

Core Information Service: Land Carbon

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- » Monitoring of terrestrial biospheric fluxes of carbon and water at the global scale
- » Full use of observations in a land data assimilation system
- » Link to the GMES Atmospheric Core Service

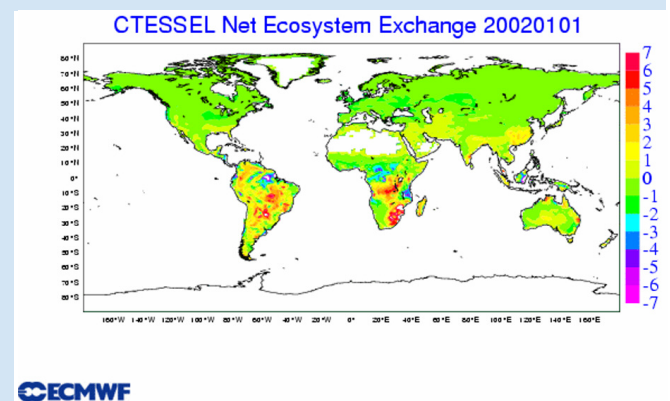
Service Objective

Parties to the UN Convention on Climate Change must deliver annual greenhouse gas inventories from 1990 onwards. Several articles of the Kyoto Protocol concern land use, land-use change and forestry activities. The land surface models used in climate models and the data assimilation techniques used in meteorology have the potential to assess the impact of weather and climate variability on terrestrial biospheric carbon fluxes.

Developing a land data assimilation system permits to make full use of satellite and in-situ observations as well as to monitor the global terrestrial carbon fluxes in the context of international conventions (e.g. to support reporting obligations in the course of the Kyoto Protocol). Pre-operational infrastructures need to be implemented in order to provide global products, both in near-real-time (NRT) and off-line modes.

Service Description

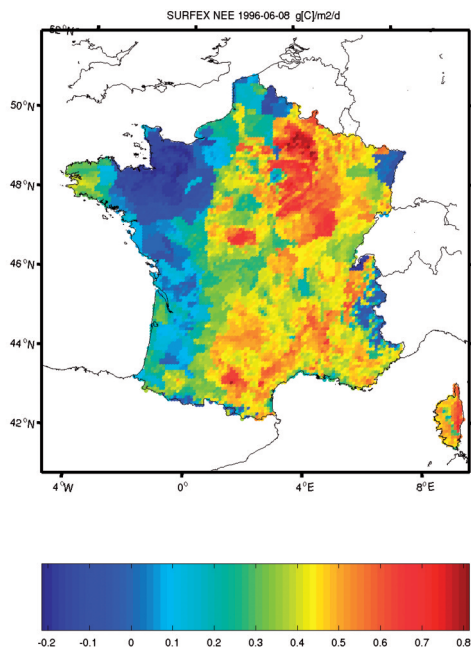
The Land Carbon Core Information Service aims to set up pre-operational infrastructures for providing global and regional (France, Hungary, the Netherlands) variables related to the terrestrial carbon cycle, in NRT, for describing the continental vegetation state (leaf area index and biomass), the surface fluxes (carbon and water), and the associated soil moisture. These variables are produced daily by models able to assimilate satellite data. This land data assimilation system is being implemented gradually. Past time series of observations, associated to atmospheric re-analysis, serve as a reference climatology for the NRT products. Combining these bottom-up to the top-down carbon flux estimates (the latter are produced by the GMES atmospheric service) reduce the uncertainties in the quantification of terrestrial biospheric sinks and sources of carbon.



CTESSEL, the land surface model of ECMWF - Simulation of the net carbon flux for 1 January 2002 (positive values are for net uptake of carbon)

Users

The greenhouse component of the atmospheric GMES service is a key user of Land Carbon Services. The scientific carbon community requires accurate terrestrial biospheric variables. Finally, in the context of the UNFCCC (United Nations Framework Convention on Climate Change) and Kyoto Protocol inventory system of the European Commission, the Joint Research Centre (JRC) has a dedicated responsibility for the sectors Agriculture and Forestry.



SURFEX, the land surface model of Météo-France - Simulation of the net carbon flux for 8 June 1996 (positive values are for net uptake of carbon)

Benefits

The Land Carbon Service permits to

- Capitalise on existing tools/expertise of European meteorological services;
- Map biospheric variables across spatial and temporal scales;
- Evaluate and reduce uncertainties;
- Implement a verification approach based on insitu observations.

Outlook

The ECMWF (European Centre for Medium-Range Weather Forecasts) re-analyses (ERA-40, ERA-Interim), provide an extensive set of products in support for IPCC. Future ECMWF re-analyses will benefit from the modelling activities of the Land Carbon Service for producing more accurate quantitative estimates and trends for relevant climate change variables. Regional, high resolution re-analyses over Europe will develop and allow downscaling over Europe as a whole.

| | Leaf Area Index | Root-zone soil moisture | Terrestrial biospheric CO ₂ flux | Water flux | Vegetation | Carbon storage |
|--------------------|--|-------------------------|---|------------|------------|----------------|
| Spatial Coverage | Global (and downscaling over France, Hungary, the Netherlands) | | | | | |
| Spatial Resolution | 16 km (and better over France, Hungary, the Netherlands) | | | | | |
| Sampling Time | Daily | | | | | |
| Timeliness | 1 day to 1 month | | | | | |

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