Monitoring soil and vegetation fluxes of carbon and water at the global scale: the land carbon core information service of GEOLAND2

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This activity of the FP7 GEOLAND2 project (2008-2012) aimed at setting-up pre-operational infrastructures for providing regional and global variables related to the terrestrial carbon cycle, in near real time. In particular, the continental vegetation state (LAI), the surface fluxes (carbon and water), and the associated soil moisture were considered. These variables are now produced daily by land surface models (LSM) able to assimilate satellite data, at the global scale (16km x 16km), and at the regional scale (8km x 8km) over test European countries (France, Hungary, the Netherlands). Methodologies to integrate remotely sensed biophysical variables into LSM were developed: Land Data Assimilation Systems (LDAS) were built using the European meteorological modeling infrastructure. Both water and carbon terrestrial cycles required a similar data assimilation approach in which a LSM was constrained by as many relevant data as possible. Indeed, water and carbon cycles are closely linked and we built integrated LDAS which include all the processes. The advantage was that consistency could be achieved across a range of products based on satellite data. The modeling and data assimilation works were associated to a verification component based on in situ observations. A link was made to the atmosphere component of GMES (the MACC2 project) using the existing infrastructure/tools developed by ECMWF. Leaf area index and surface soil moisture products derived from SPOT/VGT and from ASCAT, respectively, were used to analyze the vegetation biomass and the root-zone soil moisture. Finally, this work contributed to the specification and to the assessment of the GEOLAND2 global biophysical variable products. The products and the product access are described in a Product User Manual document, available on the GEOLAND2 data portal.
The model integration into the operational ECMWF Integrated Forecasting System is described in Boussetta et al. 2012 (http://www.ecmwf.int/publications/library/ecpublications/_pdf/tm/601-700/tm675.pdf).

Figure 1 - First operational global analysis of the Net Ecosystem Exchange of CO2 in the ECMWF Integrated Forecasting System (16 November 2011).