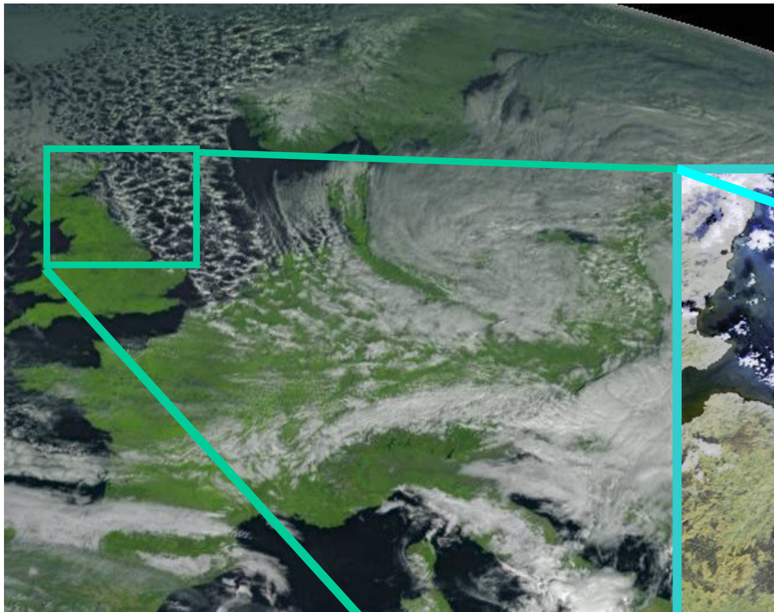
Remote Sensing for Maritime Security and Safety

Richard Bamler, Susanne Lehner
German Aerospace Center

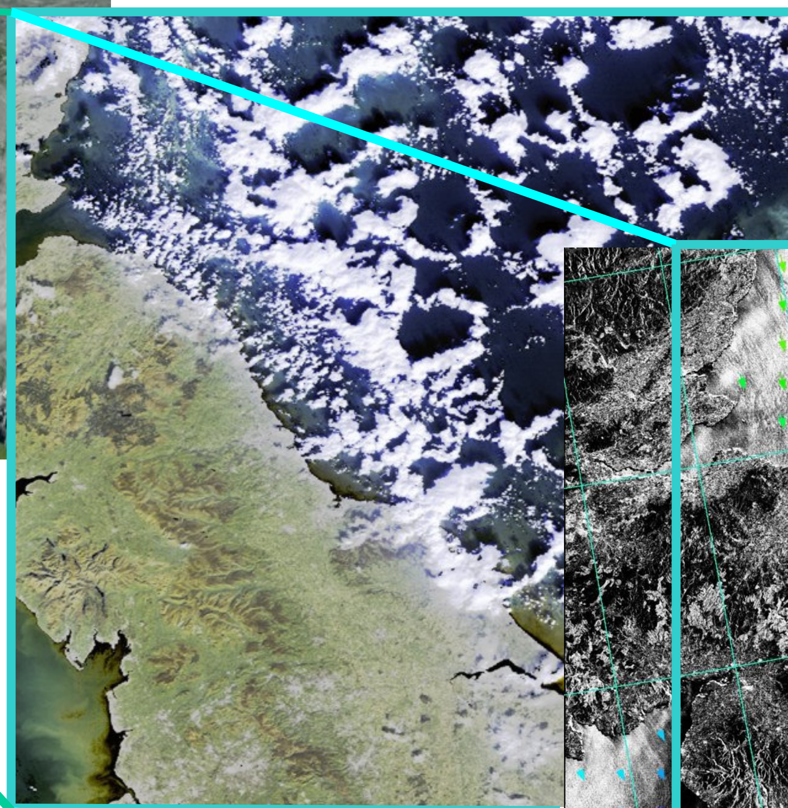
Deutsches Zentrum
für Luft- und Raumfahrt e.V.
in der Helmholtz-Gemeinschaft

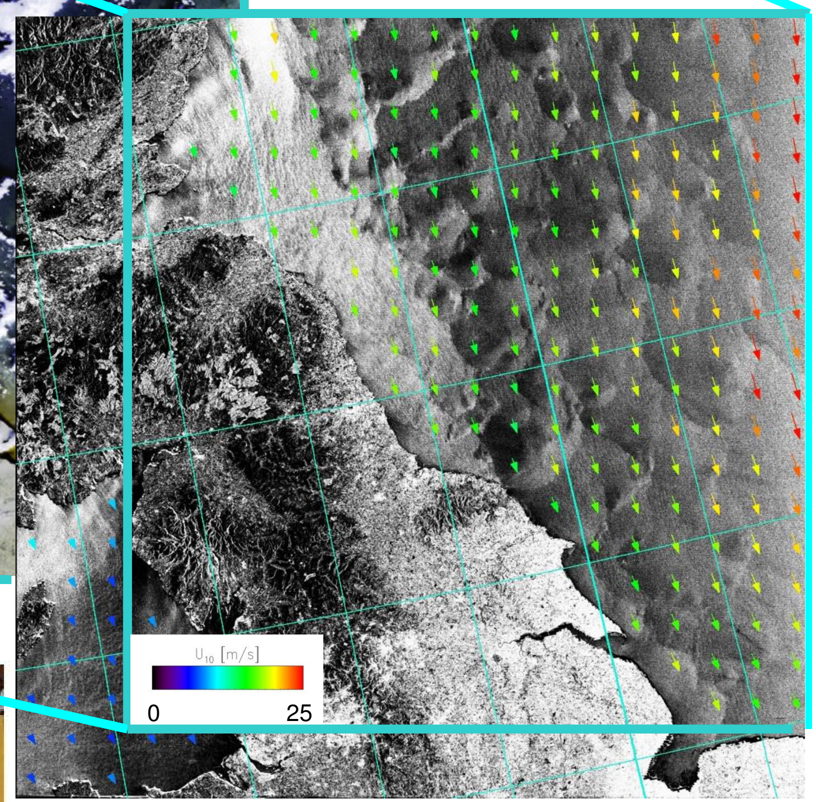
Cold Air Outbreak - Radar and Optical Images of ENVISAT



