

3.7 Ocean Colour

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Ocean colour refers to the sunlight reflected from the surface of the ocean. The particular characteristics of this reflected light are determined by the water constituents, primarily phytoplankton, suspended particles and dissolved organic compounds. Monitoring of ocean colour provides information on water quality and early warning of phytoplankton blooms and pollution events. Changes in colour patterns and characteristics can be related to and are indicative of climate changes.

Photo: © Paddy Tubbritt



Artist's impression of Envisat. Source: ESA



'No long-term trend is observed in chlorophyll concentrations derived from ocean colour observations around Ireland since 1997.'

Measurements

Satellite radiometers are the primary means used to observe ocean colour. Sensitive light sensors detect the small amounts of radiation reflected from the ocean's surface in many narrow bands of the visible and near infrared spectrum. Analysis of the different amounts of reflectance in these bands allows the characterisation of the ocean surface in terms of chlorophyll concentrations or sediment amounts or some specific dissolved organic

compounds. A continuous series of ocean colour datasets from a number of satellites exists since 1997.

Time-series and Trends

Chlorophyll concentration is the main parameter that is routinely derived from colour observations. [Figure 3.14](#) shows the monthly average chlorophyll-a (Chl-a) concentration since 1997 in the northeast Atlantic around Ireland as determined from ocean colour observations by the *SeaWiFS* sensor.¹⁹ A seasonal variation can be observed with maximum Chl-a levels reached in the summer months and a minimum in the winter. No trend is observed over the period of the measurements.

Observations of averaged Chl-a concentration for the periods January to March 2010 and June to August 2010 ([Fig. 3.15](#)) show that concentrations in the near coastal areas and the Irish Sea vary little from winter to summer.¹⁹ However, concentrations increase significantly in the open ocean during the summer months. Note that white areas over the ocean represent cloud cover where no observations could be made.

'No systematic analysis of ocean colour observations for the northeast Atlantic has been carried out in Ireland.'

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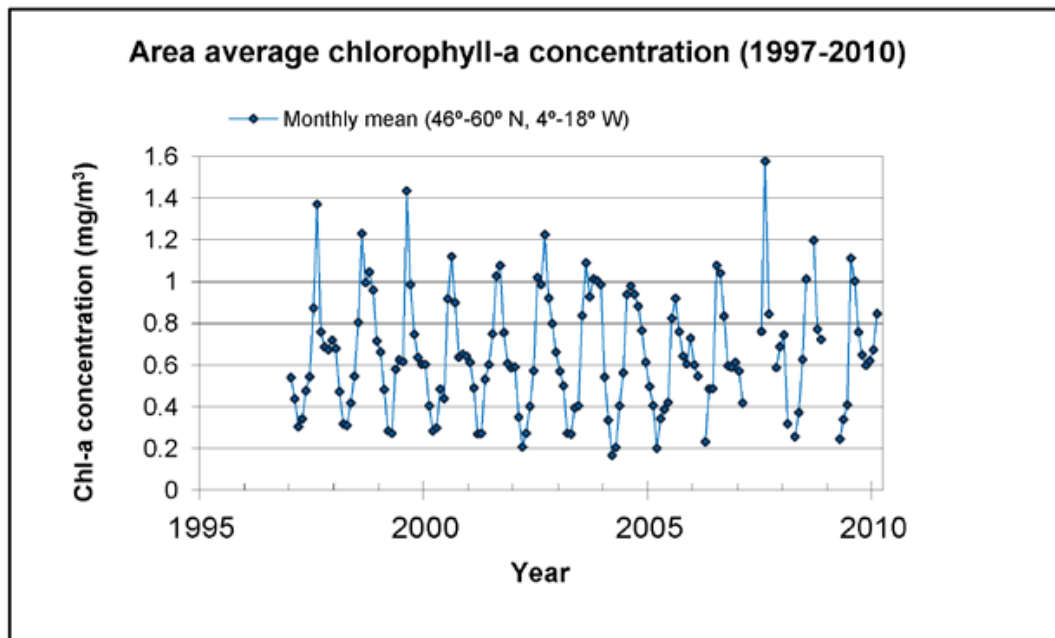


Figure 3.14. Monthly mean Chlorophyll-a concentration in the northeast Atlantic (1997–2010).

