LAND MARINE ATMOSPHERE EMERGENCY MANAGEMENT CLIMATE CHANGE SECURITY

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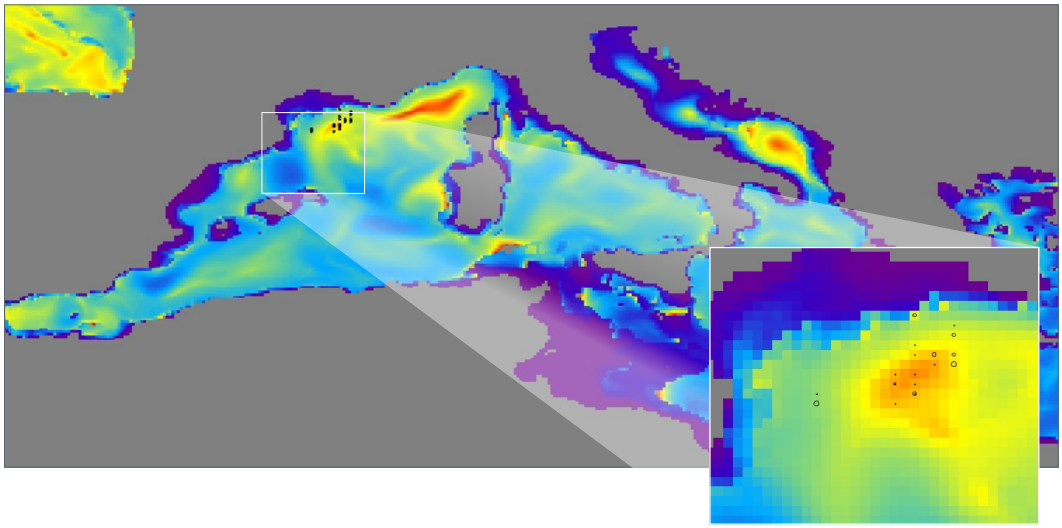
SATELLITES SUPPORT SUSTAINABLE FISHING

Fish is one of the world's most important sources of food. However, our seas are threatened by increasing pressure on fish stocks, illegal unreported and unregulated fishing activities, pollution and changing habitats. For example, it is estimated that one third of North Atlantic stocks are now overfished. With the objective of making fishing in Europe environmentally and economically sustainable, the EU Common Fishery Policy is evolving towards an ecosystem approach that must be supported by reliable scientific data on available fish stocks and marine habitats. Adequate monitoring services are therefore needed, together with bio-geophysical models capable of supporting assessment analyses for fish stock management practices.

Copernicus provides frequently updated global data for satellite-based services to protect the marine environment and sustainable fishery policies.

Numerical models can effectively support decision-making for fishery and environmental policies, assessing the status of fish stocks and habitats. However, a huge number of parameters must be taken into account, from habitat conditions favourable for feeding and spawning for different fish species, to population dynamics and their relationship with prey, to the effects of climate variability and fishing practices. Satellites cannot observe fish stocks directly but provide key inputs for marine ecosystem models. For instance, geophysical parameters such as sea-surface temperature, ocean colour and ocean currents allow plankton and micronekton concentrations to be derived, which can then be related to the likely health of different fish stocks. In addition, radar imagery can support the detection of illegal, unlicensed and unreported fishing activities.



The image shows conditions for Bluefin tuna feeding, ranging from unfavourable (blue) to favourable (red) in the Mediterranean Sea as predicted by an ocean ecosystem and fish population model for the week centred on 16 October 2002. The model uses satellite data as well as data from an operational ocean model. The zoom shows the Gulf of Lyon, where schools of juvenile Bluefin tuna (circles) were identified from aerial surveys in the same week. Historical data and simulations are used to validate the modelling approach. It is expected that such products could be used in the future for monitoring of stocks and fisheries.

Source: CLS/Green Mercator Consortium/MyOcean

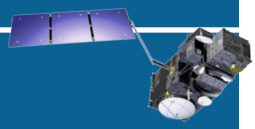
Facts

> On average, each European citizen consumes around 20 kg of fish products per year

> Yielding some 6.4 million tonnes of fish every year, the EU fishing industry is the fourth largest in the world

> Fishing and fish processing provide jobs for more than 350 000 people in Europe

> Currently, one third of assessed fish stocks are overfished, such as bluefin tuna and Atlantic cod



Benefits

Satellites contribute to sustainable fishing by providing:

> continued and global monitoring of the marine environment

> key inputs for fish stock numerical modelling

> wide area surveillance capabilities for the detection of illegal, unreported and undetected fishing activities

Policy Objectives

> Common Fisheries Policy

> European Neighbourhood Policy

> Integrated Maritime Policy

> Habitats and Birds Directive

> EU Water Framework Directive

> Integrated Coastal Zone Management

Copernicus services

The Copernicus Marine Monitoring Service makes use of satellite data to provide regular and systematic reference information about the state of the oceans and European seas, thereby supporting marine applications such as the protection and the sustainable management of living marine resources including aquaculture and fisheries.

