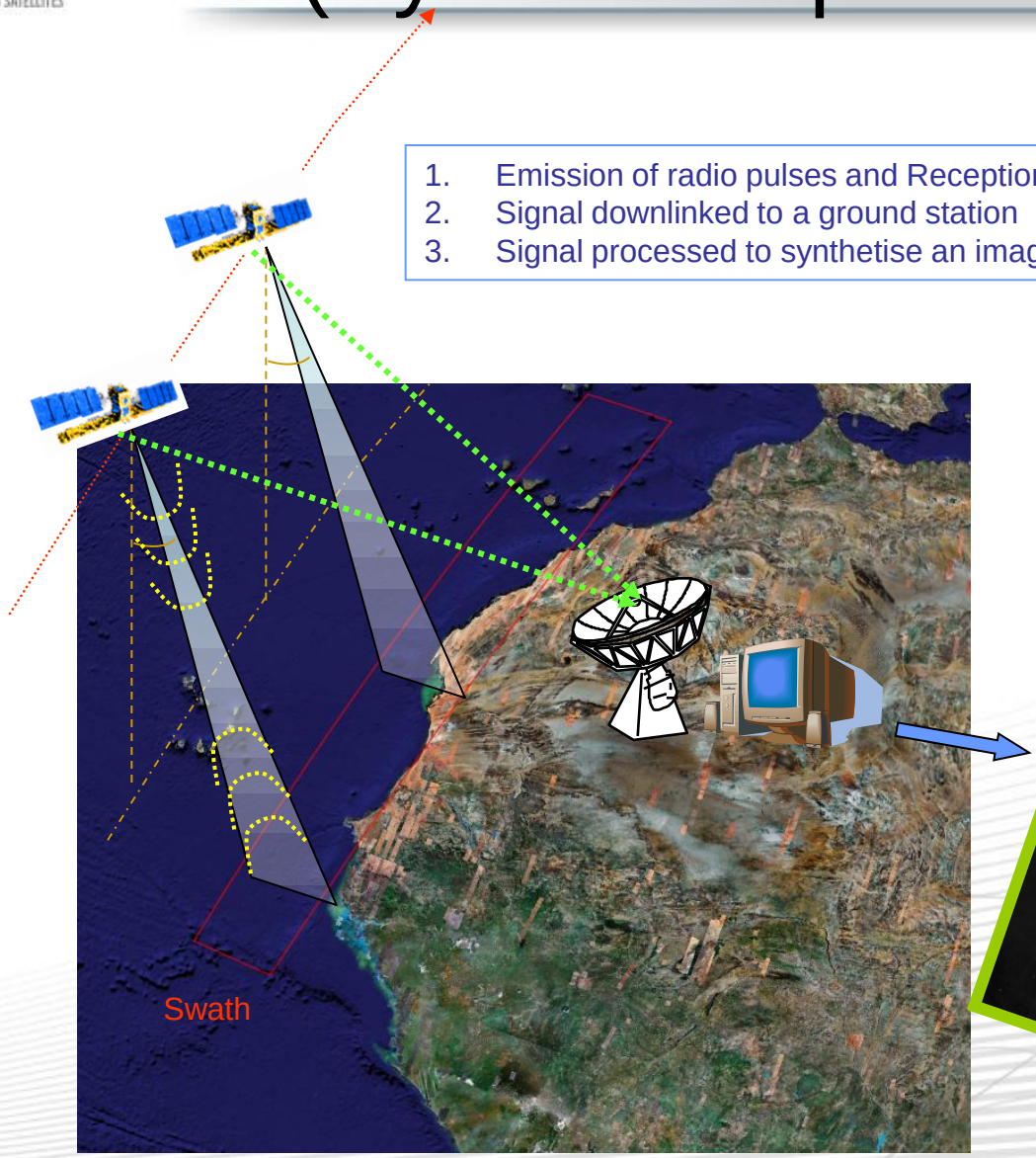
Radar Satellite

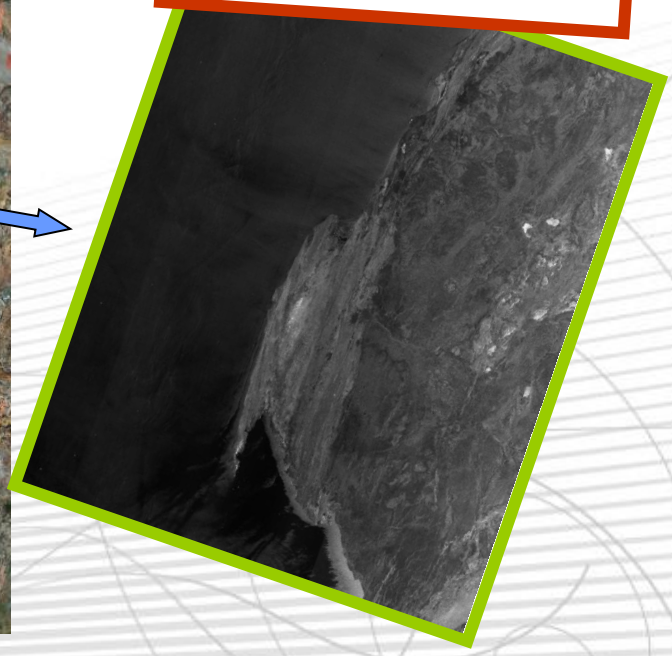
Workshop IPEE/CLS - 3-FEB-2010

Radar imaging (Synthetic Aperture Radar)

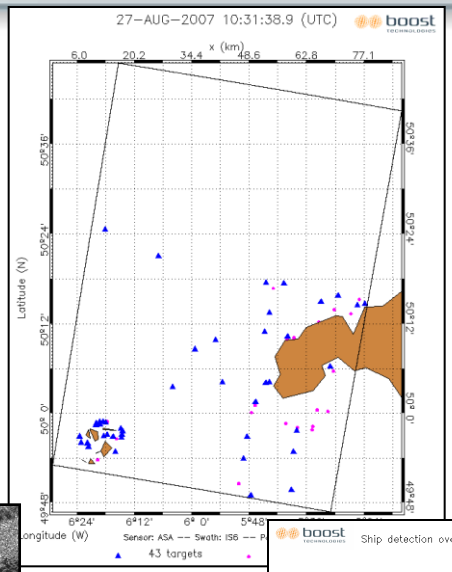
1. Emission of radio pulses and Reception of their echoes
2. Signal downlinked to a ground station
3. Signal processed to synthetise an image of the terrain reflectivity

