



Accidental Oil Spills

Management of Crisis

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Satellite Monitoring and Assessment of Sea-based Oil Pollution

Istanbul, 13-14 June 2005

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The use of satellites during emergency (I)

- Assess on the extent of polluted area.
- Provide input data to forecast models.
- Verify drifting predictions.
- Facilitate aerial surveillance operations.
- Monitoring remote areas.
- Post-crisis assessment.



The use of satellites during emergency (II)

Timely provision of suitable data (maximum time delay 4 hours from acquisition) mandatory in the first phase of the emergency.

Good planning of acquisitions (in close co-ordination with aerial surveillance) in the following phase also necessary.



The Charter (I)

What is it?

Charter On Cooperation To Achieve The Coordinated Use Of Space Facilities In The Event Of Natural Or Technological Disasters aims at providing a unified system of space data acquisition and delivery to those affected by natural or man-made disasters through authorized users. Each member agency has committed resources to support the provisions of the Charter and thus is helping to mitigate the effects of disasters on human life and property.



The Charter (II)

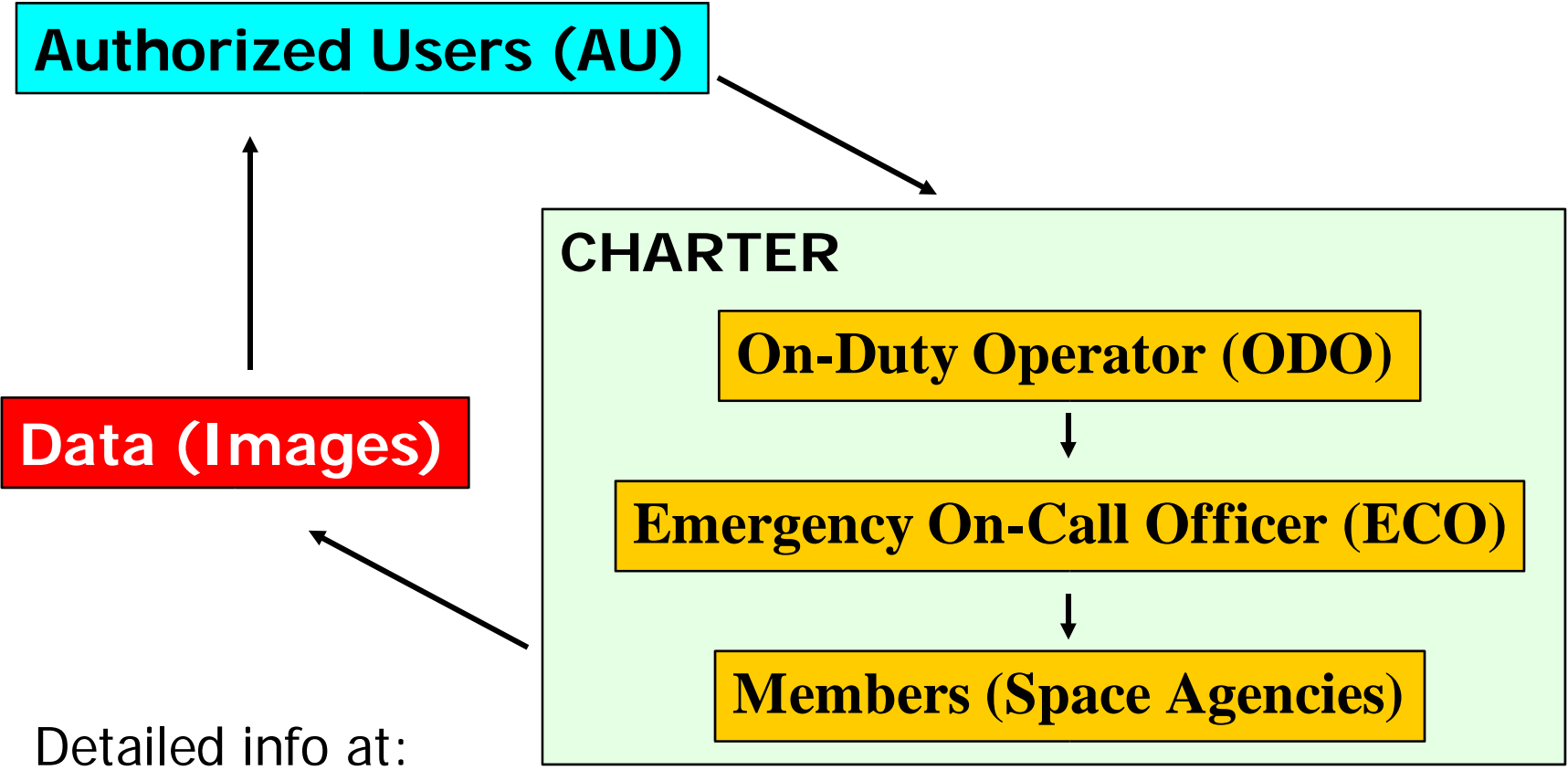
What is it?

Charter member agencies

- *European Space Agency (ESA) (1999).*
- *French Space Agency (CNES) (1999).*
- *Canadian Space Agency (CSA) (2000).*
- *National Oceanic and Atmospheric Administration (NOAA) (2001).*
- *Indian Space Research Organization (ISRO)(2001).*
- *Argentine Space Agency (CONAE) (2003).*
- *Japan Aerospace Exploration Agency (JAXA) (2005).*

The Charter (III)

How does it work?



Detailed info at:

http://www.disasterscharter.org/main_e.html

The Prestige Tanker accident

Tanker name : Prestige

Date : 13/11/2002

Location : Off Cape Finisterre (Galicia)

