Preface

A better understanding of the global carbon cycle is of central importance in predicting global change, in particular the impact of increasing fossil fuel use and deforestation on the atmospheric CO_2 concentration. During the last 10 years, scientists from all over the world have periodically met to discuss recent development in the field of the global carbon cycle. This special issue is dedicated to the contributions presented at the *Third International Conference on Analysis and Evaluation of Atmospheric CO_2 Data, Present and Past*, which was held at Hinterzarten, Germany, 16–20 October 1989. At this conference, 83 papers were presented on the following main subjects (Extended Abstracts of all contributions have been printed as WMO-Report No. 59, 1989).

- Atmospheric observations and analyses of the global CO_2 concentration distribution and its isotopic abundances.
- Terrestrial biospheric carbon exchange rates and feedback mechanisms.
- Observations of the oceanic pCO_2, the air-sea gas exchange rate as well as of the marine biota.
- Measurements from ice cores, sediments, and tree rings providing information on past global changes.
- Atmosphere, terrestrial biosphere and ocean modelling of the present state as well as of past and future perturbations.

One of the most striking conclusions of the discussions was that there still remains large uncertainties about the relative amount of anthropogenic CO_2 being taken up by the oceans and by the terrestrial ecosystems, respectively. These uncertainties are of the order of 30% of the recent fossil fuel CO_2 input into the atmosphere. To address this problem, the currently operating atmospheric CO_2 monitoring network (up to now mainly designed to monitor global oceanic background conditions) has to be expanded to include continental sites. In addition, a global coverage of pCO_2 and ΣCO_2 measurements in the world oceans, in combination with remote sensing of the global wind distribution, would be essential in solving the question.

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