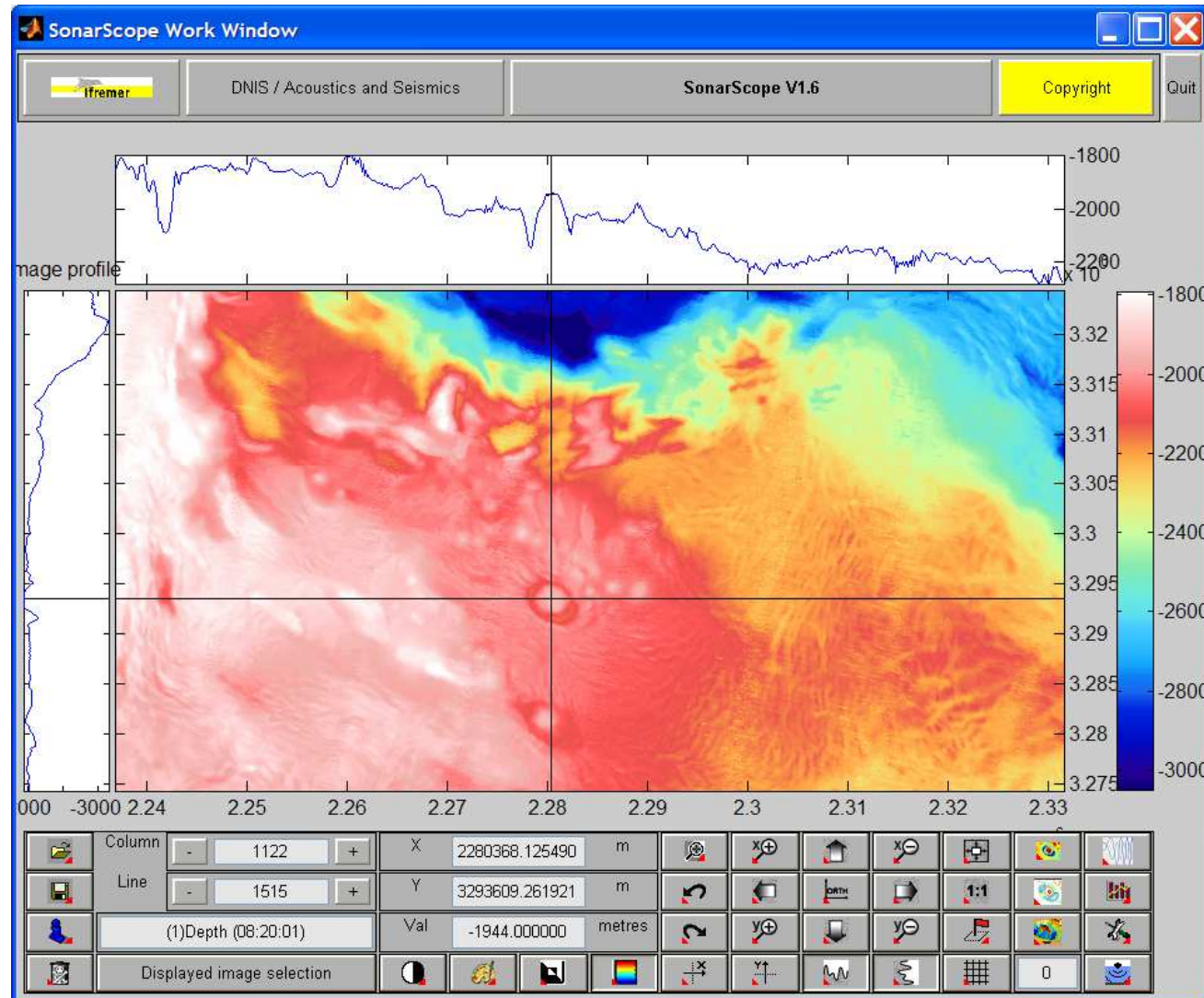

SonarScope Overview

Jean-Marie Augustin

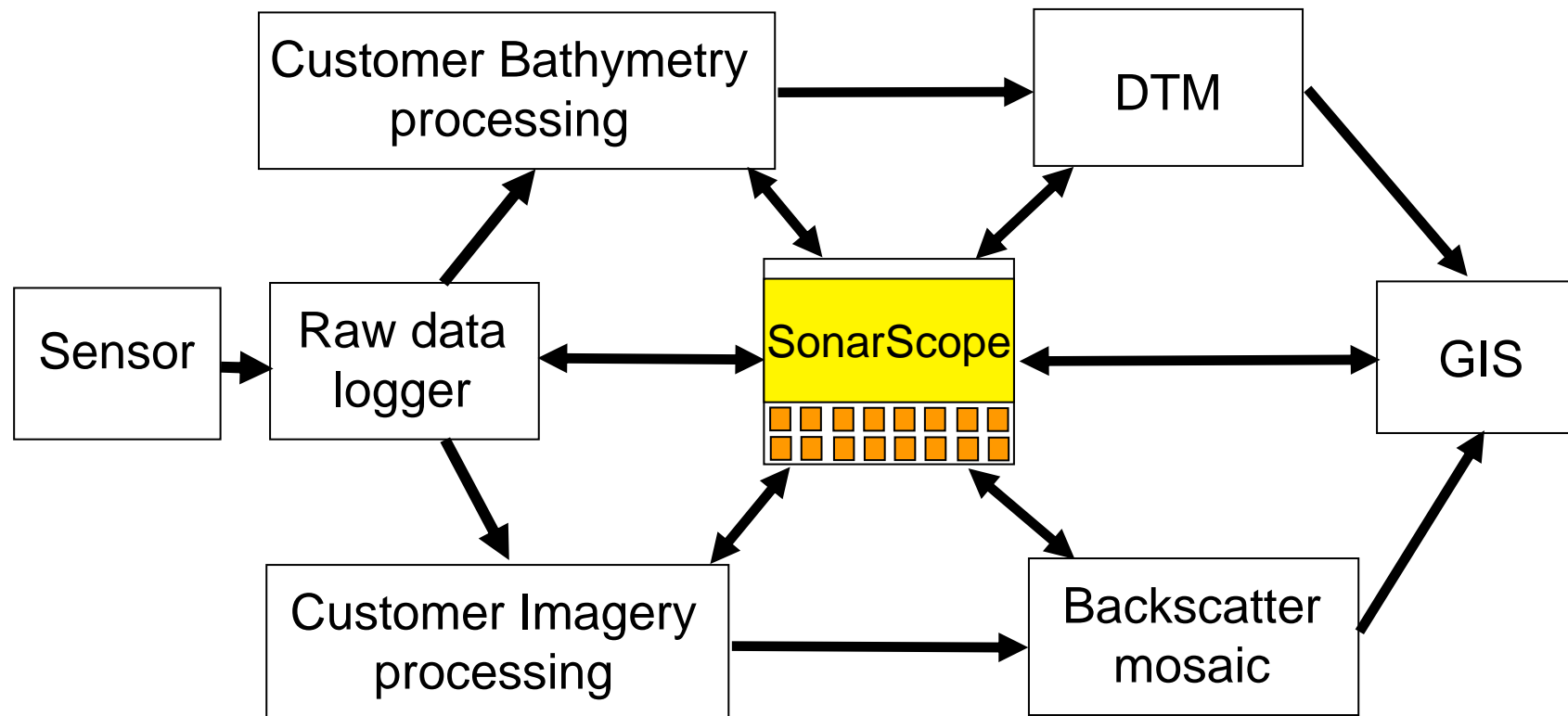
Ifremer, Brest, France

Acoustics & Seismics Dept

SonarScope : The sonar « photoshop »



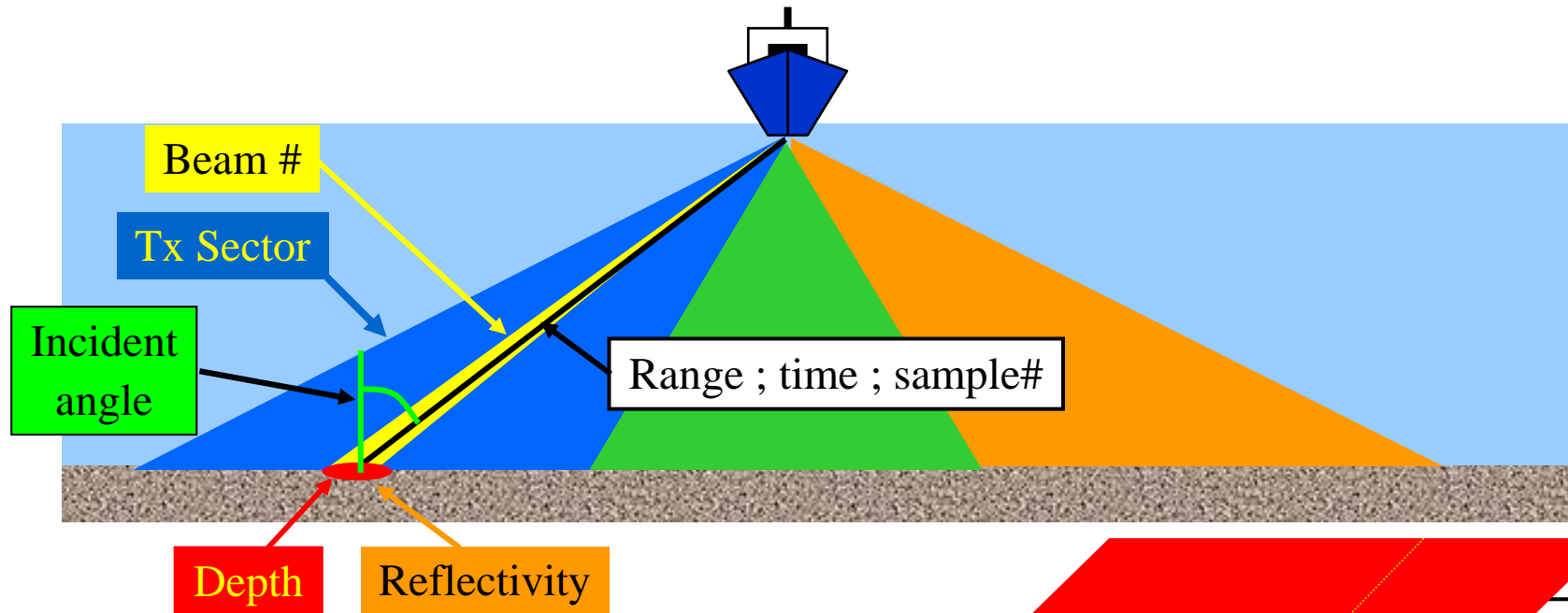
SonarScope : Principal or complementary tool



SonarScope : Tree domains of application

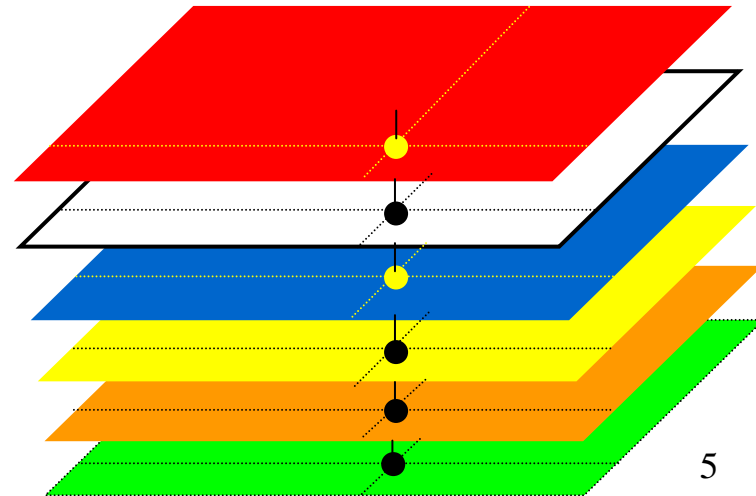
- Quality control
- Data processing
- Help for interpretation

SonarScope : Multilayer data

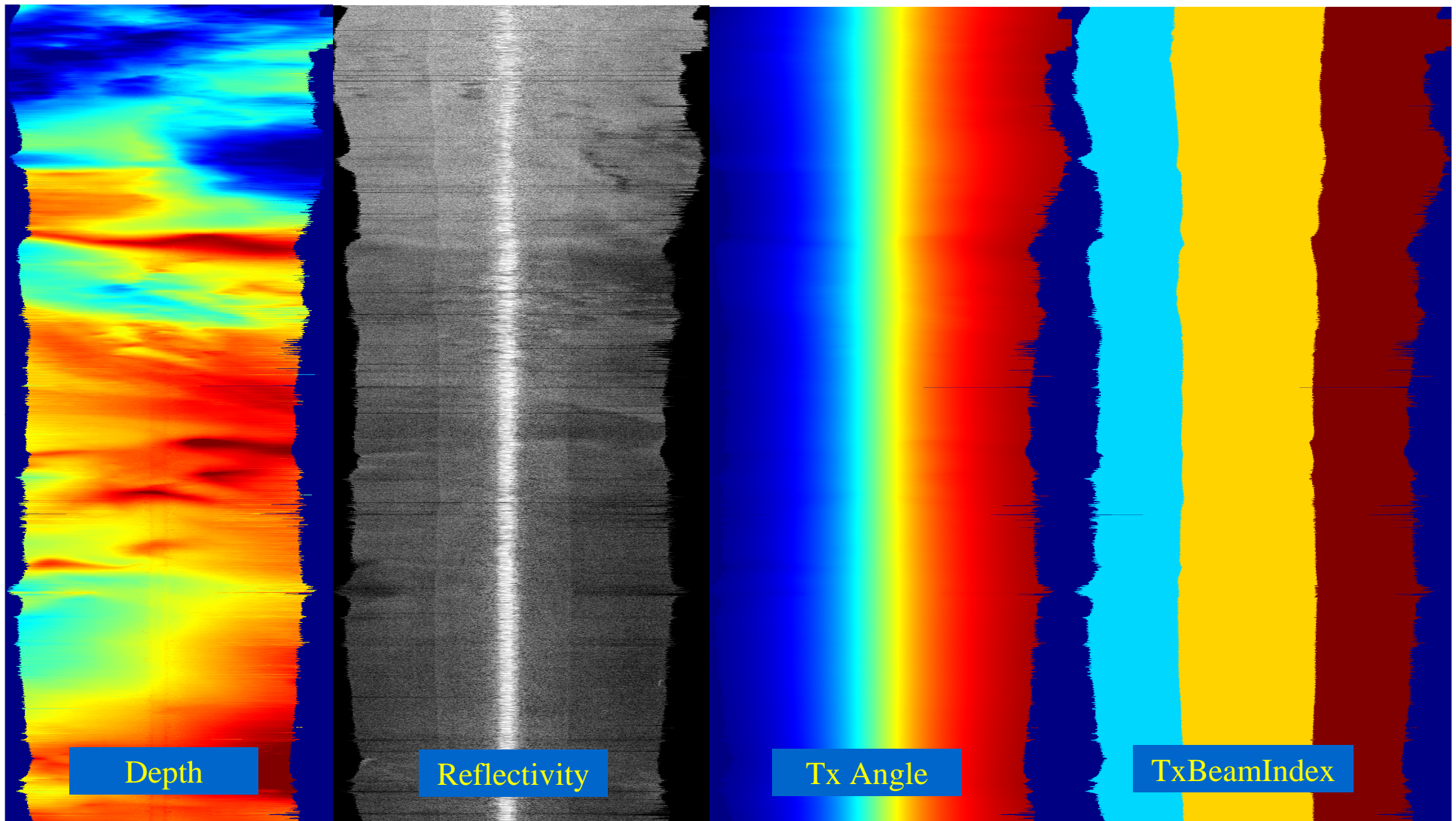


And also (e.g.) :

