

Feasible Study for Integration and Chronological Quality Control of Ocean Carbon Dioxide and the Related Data

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Total Budget for FY2004 16,113,000Yen (FY2004; 16,113,000Yen)

Key Words Carbon Dioxide, Database, Ocean, Quality Control, Metadata

1. Introduction

It is a very important subject to elucidate carbon exchange between the ocean and the atmosphere in order to estimate concentration change of carbon dioxide in the atmosphere and to predict the climate change in connection with the global warming.

Many research institutes in Japan have measured the quantity of carbon dioxide in the ocean and the atmosphere. Almost all data has been distributed by each research institutes. However its precision and accuracy are not uniform because of difference between each observation techniques and advanced observation technique in recent years. A synthesis of long-term data set has been required for the long-term data analysis for prediction of global warming. However, it is difficult to make systematical use of carbon dioxide related data observed in ages by various methods.

For above reasons, it is urgently required to develop the chronological quality control of carbon dioxide related data to elucidate the long-term oceanic absorption mechanism of carbon dioxide efficiently and to establish the data management system (database) for effective data use.

2. Research Objective

In order to support the research activities on the long-term elucidation of the carbon dioxide absorption mechanism of the ocean, this research aims to examine the possibility of chronological quality control of the carbon dioxide related data categorized by metadata and to develop the metadata management system: expansion for existing database of inventories to database of whole metadata and supplement system for on-line input and edit of metadata.

3. Research Method and Results

(1) Collection of the Inventory Information and Metadata

For chronological quality control, metadata are required to sectionalize carbon dioxide data in ages. It's urgent that collection of metadata to prevent to be scattered and lost.

Metadata were collected from Hokkaido National Fisheries Research Institute, Japan Agency for Marine-Earth Science and Technology, etc.

(2) Development of the Metadatabase

Collected metadata were integrated to existing database of inventory. Database of inventory was expanded to database of whole metadata (metadatabase).

Recommendations of IOCCP (International Ocean Carbon Coordination Project) and PICES/WG13 (North Pacific Marine Science Organization Working Group 13) were adopted as items of metadata.

(3) Development of the System for On-line Input and Edit of Metadata

For immediate registration and easy correction by data originator, the System for On-line Input and Edit of Metadata was developed. Purpose-built software is not required. Users can add or modify entries to database by generic web browser.

(4) Investigation of the Calculation Methods of Inter-Observation Deviation

To examine possibility of chronological quality control, we evaluate the calculation methods of inter-observation deviation. Recent studies of these methods were indicative of the necessity and possibility of adjustment or selection based on the estimated deviation of data.

(5) Investigation of the Inter-database Metadata Sharing

For further development of metadatabase, the possibilities of seamless global searching of metadata were studied. The Mercury, a metadatabase operated by ORNL (Oak Ridge National Laboratory) is successful in ocean carbon dioxide related data. In this study, inter-database metadata sharing with the Mercury was examined and its requirements were studied.

4. Conclusion

We have established metadatabase and supplemental system for online input and edit of metadata (Fig. 1). This gives preparation to develop the chronological quality control method and contribution to promotion of mutual use of ocean carbon dioxide related data among researchers.

To develop chronological quality control of ocean carbon dioxide related data, we examined estimation methods of inter-observation deviation of chemical data in recent studies^(1,2). In the result, deviations that have roots in variety of methods of analysis and standard reagents were not negligible. And necessity of adjustment or selection based on

estimated deviation was confirmed.

For further development of metadata, the possibilities of seamless global searching of metadata were explored. In the result, the Mercury of ORNL is consistent with international standards and suitable for inter-database sharing of metadata. However, the Mercury requires using charged software for building of database.

The result of this research showed possibility and prepared to promote mutual use of the historical ocean carbon dioxide data between researchers in and outside the country and is contributed to long-term climate change prediction of global warming etc.

Consequently, we think this feasible study built up a solid basis for development of the chronological quality control of ocean carbon dioxide related data. Based on this result, we hope that this study is going further to develop distributions and applications of ocean carbon dioxide related data in the future.

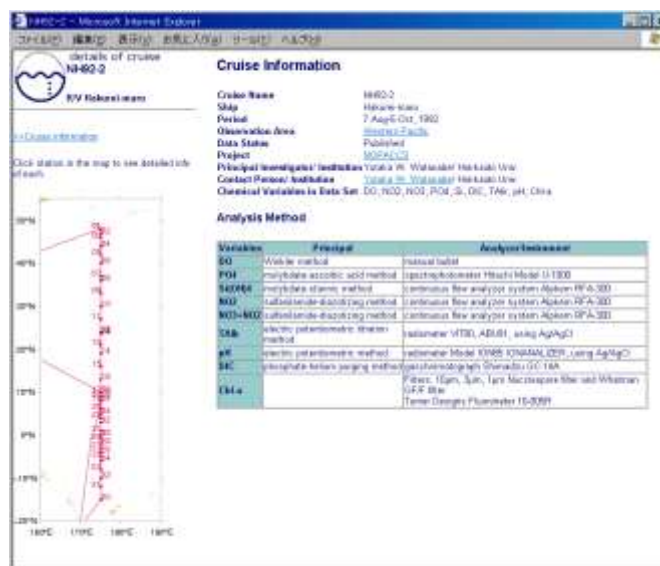


Fig. 1 Screenshot for a Metadata

Reference

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