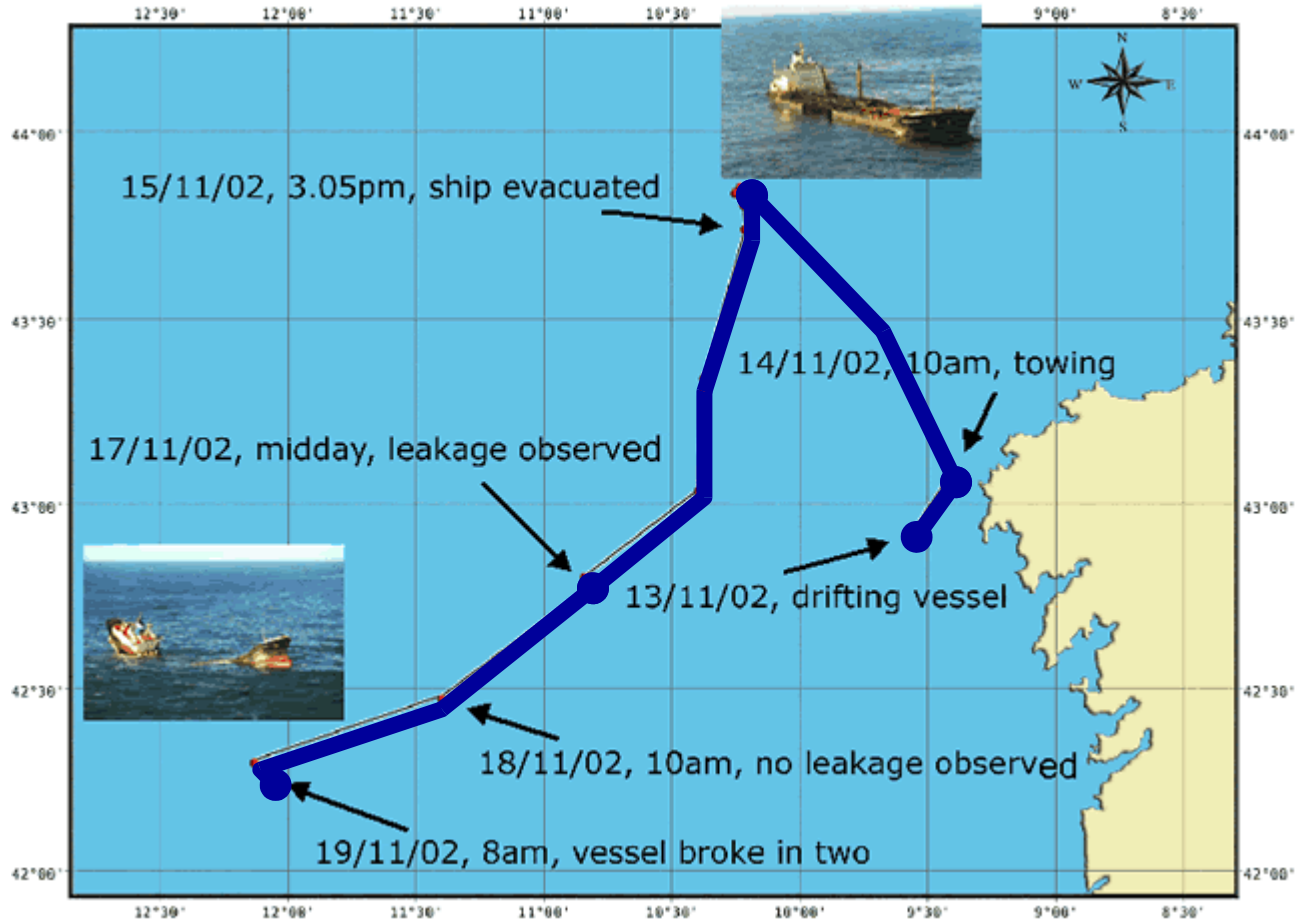
Oil type : heavy fuel

Total quantity : 77 000 T

Spilled oil : 64 000 T

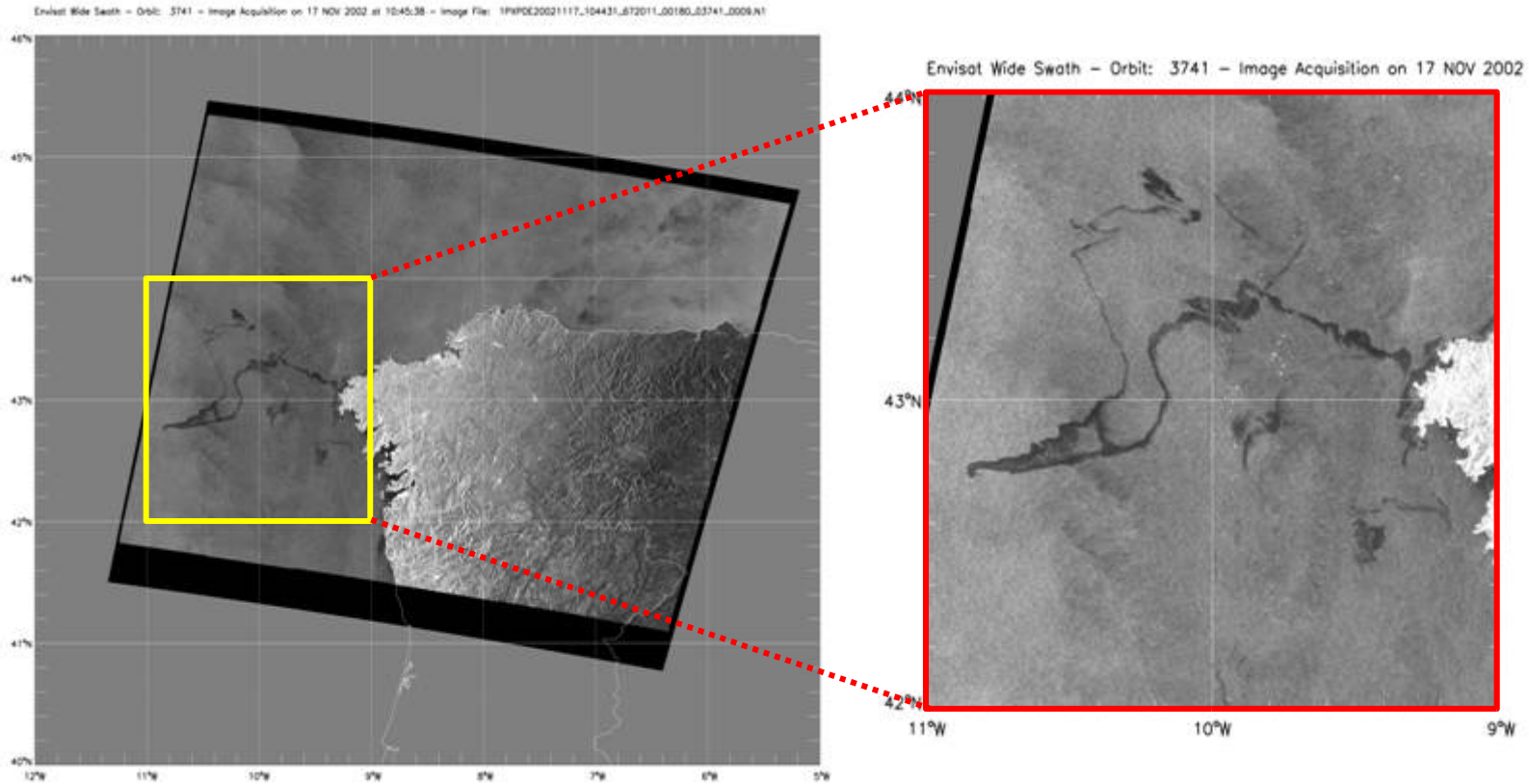


Tanker Positions