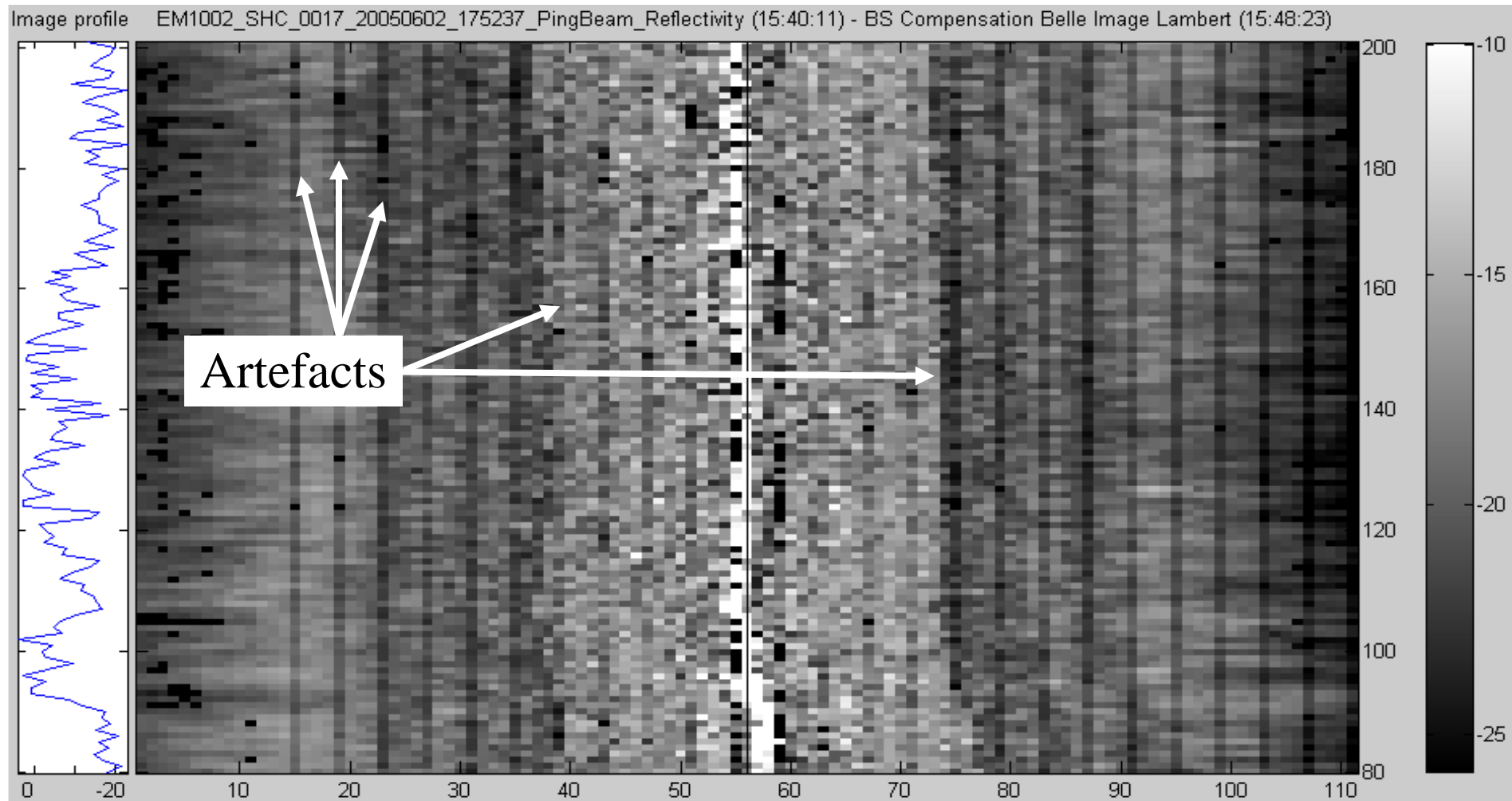
- Detection type (amplitude/phase)
- Transmit angle
- Mode, roll, pitch, heave...
- Etc.