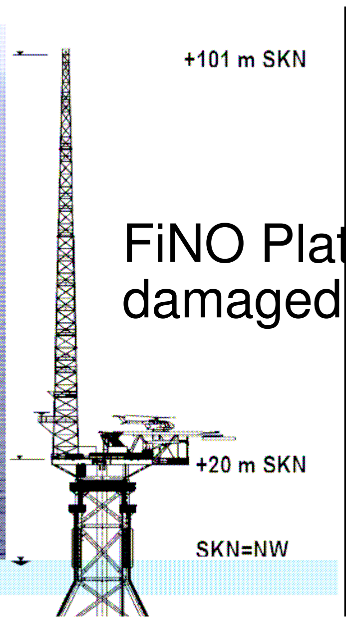
MSG-1 image acquired on Nov 1, 2006, 10:30 UTC

MERIS FR LEVEL 2
aquired on Nov 01, 2006

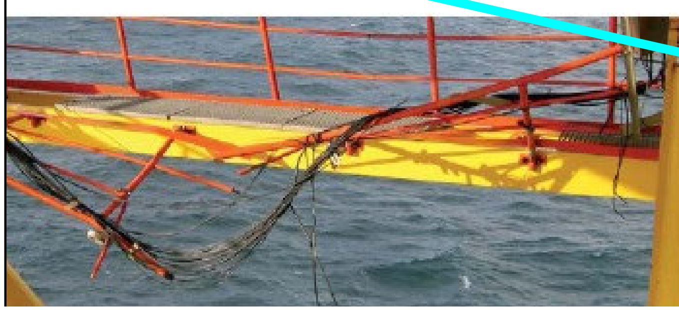




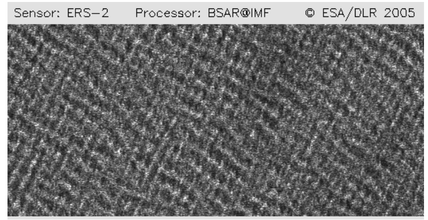
ASAR WSM acquired on Nov 1, 2006 10:26 UTC wind field superimposed



FiNO Platform damaged

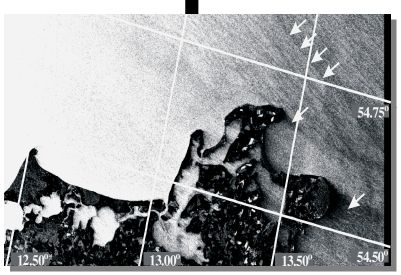


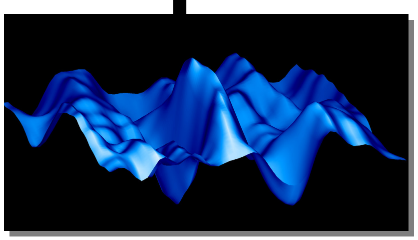
Wind, Waves and Currents from Radar Images

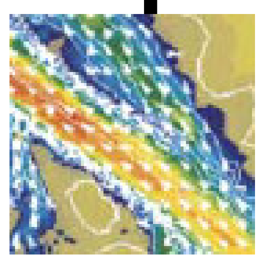


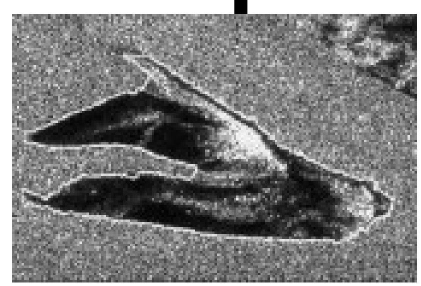
SAR Processor

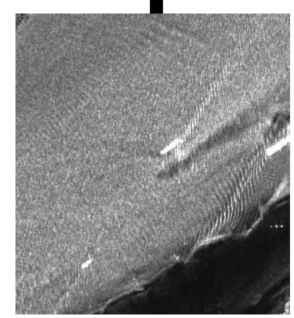
Wind Field	Sea State Hs, 2D, Hmax	Currents	Coast Line Oil Detection	Ship Detection
Scatterometer Algorithm, CMOD	Empirical, Inversion Algorithm,	Along Track Interferometry Doppler	Line Detection	Intensity Speed, Wake