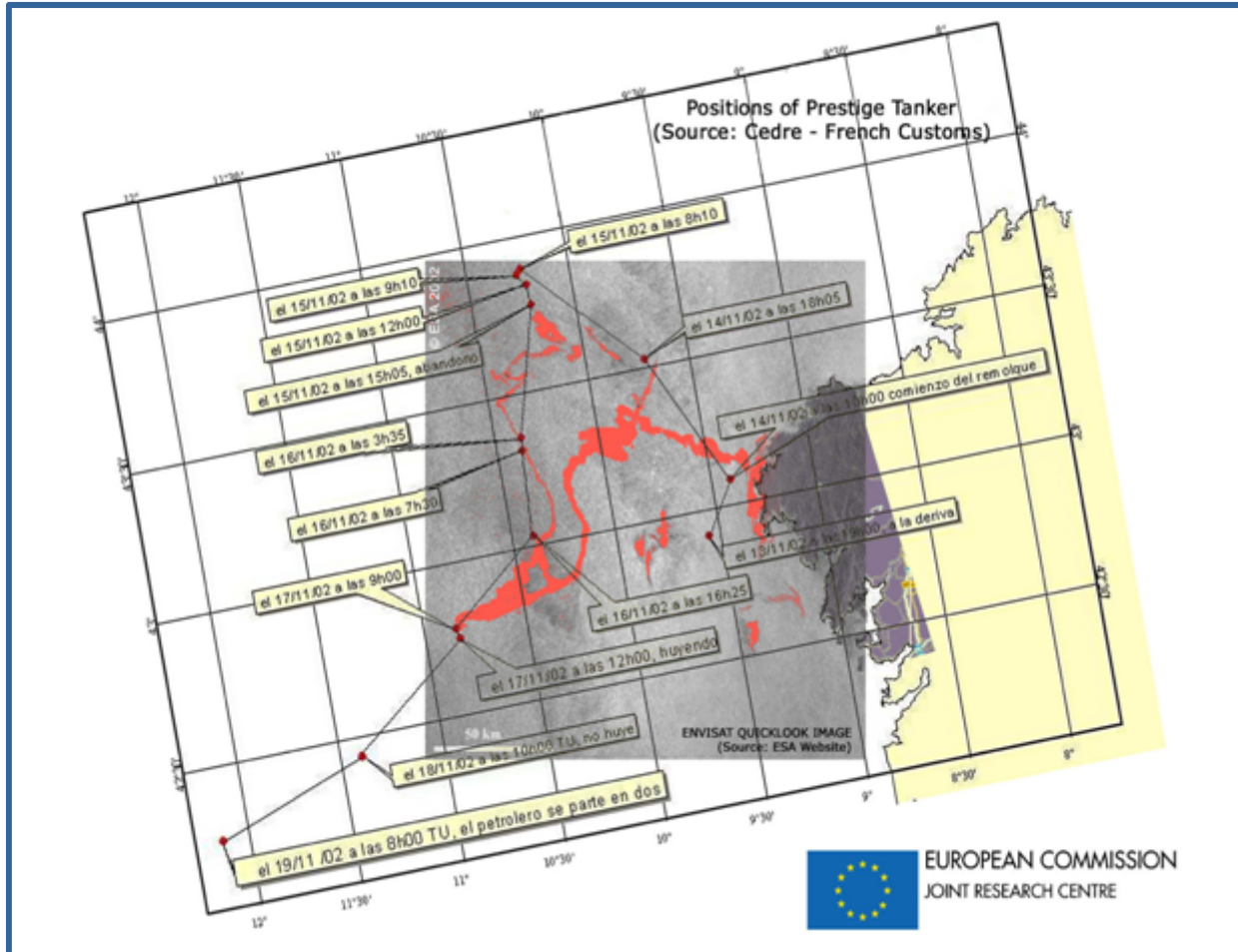


First Satellite Image 17 Nov

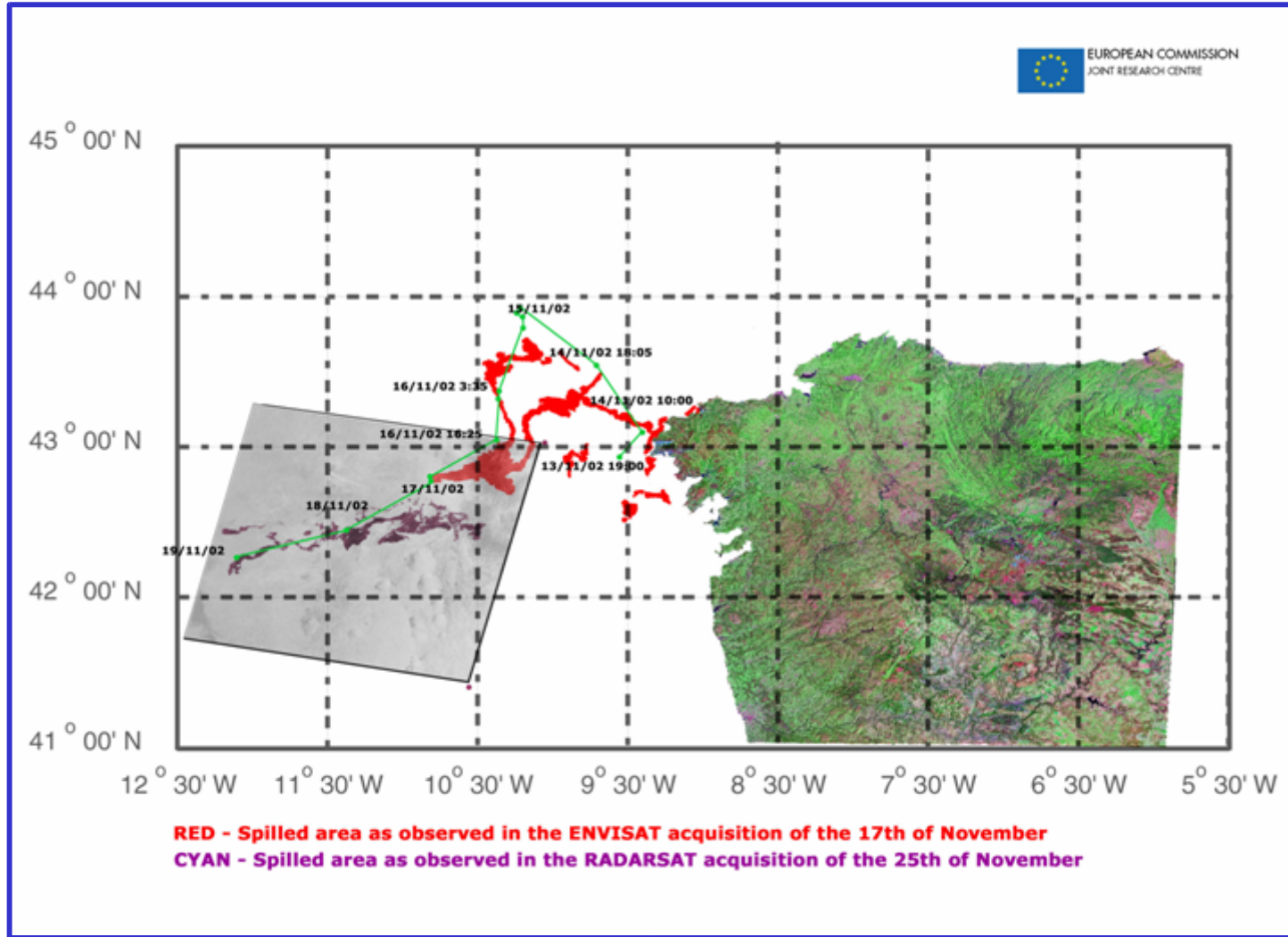
First radar image (Envisat, 17 Nov'02) showing one of the largest oil slicks ever seen from space



