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SDG 14 Conserve and sustainably use the oceans, seas and marine resources for sustainable development

SDG Goal 14

① 14.1 By 2025, prevent and significantly reduce marine pollution of all kinds, in particular from land-based activities, including marine debris and nutrient pollution

② 14.2 By 2020, sustainably manage and protect marine and coastal ecosystems to avoid significant adverse impacts, including by strengthening their resilience, and take action for their restoration in order to achieve healthy and productive oceans

③ 14.3 Minimize and address the impacts of ocean acidification, including through enhanced scientific cooperation at all levels

④ 14.4 By 2020, effectively regulate harvesting and end overfishing, illegal, unreported and unregulated fishing and destructive fishing practices and implement science-based management plans, in order to restore fish stocks in the shortest time feasible, at least to levels that can produce maximum sustainable yield as determined by their biological characteristics

⑤ 14.5 By 2020, conserve at least 10 per cent of coastal and marine areas, consistent with national and international law and based on the best available scientific information

SDG Goal 14

⑥ 14.6 By 2020, prohibit certain forms of fisheries subsidies which contribute to overcapacity and overfishing, eliminate subsidies that contribute to illegal, unreported and unregulated fishing and refrain from introducing new such subsidies, recognizing that appropriate and effective special and differential treatment for developing and least developed countries should be an integral part of the World Trade Organization fisheries subsidies negotiation

⑦ 14.7 By 2030, increase the economic benefits to Small Island developing States and least developed countries from the sustainable use of marine resources, including through sustainable management of fisheries, aquaculture and tourism

SDG Goal 14

- 14.a Increase scientific knowledge, develop research capacity and transfer marine technology, taking into account the Intergovernmental Oceanographic Commission Criteria and Guidelines on the Transfer of Marine Technology, in order to improve ocean health and to enhance the contribution of marine biodiversity to the development of developing countries, in particular small island developing States and least developed countries
- 14.b Provide access for small-scale artisanal fishers to marine resources and markets
- 14.c Enhance the conservation and sustainable use of oceans and their resources by implementing international law as reflected in UNCLOS, which provides the legal framework for the conservation and sustainable use of oceans and their resources, as recalled in paragraph 158 of The Future We Want

Ocean Colour

Coverage by protected areas of marine sites of particular importance for biodiversity

