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TELLUS

Foreword

High latitude ecosystems are identified to be susceptible to climatic change and through several processes tightly connected to both the regional and global climate system. In many parts of the world these 'high latitude ecosystems' are located far away from universities and research institutes making long-term research extremely difficult. The Nordic countries represent an exception in this respect with a number of high quality research facilities with easy access to dominating and representative boreal and sub-Arctic ecosystems. This gives Nordic researchers an excellent opportunity to make important contributions to understanding the effect of climatic change on these ecosystems as well as the impact of the feedback on the climate by these ecosystems. The interaction between terrestrial ecosystems and the climate system is a central question in global climate change research. For instance, the exchange of greenhouse gases between the terrestrial surface and the atmosphere is strongly modified by the climate itself through different feedback and feed-forward mechanisms.

The Nordic ecosystems, in particular forests, wetlands and lakes, play a key role in exchanges of carbon dioxide and methane both at regional and global scale. There are large amounts of organic carbon stored in these ecosystems and concern has been expressed that the expected changes in climate could cause a decrease in today's sinks and even turn sinks into sources. It has, however, also been suggested that the possible rise in temperature could increase mineralization in forest soils and, thus, increase productivity which in turn would lead to more carbon uptake and increasing sink strength. In addition to temperature increase, elevated UV-B radiation and atmospheric ozone concentration are suspected to affect the northern ecosystems, which would change the carbon dynamics and, thus, the atmospheric impact of the terrestrial ecosystems. Another important question in the context of international agreements, in particular the Kyoto protocol, is how large the sink is in specific ecosystems and how this sink varies between years and with external factors.

In order to try to answer some of the questions raised above, the Nordic Centre for Studies of Ecosystem Carbon Exchange and Its Interactions With the Climate System (NECC) started its activities 1 January 2003. It is a virtual Centre consisting of fourteen research teams in the Nordic countries Sweden, Denmark, Finland and Iceland. The NECC is funded jointly by a number of Nordic research organizations under a so-called 'Centers of Excellence (NCoEs) programme'; in this case with focus on climate change research. The work has included co-operation with another NCoE project, BACCI which is devoted to atmospheric aerosol research. The funding period is time limited and ends by 31, December 2007.

One of the key elements of the NECC is to utilize the existing network of CO_2 and CH_4 flux measurement sites in the Nordic region. The high time resolution (half-hourly) data provided by eddy correlation and smaller scale chamber measurements are very valuable for analysis of how the different systems function with respect to climatic variables and other external factors. There are more than twenty sites equipped with eddy covariance systems for flux measurements covering all of the dominating ecosystems in the Nordic region including forests, agriculture, lakes, wetlands and urban sites. Data are presented and exchanged through an interactive database, which is located at the web site of the NECC (www.necc.nu). The papers published in this issue of *Tellus B* is part of an effort to synthesize the results from the many studies that have been going on within the NECC. A second set of papers will appear in a forthcoming issues of *Tellus B* in the beginning of 2008.

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