First Image Interpretation



Second Image Interpretation



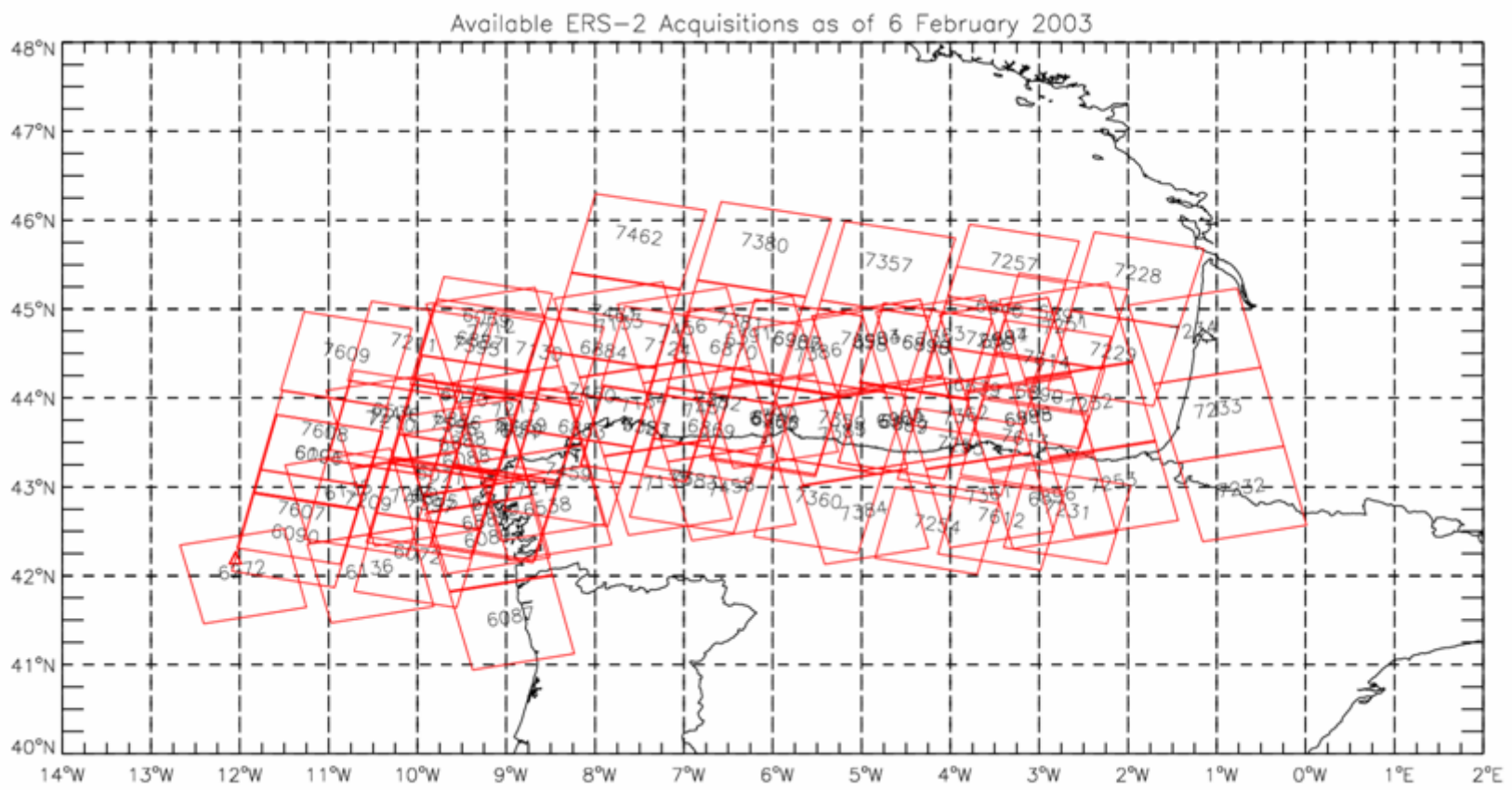


Summary of Activities

- Since 15 November 2002 a total of 169 full resolution satellite radar images were analyzed (5 RADARSAT, 62 Envisat and 102 ERS-2 Images)
- The source of the images is:
 - CNES within the frame of the CHARTER in a first phase until 2/12/2002, and then
 - ESA/ESRIN with a dedicated FTP site where 15-20 new images are uploaded every week (until mid Feb.)