Wave height

Sea Surface Temperature

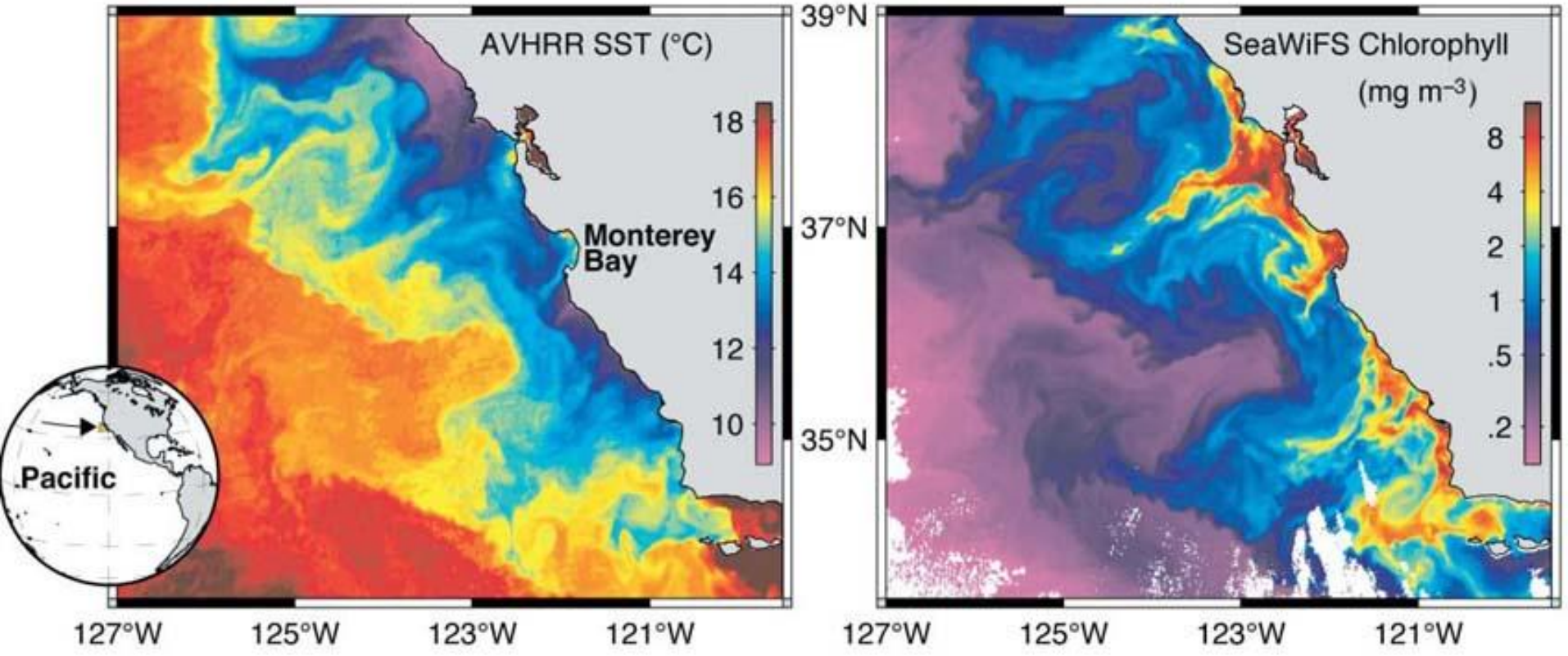
Sea Level

Change in area coverage of coral functional groups. (Total coral cover itself provides limited information on health/productivity in context of acidification

Measuring Water Depth from the International Space Station ...
... depths of lagoon features at Pearl and Hermes Reef, northwest Hawaii
http://eol.jsc.nasa.gov/newsletter/CoastalZone/default.htm

This photograph taken from the International Space Station shows the shallow sand bars to the west (left side) of Eleuthera Island in the Bahamas. The water there is only a few feet deep. To the east (right side) the deep water is a pure blue-no subsurface features are visible. (Image ISS004-E-8777 courtesy NASA-JSC Gateway to Astronaut Photography of Earth.)

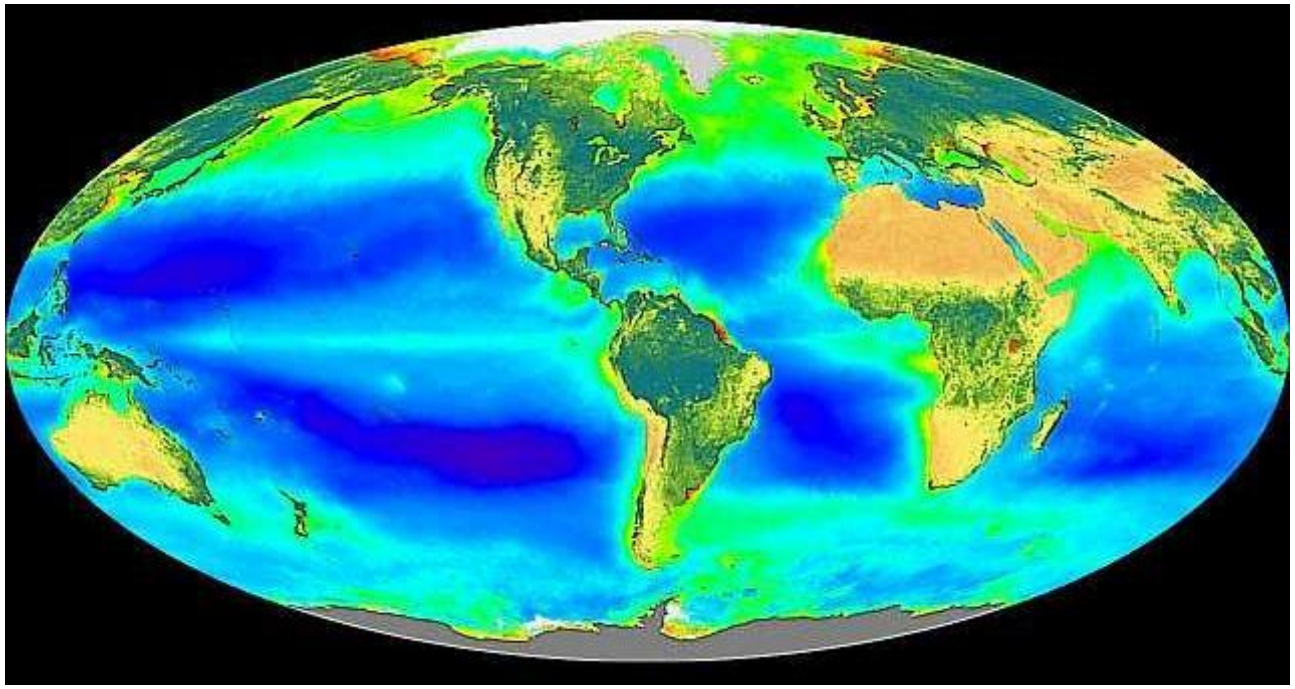
Upwelling – sea surface temperature and ocean colour



