

DISTRIBUTION OF $p\text{CO}_2$, CARBON FLUX AND ITS MAIN DRIVING FORCES IN THE SOUTHERN OCEAN

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In order to get much more knowledge on carbon cycling in the Southern Ocean, we analyzed the data that collected from the Chinese Antarctic Research Expeditions (CHINARE), which including CHINARE-XVI (1999–2000), CHINARE-XIX (2002–2003), and CHINARE-XXI (2004–2005), by analyzing and comparing the $p\text{CO}_2$ along the tracks of the cruises by XUELONG as well as other relevant elements, the characteristic of distribution of $p\text{CO}_2$ and their main driving forces were discussed in the Southern Ocean and the carbon flux was also calculated. The partial pressure of CO_2 in the surface sea water ($p\text{CO}_2$) was continually measured by LiCor-6262 $\text{CO}_2/\text{H}_2\text{O}$ analyzer in R/V XUELONG along tracks of the cruise during CHINARE cruises, between Zhongshan Station and Great Wall Station and from December to January in the austral summer.

The Southern Ocean presented a very complicated behavior of distributions of partial pressure of CO_2 ($p\text{CO}_2$) with hydrology and biology, including many sub-systems and hydrological fronts, which appeared different distributions of $p\text{CO}_2$ greatly. In general, biological effects will become as a main driving force in the seasonal ice zone in austral summer, but in special regions the hydrological process would still be dominating. Calculated by the model of CO_2 flux, the observed area between 60°E and 80°W in the Southern Ocean, the average air-sea flux of CO_2 in summer (December and January) was $5.42 \text{ mmol}/(\text{m}^2 \cdot \text{d})$, thereinto, in January that with higher bio-production than those in December, the flux was accordingly higher, which reflect the effect of high production on the carbon flux in the Southern Ocean. (NSFC Grants (40276001), Fujian Youth Technological Creation Grant (2004J056), Fujian Natural Science Foundation Grant (Z0513027) and TIOSOA Foundation Grant)