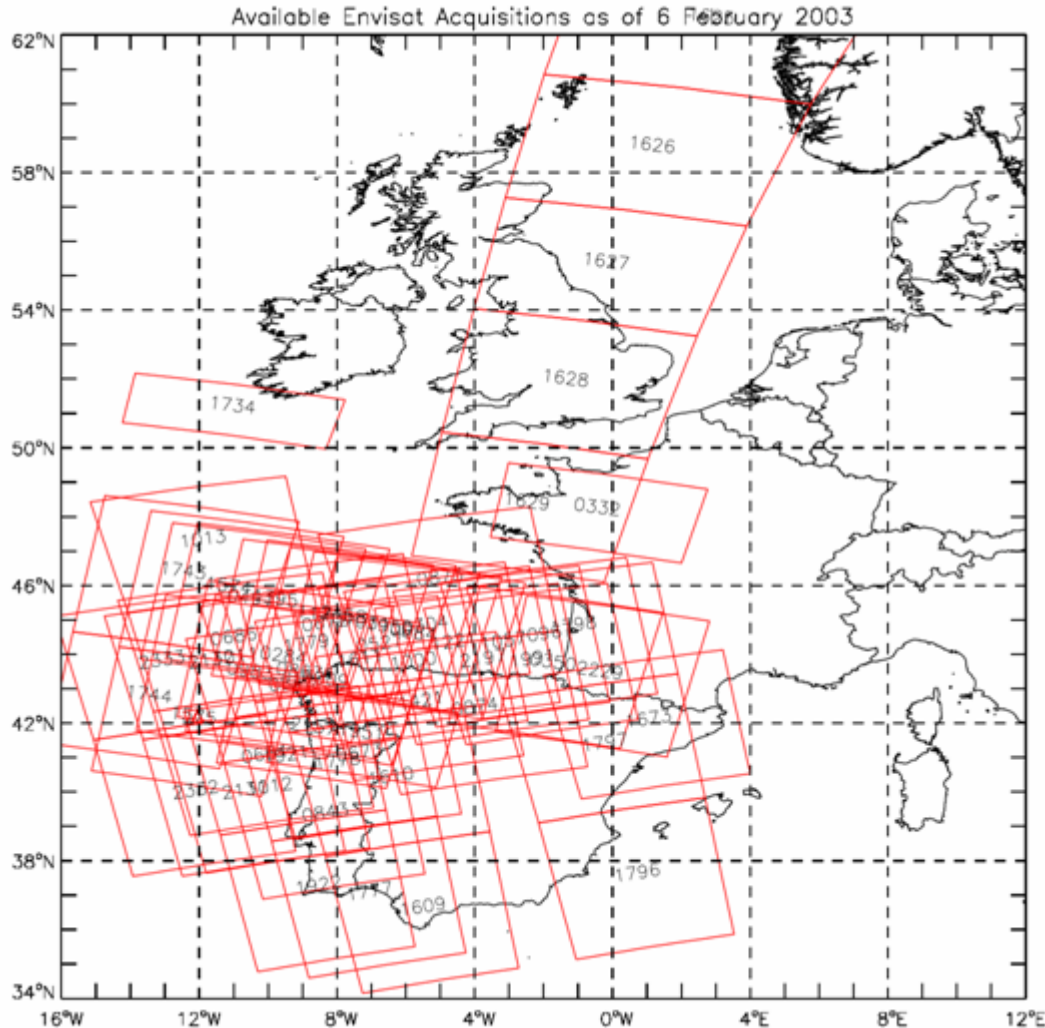


ERS-2 Images





ENVISAT ASAR

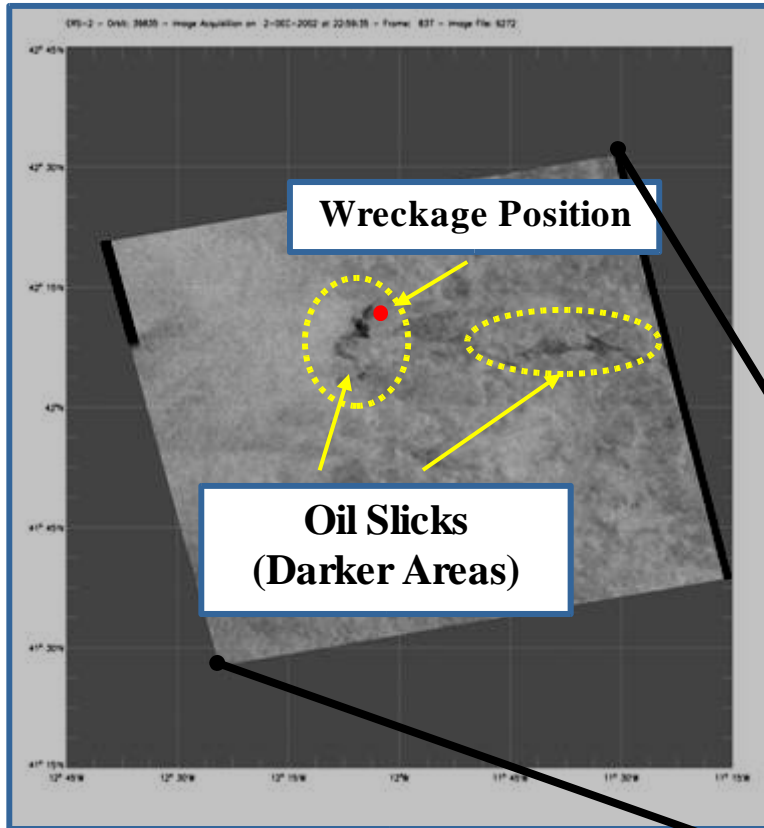




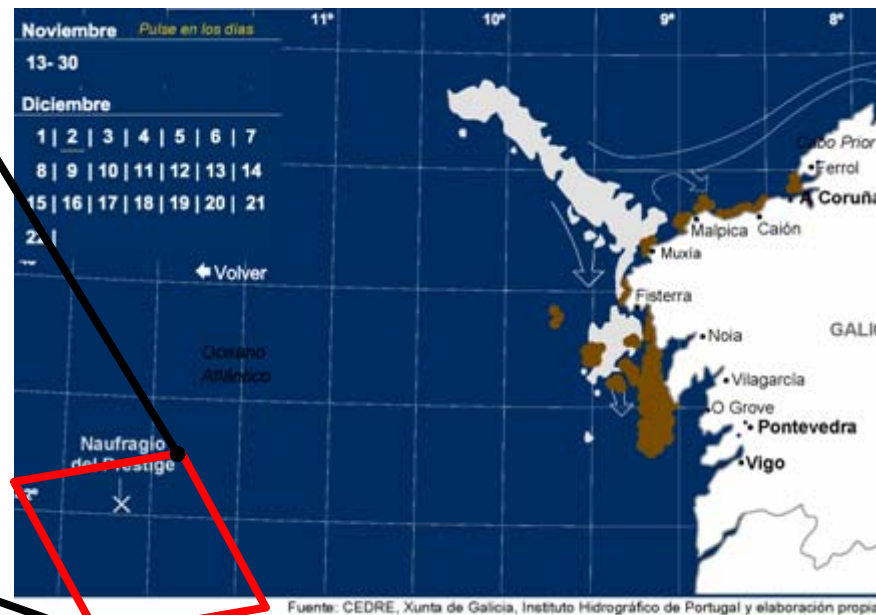
Performed Tasks

- Image Geo-location
- Post-Processing (image equalization and oil/sea-clutter contrast enhancement filtering)
- Image Interpretation
- Delivery of Results to EC DG-Environment to be attached to their Info-sheet Reports
- These reports are distributed within the EC and all Member States