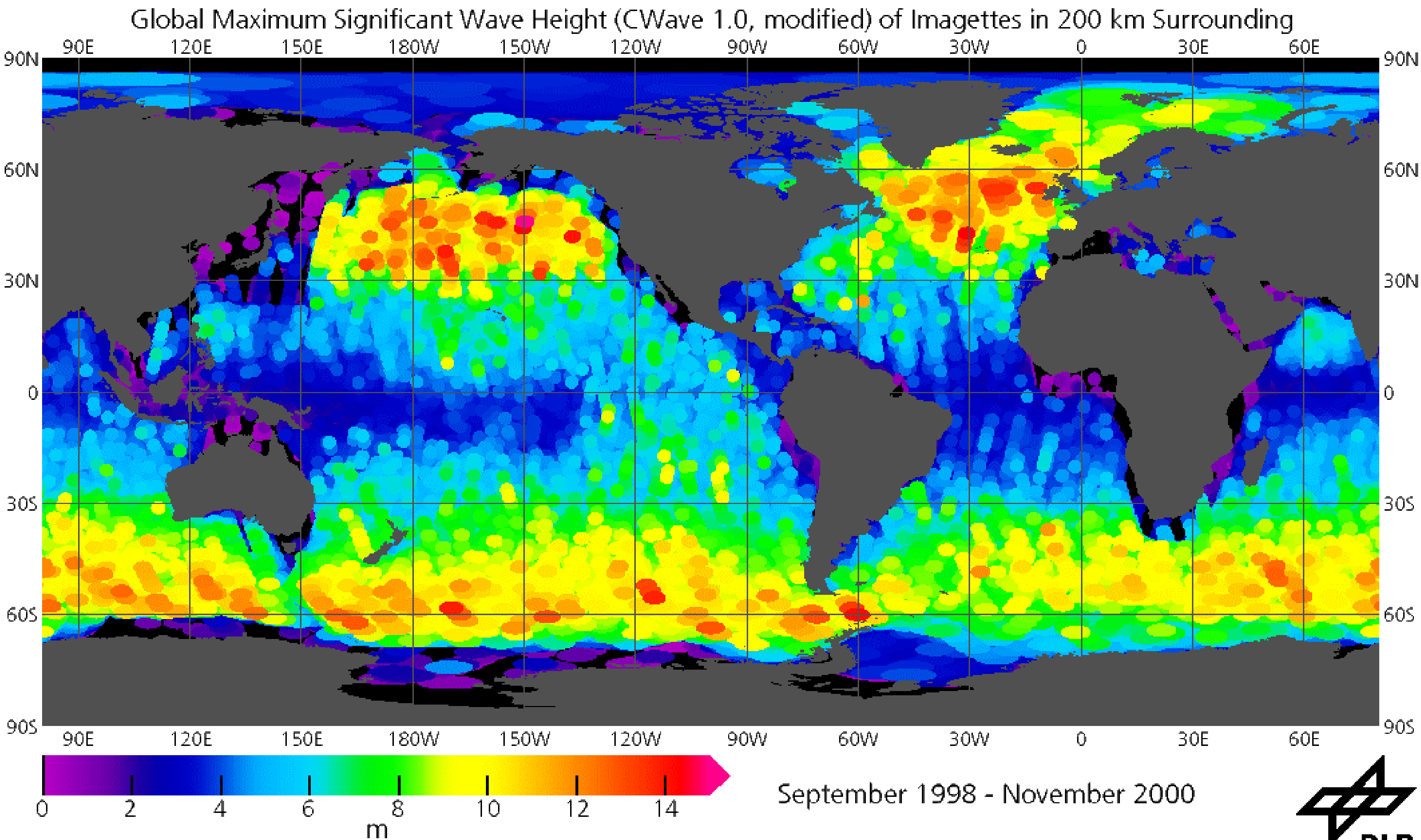








Global maximum Wave Height from Satellite



Use of Satellite Data at Weather Centers

Data Assimilation

ERS-2

JASON

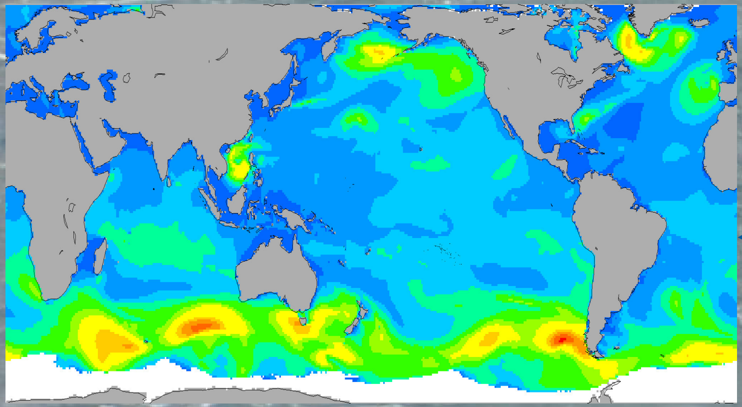
ENVISAT

Radar Altimeter

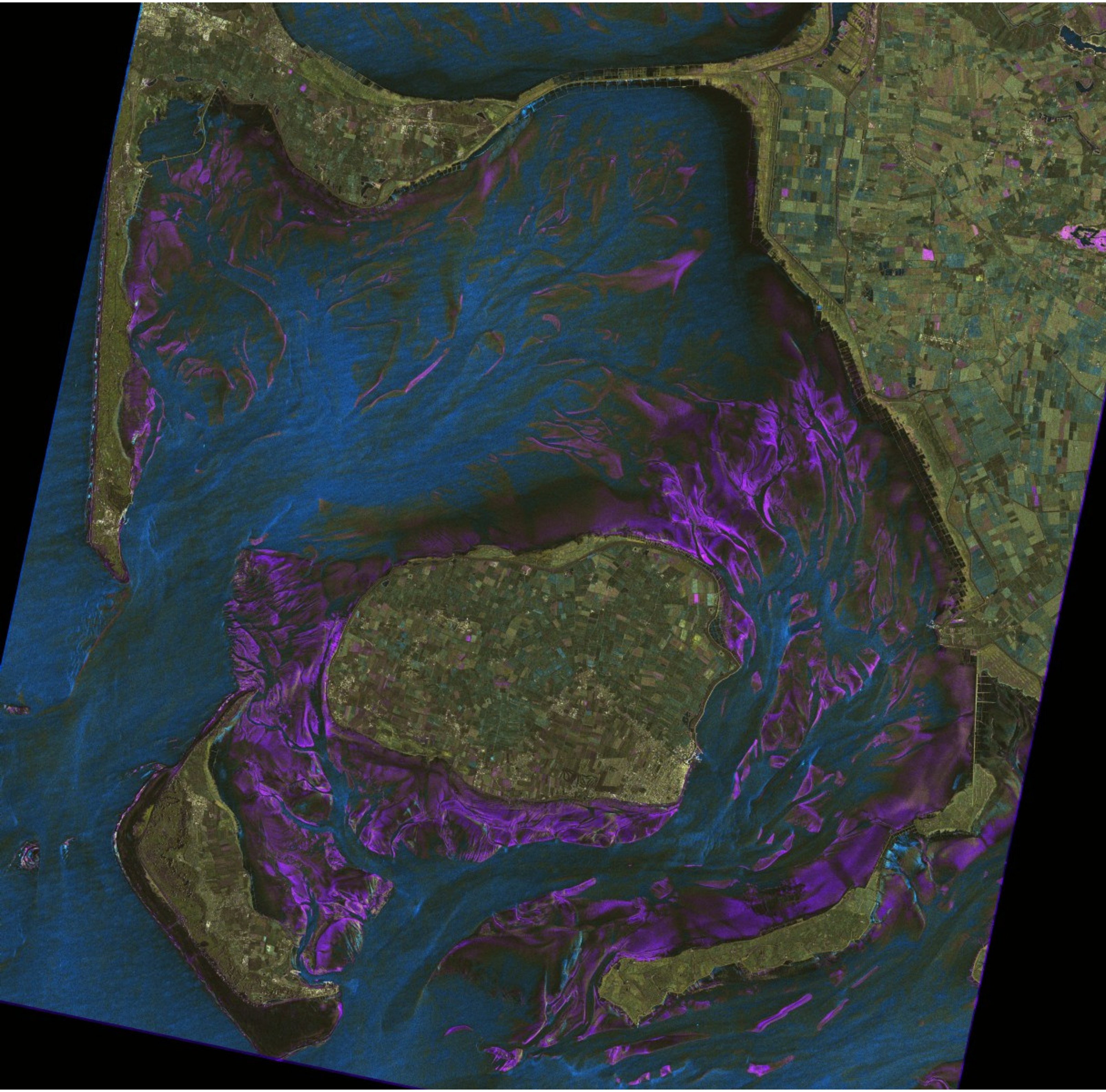