http://www.mbari.org/canon/Images/upwellinggraph.jpg

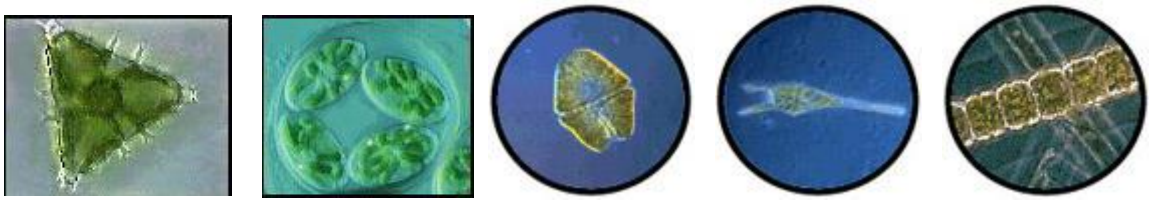
Ocean colour

- The term Ocean Color is used to indicate remote sensing of the sea in the visible and near infrared with the primary objective of determining the radiance emerging from the sea from the top-of-atmosphere radiometric signal
- The radiance emerging from the sea is then used to generate higher level products (e.g. maps of chlorophyll concentration)



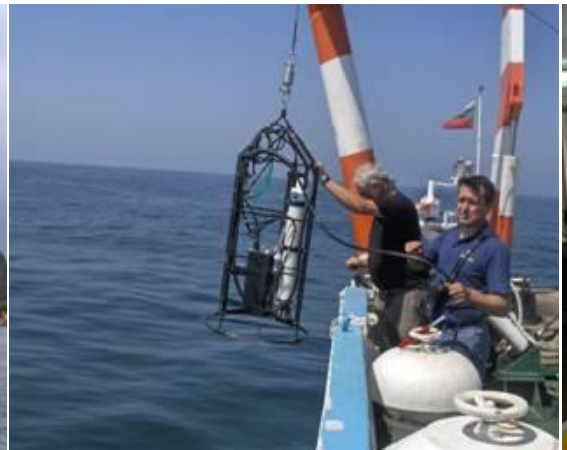
The importance of chlorophyll-a measurements

- Phytoplankton; microscopic unicellular marine plants containing chlorophyll, vital for photosynthesis
- When phytoplankton dies it sinks to the sea bottom
- Although phytoplankton account for approximately 50% of the photosynthesis on the Earth, over 99% of all the carbon dioxide that has been incorporated into living things over geologic time is buried in marine sediments
  - Therefore, the larger the world's phytoplankton population, the more carbon dioxide gets pulled from the atmosphere
- Chlorophyll concentration, used as a proxy for phytoplankton biomass is essential to full understanding of the carbon cycle



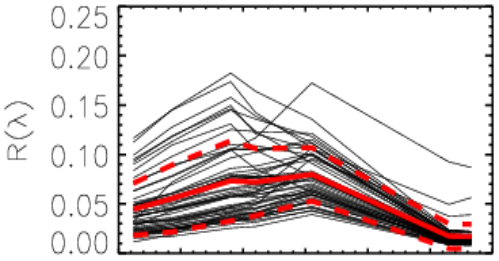
Quality assurance / quality control

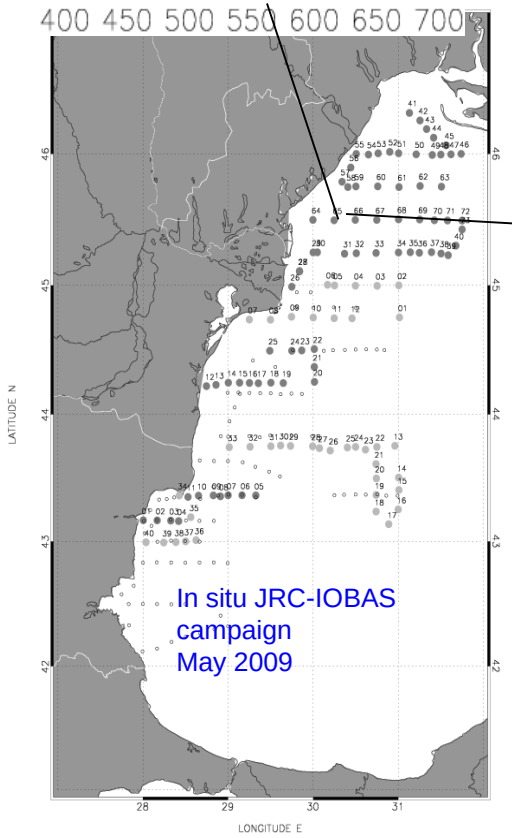
- Systematic tower observations
- In situ measurement campaigns
- Laboratory analysis
- International networks