Example Image Interpretation



ERS-2 Image over the wreckage area (2 Dec'02) showing the oil coming up



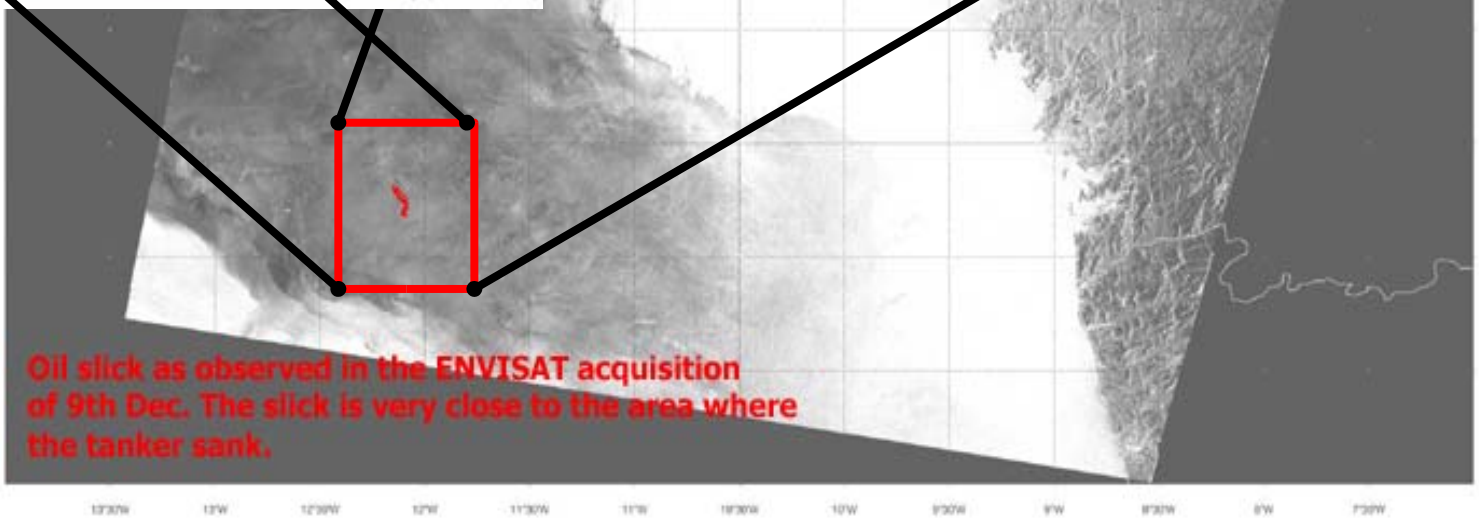
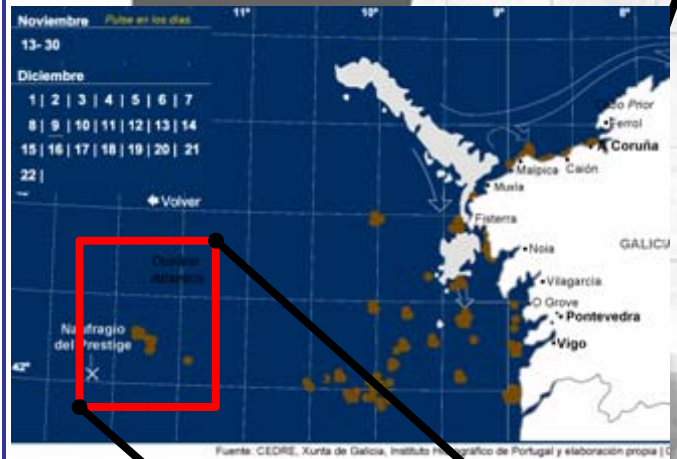
Example Image Interpretation

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ENVISAT 9 Dec

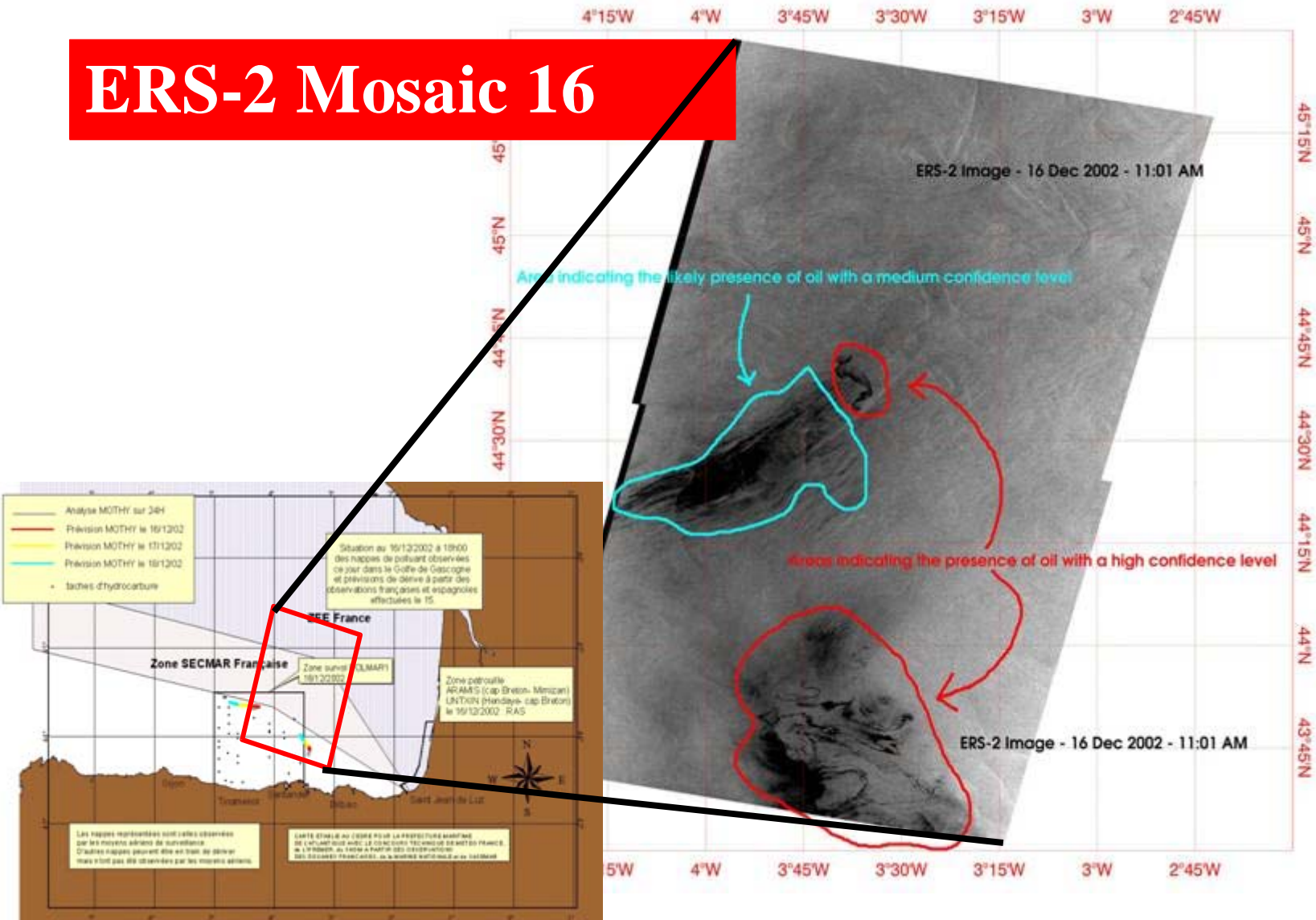


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Example Image Interpretation