significant wave height, wind speed

Quality Control

Interpolation

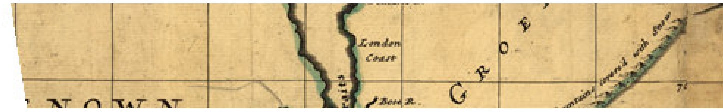


New High Resolution Radar Satellites available, e.g., TerraSAR X, Cosmo, Paz



Wadden Sea
North Sea

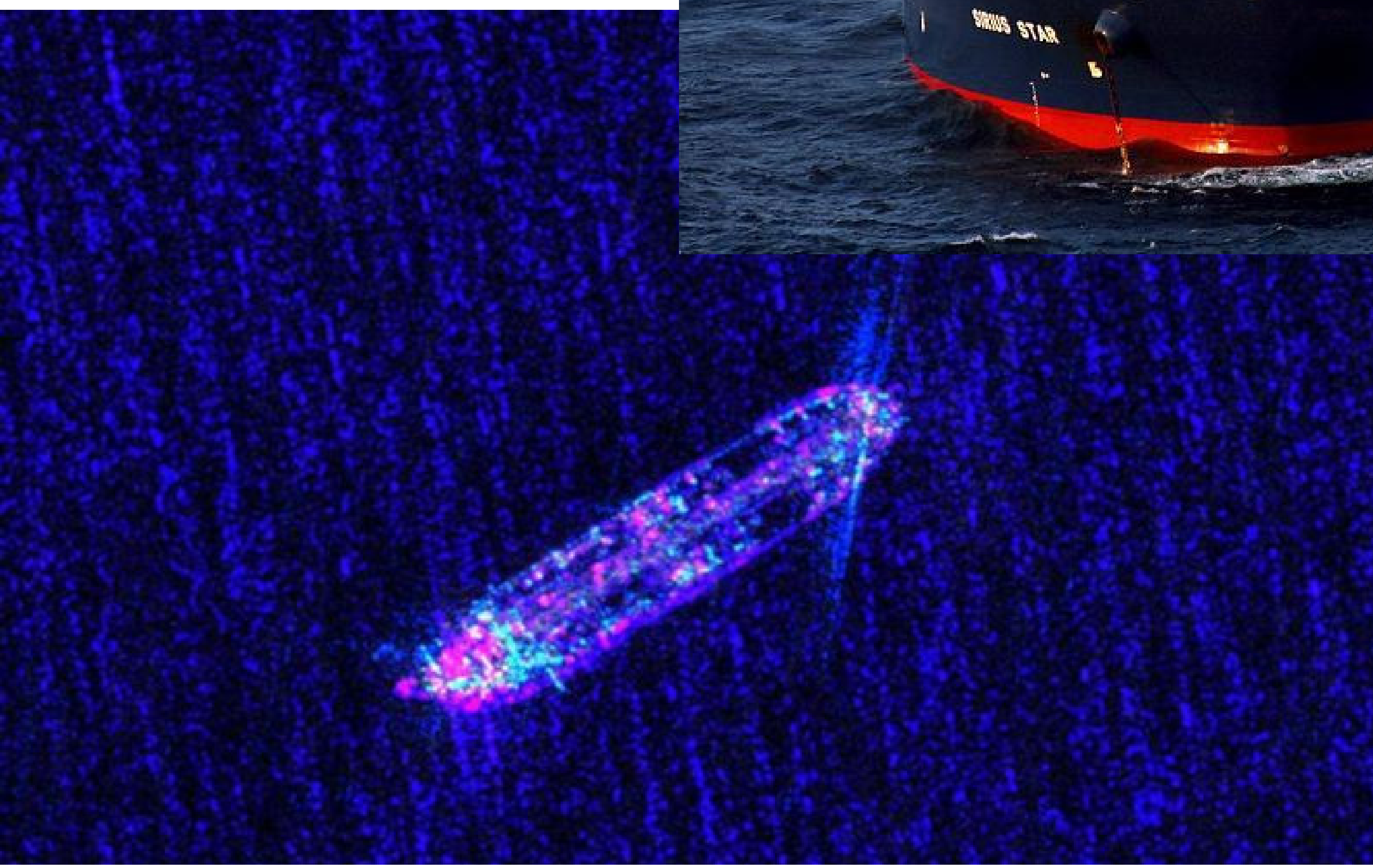
Multitemporal view of TerraSAR X Stripmap