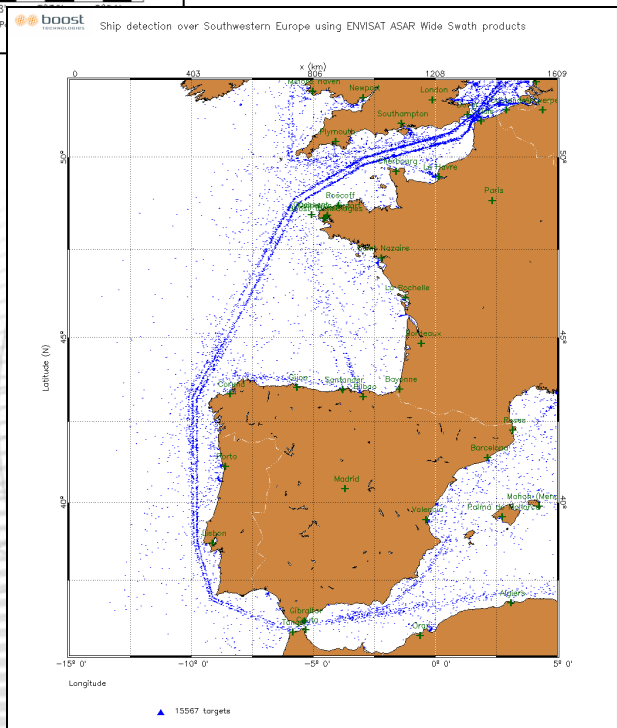


- Day / Night Vision
- All-weather Vision

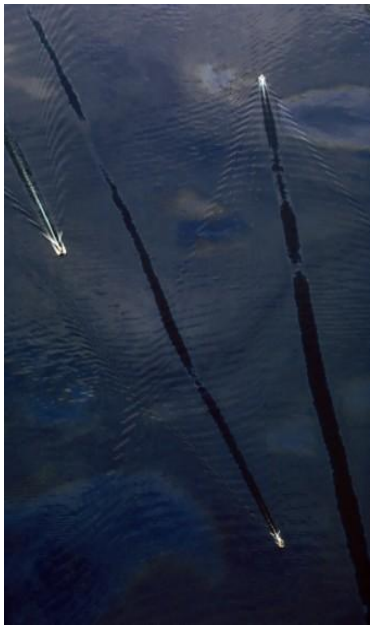


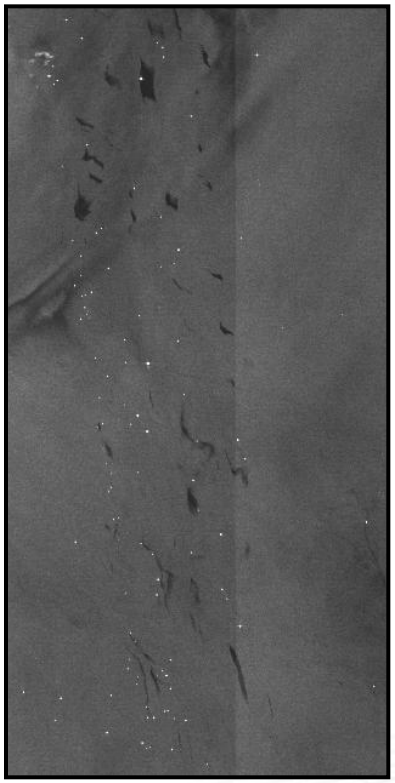
Ship detection

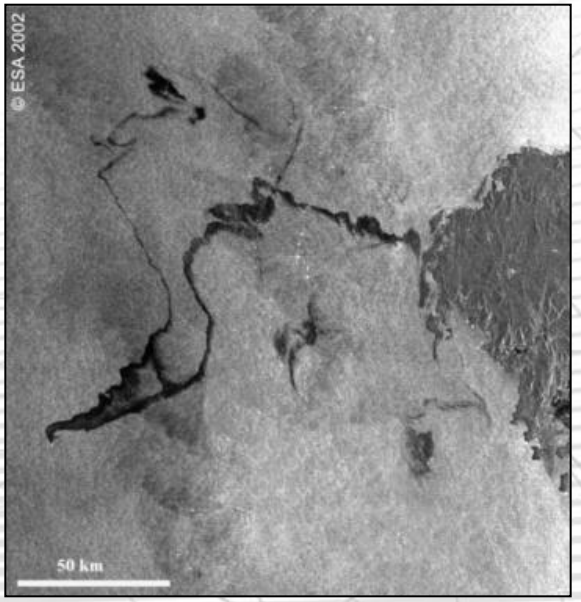




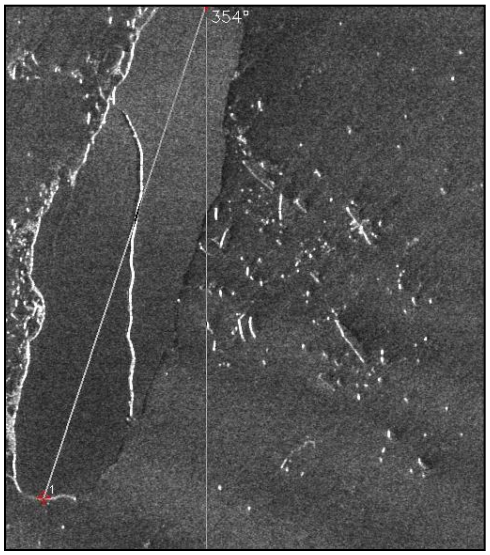
Oil spill detection and monitoring