ERS-2 Mosaic 16

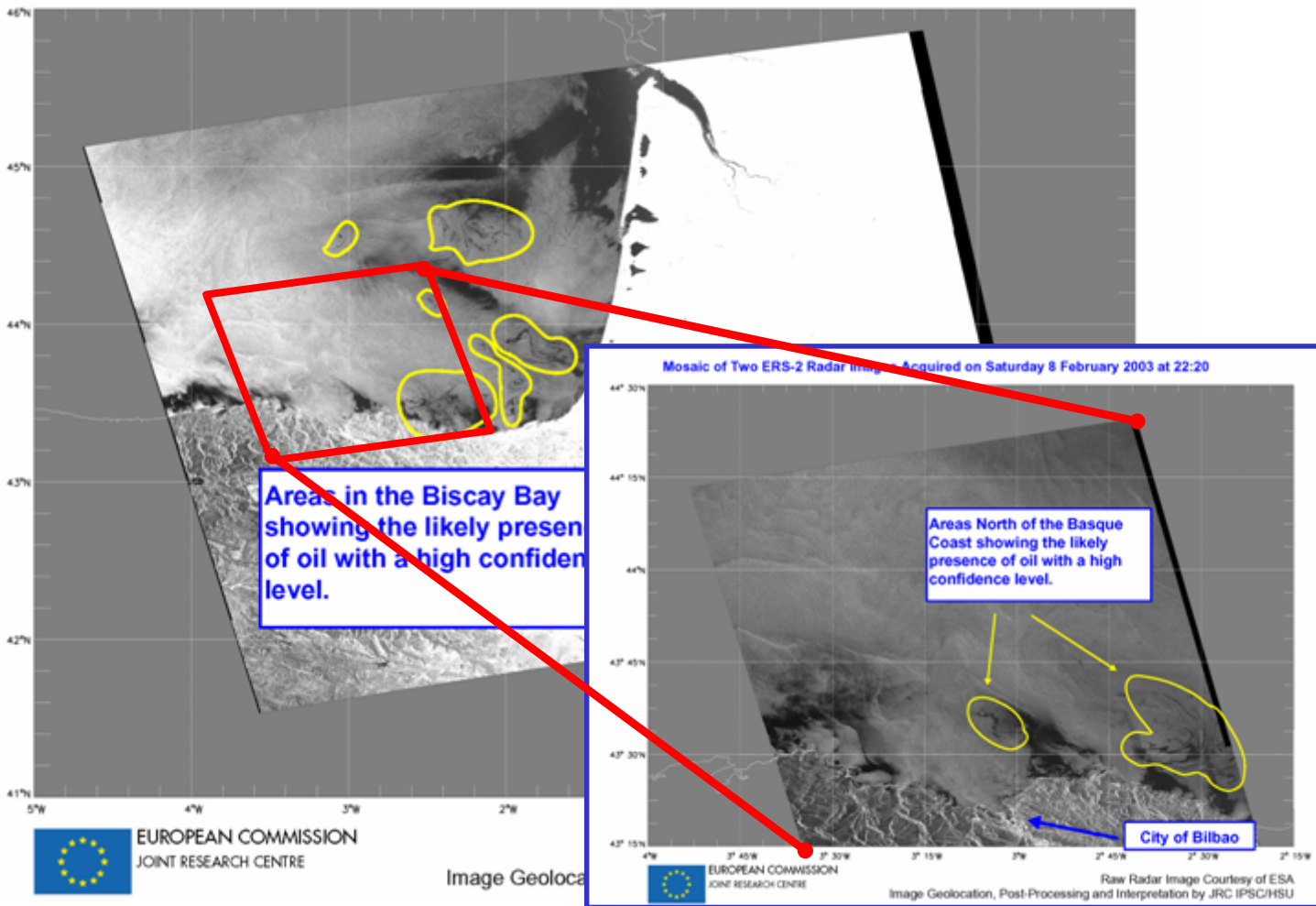


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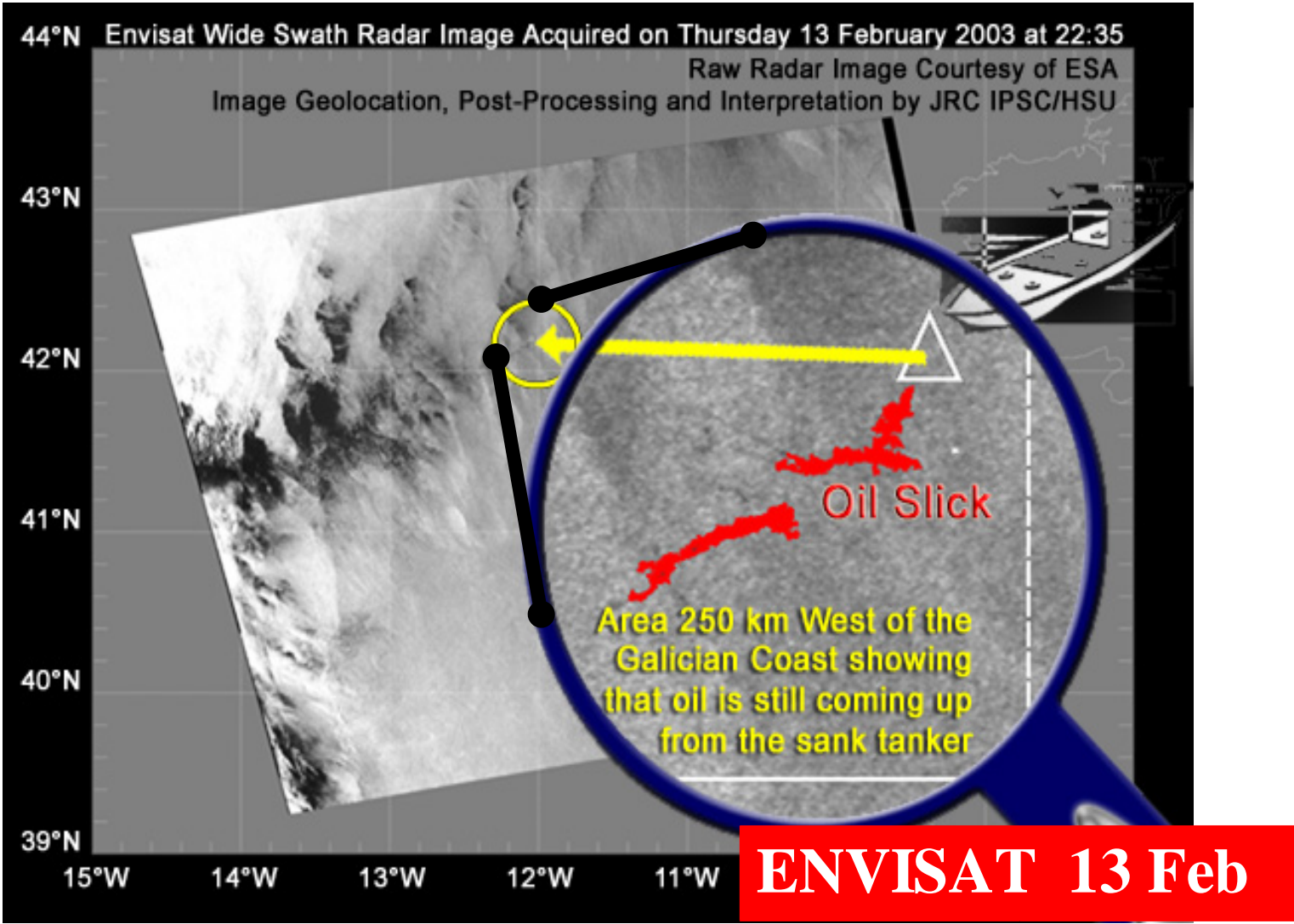
ERS-2 and ENVISAT ASAR