SIRIUS STAR

SIRIUS STAR
TSX Dual polarisation

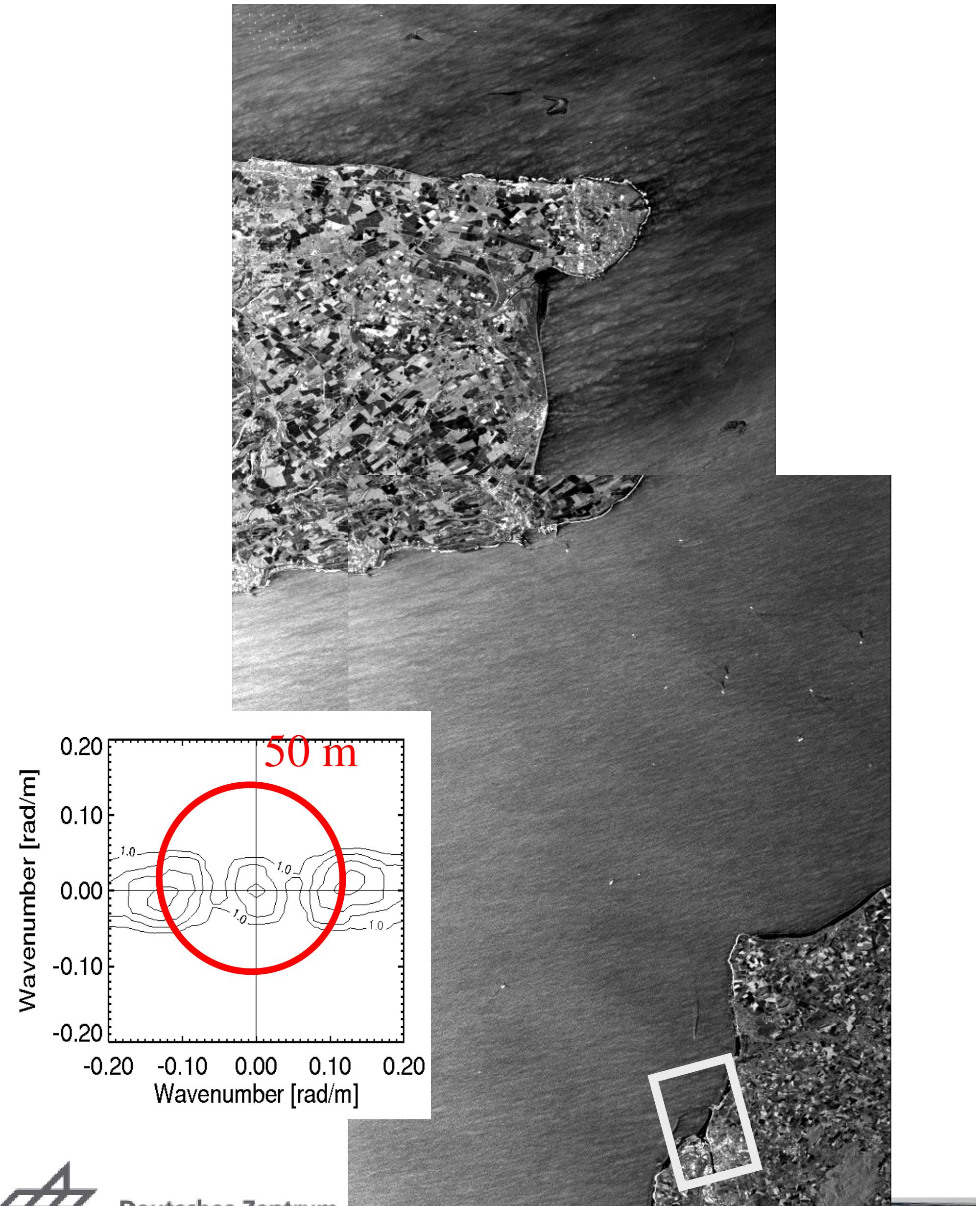
Somali Coast



UKRAINE - Oil Spill in the Kerch Strait - November 16, 2007

