An analysis of the applicability of the new ESA MSS/TM/ETM+ Landsat archive for coastal and oceanic applications.

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Background

- The European Space Agency (ESA) has used its ground stations, in co-operation with the USGS and NASA, to acquire Landsat data over Europe for over 40 years.
- The full archive is currently being reprocessed to create a consistent MSS/TM/ETM+ dataset with quality standards that are the highest achievable using the current instrument knowledge.
- Processing algorithms are mainly based on the approach implemented by the USGS, but there are important differences including the generation of marine scenes.

Data is available via https://landsat-ds.eo.esa.int/app/

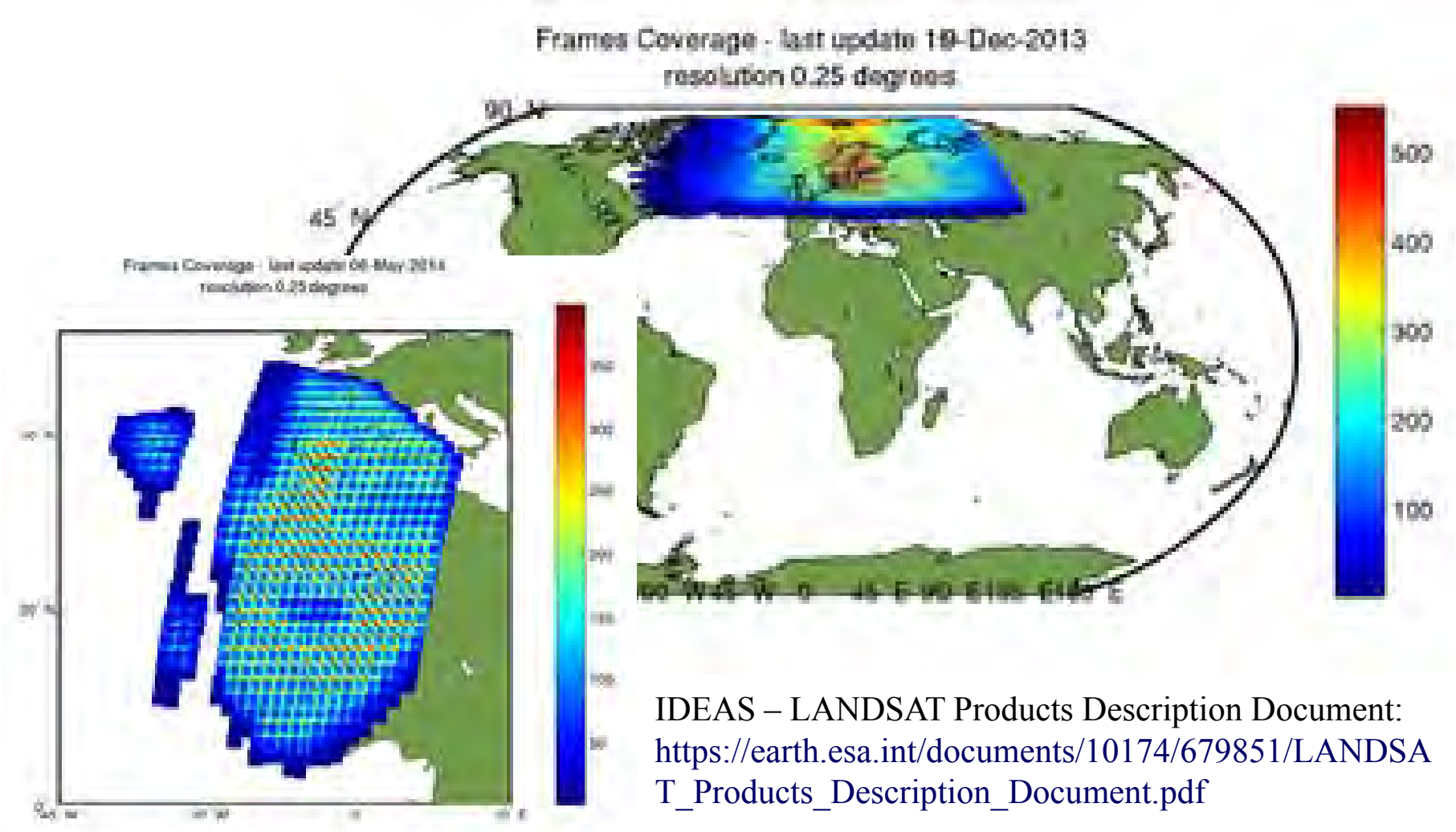
[requires an ESA SSO username/password]

