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The Continental-Scale Greenhouse Gas Balance of Europe

 Springer

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Preface

The human interference with the climate system, the perturbation of the carbon cycle through massive release of greenhouse gases, caused by fossil fuel burning and land-use change, is threatening society and represents a key challenge for research and policies in the twenty-first century. Growing evidence of human-induced climate change has raised public concern calling for urgent international policy actions. Initiatives culminated in the establishment of the United Nations Framework Convention for Climate Change (UNFCCC) and the Kyoto Protocol (1997), where Parties for the first time agreed on legally binding commitments to reduce greenhouse gas emissions. It is worth noting that the unfinished ‘sink’ business, the Articles in the Kyoto Protocol dealing with terrestrial biospheric carbon dioxide sources and sinks, gave carbon cycle research a real boost. In the 1990s, the regional carbon balance and how the different ecosystems contribute at different timescales under different environmental conditions were hardly known.

During the fourth Framework Programme (1994–1998), the European Union supported more than 20 research projects studying the components of the carbon cycle. These projects provided a solid basis for a more integrated attempt to tackle the research challenges and demands imposed by the Kyoto Protocol at European scale.

Both the European Commission and the scientific community felt that it was time to develop an integrated carbon cycle research programme taking the new challenges on board. Since an international science plan was lacking, the European Commission initiated an international workshop in Orvieto, 24 June 1998, in order to discuss the current status of research and find ways to overcome the European research fragmentation in this area. The CarboEurope idea was then presented for the first time.

The fifth Framework Programme (FP5, 1998–2002), Key Action: ‘Global Change, Climate and Biodiversity’, was focusing on applied research, with the specific aim to support the implementation of international conventions. Naturally, carbon cycle research received high priority. During the lifetime of FP5, the CarboEurope concept was implemented through a cluster of research projects, and also became a blueprint for other regional carbon programmes of the International Global Carbon Project (GCP).

During the sixth Framework Programme (2002–2006), and within the context of the European Research Area, a higher level of integration was achieved through the utilisation of specially designed funding instruments such as Integrated Projects (IP). This new funding instrument allowed the creation of large-scale consortia targeting research questions of strategic nature over periods of 5 years, the original concept now being implemented through the CarboEurope-IP.

The CARBOEUROPE-IP (2004–2008) brings together more than 60 research institutes and universities with the objective to assess the European Terrestrial Carbon Balance. The implementation of dual constrain concept (bottom–up, top–down) and the integration of long-term observations at different scales through modelling, followed over the past years, proved to be of great value for understanding and verifying sources and sinks at regional and continental scales. As a result, Europe has currently the densest and best integrated research network of in situ observations of ecosystem carbon and nitrogen fluxes and trace gas concentrations. These observations have discovered surprises in the ecosystem functioning and response to climate-related extremes and helped the further development of complex models. They also show that both scientific and societal questions about the carbon cycle can only be resolved by an integrated approach combining modelling with sustained long-term observations of key carbon variables. In the context of the seventh Framework Programme (2007–2013), integrated research on carbon cycle remains one of the key priorities under the Environment Programme.

We congratulate the authors for the present publication which provides an integrated assessment of our current capacity to observe the continental carbon cycle, understand the processes and quantify the uncertainties involved. It provides, with no doubt, a valuable contribution to the important ongoing scientific debate on carbon cycle and climate change.

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