The GEO Carbon Cycle and Greenhouse Gas Flagship: a new initiative toward a policy relevant global carbon observing and analysis system

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The budgets of carbon and other greenhouse gases (GHGs) still carry many uncertainties that make evaluating the success of climate change mitigation and adaptation strategies difficult. Improvements in long-term, high quality observing systems within and across the atmospheric, oceanic, terrestrial, and human domains are required to quantify GHG sources and sinks, to understand changes in the carbon cycle and hence the climate system, and to address society's efforts to mitigate and adapt to climate change. Many observing efforts and initiatives are currently in place at global and regional levels, but what is needed is a global coordinating mechanism to provide useful and comparable information to resource managers and policy makers.

A global initiative, the *GEO-Carbon Cycle and GHG Flagship*, is proposed in the framework of GEO to promote interoperability and provide integration across the different parts of the system, particularly at the interfaces of the different domains. The intention is neither to rewrite new strategies nor duplicate existing efforts, but instead to build on existing initiatives and networks, ensure their continuity and coherence, and fill in the missing pieces to obtain a comprehensive, globally coordinated, carbon observation and analysis system. The GEO-Carbon Flagship shall address policy agendas and will operate as a common and open platform to plan and implement strategies and joint activities at the global level from science to policy.

The main aim of the Flagship is to develop an independent system for monitoring and evaluating changes in the carbon cycle and GHG emissions as they relate to human activities and climate change, and to provide decision makers with timely and reliable policy-relevant information, recommendations, and services. Such services would include physical information, such as changes in distributions and fluxes, but also cost-estimates and evaluations of social impacts associated with emissions reduction, land-change, or ocean management efforts.

Among the first activities will be identification of users and needs, along with an analysis of knowledge gaps, how such gaps can be addressed effectively, and how the existing networks and observing approaches can be reconciled and used more effectively.