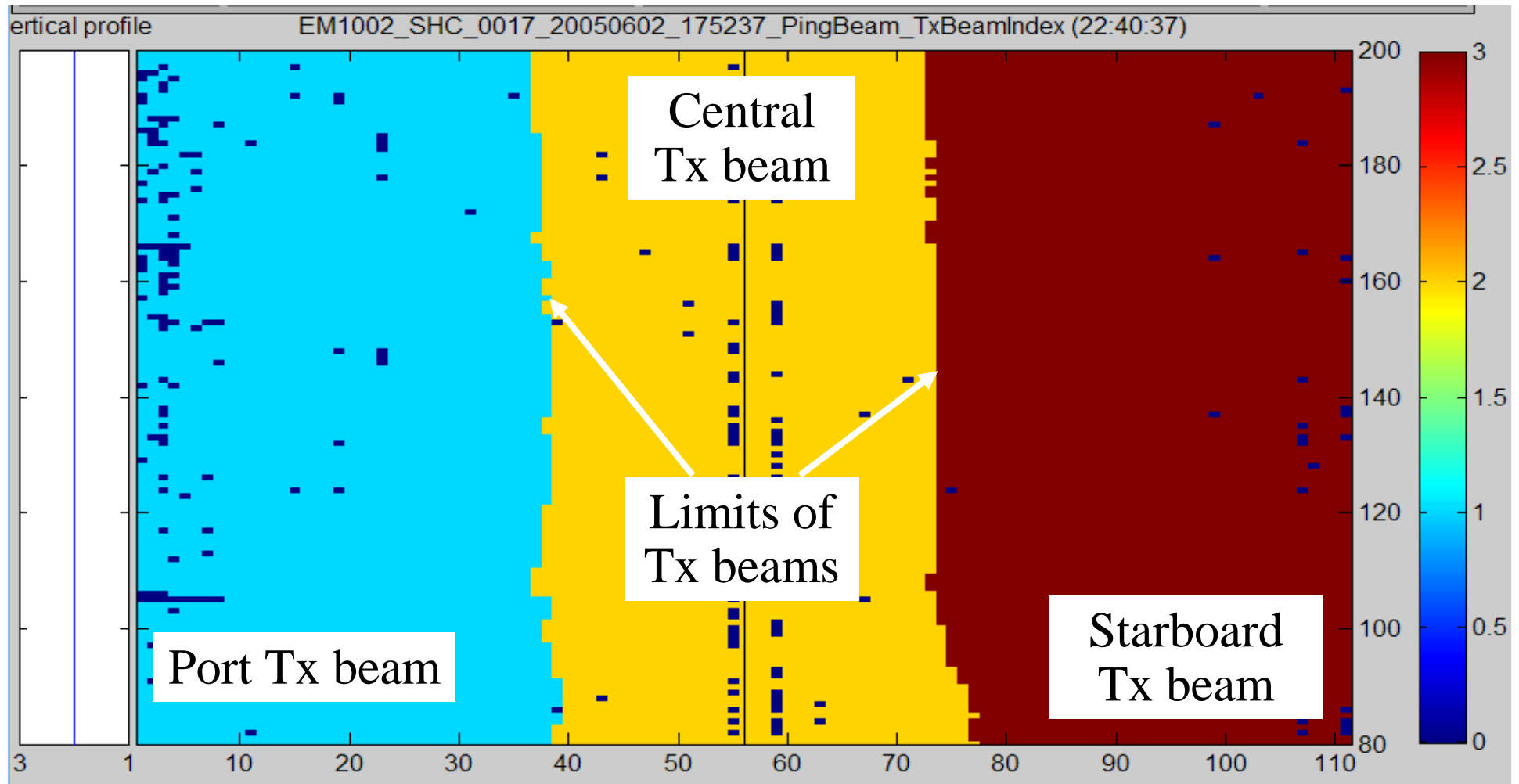
SonarScope : Example of multilayer data



SonarScope : Quality Control

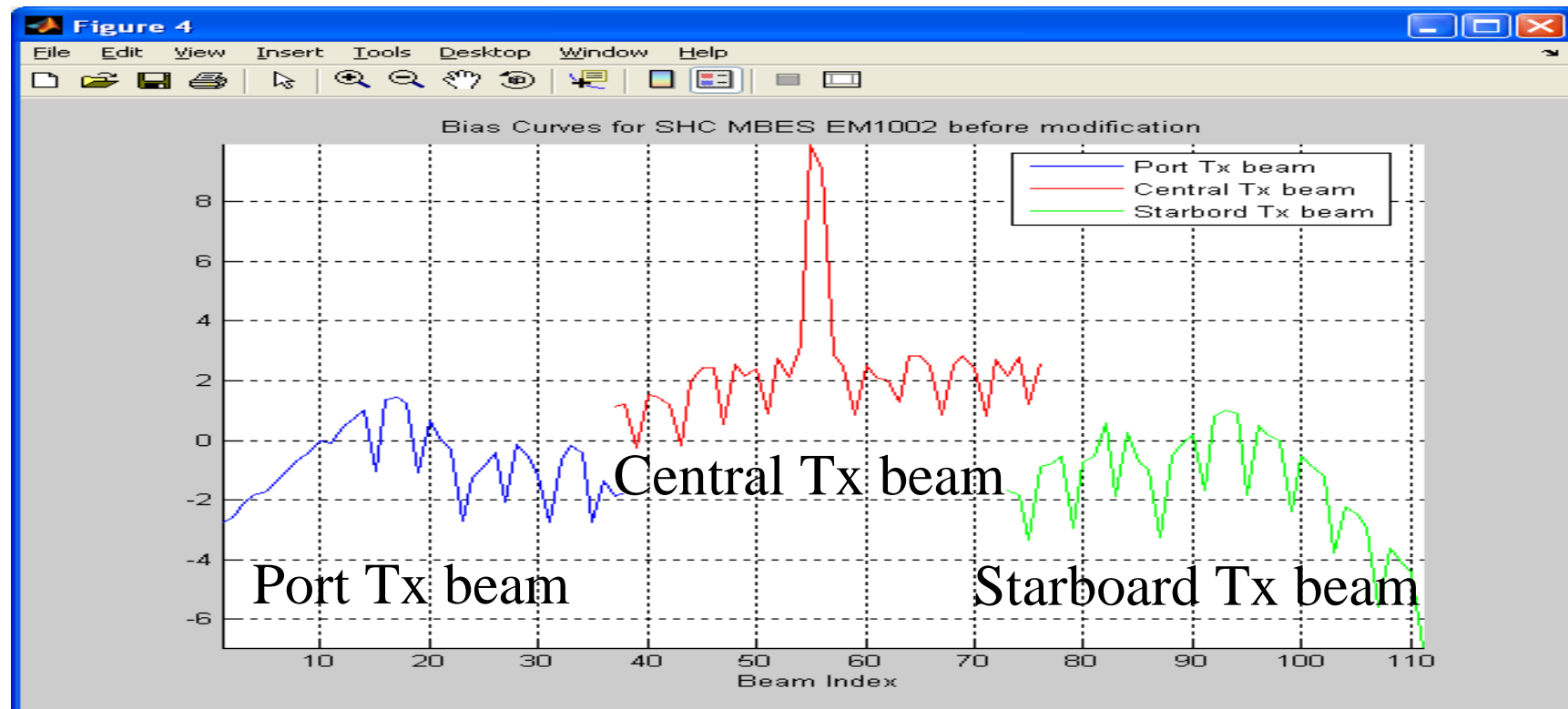


SonarScope : Quality Control

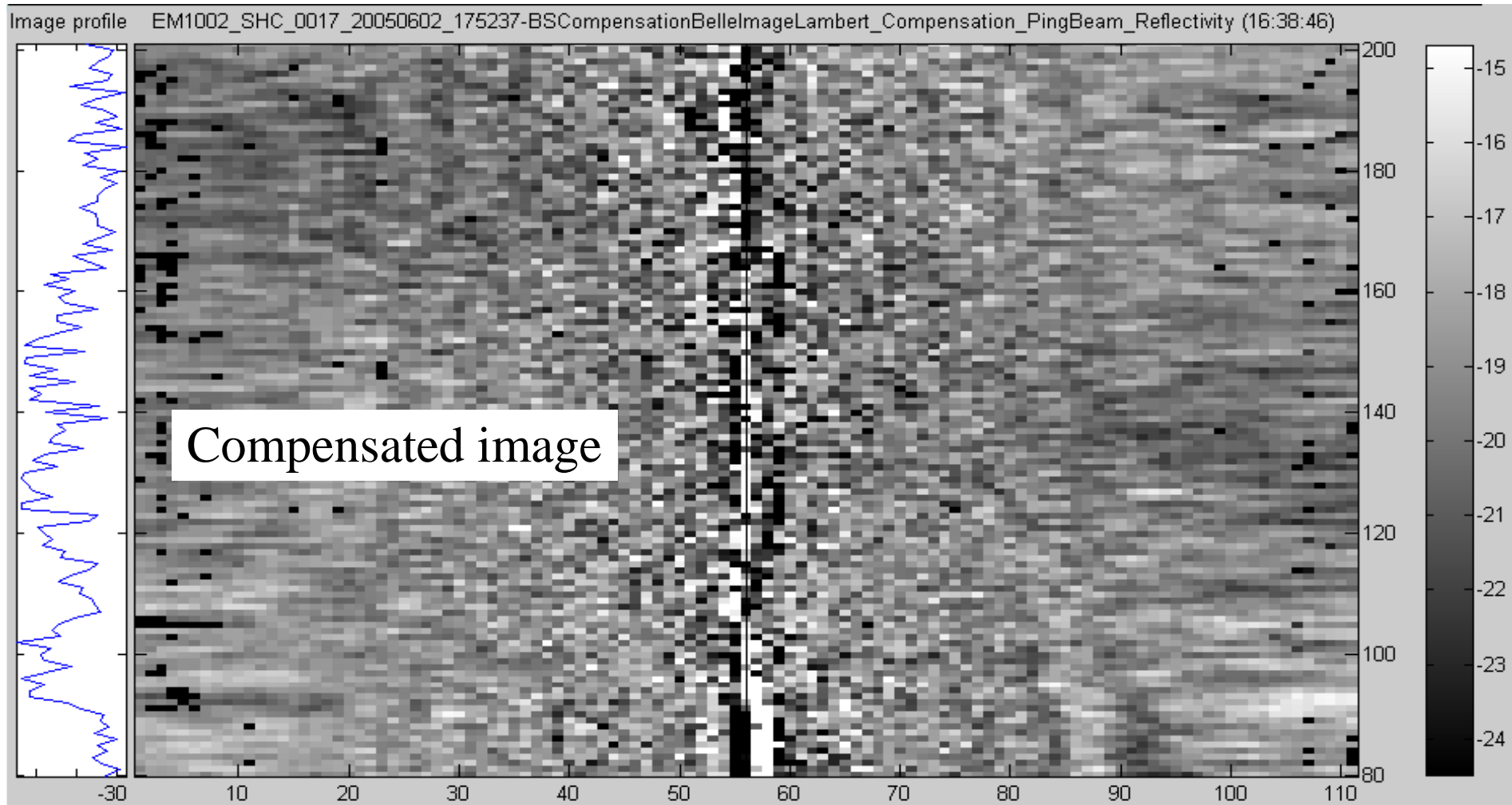


SonarScope : Quality Control

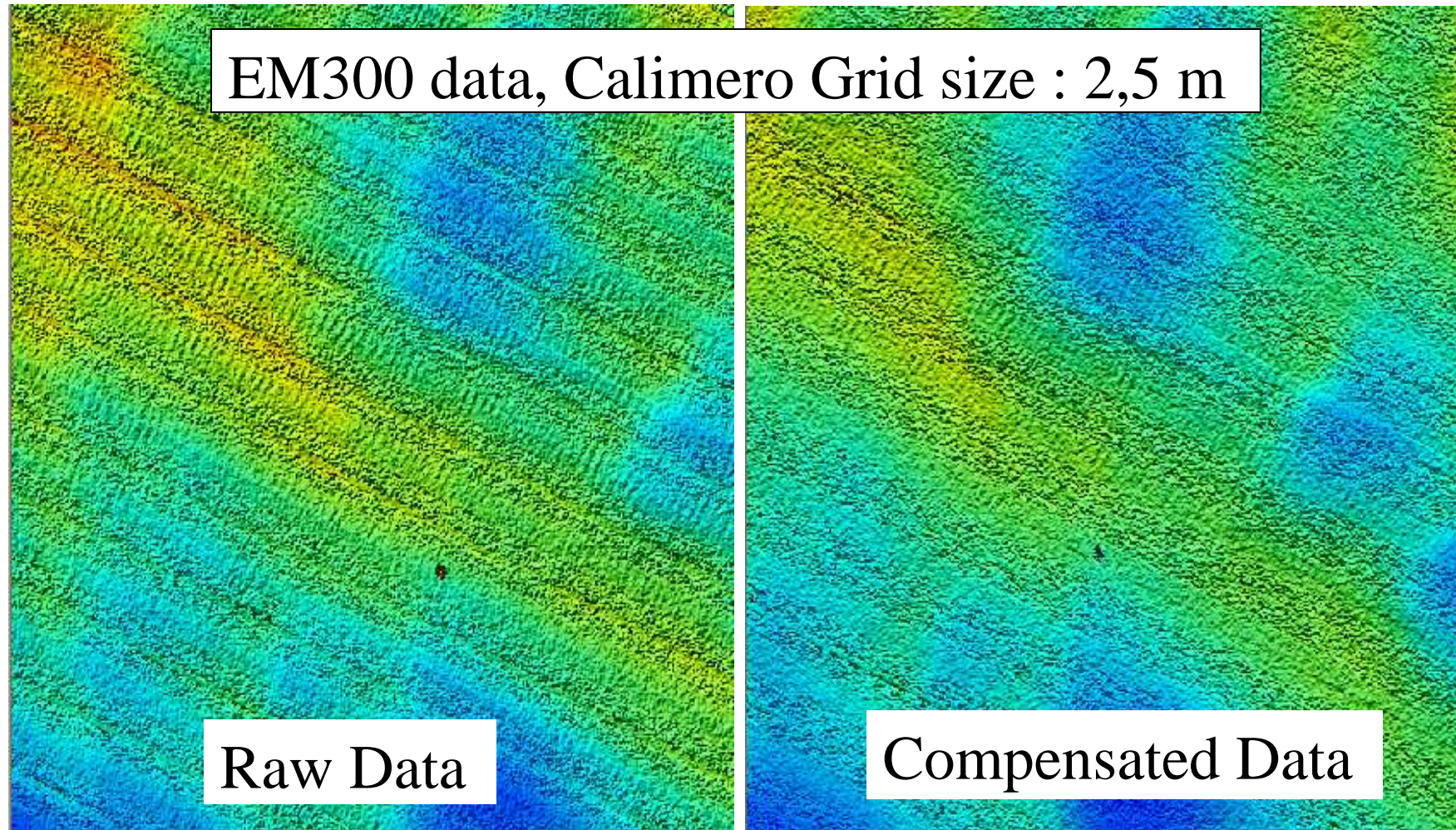
- Multi-layer statistics : mean of reflectivity vs Tx Angle grouped by Tx sectors



SonarScope : Quality Control

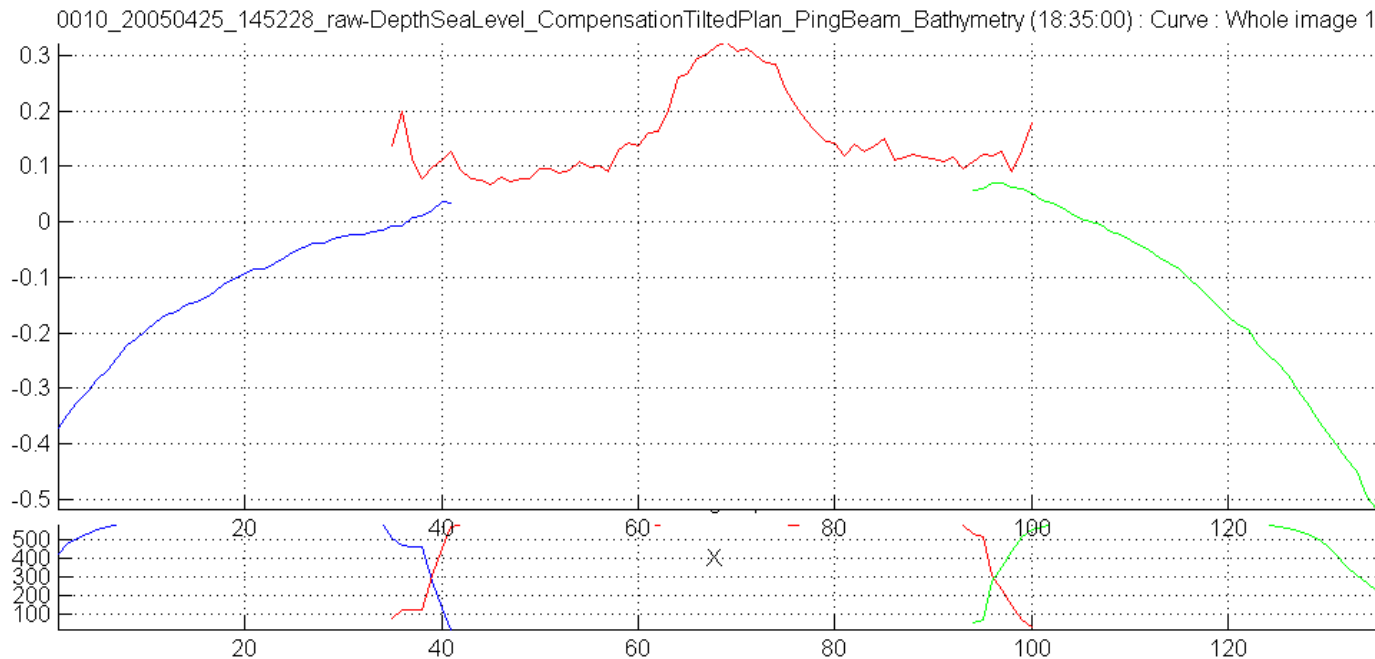


SonarScope : Quality Control



SonarScope : Quality Control

- Multi-layer statistics : Bathymetry minus tilted plan vs RxBeamIndex grouped by TxBeamIndex

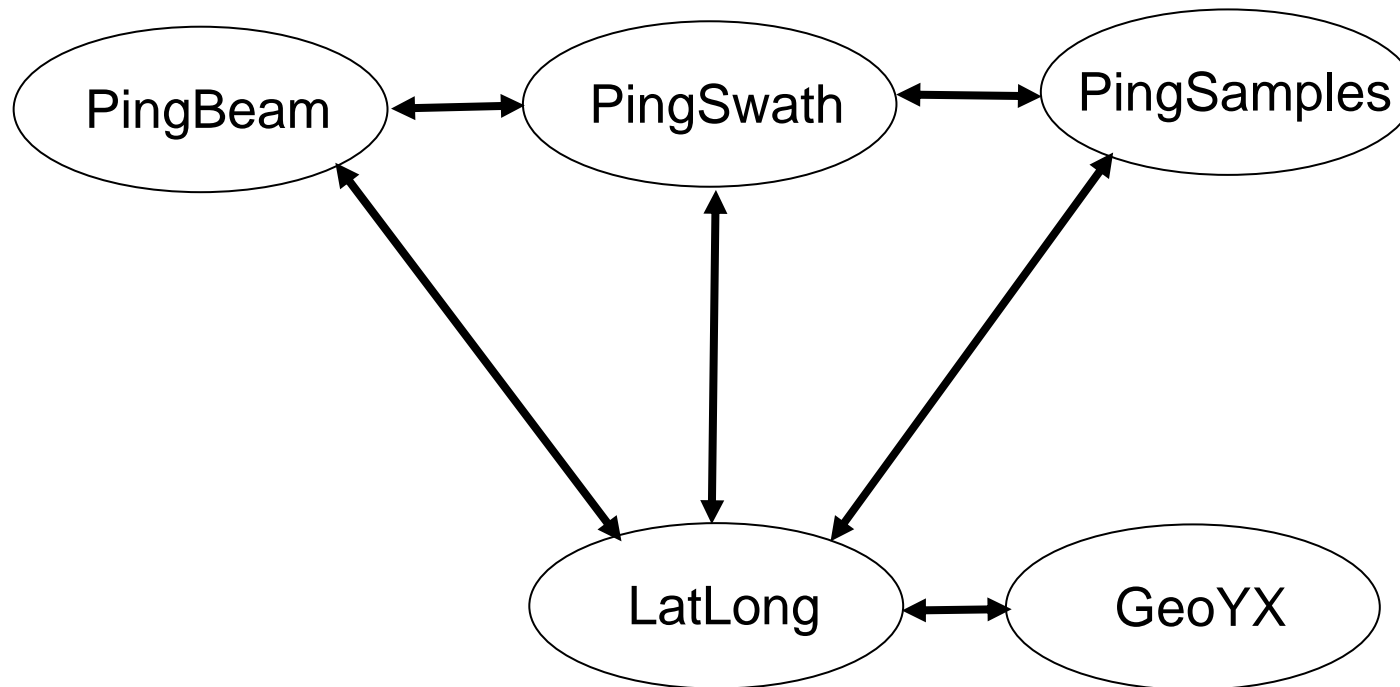


SonarScope : Data Processing

- An abstraction model for all MBES and Sidescan sonars
 - Transmission beams
 - Reception beams
 - BS
 - TVG, NE, Insonified Area, etc ...
- An abstraction model for sonar data
 - Geometry
 - Data information