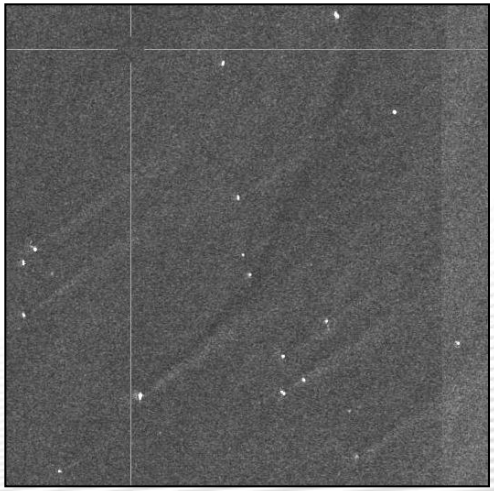


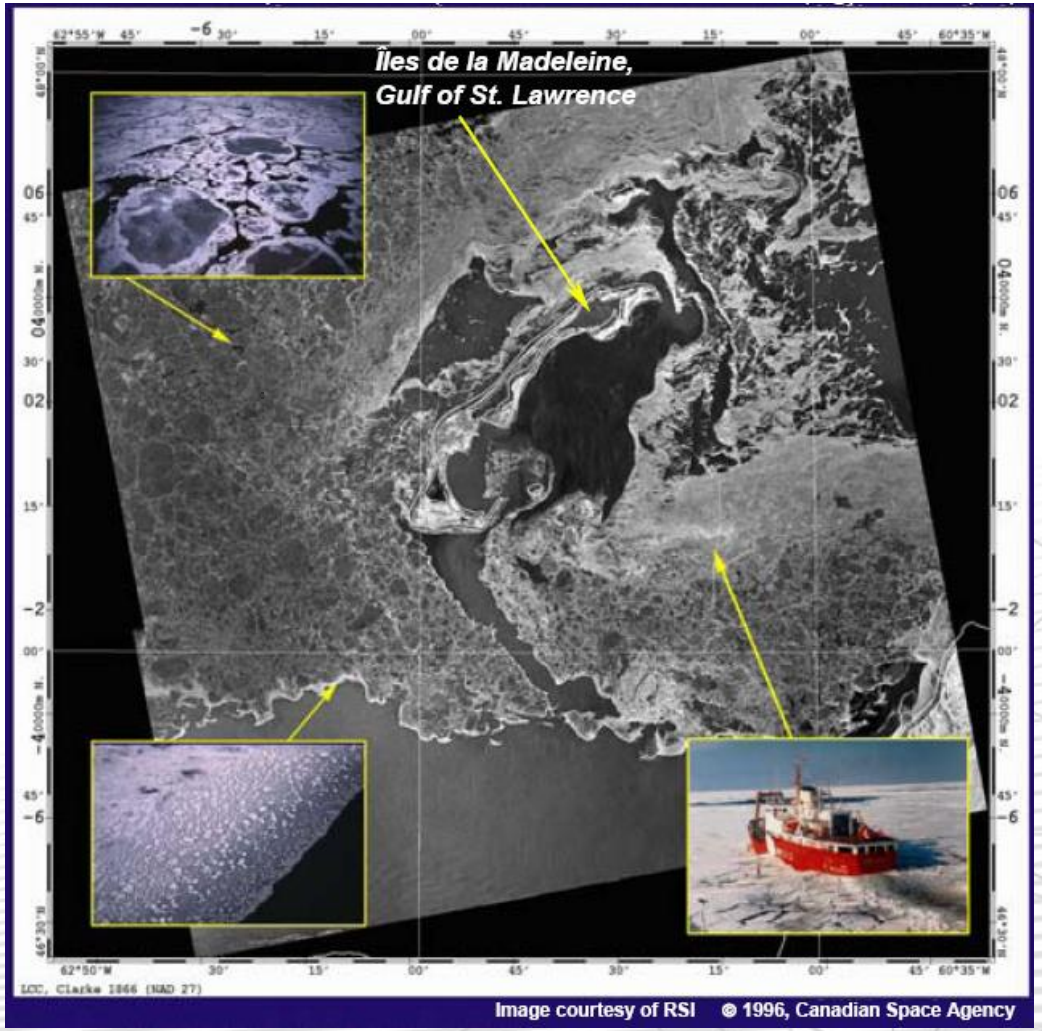




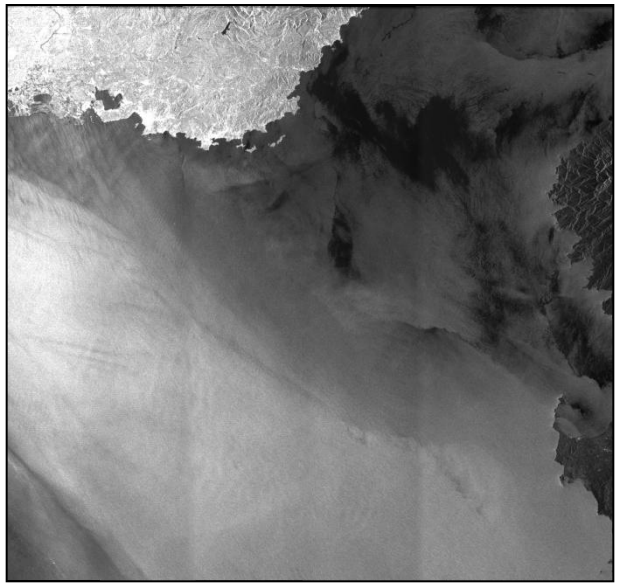
Sea ice monitoring

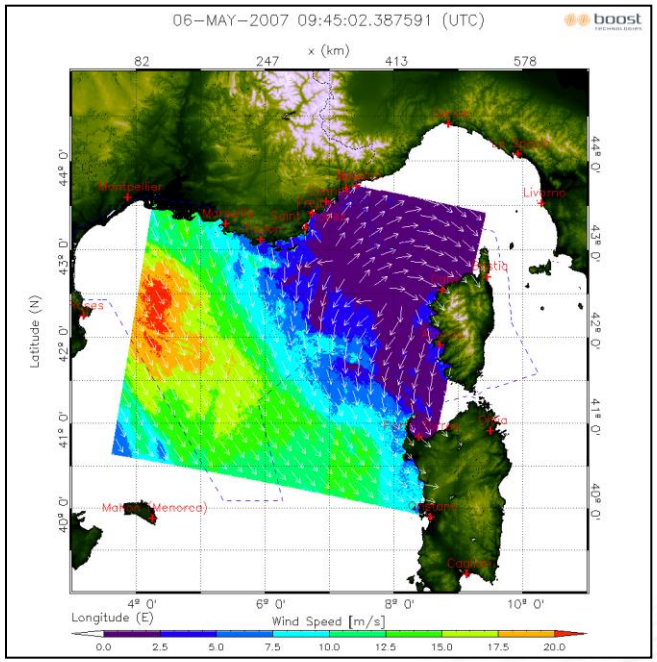


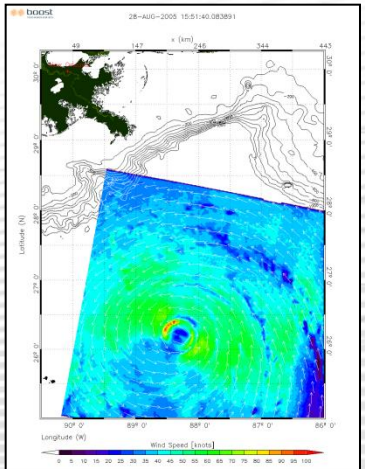




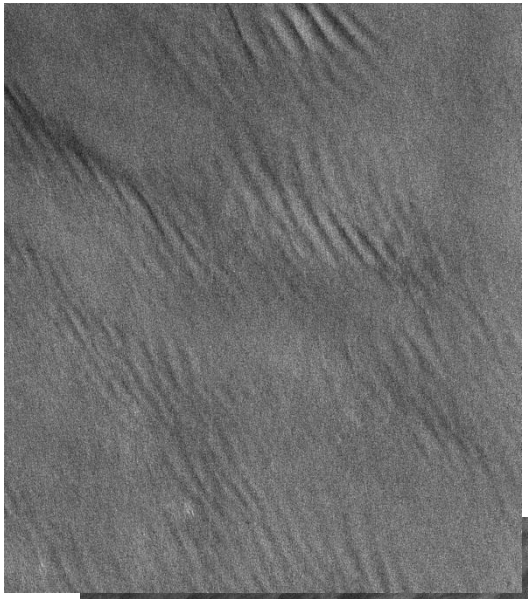
Wind sensing