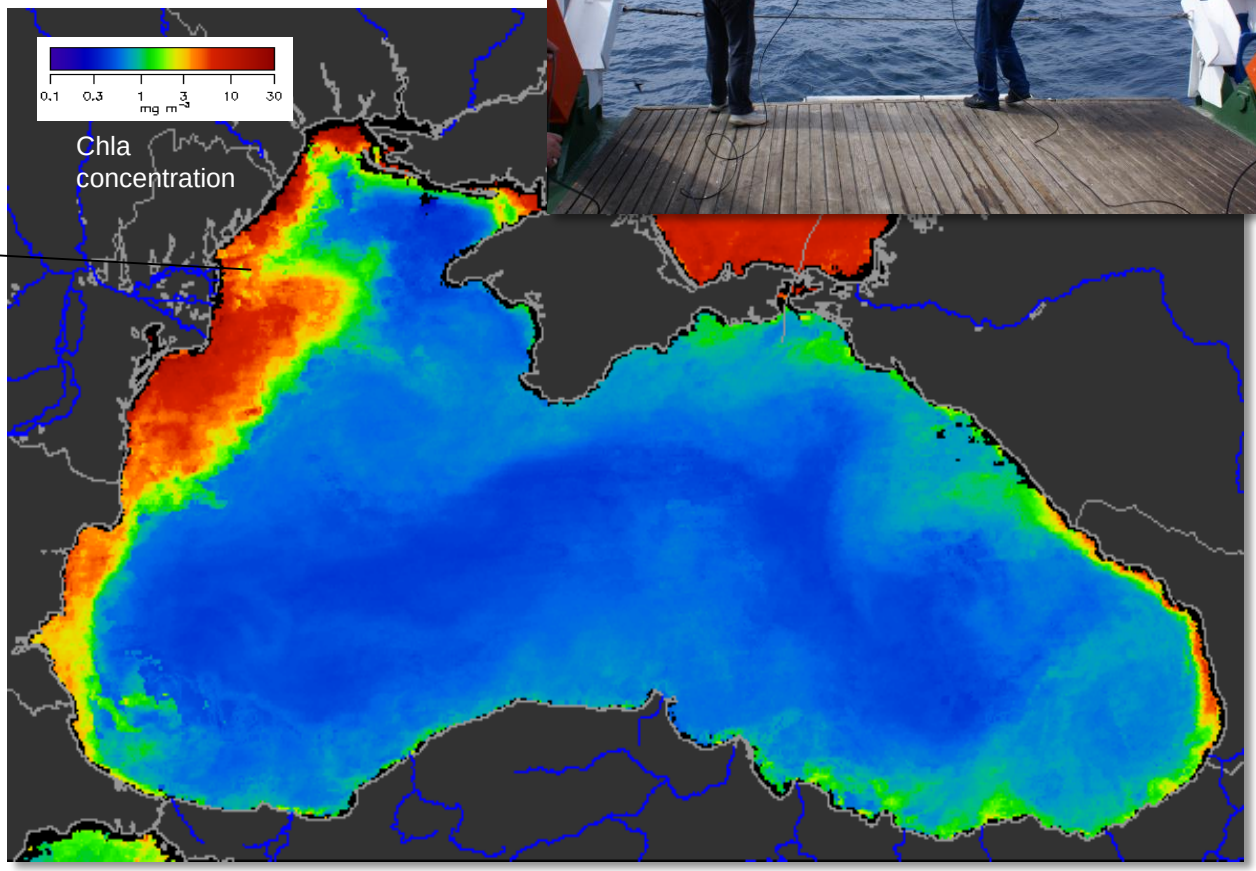


Black Sea Campaign; Setting international standards

Zibordi ~~et al validating ocean colour~~ –

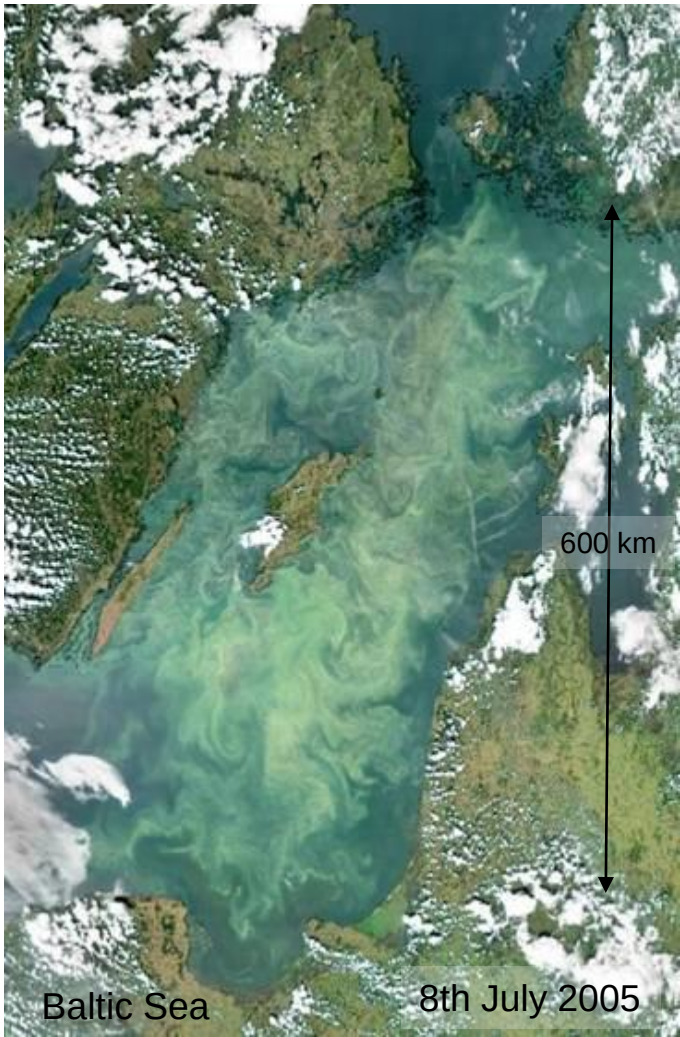






Cyanobacterial biomass prediction

- New paradigm for predicting toxic algal bloom magnitude
- Causal chain supported by data
  - Bottom phosphate pool