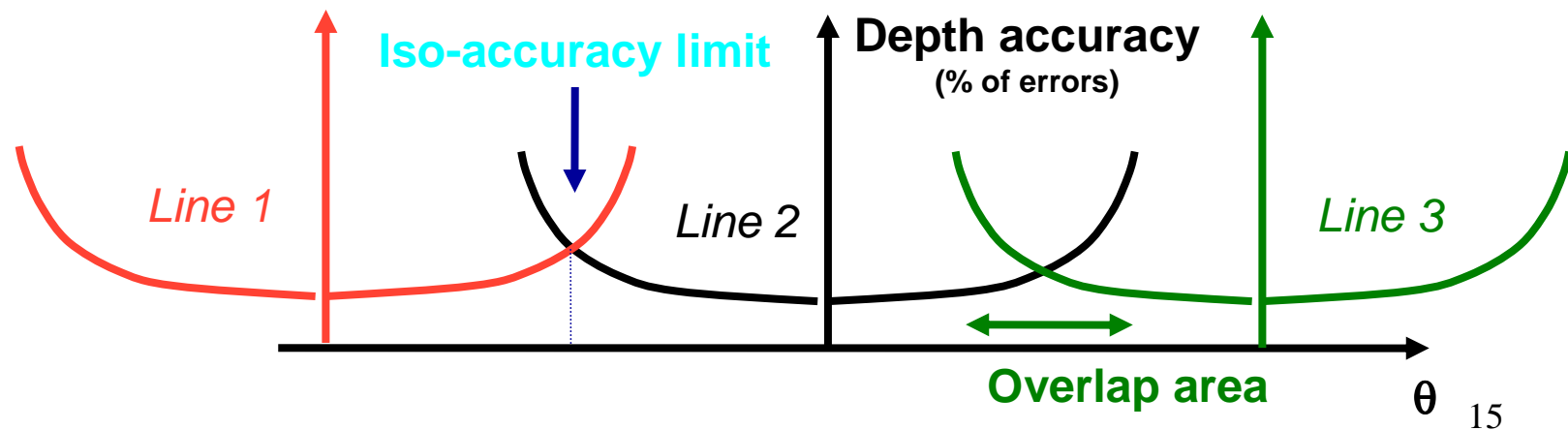
SonarScope : Data Processing

- All geometry transformations



SonarScope : Swath overlap processing

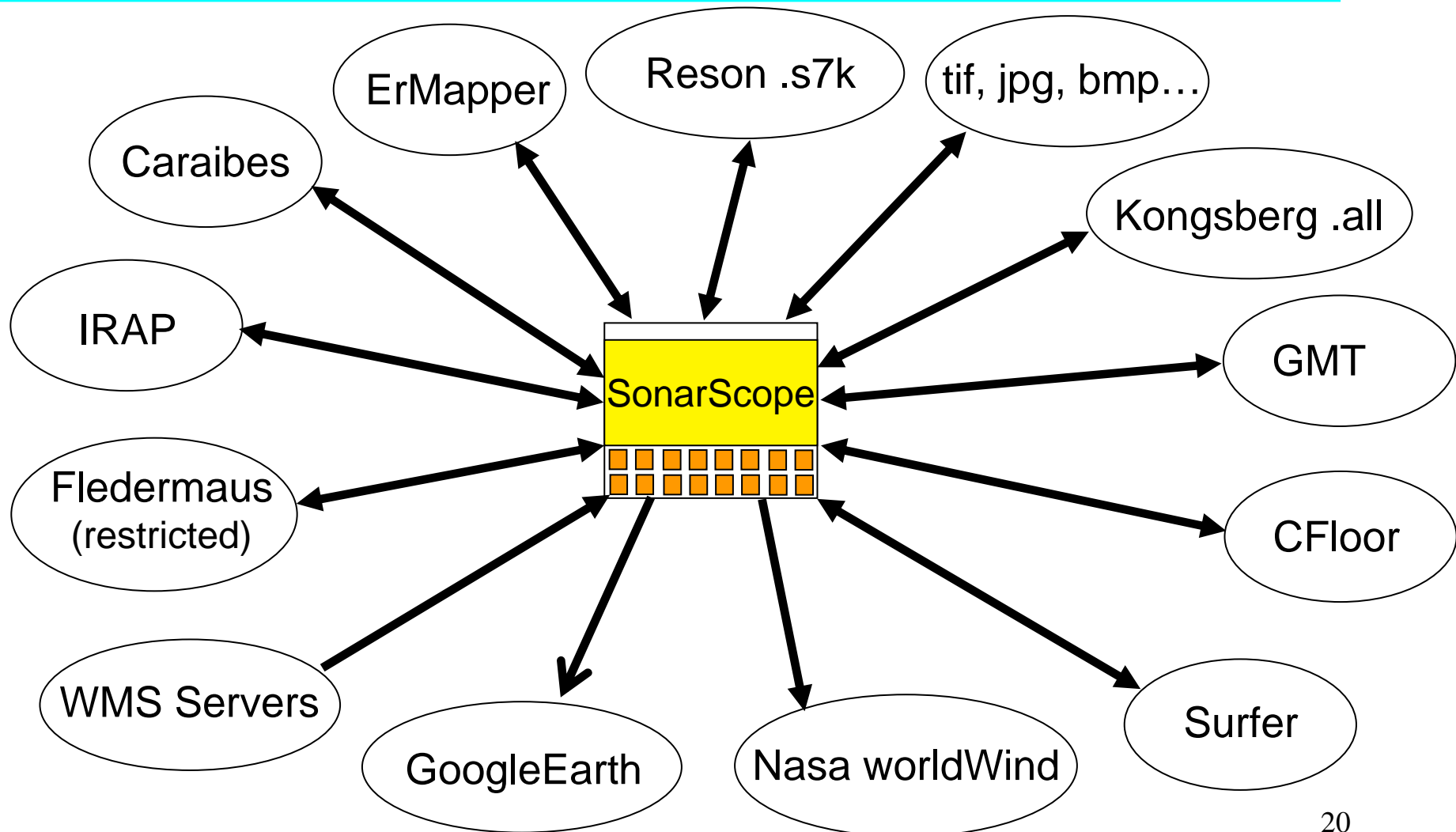
- Each swath line is a mosaic image
- The Tx angle is « mosaicked »
- A pixel replaces another one only if the absolute value of its transmission angle is lower than the resident pixel : lines are separated by the iso-accuracy limit



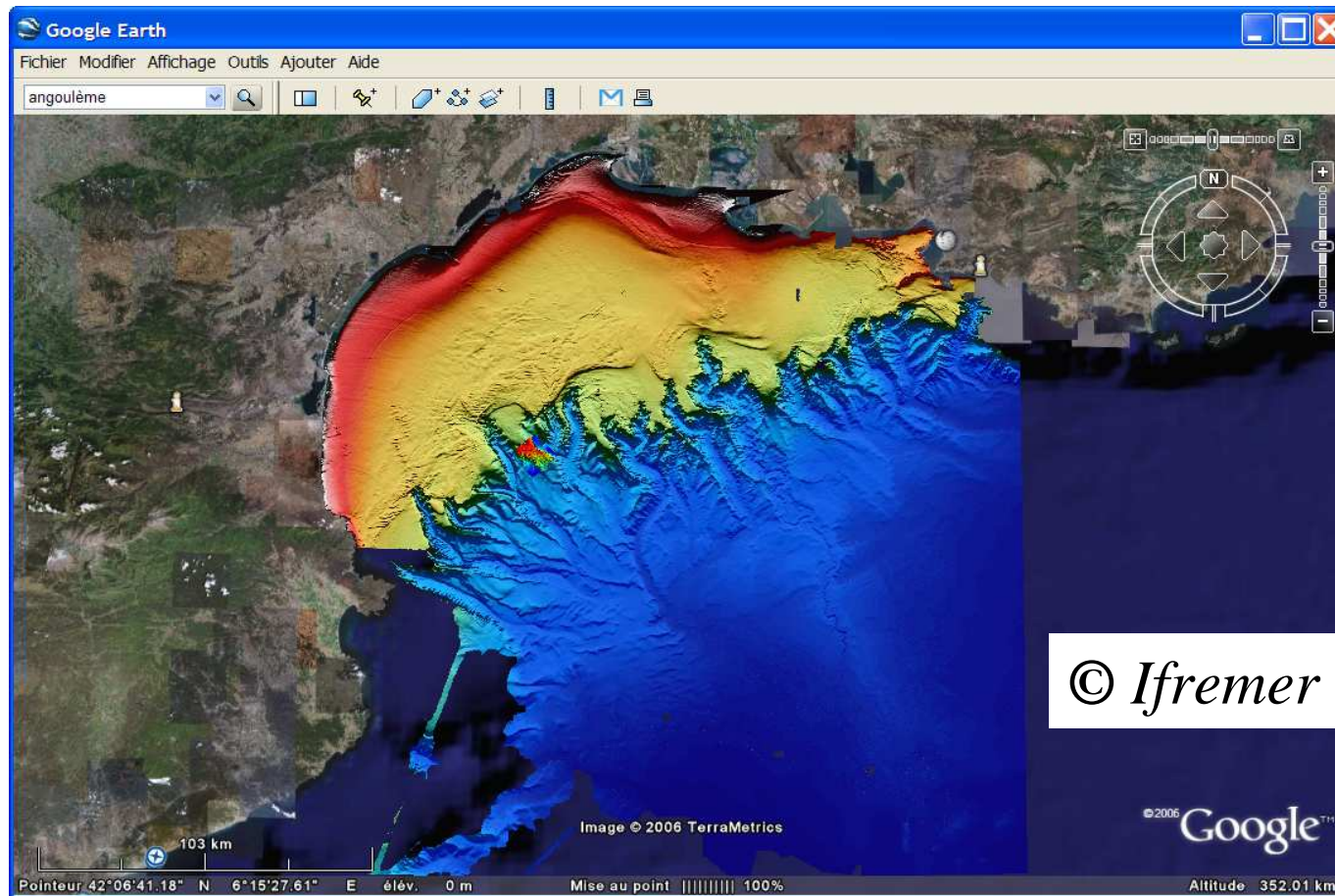
SonarScope : Help for Interpretation

- Multiple format exportation, Free viewers, WMS data importation
- Statistic compensations
- Calibration
- Signal processing
 - Speckle filtering
 - Texture analysis & segmentation
 - BS model
 - Sand ripples analysis

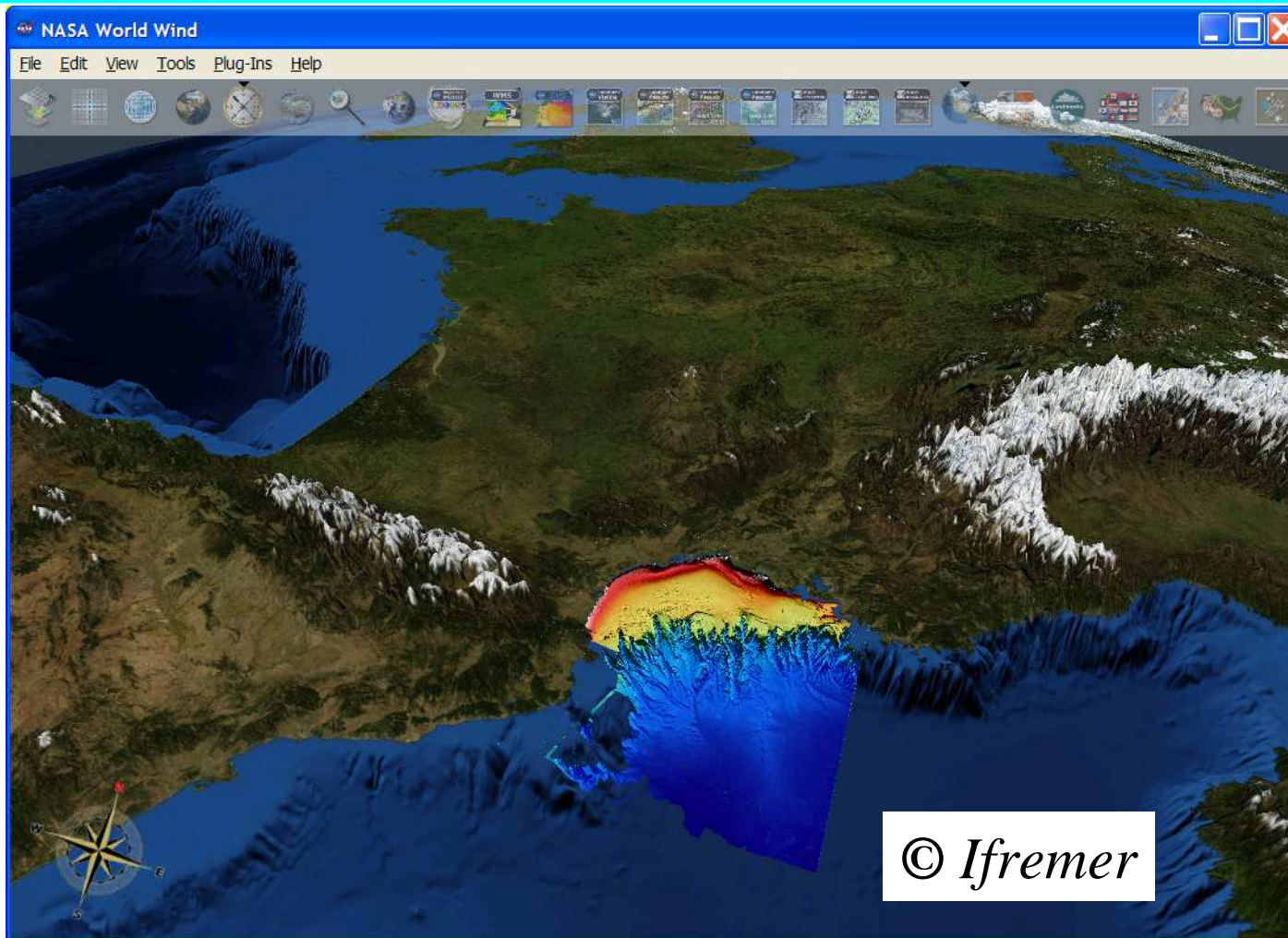
SonarScope : Multiple input/output data formats