Processing Levels

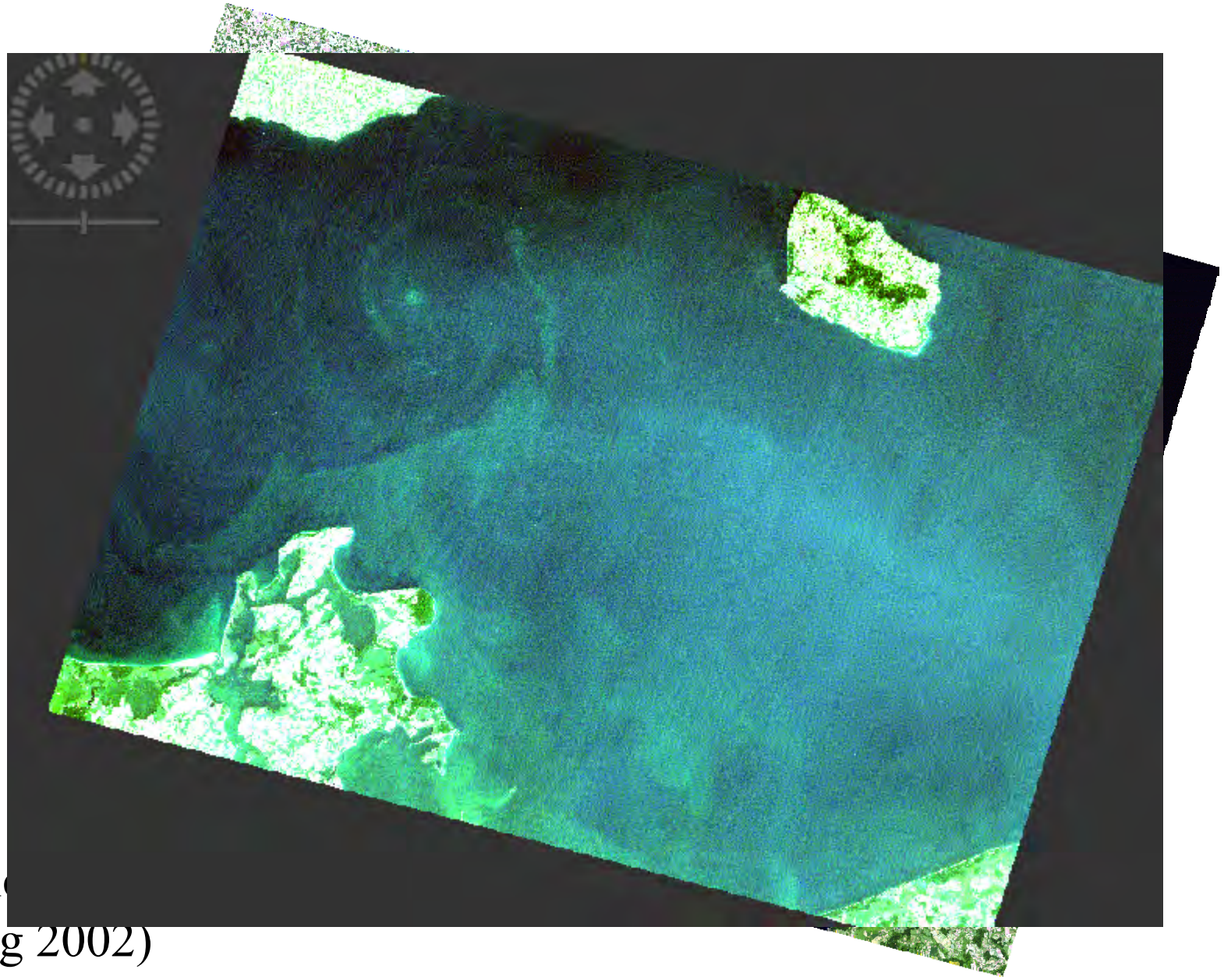
Possible levels of processing:

- L1T Ground Terrain Corrected (**GTC**) being fully geometrically corrected; using both a Digital Elevation Model (DEM) and Ground Control Points (GCPs).
- Where GCPs are not available, L1Gt is produced and where the DEM is also not available then the L1G Systematically Corrected (**GEO**) format is produced.
- GEO products are unique to ESA and produced over areas such as the ocean. However, as Landsat is not designed for oceanic acquisitions the products are generally noisy; arising primarily from low reflectances compared to terrestrial targets.