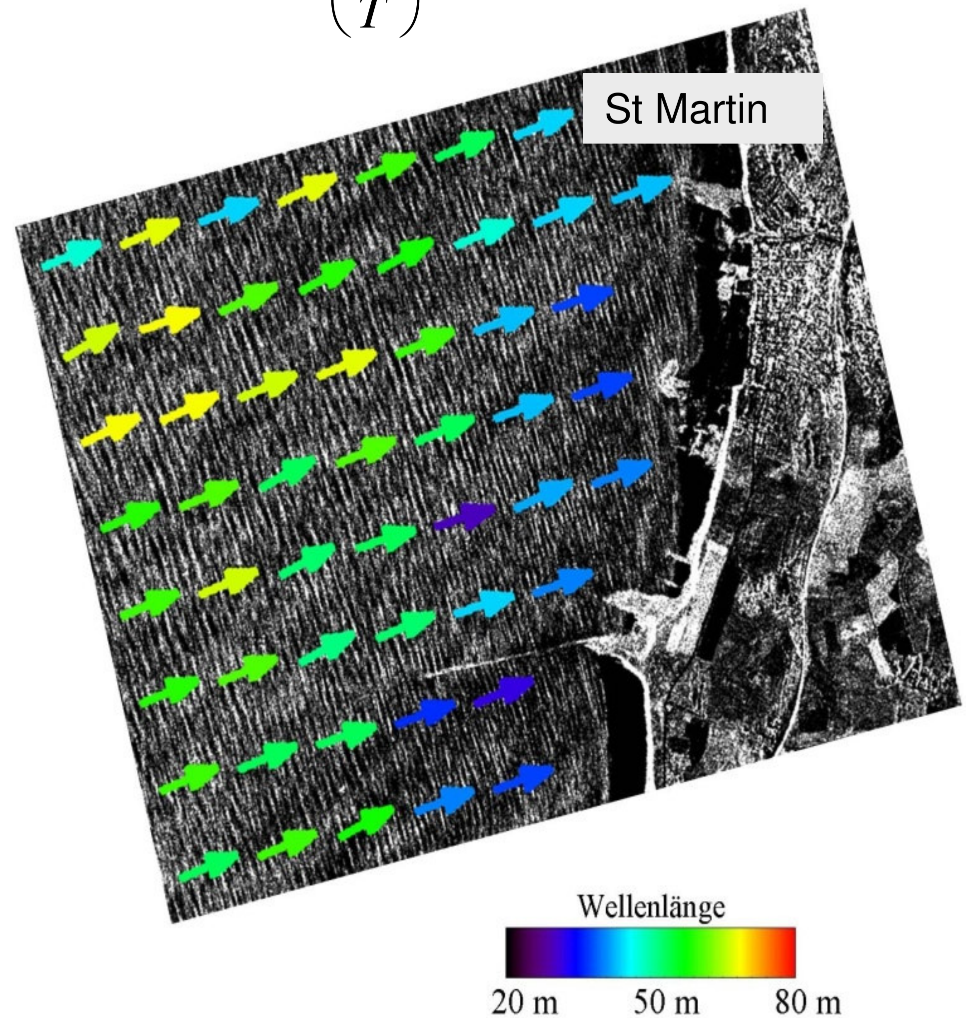
1:75.000

Coastal Ocean Wave Field at the Channel

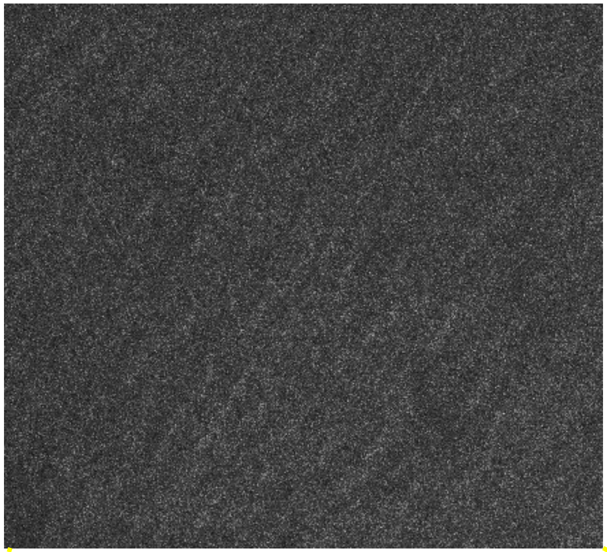


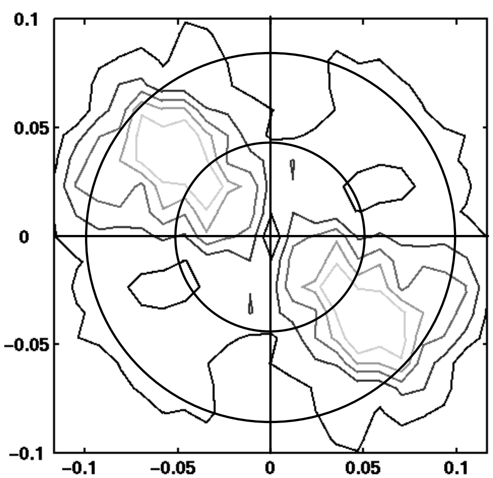