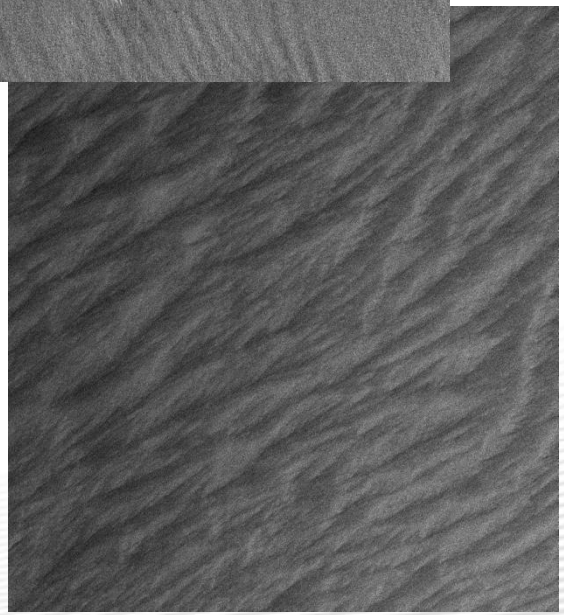


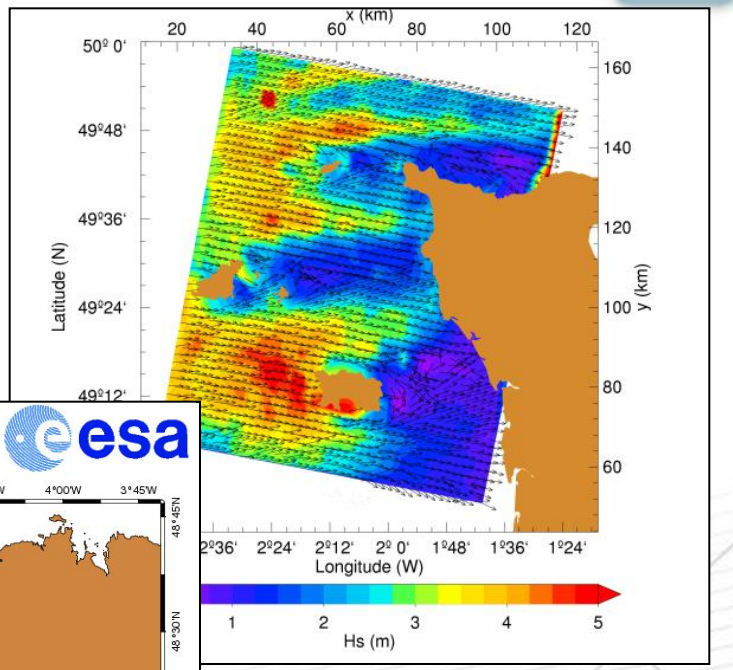


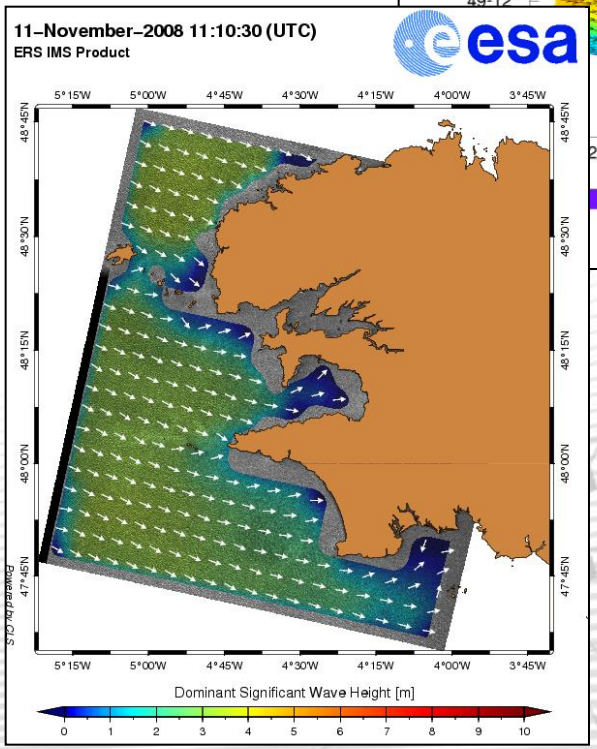


Wave (swell) sensing









Operational aspects

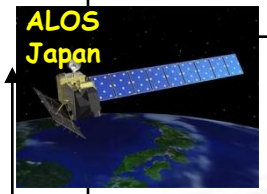
- Which satellites ?
- Satellite availability time ?
- Information delivery time ?