Maspalomas and Kiruna TM frames 1984-2011; Images: X-PReSS



IDEAS – LANDSAT Products Description Document:
https://earth.esa.int/documents/10174/679851/LANDSAT_Products_Description_Document.pdf



Landsat
Balti
(20 Aug 2002)

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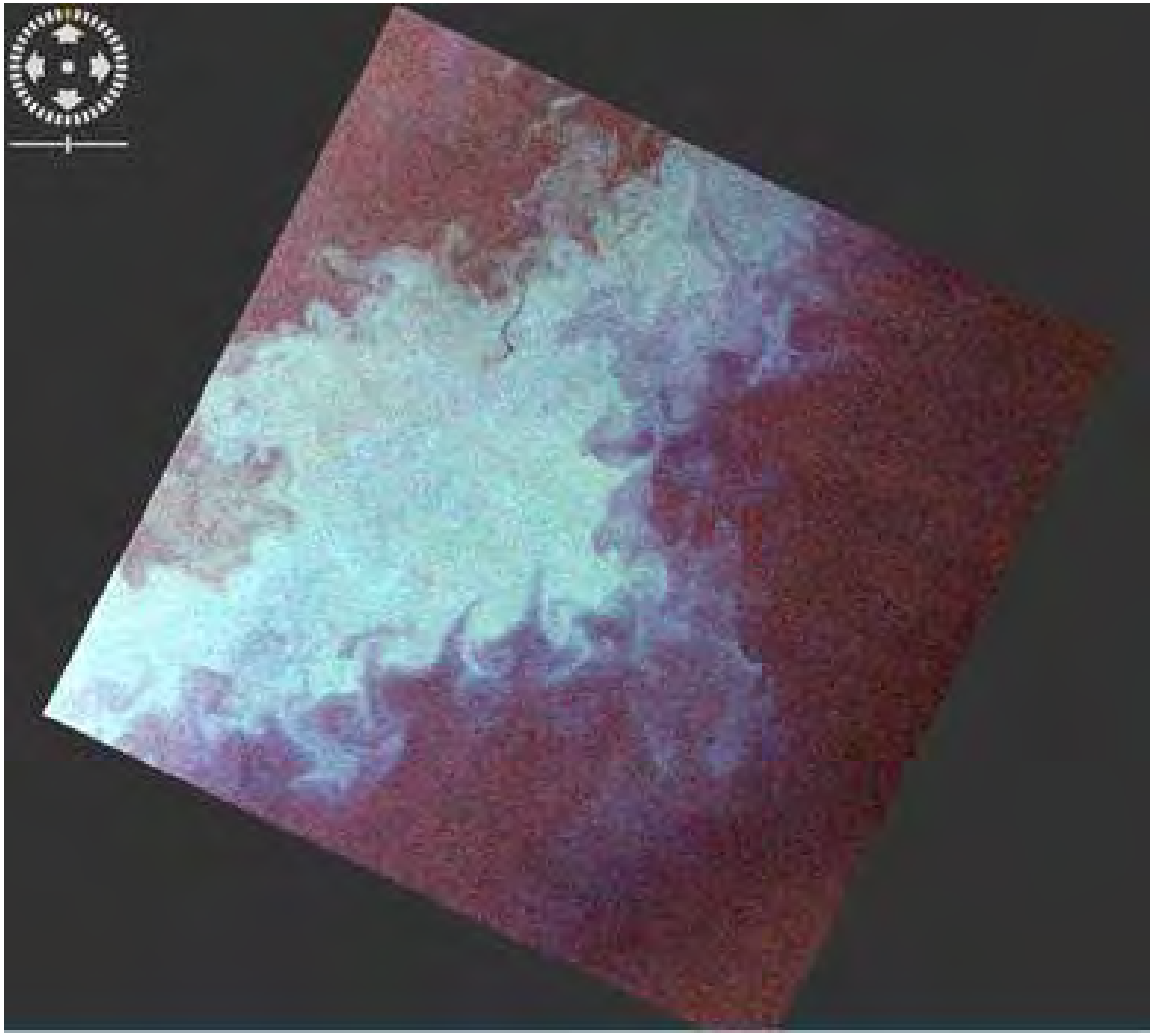
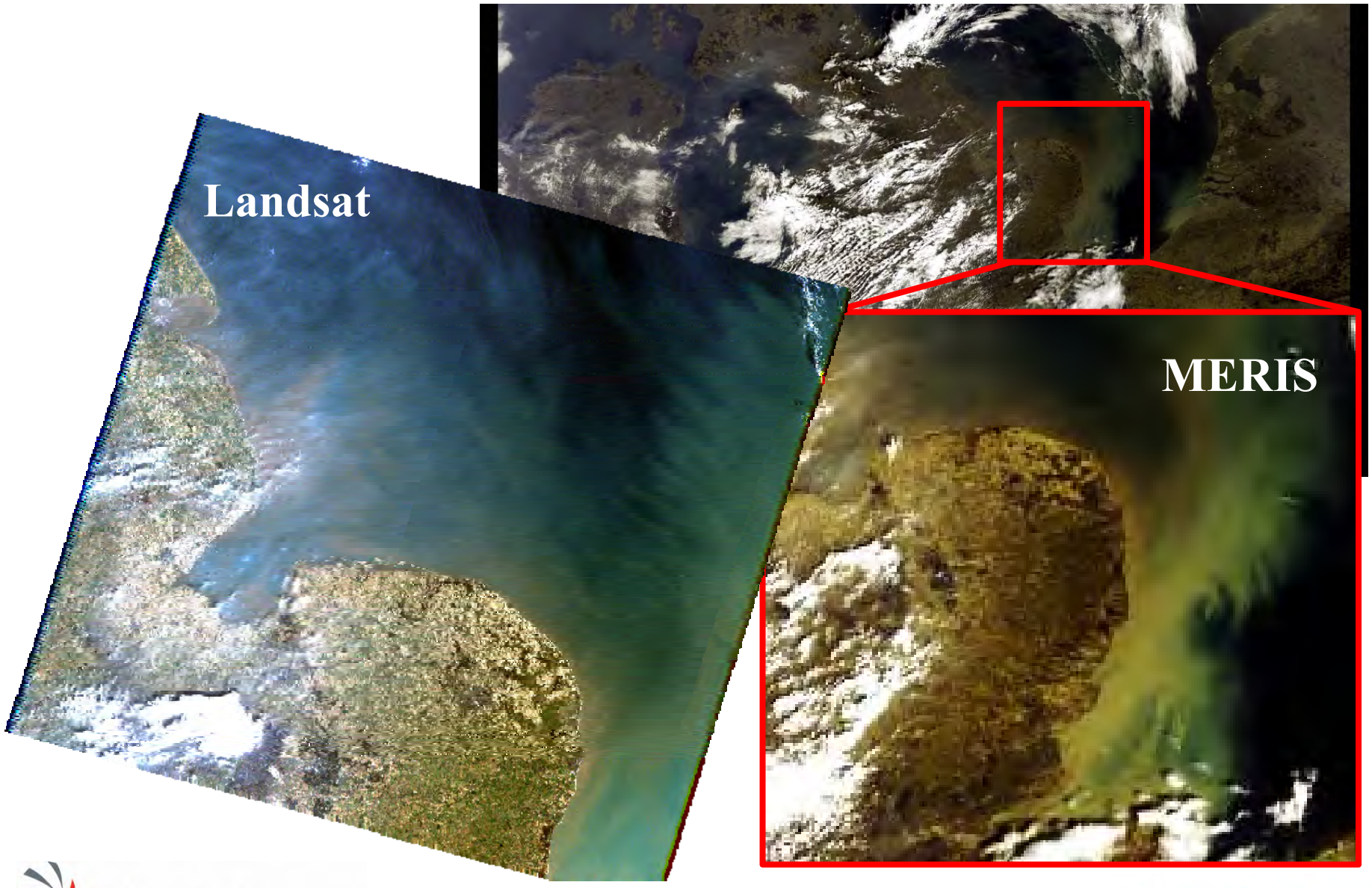


Landsat 7 ETM+ Barents Sea (16 Sep 1999)