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ENVISAT Wide Swath Radar Image Acquired on Saturday 8 February 2003 at 22:00



Example Image Interpretation



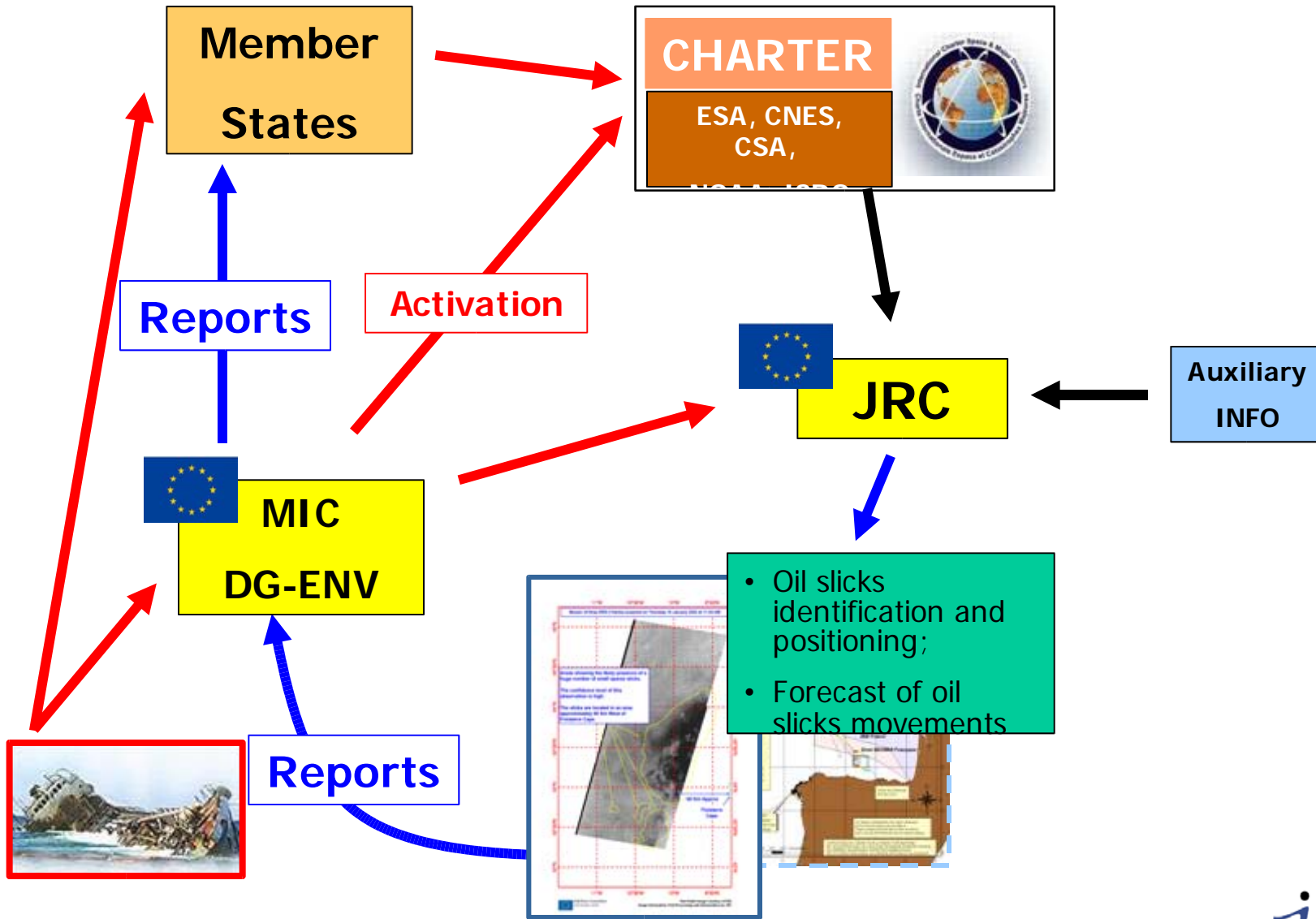


Preliminary Conclusions

- Results obtained by the use of satellite images can be summarized as follows:
 - provision of useful information due to the capability to cover large and remote areas;
 - no information have been provided in some cases due unfavorable sea conditions;
 - Some oil slicks not confirmed by other observations:
 - misinterpretation due to complex situations;
 - lack of knowledge of the characteristics and of the behavior of the discharged oil;
 - lack of experience in dealing with accidental spills;
 - lack of contextual info at the time of image interpretation;
- The Prestige Case confirmed that the optimal use of RS from space is in support of airborne means

The Working Scheme

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Necessary Improvements

- Minimization of the time delay from image acquisition and delivery of the final result.
 - set-up of dedicated infrastructures (receiving stations or dedicated fast link to the receiving stations).
- Improving co-ordination in the exchange of auxiliary data and in the procedure of selection and planning of suitable observations.
- Provision of the information in a standardized format.
- Improving the forecasting of slick movement (robust models and timely availability of necessary input data).
- Better understanding of the behavior of heavy fuel including an effective tool/technique to detect submersed oil.

An Improved Working Scheme

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