  - Transported to surface layer by winter deep mixing
  - Excess phosphate gives potential for cyanobacteria bloom in summer
  - …and increases their long-term competitiveness

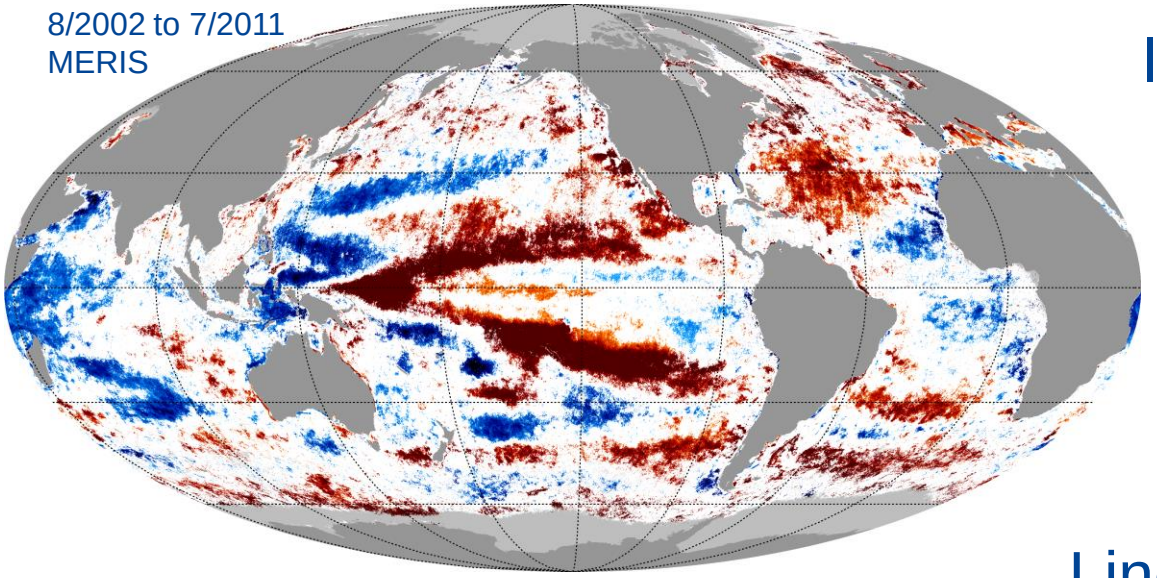


SOURCE: M. Lilover & A. Stips, 2008 THE VARIABILITY OF PARAMETERS CONTROLLING THE CYANOBACTERIA BLOOM BIOMASS IN THE BALTIC SEA Journal Marine Systems (in press)