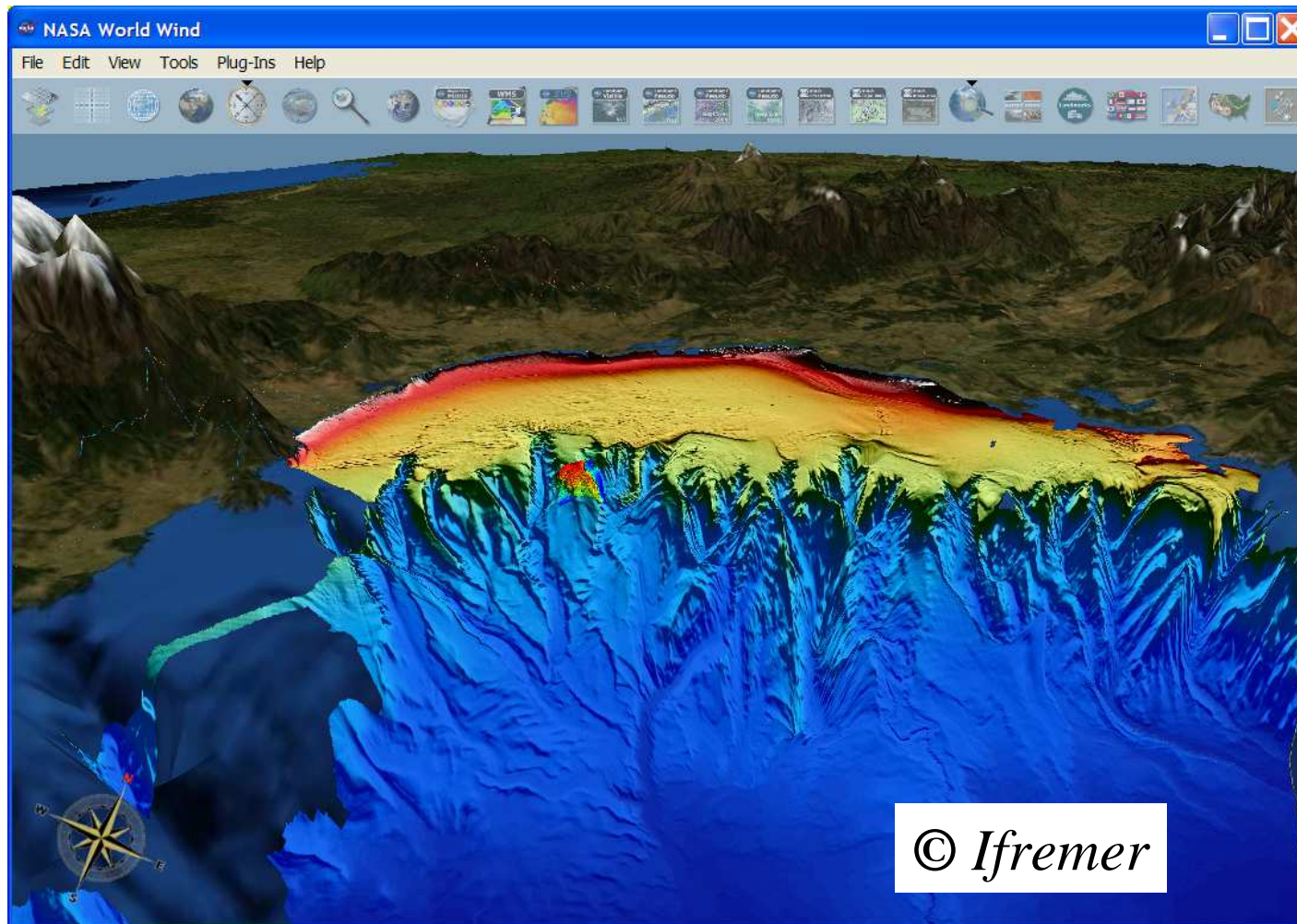
SonarScope : GoogleEarth format



SonarScope : NasaWorldWind format

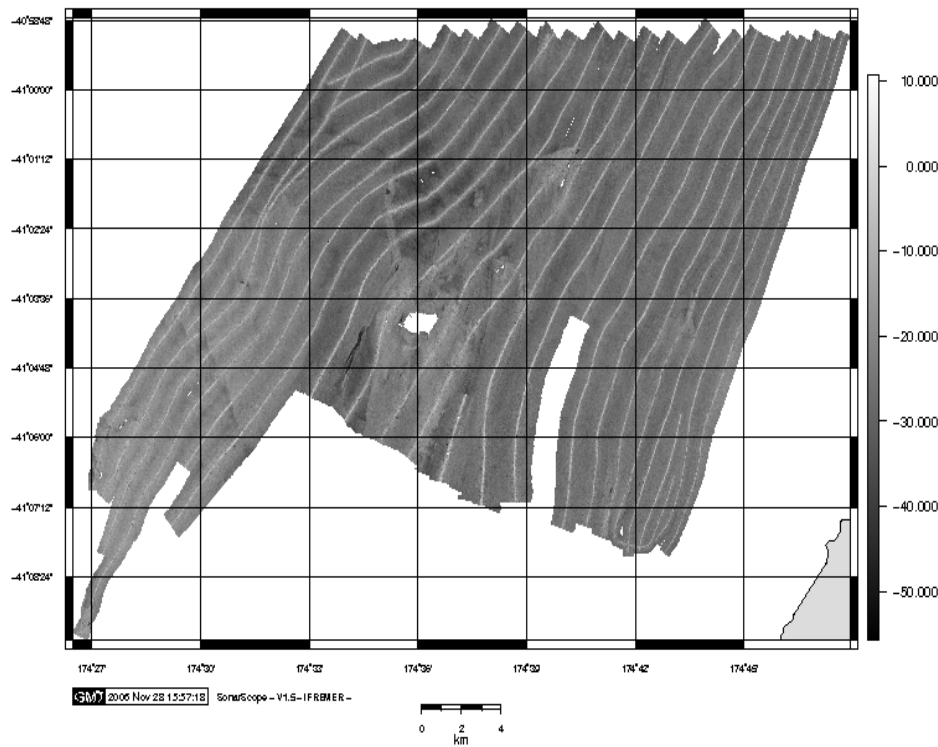


SonarScope : NasaWorldWind format

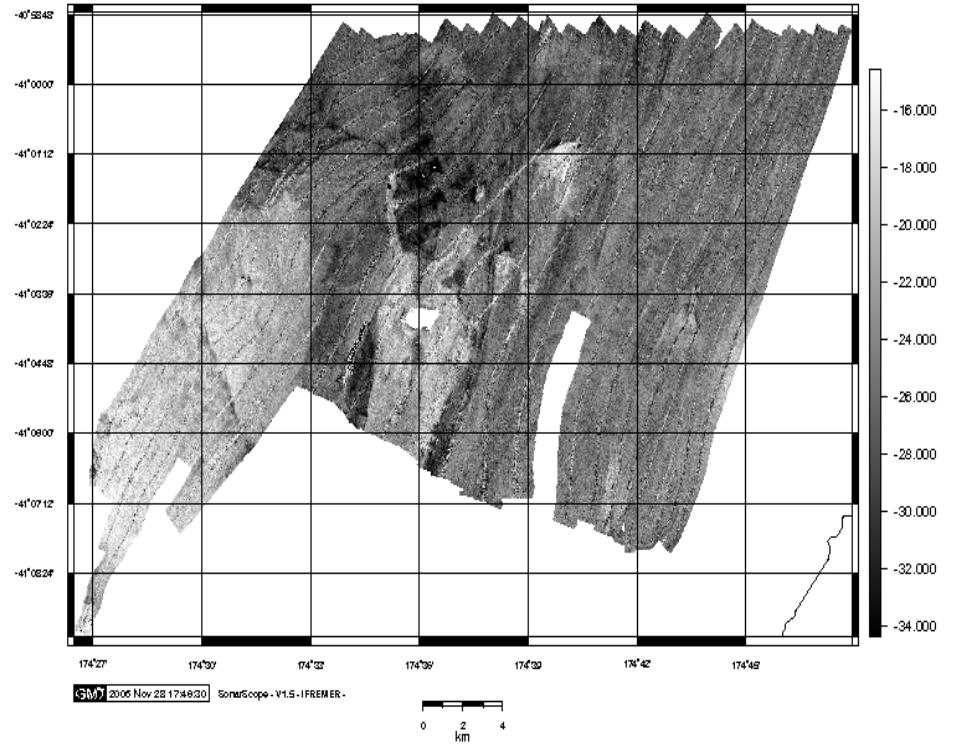


SonarScope : Statistic compensation

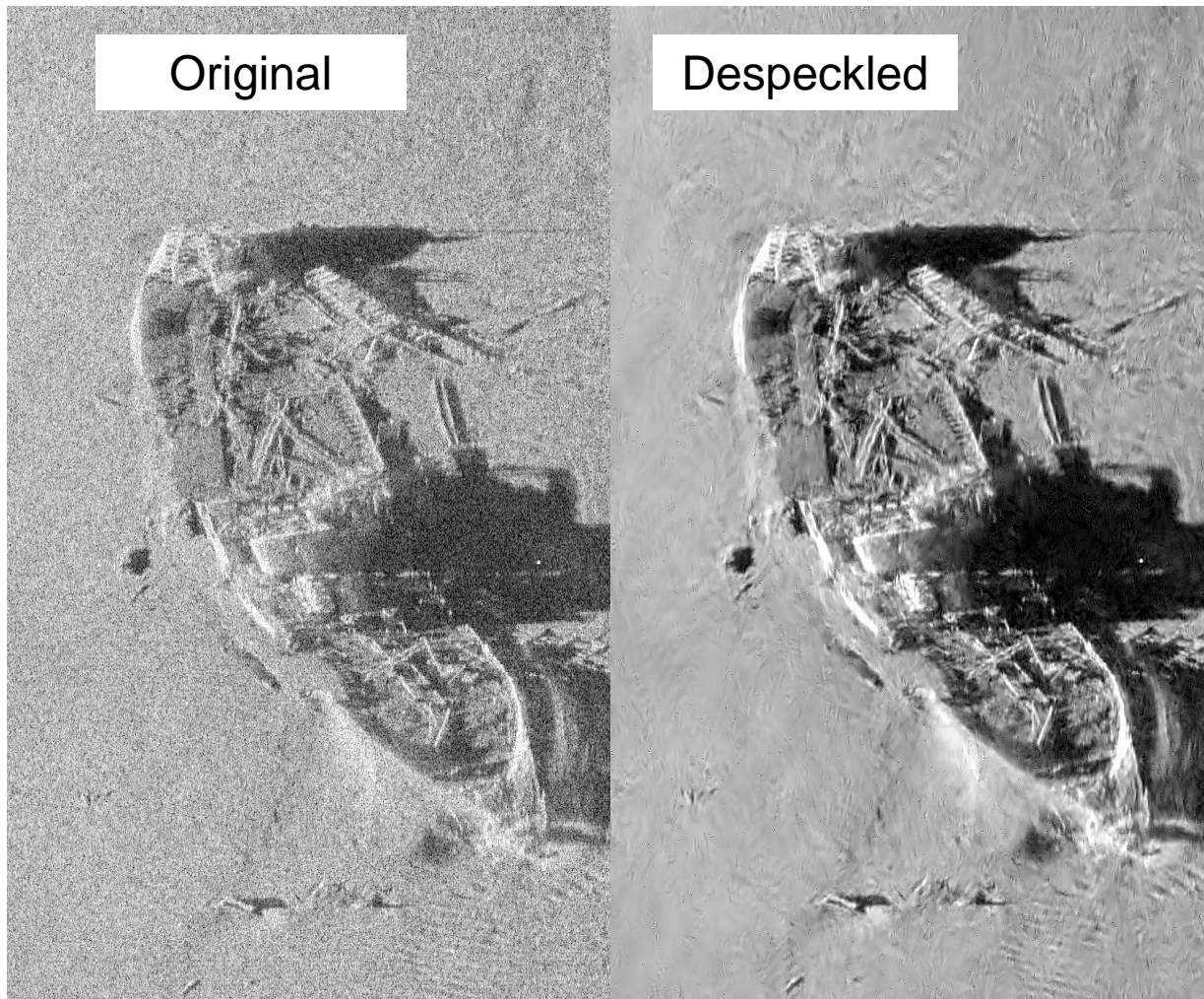
TAN0211Reflectivity_14_43_5m_LatLong_Reflectivity (15-54-05) MERCATOR Long Centrale= 10.00, Lat cons. = 10.00



TAN0211Reflectivity_14_43_Compensation_5m_LatLong_Reflectivity (17-38-39) MERCATOR Long Centrale= 10.00, Lat cons. = 10.00