¹⁹ Analyses and visualisations used in this section of the report were produced with the Giovanni online data system, developed and maintained by the NASA GES DISC.

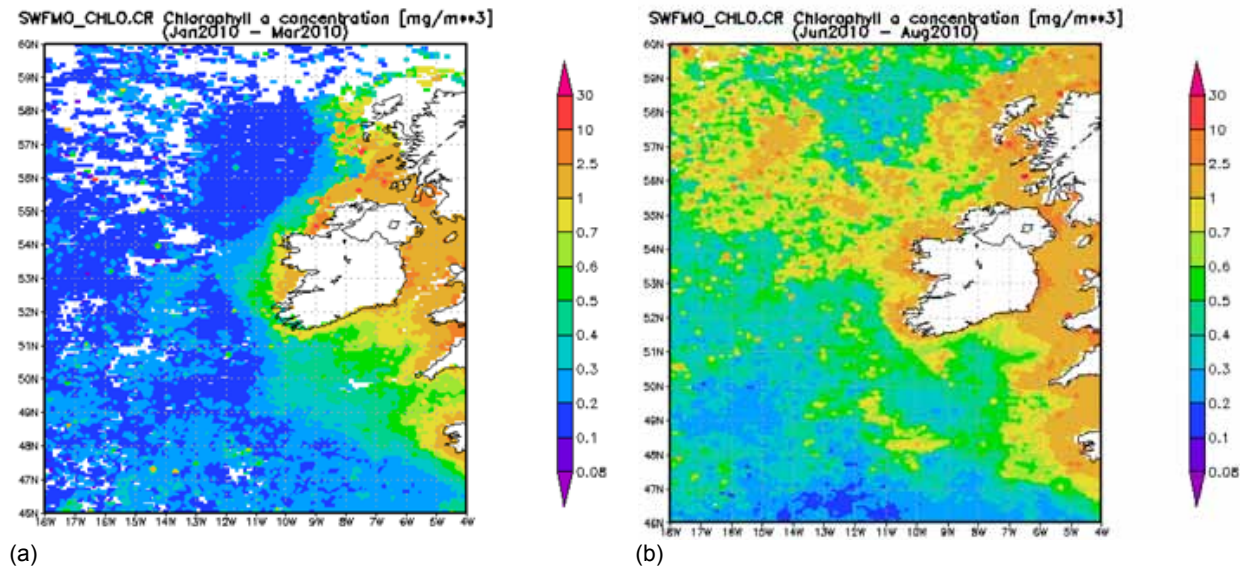


Figure 3.15. Averaged Chlorophyll-a concentration for the periods January–March 2010 (a) and June–August 2010 (b).

Maintaining the Observations

A range of sensors from a number of space agencies makes observations of ocean colour. However, limited sensor lifetimes, inter-calibration and comparability of observations are key issues to be addressed. The reliability of satellite measurements in coastal areas needs to be improved. The existence of a 15-year time-series of colour observations for the seas around Ireland represents a valuable resource. A systematic analysis of these observations should be carried out.

Further Information and Data Sources

Acker, J.G. and Leptoukh, G. (2007) Online analysis enhances use of NASA earth science data, *Eos, Transactions, American Geophysical Union*, Vol. 88, No. 2, pp. 14 and 17.

International Ocean Colour coordinating group:
<http://www.ioccg.org/>

Information and data from the ESA-funded Climate Change Initiative Ocean Colour project:
<http://www.esa-oceancolour-cci.org/>

Information and data from the ESA-funded GlobColour project: <http://www.globcolour.info/>

Information and data from the ESA-funded CoastColour project: <http://www.coastcolour.org/>

Data from the GMES MyOcean Service:
<http://www.myocean.eu.org/>

Information and data from NASA missions:
<http://oceancolor.gsfc.nasa.gov/>

Data via Giovanni from the Goddard Earth Sciences and Information Services Center: <http://disc.sci.gsfc.nasa.gov/giovanni/overview/index.html>