Available satellites

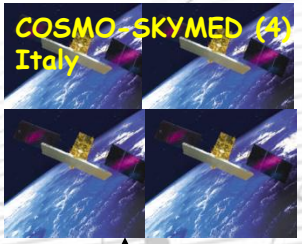
Fully operational

No on-board storage: operational only where downlink stations are available

Operational satellite. Service level to be confirmed



No tasking. Archive only



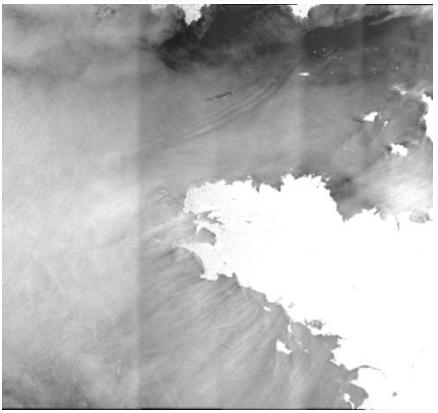
No commercial offering so far

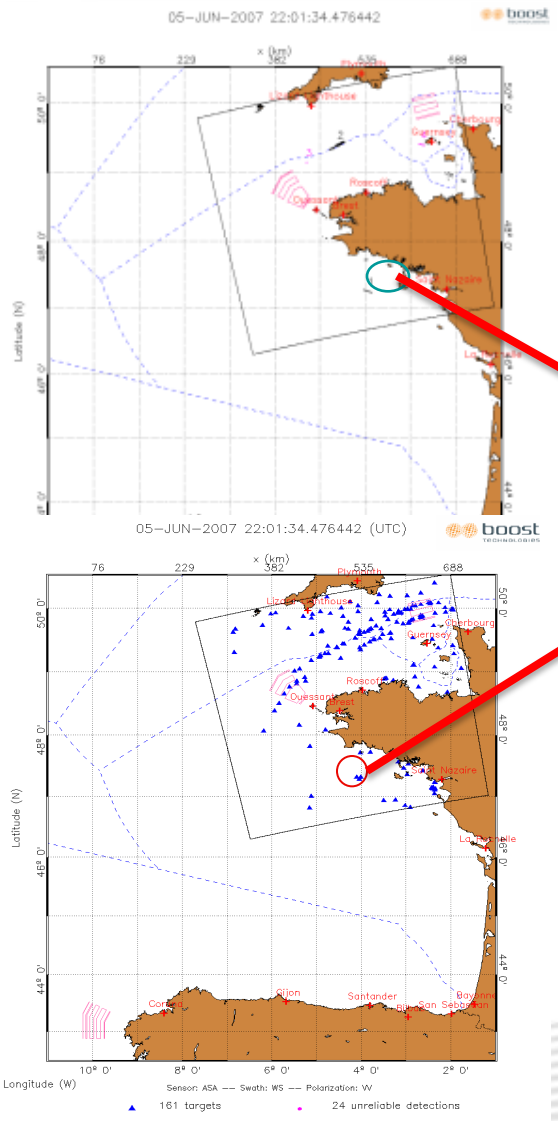
SAOCOM (Argentina)
RISAT (India)

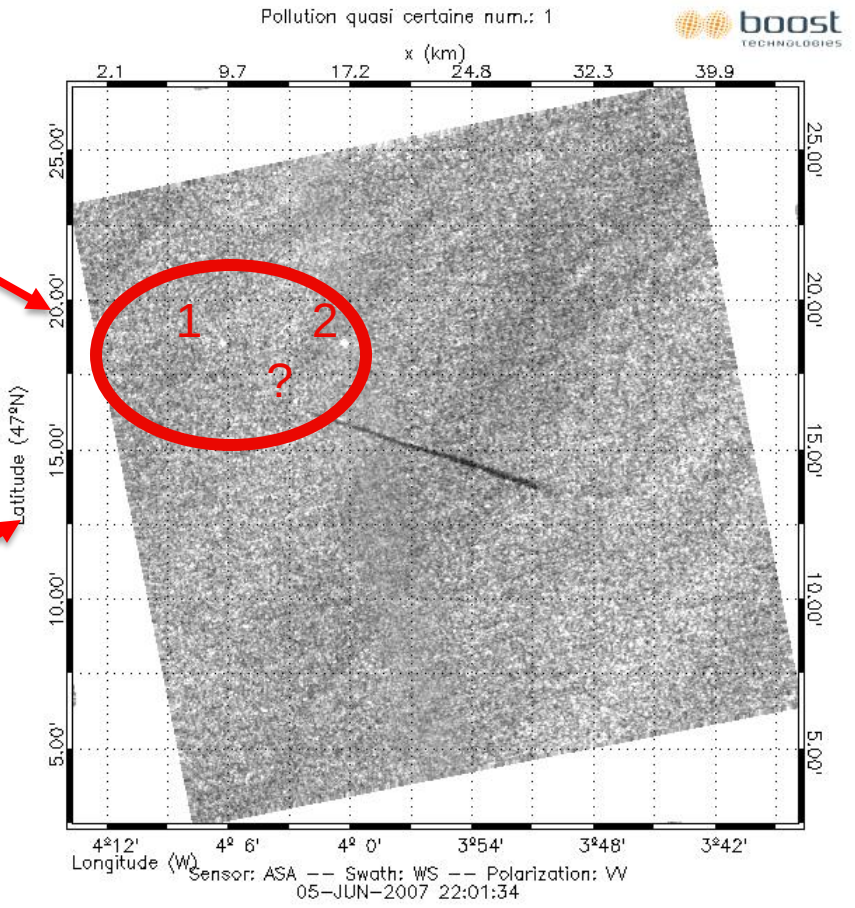
Sentinel-1 (Europe)
HayYang-3 (China)
Radarsat-C (Canada)

