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Integrated Carbon Observation System

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ICOS is a recently-launched, world-class research infrastructure dedicated to the monitoring and improved understanding of carbon sources and sinks. It consists of complementary, harmonized networks of long-term monitoring stations focusing on Europe and adjacent regions. The ICOS networks will comprise about 40 operational atmospheric stations (measuring atmospheric composition in greenhouse gases and other core parameters), ca. 30 ecosystem stations (measuring fluxes to and from ecosystems) and about 25 oceanic measurement platforms (including fixed time series stations, repeat hydrographic sections and voluntary observing ships). The station networks are expected to be operational in 2014. The networks will be coordinated through a set of central facilities: three Thematic Centres respectively for atmospheric, ecosystem and ocean data, and a Central Analytical Laboratory. The mission of the Thematic Centres is to process, validate and distribute data to end-users. ICOS will also set up a Carbon Portal dedicated to easy discovery of and access to data and elaborated products such as flux maps by end users.

Through its Preparatory Phase Project (funded by the EU through FP7) ICOS is currently demonstrating its capability to monitor greenhouse gases across Europe at four atmospheric sites and four ecosystem sites, working in near real time with the Atmospheric and Ecosystem Thematic Centres. At this occasion, the instrumental packages, the experimental set up as well as protocols prepared for the standardized ICOS stations are tested.

ICOS atmospheric measurements, in combination with a dedicated modelling framework, will allow estimating daily fluxes at a typical resolution of 50 km with a precision of $\sim$40 gC m-2 yr-1. The ecosystem network informs on the small scale variability of fluxes and its drivers. When completed, ICOS will provide the essential long-term observations required to understand the present state and predict future behaviour of the global carbon cycle and greenhouse gases emissions. ICOS will notably provide key data for the monitoring and assessment of the impact of carbon sequestration and/or greenhouse gases emission reduction activities on global atmospheric composition levels.