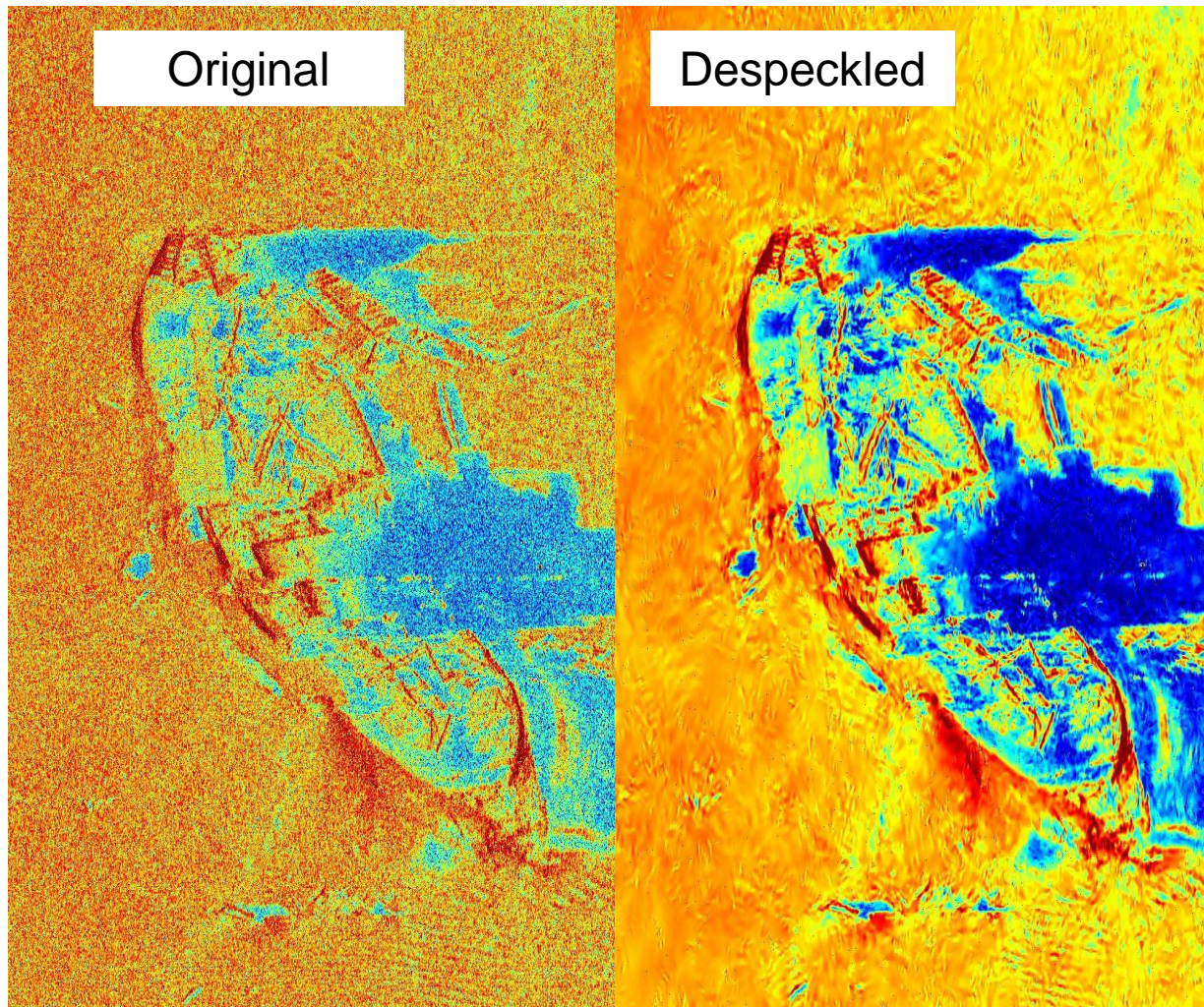


SonarScope : Speckle filtering



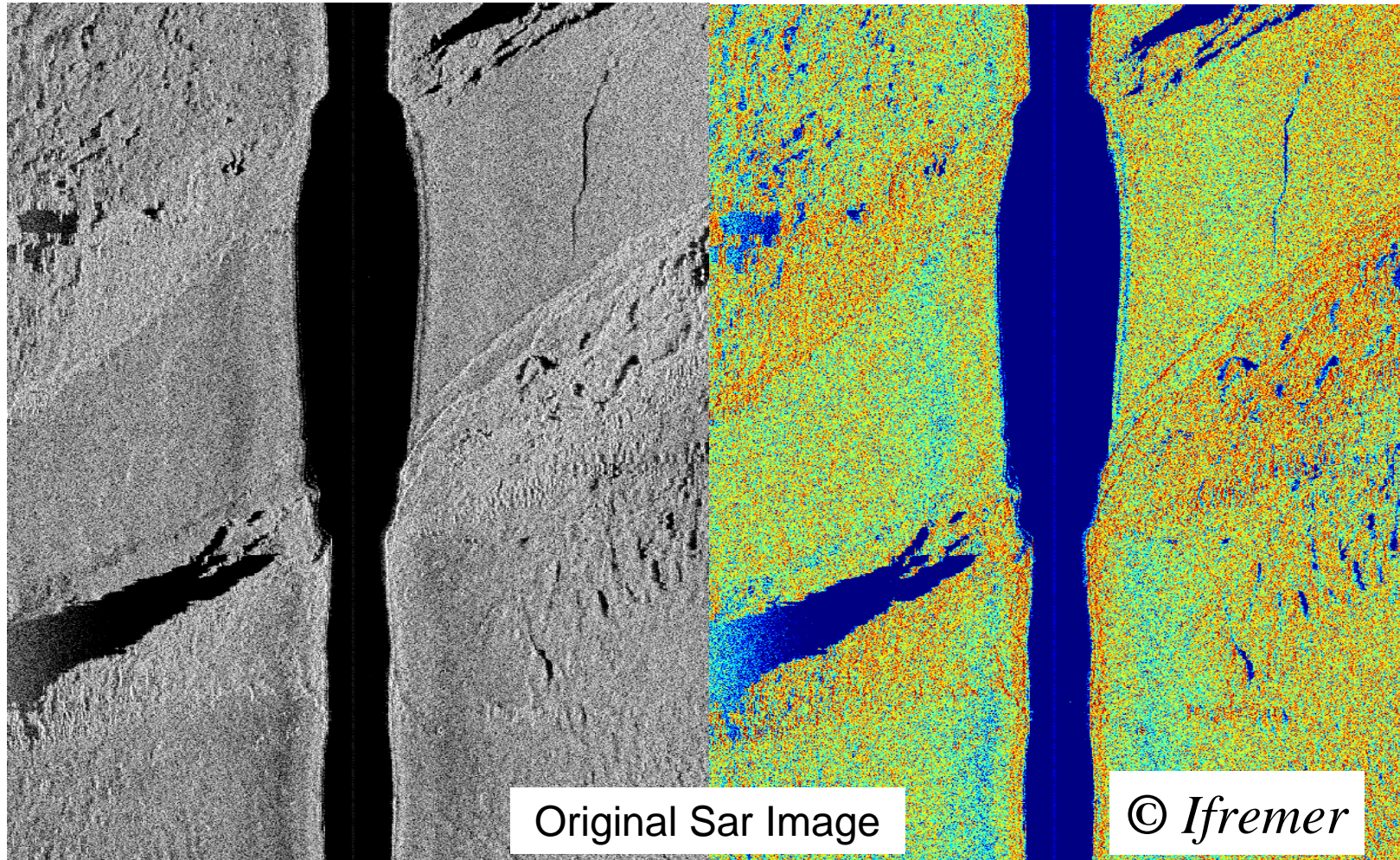
Swansea wreck.
Klein 5500 sonar.
Courtesy of
DGA/GESMA

SonarScope : Speckle filtering

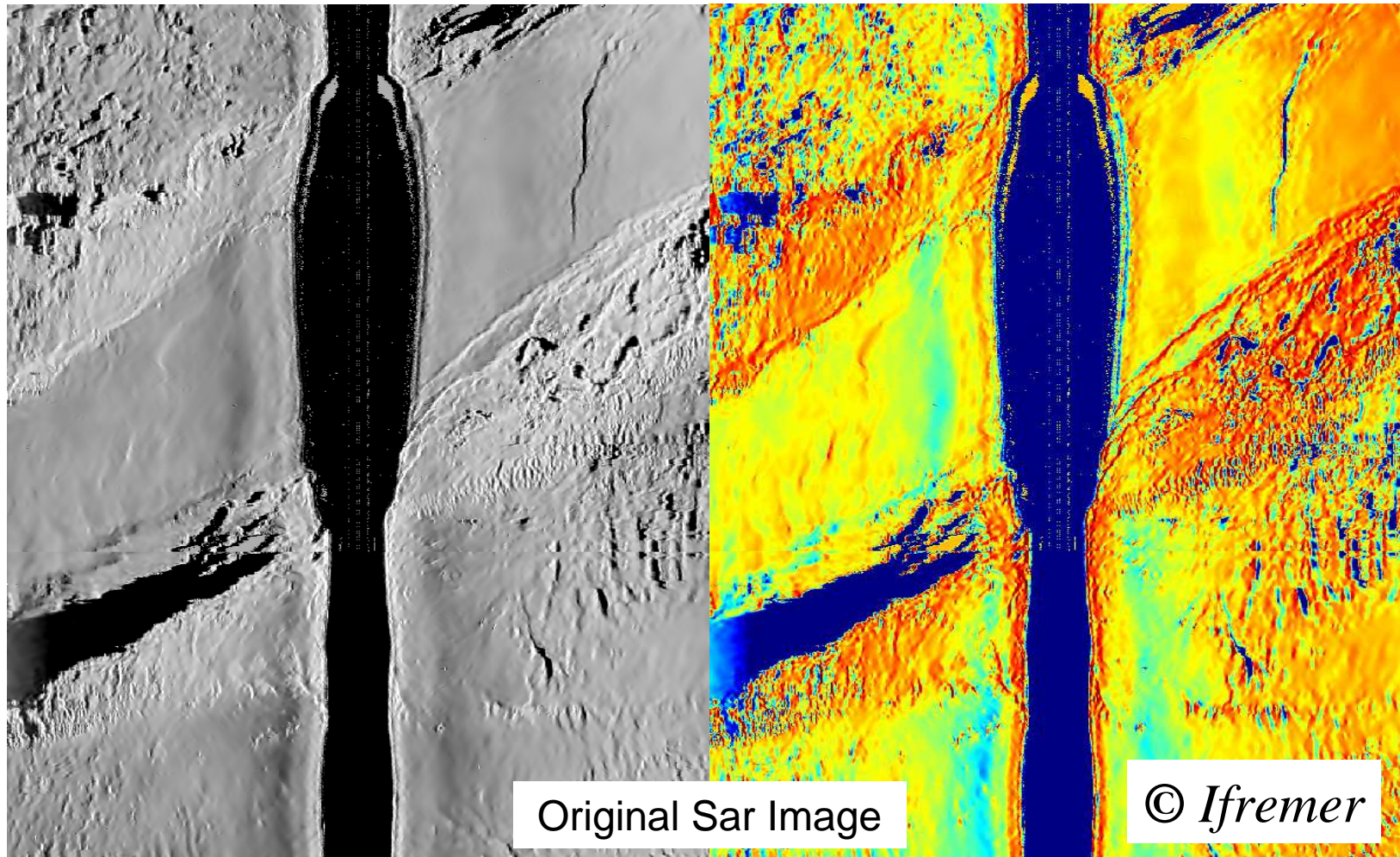


Swansea wreck.
Klein 5500 sonar.
Courtesy of
DGA/GESMA

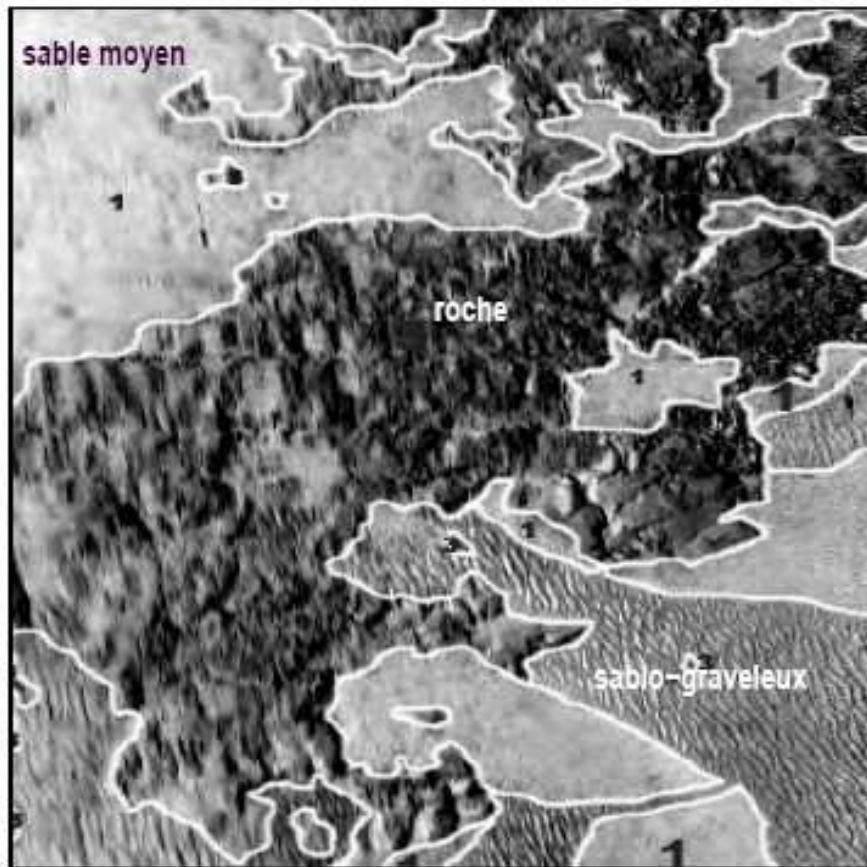
SonarScope : Speckle filtering



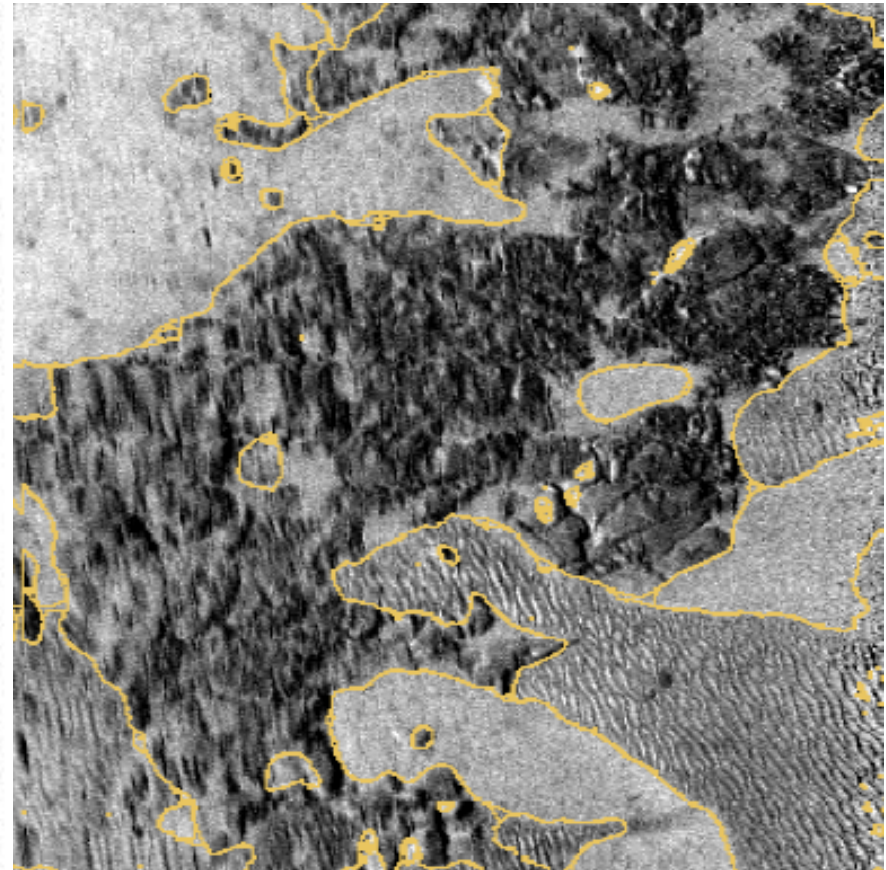
SonarScope : Speckle filtering



SonarScope : Segmentation

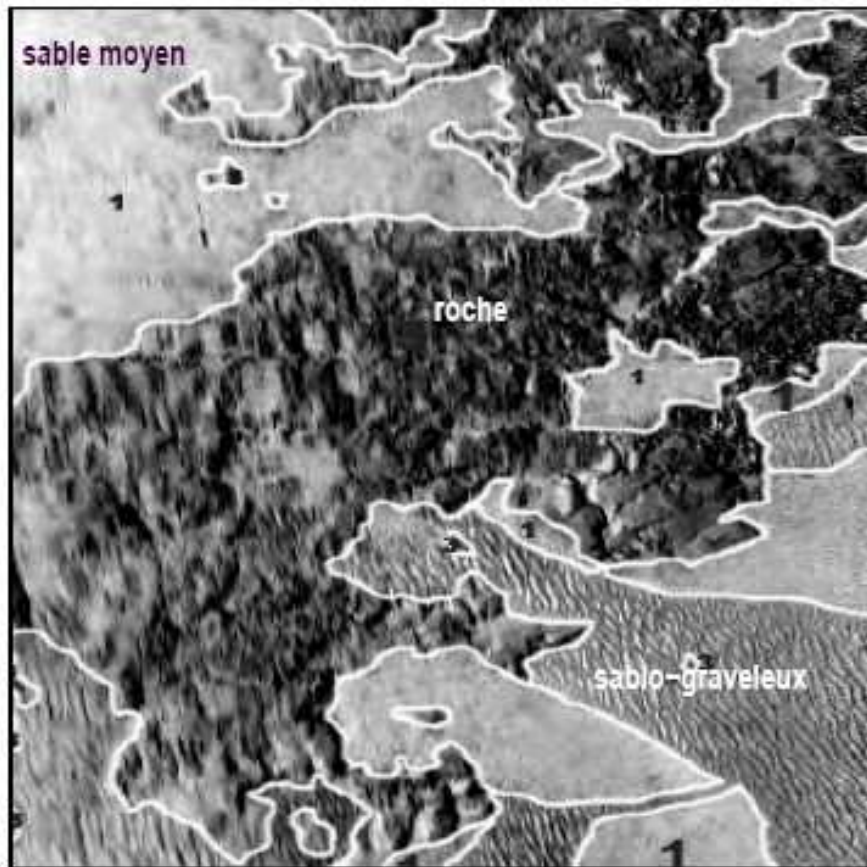


Segmentation manuelle
(Axel Ehrhold Rebent project)