1995 2001 2006 2007 2008 2009

Detection and monitoring of oil spill discharge



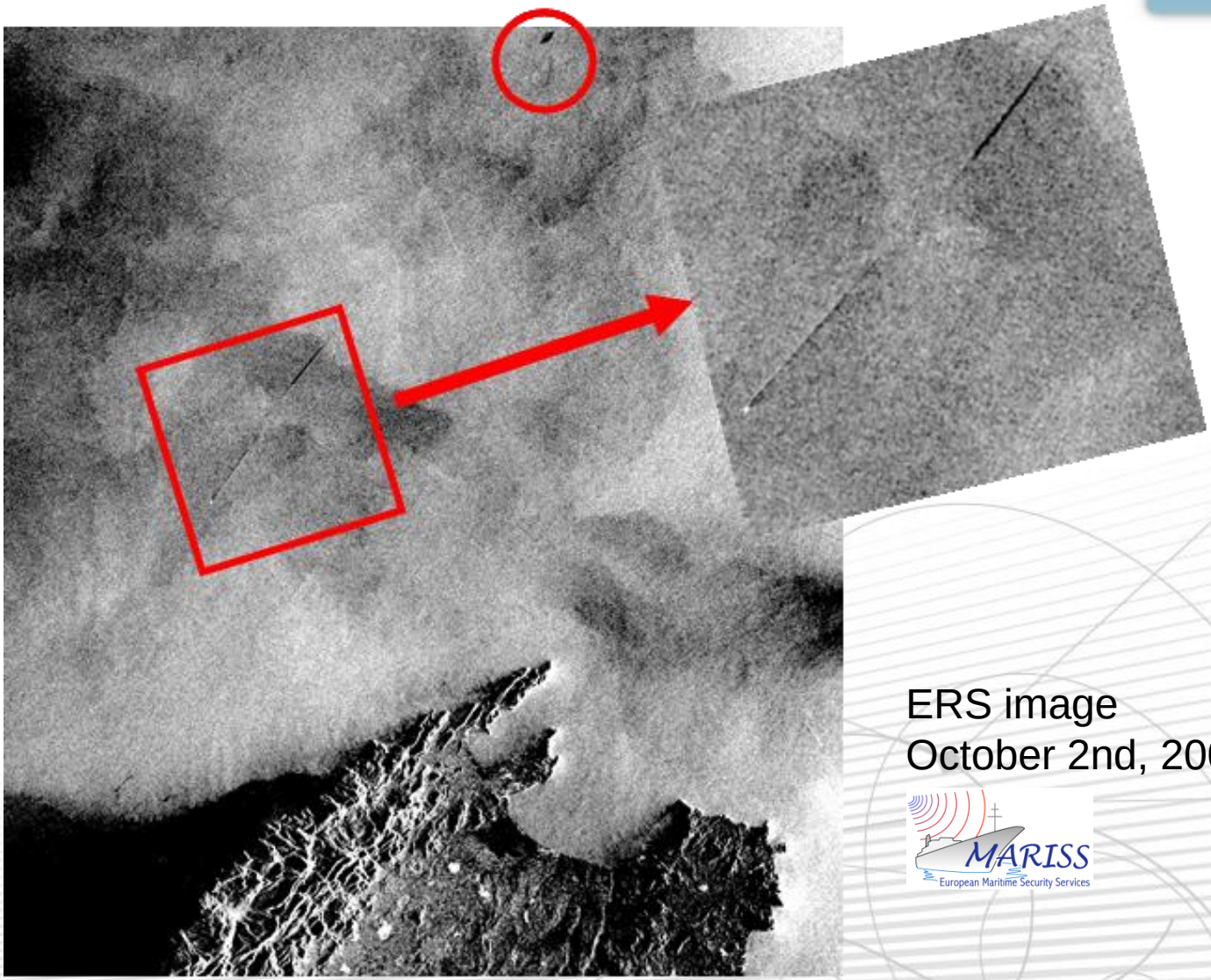




Oil spill detection with its boat

5 June 2007

Small slick in low traffic area



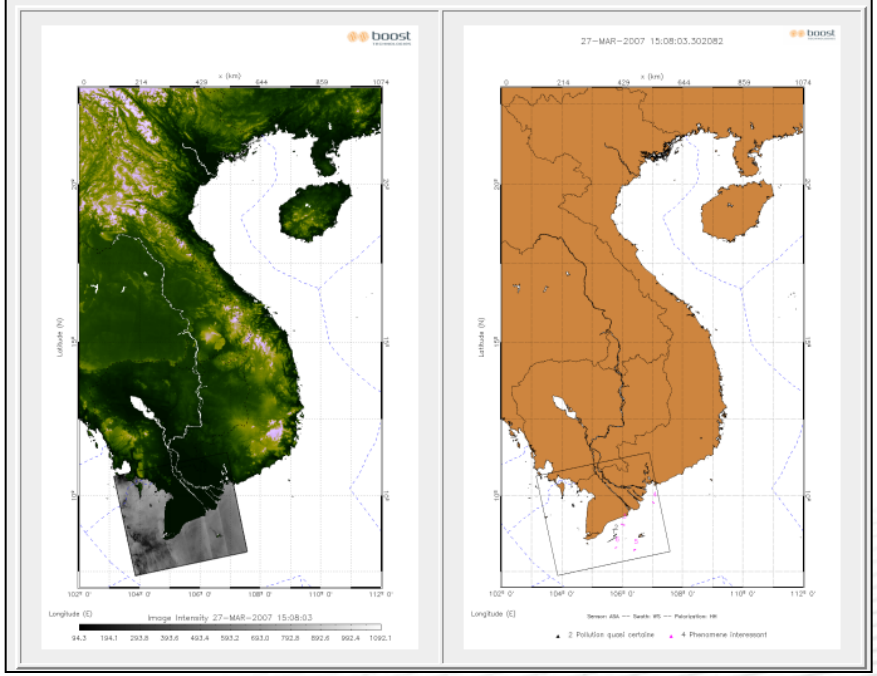
ERS image
October 2nd, 2007

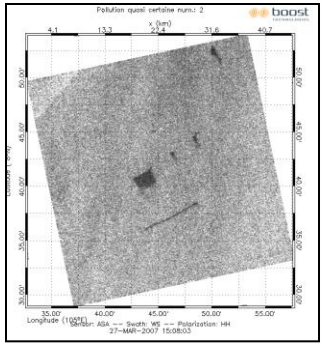
Oil spill report

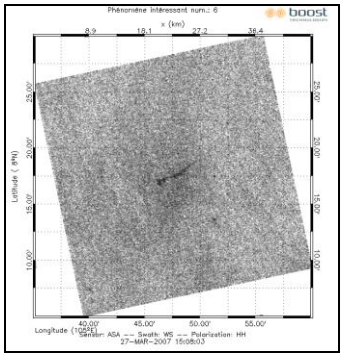
Oil spill detection report

Envisat ASAR (Wide Swath Mode) -- 27 March 2007 at 15:07:36 UTC

Number of detected highly probable oil spills:	2
Number of features of interest:	4



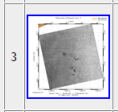


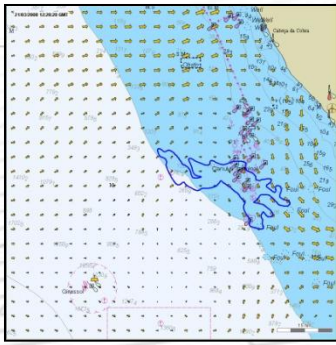


Highly probable polluted areas

No.	Zoom	Description	User Feedback
1		• Lat: 8°N 33.54' -- Lon: 105°E 39.77' • Length [km]: 36.7 • Area [km²]: 8.7 • Perimeter [km]: 79.3 [Associate source of pollution]	[Add comment]
2		• Lat: 8°N 41.46' -- Lon: 105°E 45.19' • Length [km]: 13.1 • Area [km²]: 16.1 • Perimeter [km]: 39.1 [Associate source of pollution]	[Add comment]

Features of interest

No.	Zoom	Description	User Feedback
3		• Lat: 9°N 2.87 -- Lon: 106°E 1.42' • Length [km]: 13.5 • Area [km²]: 16.4 • Perimeter [km]: 36.4	[Add comment]



Detection of vessels

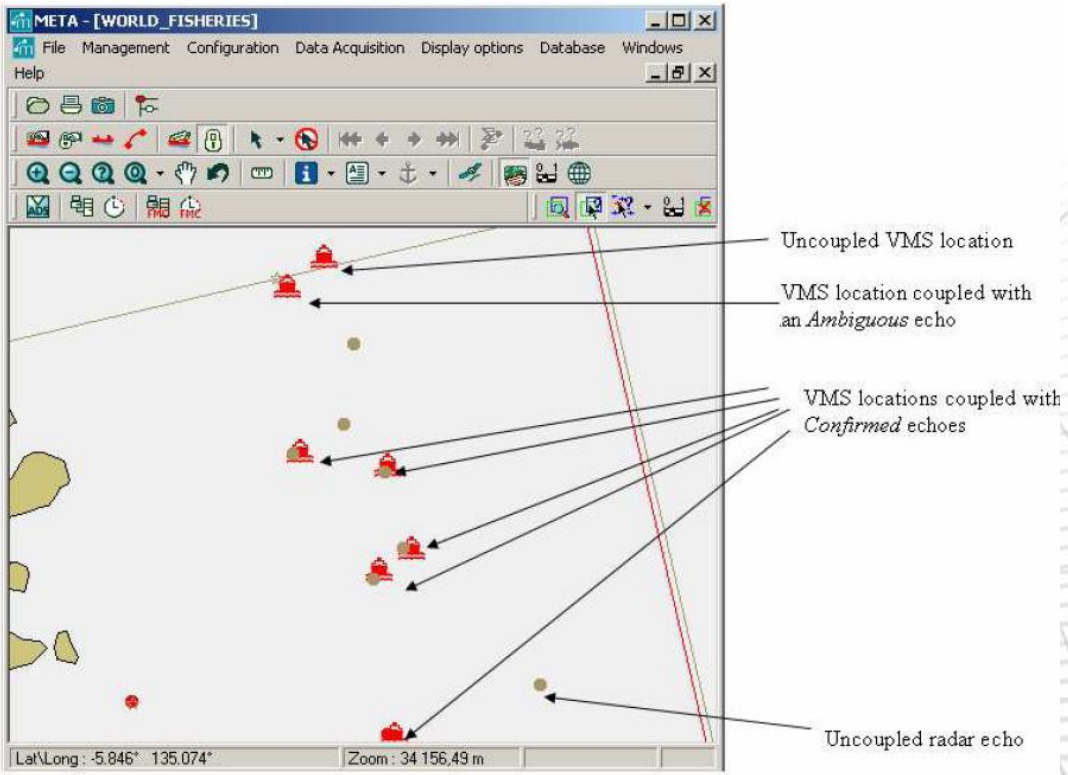
« Marion Dufresne 2 » research and supply vessel 118m