shallow under water topography

$$\left(\frac{\lambda}{T}\right)^2 = g * h$$



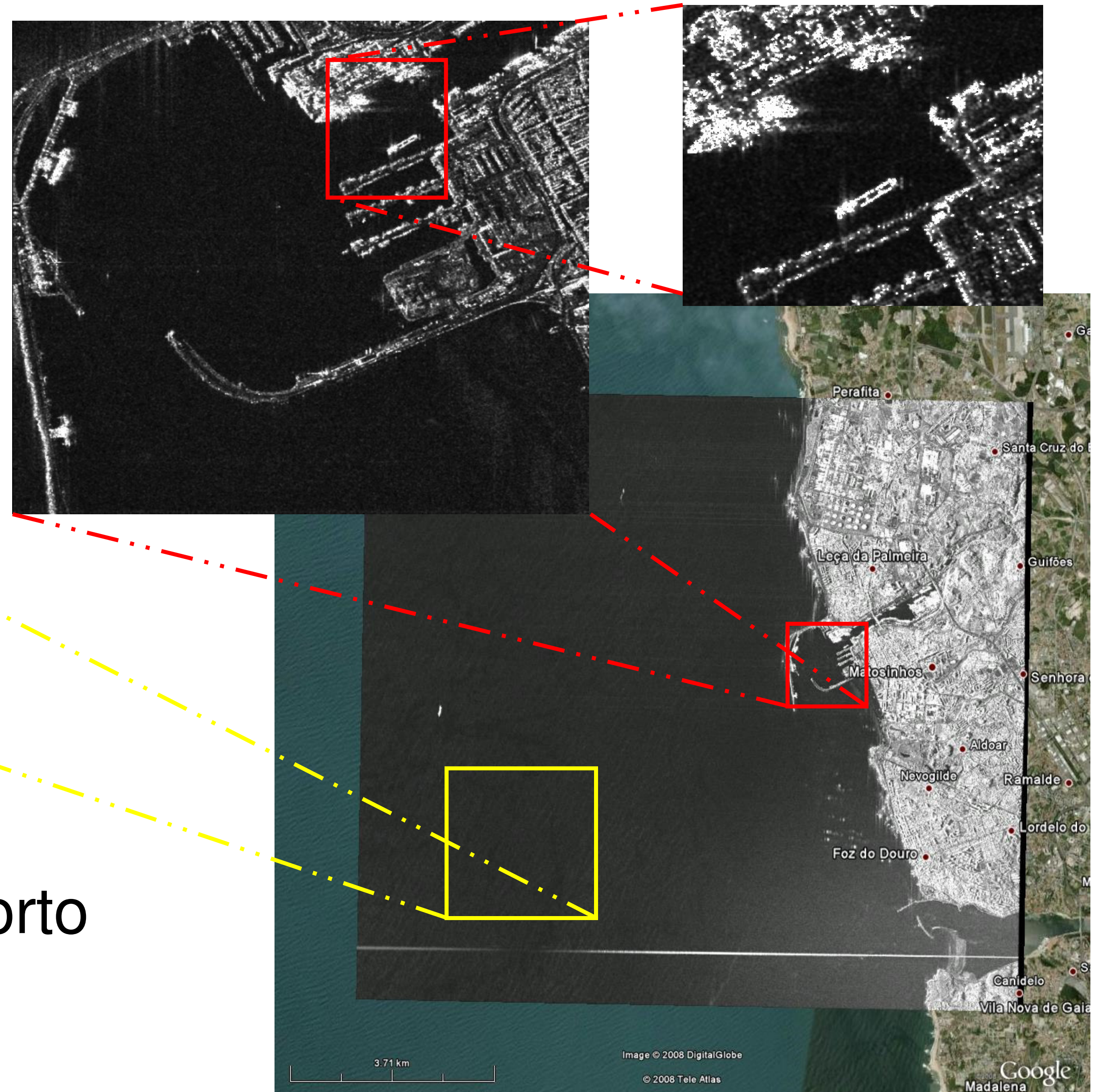
TSX Image near Planned Ocean Wave Energy plant



