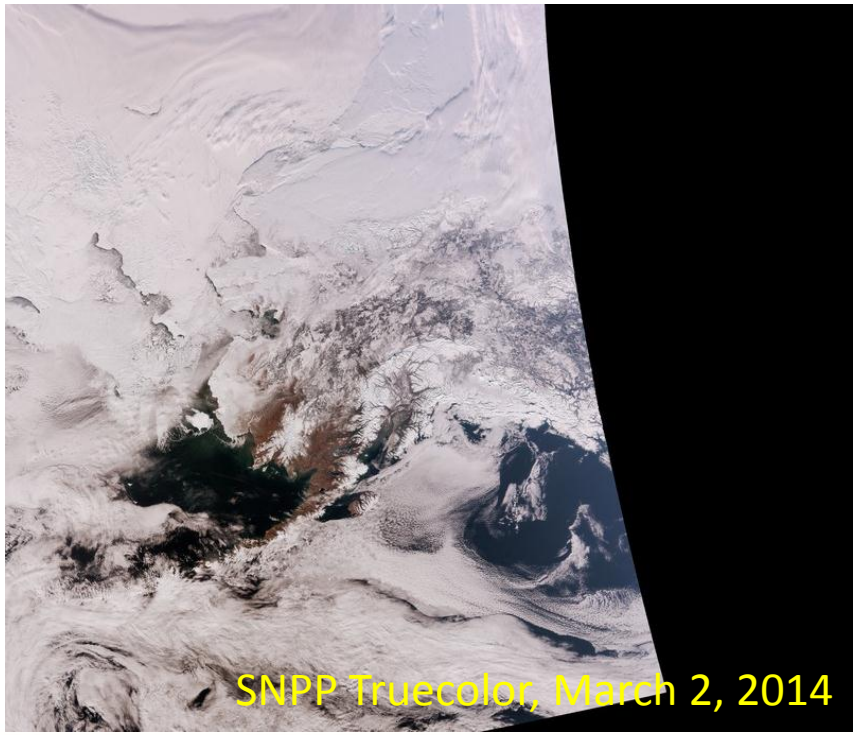
Geographic Information Network of Alaska (GINA)

Data and Services focused on Alaska

Tom Heinrichs, Director
Dayne Broderson, Technical Services Manager

- Near-Real Time Data
  - MODIS
  - AVHRR
  - VIIRS on Suomi NPP
- Puffin Feeder



GINA

Partnerships and Projects

- Statewide Digital Mapping Initiative (SDMI)
  - project completion 2014
  - 2.5 m Orthorectified SPOT-5 basemap
  - DEMs, topographic maps, NOAA charts
- Satellite receiving station
- North Slope Science Catalog
- SwathViewer

UAF HyLab

Partnerships and Services

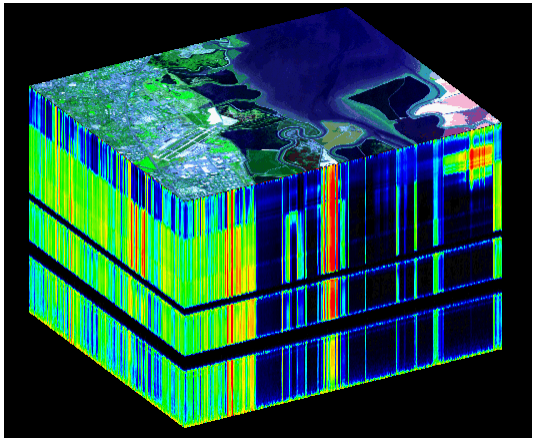
Dr. Anupma Prakash & Dr. Don Hampton

- UAF Hyperspectral Imaging Lab
- Hyperspectral sensor (HySpex)
- Airborne HS data will allow upscaling, providing intermediate scale between field and MODIS scale.

HySpex System

Manufacturer	NEO / HySpex	
Model	VNIR-1600	SWIR-384
Spectral range (nm)	400 - 1000	930 - 2500
No of bands	160	288
Radiometric resolution	12 bit	14 bit
Spectral sampling (nm)	3.7	6
Spatial pixels	1600	384
SNR (peak)	250:1	500:1
Dimensions (lwh in cm)	29 x 14 x 36	
Approx weight for system (kg)	20	
Power consumption (W)	160	

Source: NEO



Source: Virtual Outcrop Geology group at CIPR

Remote Sensing of Oil in Ice

- Joint Industry Programme
- Collaborative among NGOs, academic institutions, contractors and CRREL
- Set-up
- Sensor suite
- Modeling effort

Photo courtesy of W. Scott Pegau

Questions?

Jessica Garron

jigarron@alaska.edu

907-474-7598