« Apache » longliner 57m

« Cap Bourbon 2 » longliner 56m

Technical concept
Ship detection with radar satellite

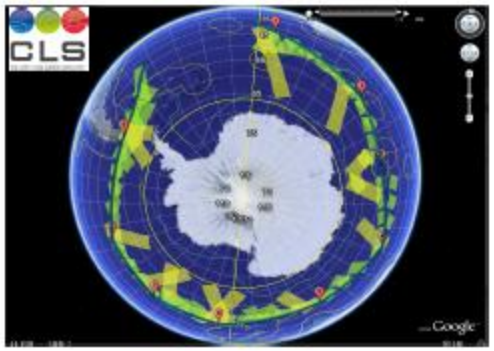
- Ship detection with wide coverage, day/night and all-weather vision
- Combination of Radar and VMS: detection of non-cooperative vessels
- Requires a ground station on site for data real-time downlink



Vendée Globe Race

CLS chosen by the Vendee Globe HQ to deliver metocean data to secure the race:

- ocean data
- meteo data (with Météo France)
- iceberg detection
- iceberg monitoring & drifting



Detection and monitoring of iceberg

Hello From Roxy

I just passed an iceberg less than 0.5nm on my Starboard side.
Pos 51°24.7'S 61°60.04E @11h03 TU

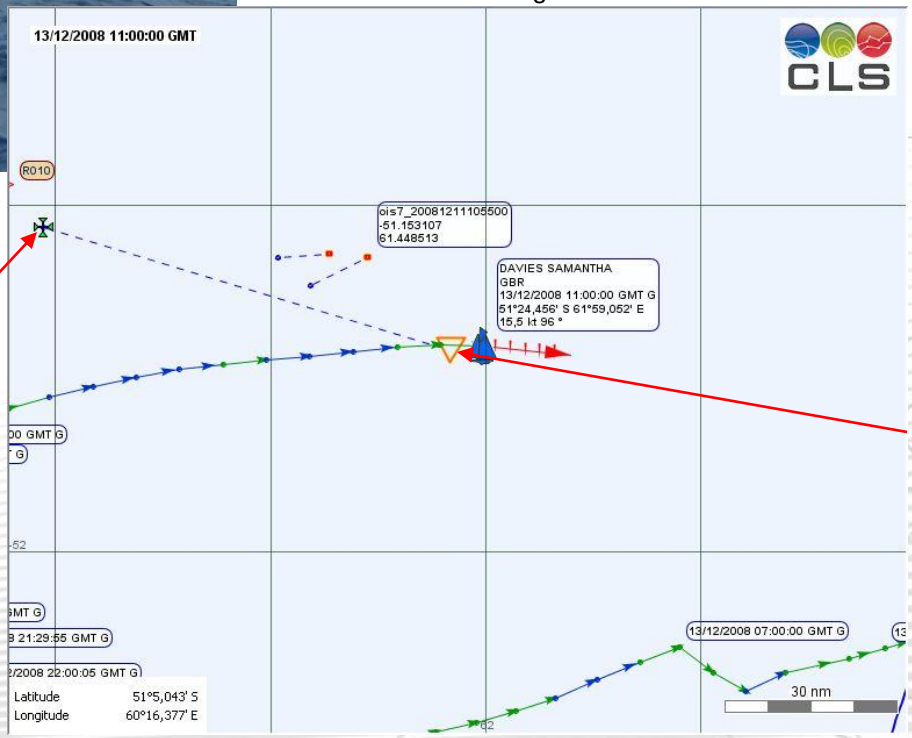
Size C2 - around 100m I think, big enough to show up on the radar easily.

Photos attached

SO beautiful, intense blue at the base, gleaming white top, waves crashing off the sides, SO dangerous.

I hope it's the only one.

THANK YOU to the CLS prog and other obs, I knew I was in a zone with ice and have been looking out.

