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FOREWORD

6th International CO_2 Conference, Sendai, Japan, 1–5 October 2001

The Sixth International Carbon Dioxide Conference was held on October 1–5, 2001, in Sendai, Japan, hosted by Tohoku University, Sendai. Approximately 300 papers were presented at the conference in oral form and as posters by participants from 26 countries. A subset of the presentations has been submitted and reviewed for publication in Tellus, and is published in this special issue on the global carbon cycle. These carbon dioxide conferences are held every four years, and cover a wide range of issues related to the fate of anthropogenic emissions of carbon dioxide, the cycling of carbon through the earth's system, and how the carbon cycle is affected by global environmental change as well as by direct human management of our natural resources. The carbon cycle straddles the boundaries of many scientific disciplines, and all carbon dioxide conferences have reflected that fact. Observations of the atmosphere, oceans, ecosystems, and ice cores were presented, new observational techniques, as well as studies using process models in each of these realms, and inverse models that infer patterns of surface sources from observed concentration patterns. Especially the inverse approach is undergoing rapid development.

This special issue presents progress made during the last few years. Many interesting findings, hypotheses and conclusions are presented, but it is also clear that there are still important issues that have not yet been definitively, or some of them not even provisionally, resolved. Examples are the magnitude, location, and processes driving the large sink of carbon into terrestrial ecosystems in the northern hemisphere, the magnitude of the carbon sink into the southern oceans, the possible adjustments of the earth's carbon cycle to a changing climate. A different climate is likely to affect the functioning of ecological systems as well as the physical circulation of the oceans and atmosphere. All of these uncertainties affect our ability to adopt effective measures that would temper the rate of growth of atmospheric carbon dioxide and its increasing influence on the radiation balance of the earth. Historically the investment in carbon cycle science by society has been small. A significant expansion appears to be necessary to produce results in the next 5–10 years that are both robust and specific enough to support optimal policy decisions aimed at slowing down the increasing anthropogenic forcing of the earth's climate.

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