

Abstract

Climate change is one of the biggest issues on the earth, and the research on the climate system has been paid much attention today. The behavior of carbon dioxide (CO₂), one of the major green house gases, and its related substances within and among the atmosphere, the ocean and the land biosphere is playing a key role in regulating the climate.

The ocean contains ca. 4×10^{19} g of carbon, which is about 50 times of that in the atmosphere. The change in carbon cycle in the ocean is considered to have a crucial impact on the concentration of CO₂ in the atmosphere. However, little has been quantitatively known about the variability of CO₂ in the ocean and its controlling physical, chemical and biological processes.

The observations of the concentration and carbon isotopic ratio of total dissolved inorganic carbon (TCO₂) in seawater occupy important part of the research on the behavior of carbon in the ocean. In the first part of this report, we describe the fundamental knowledge of CO₂ system in seawater and the method to precisely measure TCO₂ including sampling method, the structure and the operation of the instrument we developed, and the way to assure the quality of the data. We also present some results we obtained in the western North Pacific and the equatorial Pacific. In the second part, we report the methods to collect and treat samples for the analysis of the isotopic ratio of radio carbon (¹⁴C) in the atmospheric CO₂ and TCO₂ in sea water.