

Preface

The book is organized for our better understanding of the biogeochemical processes on land and in the ocean, which regulate the carbon cycle and closely related global climate. It is associated with the international workshop, which was held on 19, 20 and 21st, January, 2004 at Tsukuba, Japan to present the results obtained under the GCMAPS (Global Carbon Cycle and Related Mapping Based on Satellite Imagery) program and to discuss further work in future with invited speakers.

A team of scientists under the GCMAPS program has been monitoring climate change by developing several techniques and parameters. The experience and knowledge gained during the program have been documented in this book. Preliminary interpretation of the data obtained so far shows that various drastic changes have been taking place on our planet. Above all, global warming, which causes temperature and sea level rise, and also changes in climate and ecosystems, is likely to have the largest influence on mankind. One of the major substances which cause global warming is carbon, especially in the form of carbon dioxide gas. At present, clarifying the actual state of various forms of carbon on the earth surface has become increasingly important and urgent issue internationally.

The keyword for clarifying actual status of carbon cycle is “Primary productivity”. Photosynthesis in big forests leads to absorption of plenty of carbon dioxide. On the other hand, the oceans cover about 70% of the earth surface, and numerous phytoplankton that live there also absorb a lot of carbon dioxide into their tiny bodies. So estimating primary production is very important when clarifying carbon cycle on the earth. We have created a database on the global scale and have started global mapping of carbon.

What is now attracting the most attention to grasp the primary productivity is the Earth Observation Satellites (EOS) which are loaded with new generation high-accuracy sensors. Several EOS satellites like the ADEOS (1996–1997) and the ADEOS 2 (since 2002) of Japan, the Sea Star (since 1997) and the Terra (since 2000) of the U.S.A. have been launched. Observation by satellite sensors makes not only global mapping of primary production possible but also acquisition of time series data due to repeated measurements, because they return to the same place in 3 to 4 days. In order to verify the global map, field observation and research are indispensable both on land and in the ocean. Validation was made in the western Pacific and adjacent countries.

The GCMAPS program is concerned with marine and terrestrial environmental changes, which affect carbon cycle on the regional and global scales. Especially ENSO is one of the most important cyclic climatic fluctuation on the earth. The topics discussed at the international workshop included 1) Global mapping of

primary production, 2) Carbon cycle in the equatorial Pacific in response to ENSO cycle, 3) Terrestrial carbon cycle, and 4) Future perspective. These important topics are included in this book.

Editors-in-Chief
Masae Shiyomi and Hodaka Kawahata