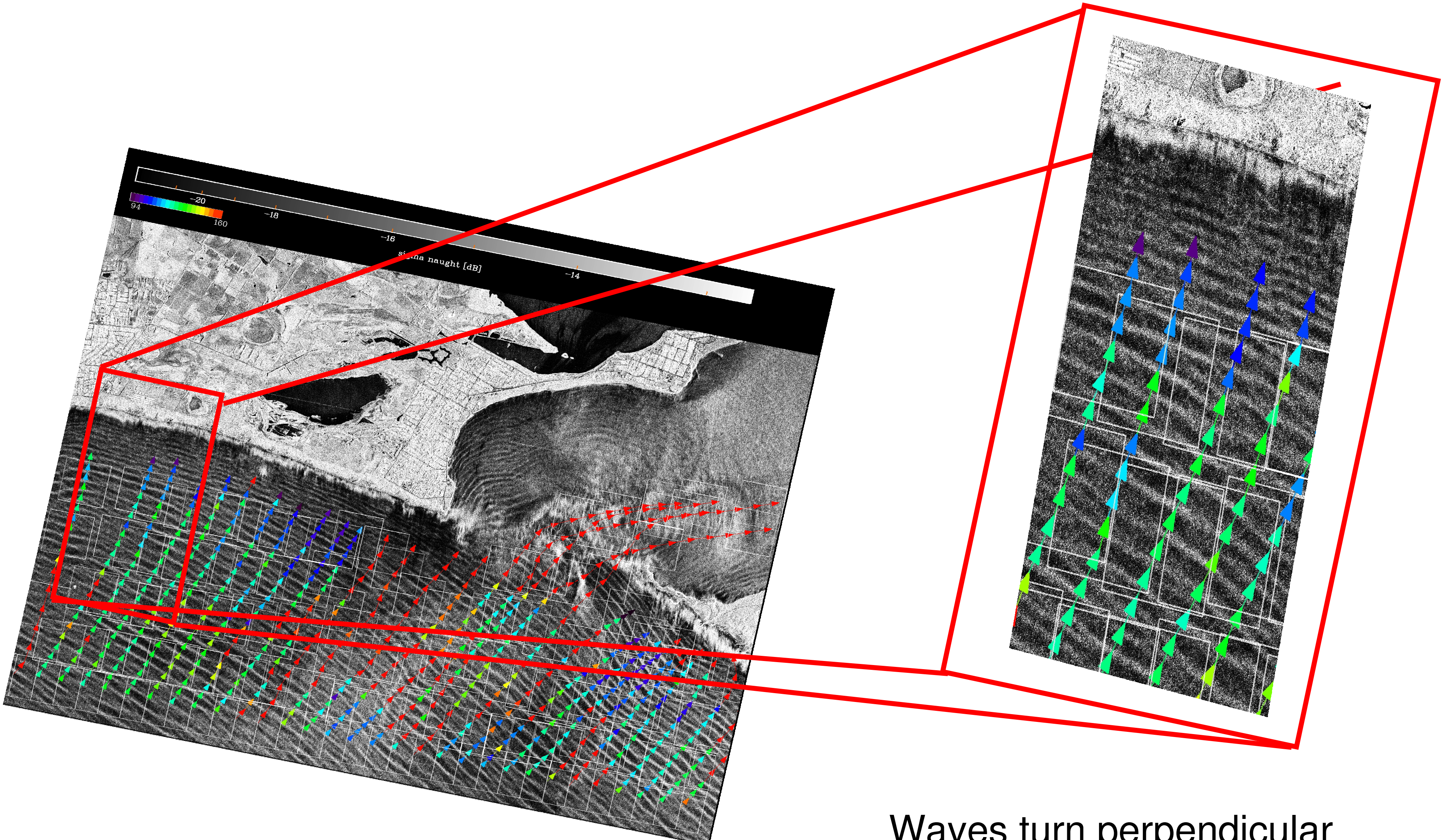


Peak wavelength 92 m

Porto




Melbourne, 17.3.08
Entrance Port Philipp



Waves turn perpendicular
to the shoreline.


© BBC November 2002
Horizon – Freak Wave
COMBI