MODIS June 2006, courtesy NASA

MERIS June 2006, courtesy ESA

8/2002 to 7/2011
MERIS



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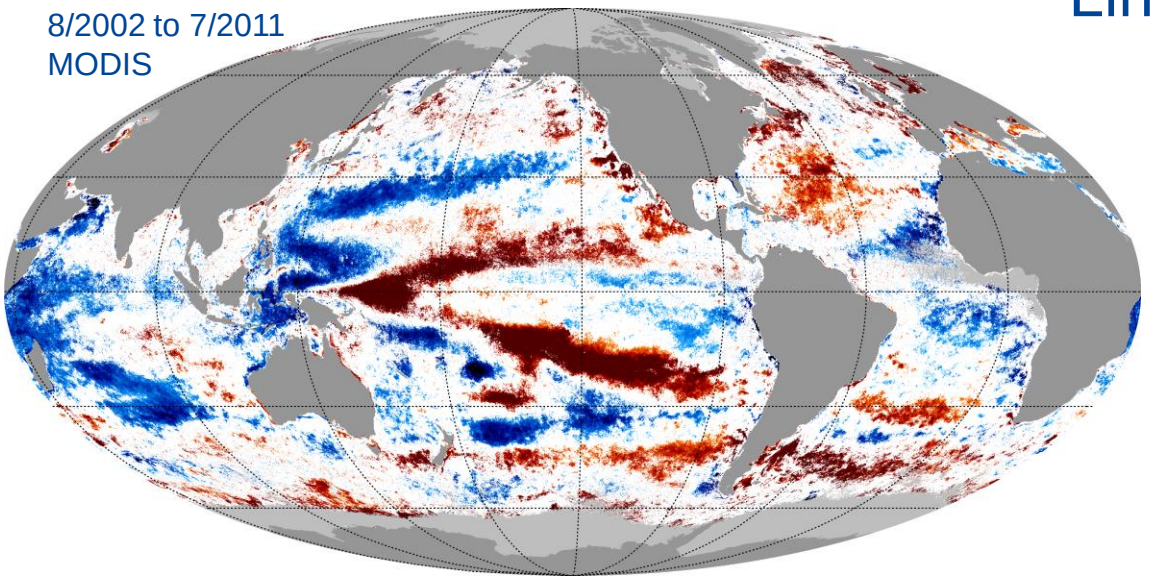
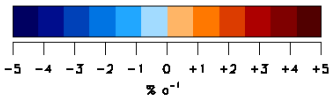
MODIS



Improving data availability, synergistic use, record completeness, and hence improving knowledge

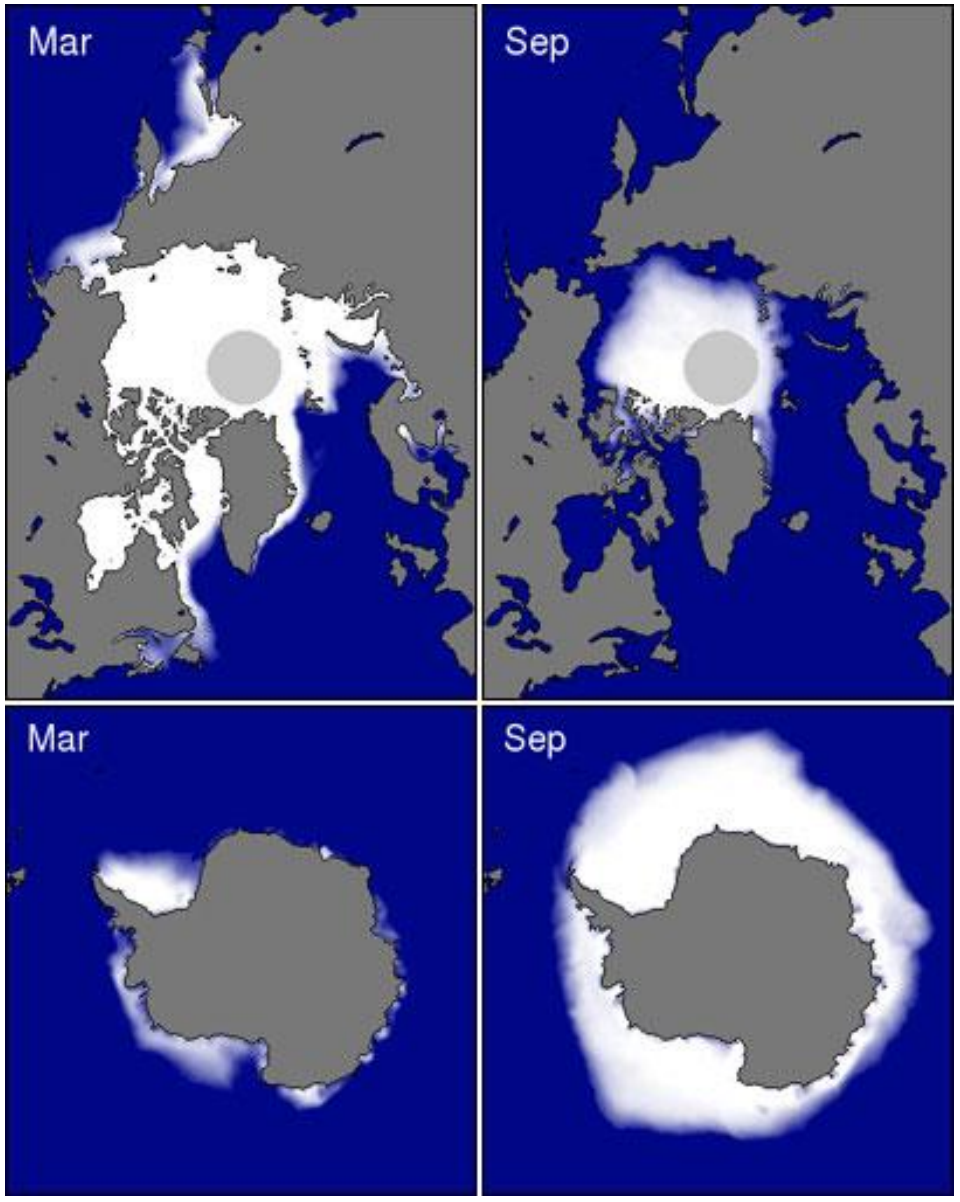
Linear trends in chlorophyll a concentration