Example products:

> Bio-geochemical analysis and forecast for global and regional seas

> Other geophysical parameters including sea-surface temperature and ocean currents

Sentinel contribution

The Copernicus Sentinel-1 and -3 missions will support sustainable fishing by providing:

> global coverage and short revisit time for wide area surveillance and control for enhanced fisheries protection (Sentinel-1)

> global sea-surface temperatures to an accuracy of better than 0.3 K (Sentinel-3)

> accurate ocean colour mapping such as concentrations of chlorophyll and suspended sediments (Sentinel-3)

> ocean wind-field speeds (Sentinel-1)

> precise measurements of sea-surface height (Sentinel-3)

Next steps

> Improve understanding of fish stock resilience and vulnerability to natural and anthropogenic factors (e.g. climatic versus over-fishing effects)

> Widen area surveillance and control of marine resources in Member State Exclusive Economic Zones for enhanced fisheries protection and detection of Illegal, Unreported, and Unregulated (IUU) Fishing and supporting activity (e.g. refueling or catch transfer)

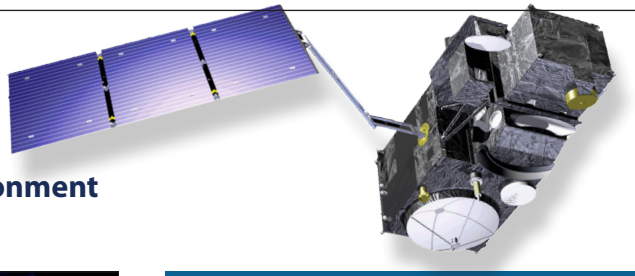
> Improve satellite-based bio-geochemistry products (e.g. primary production and dissolved oxygen)

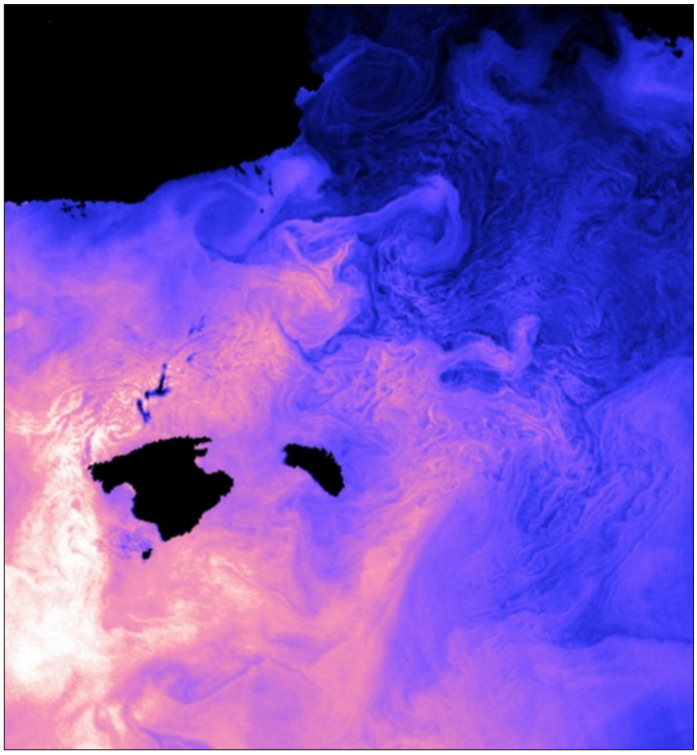
> Improve coupling of dynamical models with satellite-based and in situ observations

> Support the integration of satellite-based data in the practices of monitoring and policy enforcement centres

Sentinel-3

Benefiting services for the marine environment and resources





The forthcoming Sentinel-3 mission will support fish ecosystem monitoring by providing global, continuous, timely and accurate observations of various oceanic geophysical parameters including sea-surface topography, sea surface temperature and ocean colour.

A Sea and Land Surface Temperature Radiometer (SLSTR) will be used to determine global sea surface temperatures to an accuracy of better than 0.3 K. Ocean colour will be measured with unprecedented detail with the Ocean and Land Colour Instrument (OLCI). The advanced Synthetic Aperture Radar Altimeter (SRAL) will provide precise measurements of sea surface height, which are essential for ocean forecasting systems and climate monitoring.

The first Sentinel-3 satellite will be ready for launch in 2014, followed by a second satellite to provide the required level of coverage for Copernicus services.

An image of the waters around Spain's Balearic Islands in the western Mediterranean Sea showing differences in sea surface temperatures captured by Envisat's Advanced Along Track Scanning Radiometer (AATSR). Envisat's AATSR was a precursor of the SLSTR to be carried on the upcoming Sentinel-3 satellite.

Source: ESA