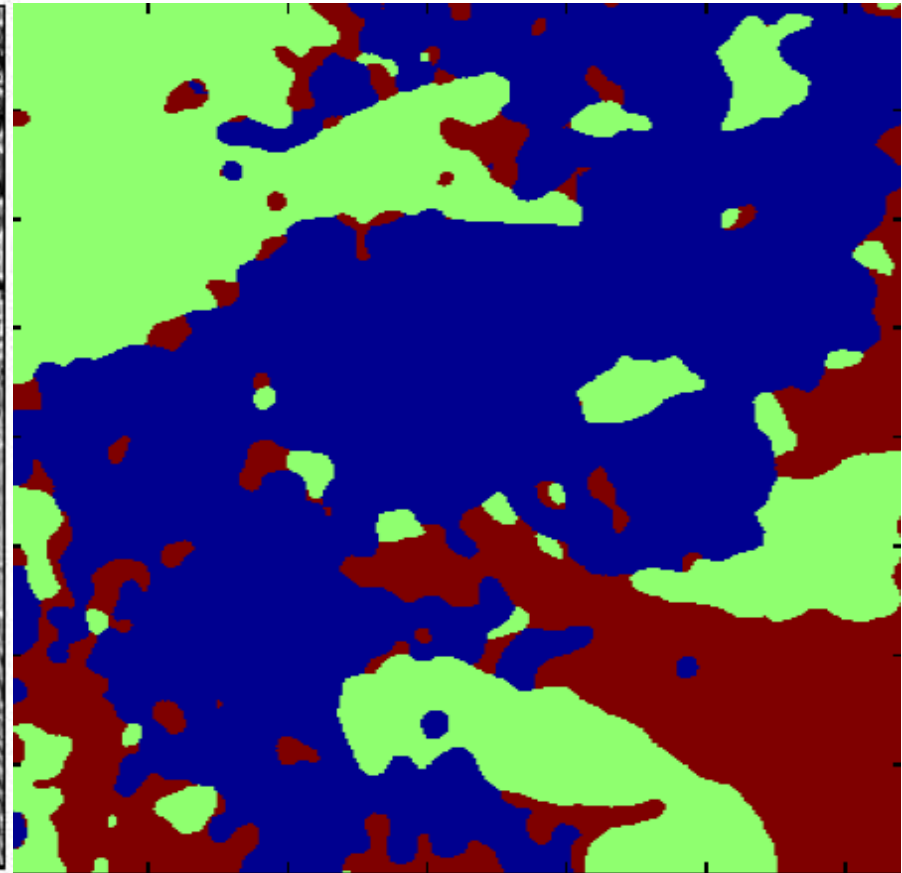


Segmentation variationnelle
 $\tau=6,9\%$

SonarScope : Segmentation

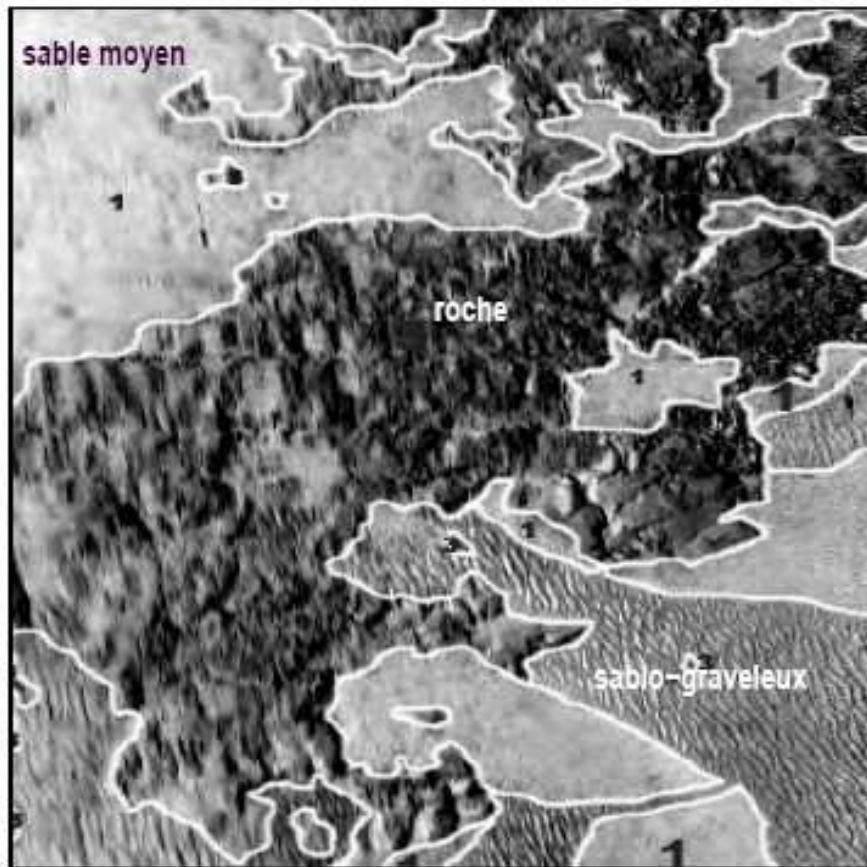


Segmentation manuelle
(Axel Ehrhold Rebent project)

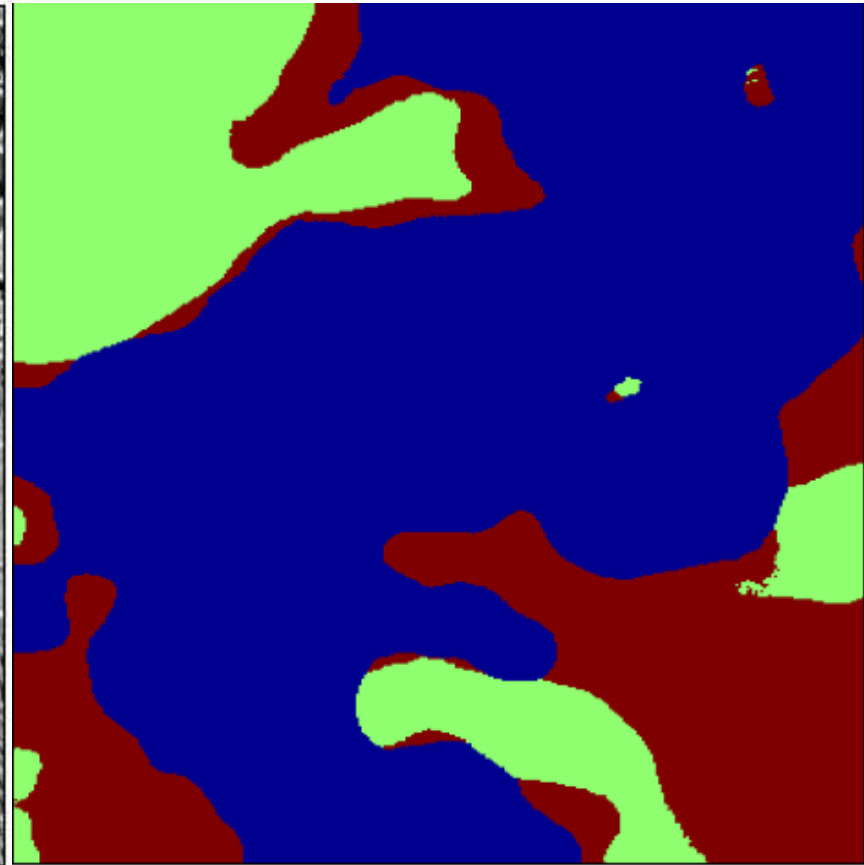


Segmentation bayésienne
 $T_w = 7 \times 7$ $\tau = 12,5\%$ 30

SonarScope : Segmentation

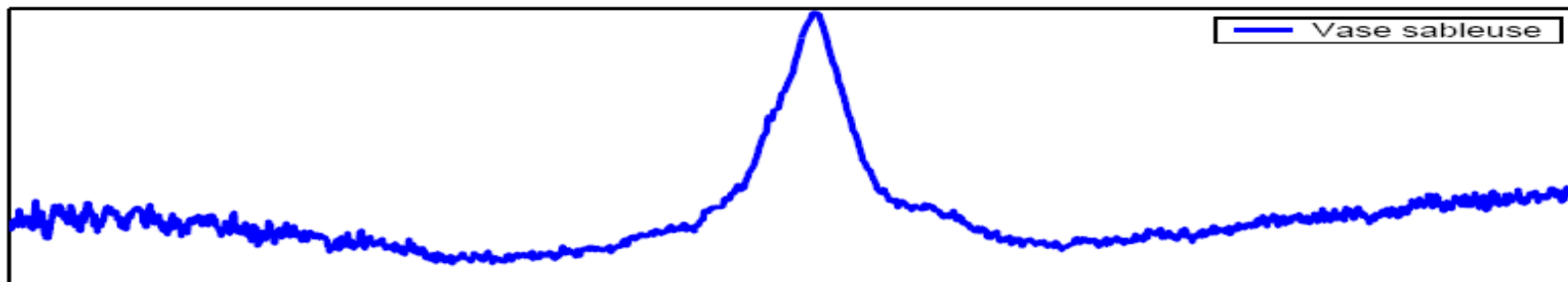
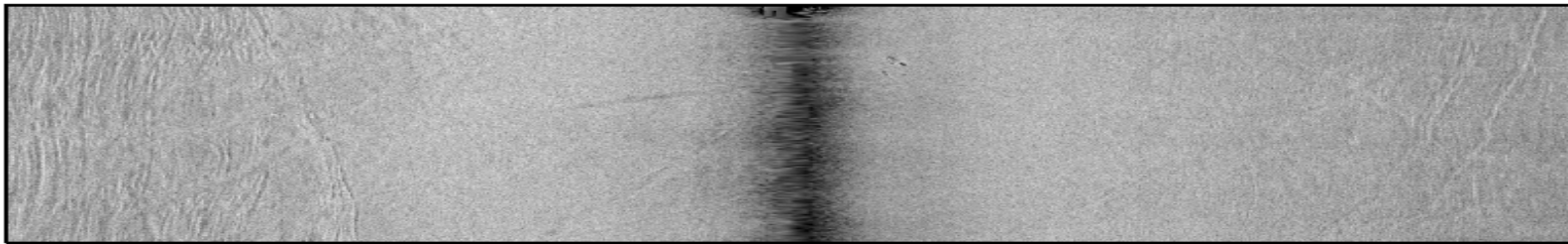
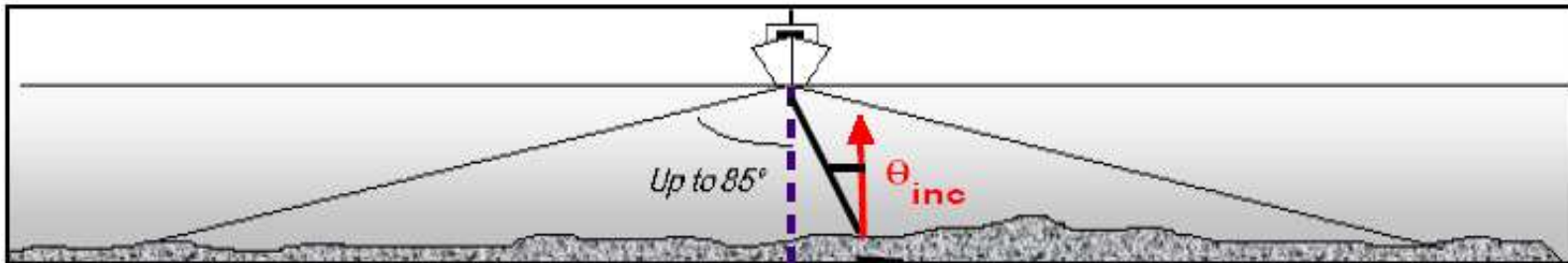


Segmentation manuelle
(Axel Ehrhold Rebent project)