Source Vantrepotte & Mélin Joint Research centre, see *Cont. Shelf Res.*, 2010; *Deep-Sea Res.*, 2011; *Geophys. Res. Lett.*, 2011

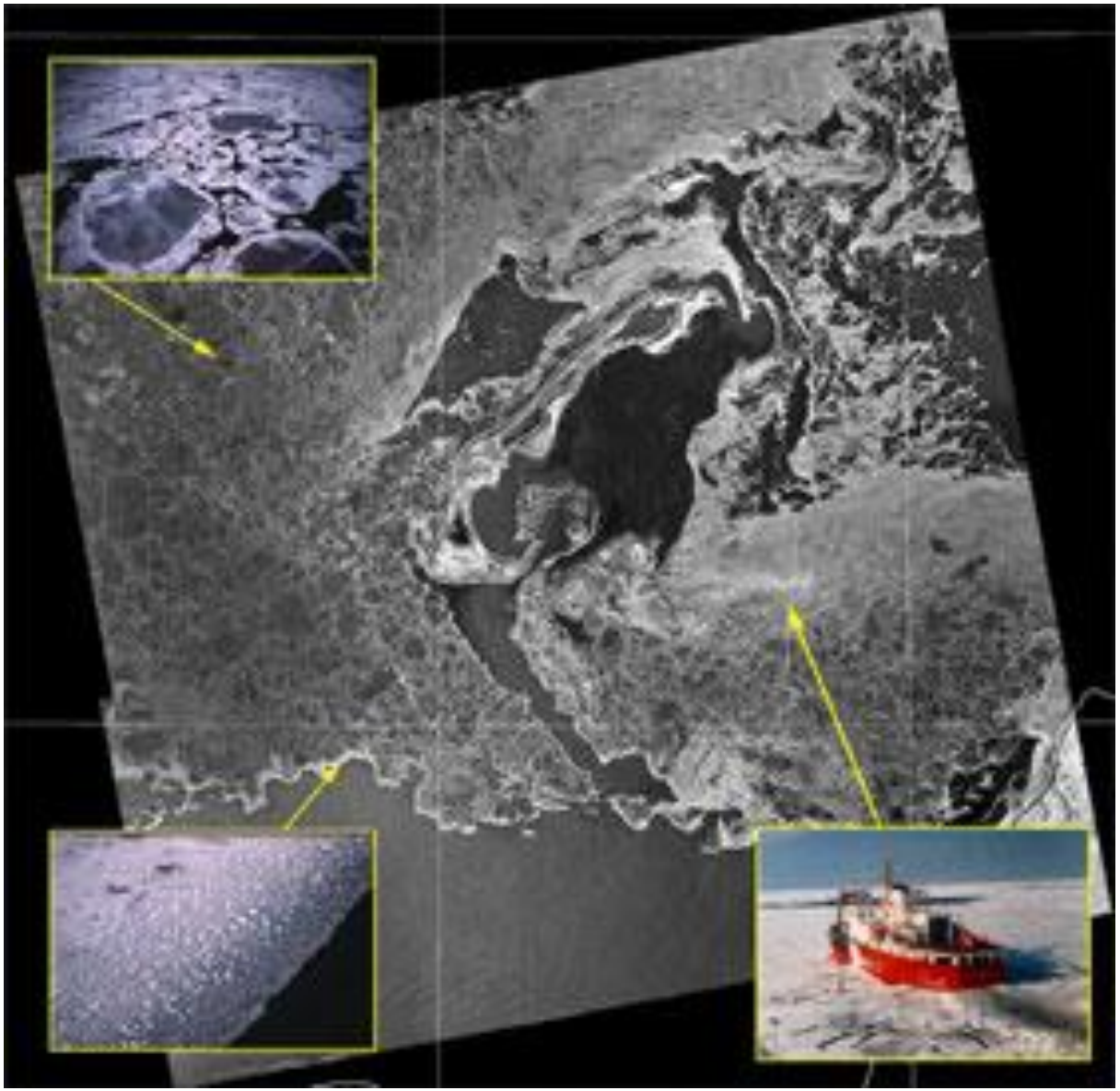
Sea ice mapping passive microwave

Sea ice climatologies: Arctic and Antarctic sea ice concentration climatology from 1981-2010, at the approximate seasonal maximum and minimum levels based on passive microwave satellite data. Image provided by National Snow and Ice Data Center, University of Colorado, Boulder.