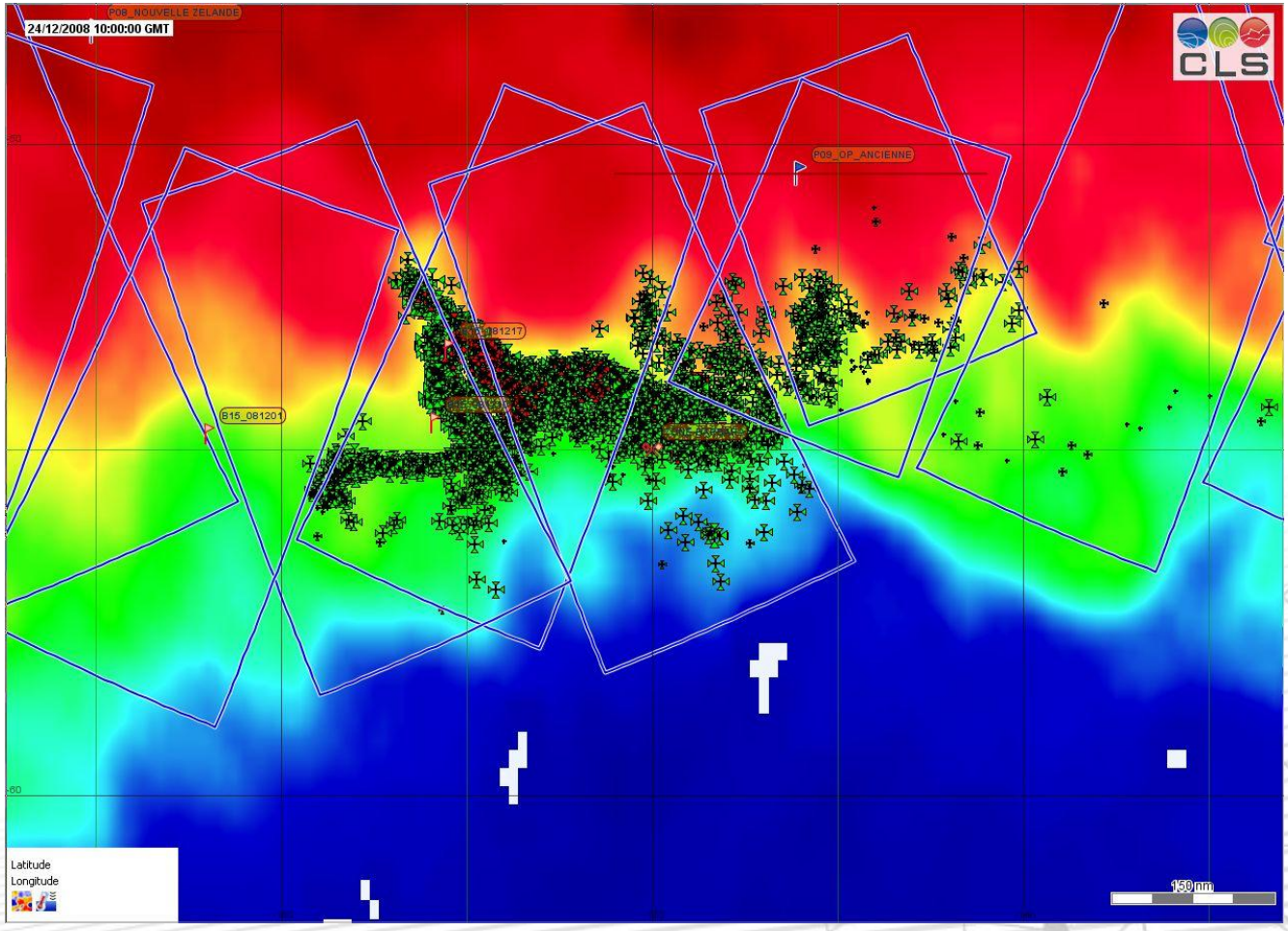


Iceberg detection 9 dec

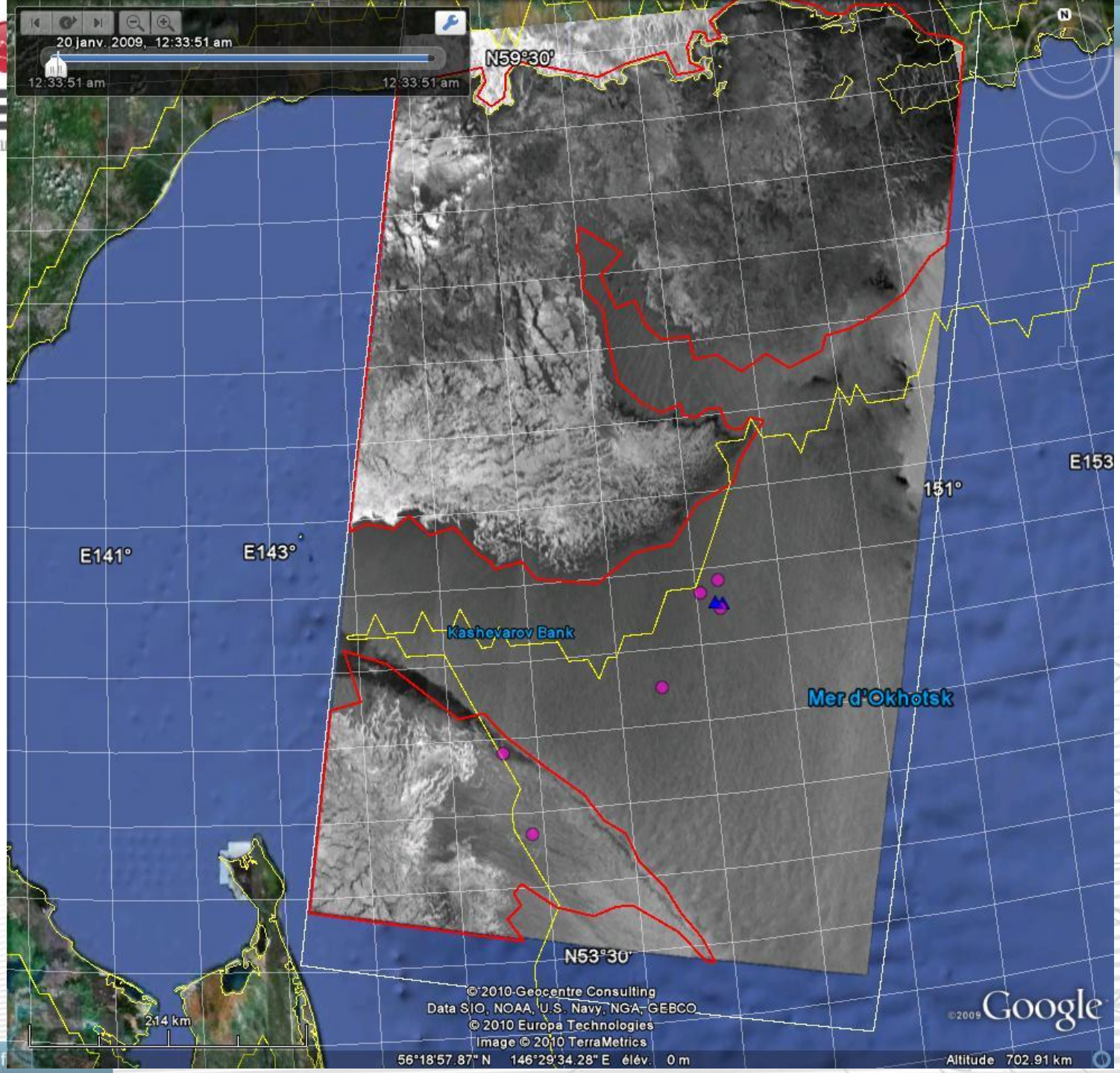
Estimated location by Samantha Davies 13 dec

Detection of the density of iceberg

CLS helped in the decision making to place the doors in the Antarctic current in real time



SST map


20 janv. 2009, 12:33:51 am
12:33:51 am
12:33:51 am
N59°30'
E141°
E143°
151°
E153
Kashevarov Bank
Mer d'Okhotsk
N53°30'
2.14 km
©2010 Geocentre Consulting
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
© 2010 Europa Technologies
Image © 2010 TerraMetrics
©2009 Google
56°18'57.87" N 146°29'34.28" E élév. 0 m
Altitude 702.91 km