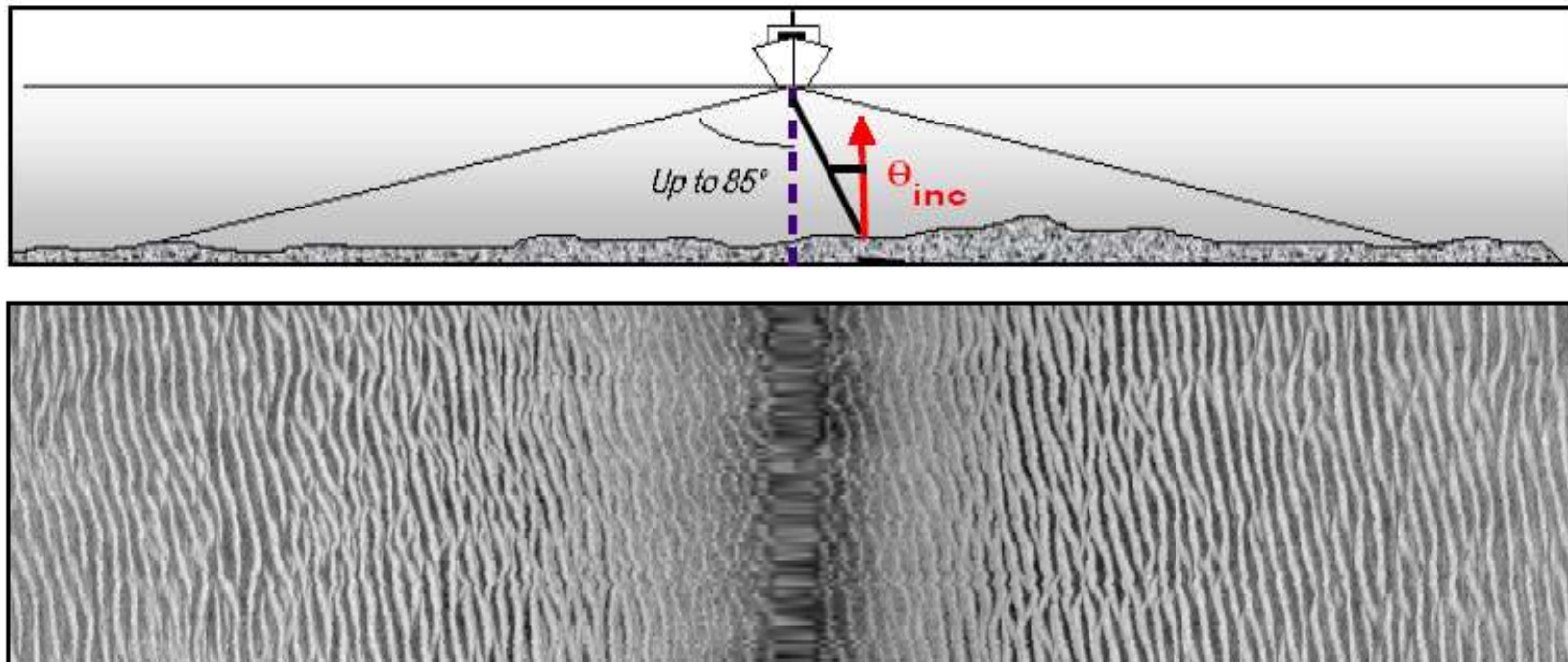
Segmentation bayésienne
 $T_w = 33 \times 33$ $\tau = 13\%$ 31

SonarScope : Segmentation



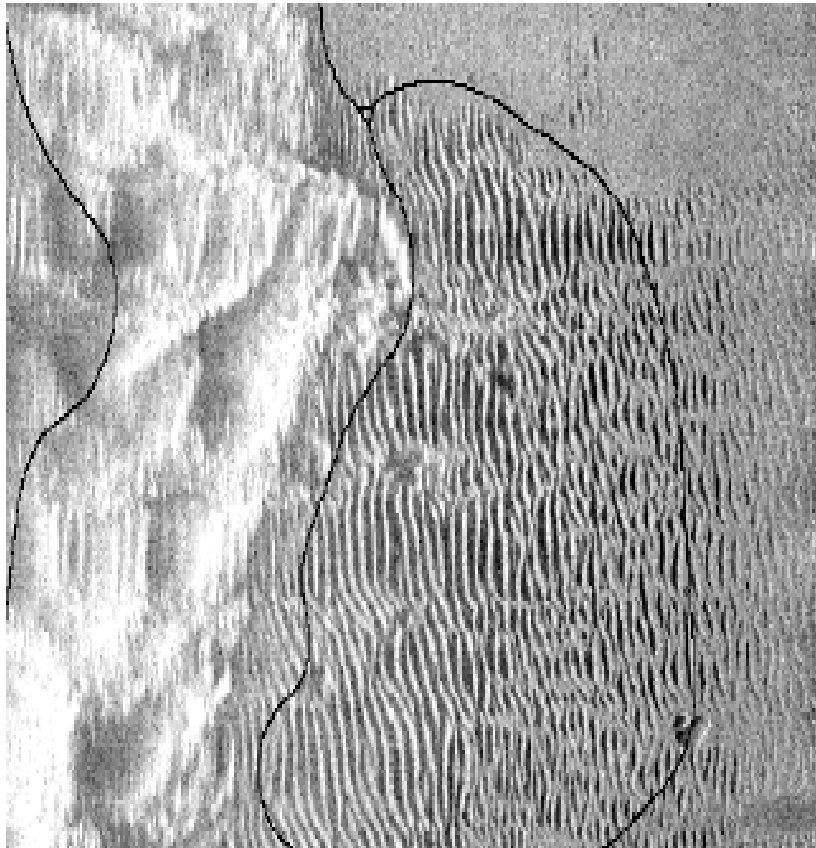
Dépendance angulaire du niveau d'énergie

SonarScope : Segmentation

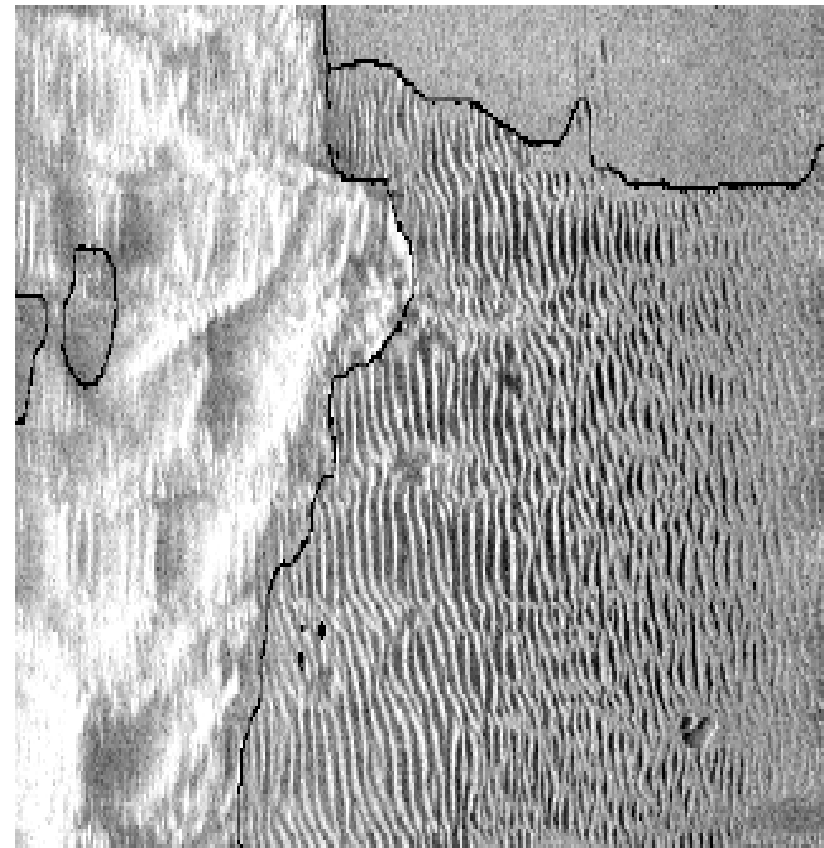


Dépendance angulaire de la texture

SonarScope : Segmentation



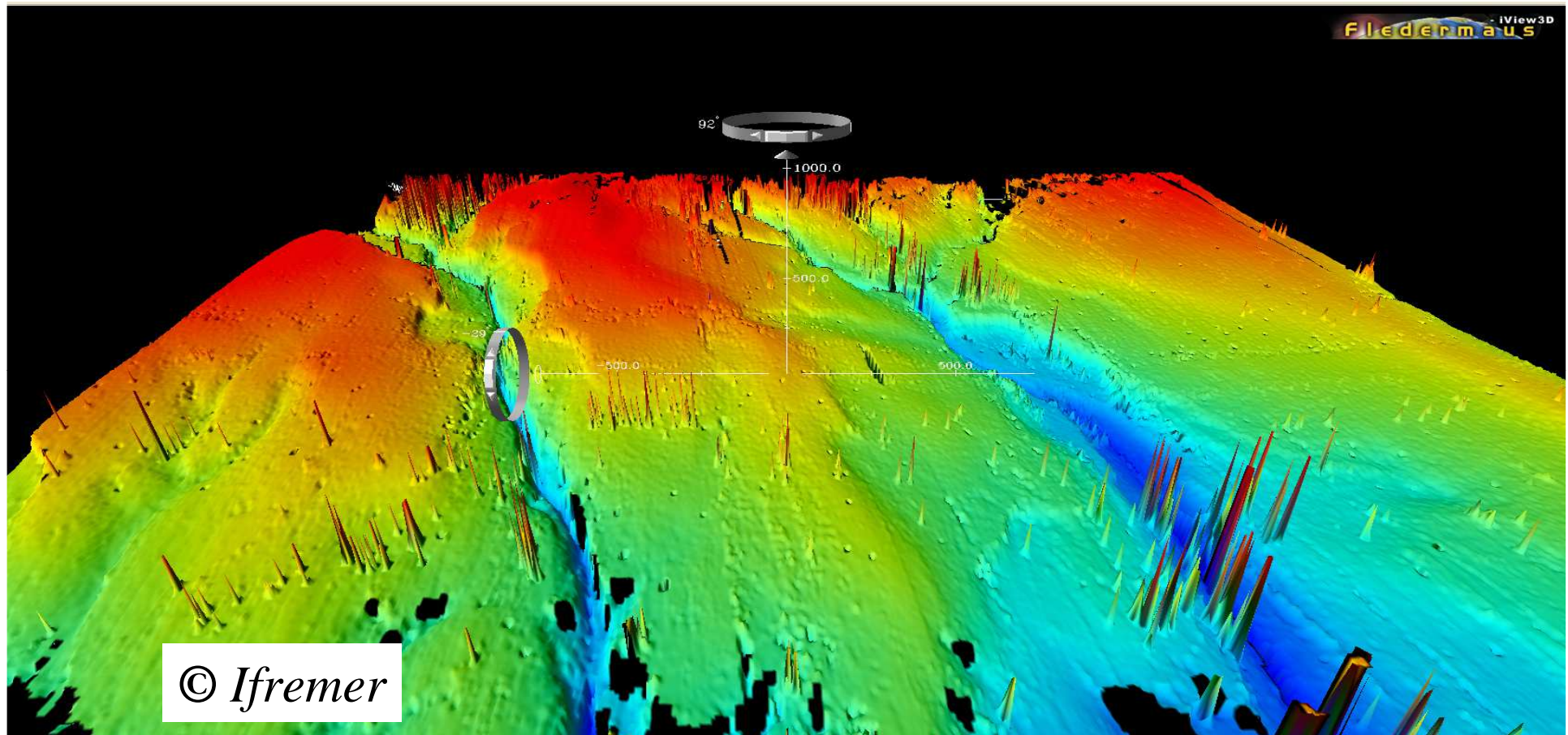
Segmentation sans
dépendance angulaire



Segmentation avec
dépendance angulaire 34

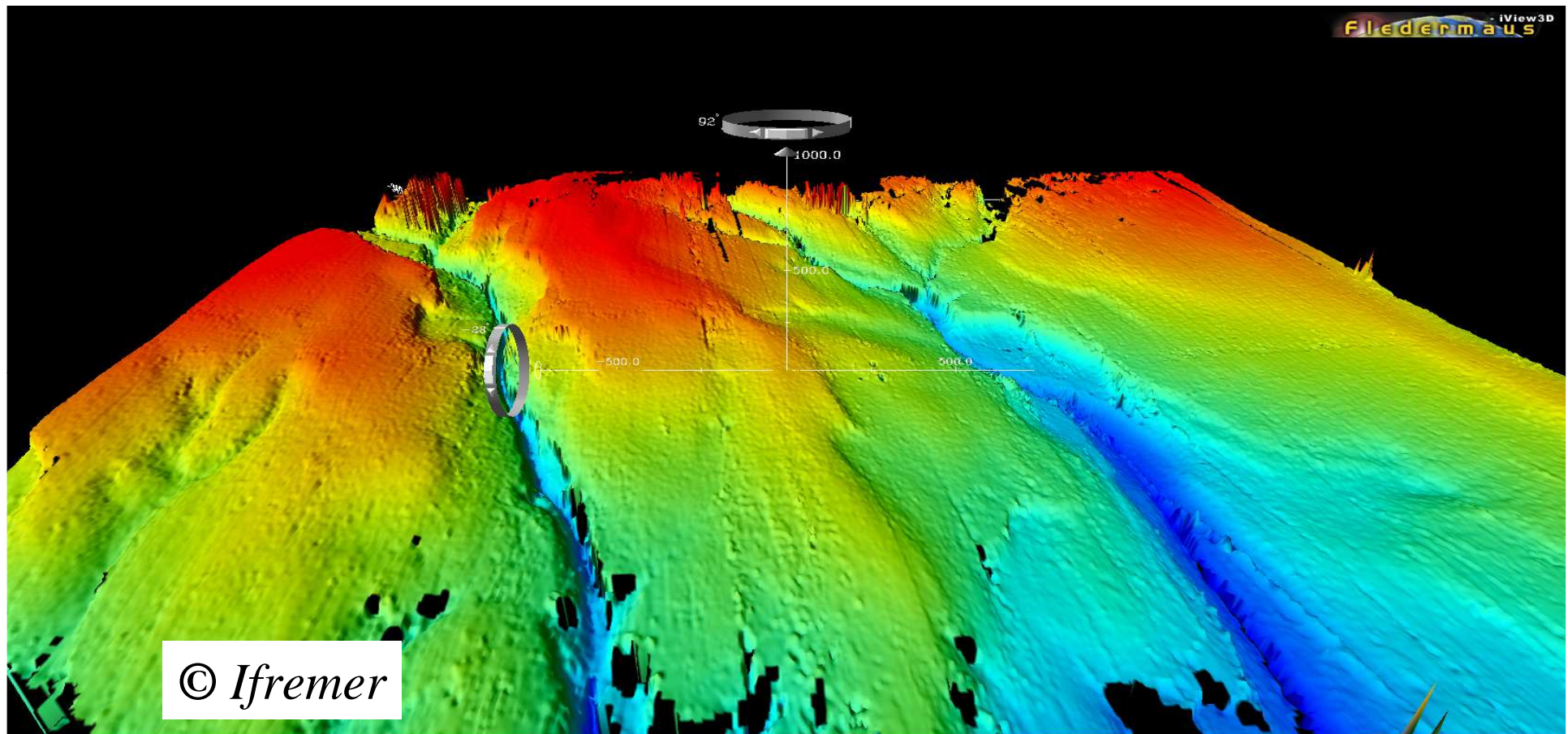
SonarScope : Reson-SAT2

- Reson 7150 24 kHz bathymetry : a forest of artefacts



SonarScope : Reson-SAT2

- Reson 7150 24 kHz bathymetry after a preliminary spike remover



SonarScope : External diffusion

- 2005-2006 : partnership agreements with
 - NIWA (New-Zealand)
 - CHS (Canada)
 - CIDCO (Canada)
 - SHOM (France)
 - ENST (France)
- 2007 : commercial product