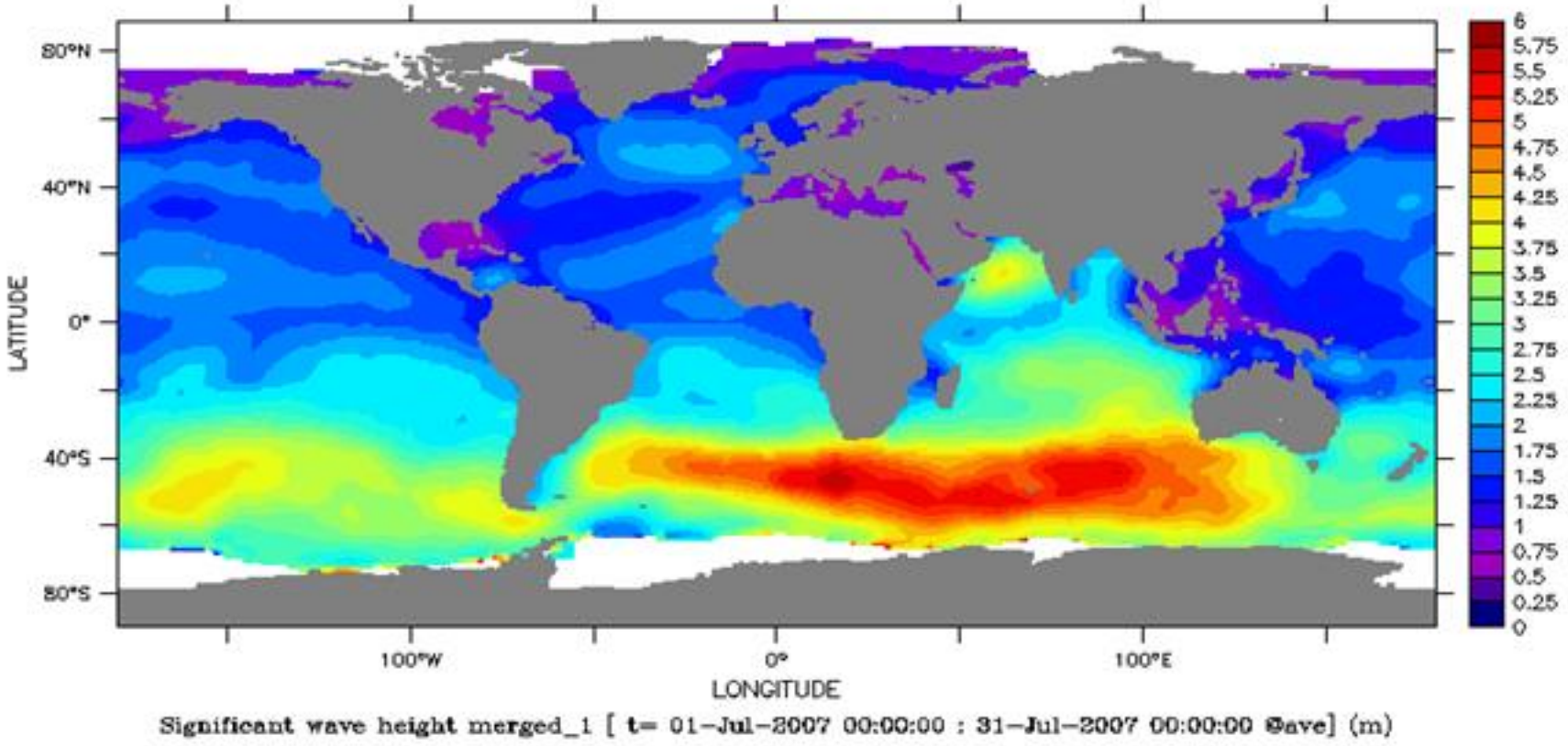
Ice mapping – active remote sensing

RADARSAT-1 provided routine surveillance of the entire Arctic region. This helped to track sea ice distribution, identify various types of ice, and produce daily ice charts.



Canadian Space Agency

Wave height and wind speed



Source CNES
http://smsc.cnes.fr/IcJASON3/haut_moy_vaguesp.png:

http://marine.copernicus.eu/web/111-about-copernicus.php