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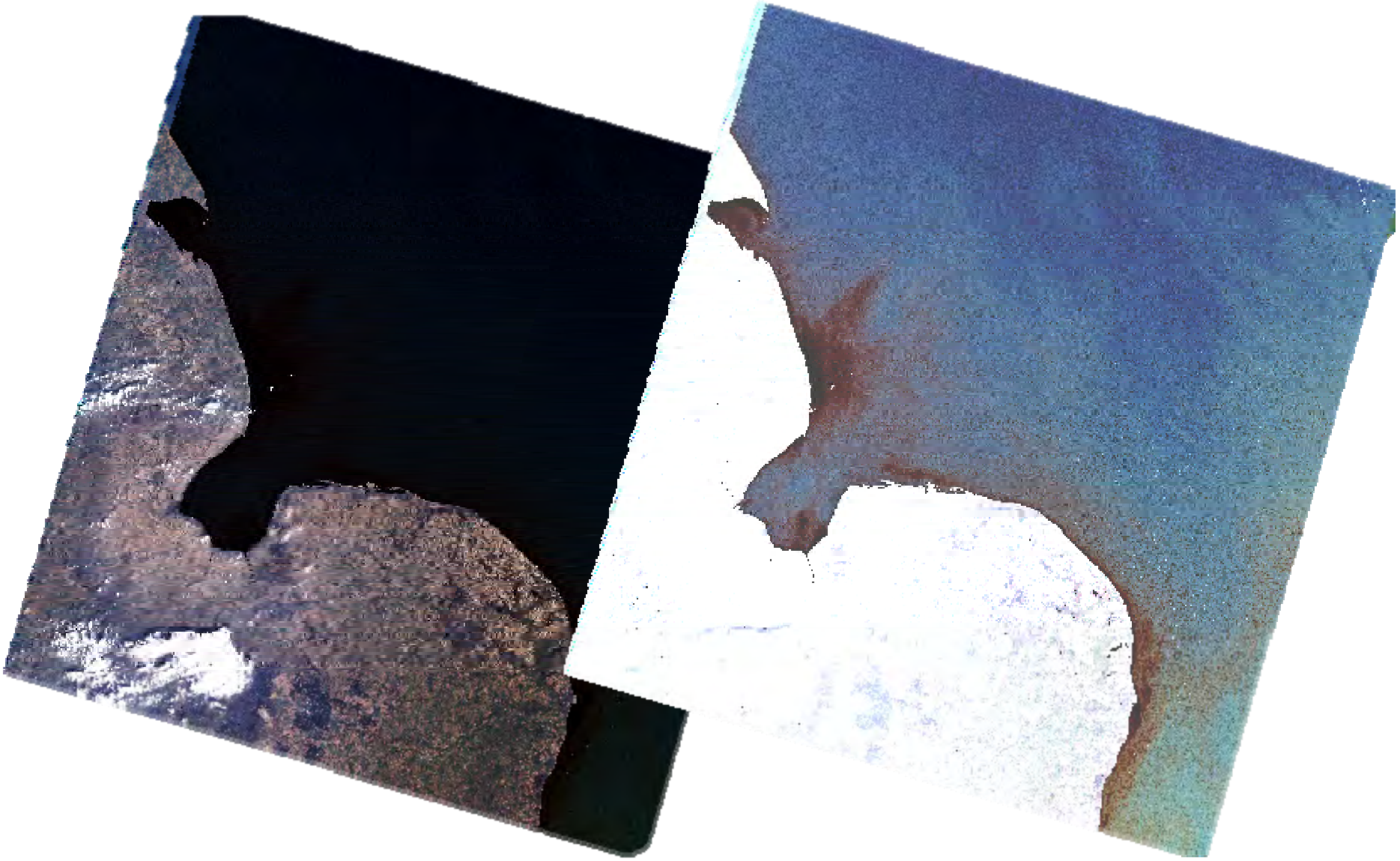

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Conclusions

• The ESA Landsat archive is providing a complimentary source of data to what's available via the United States Geological Survey, e.g. approximately 290K Landsat 5 TM scenes are available from Kiruna ground station alone between 1983 and 2011.

• TM and ETM are online and available, but with more to be added, and the processor is currently being validated for MSS.

• Although Landsat is not ideally suited to observing the ocean, and so the data is noisy, features can be clearly seen and it's possible to perform an above-water atmospheric corrections that then allows for quantitative products to be determined.