Southern Ocean FCO2 trend south of Tasmania

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Résumé

Climate change is affecting the entire globe. In the Southern Ocean, changes in sea surface temperature and sea ice formation are some examples of the impact of the increase in atmospheric CO2 is causing. These changes can directly affect the sea-air CO2 flux as CO2 (FCO2) has important thermodynamic conditions. Moreover, the Southern Ocean is a highly dynamic ocean. Therefore, assessing what is its normal variability and what can be considered as a trend is very important to determine the real impact of climate change in this region. The study region of MINERVE project comprises the open ocean region between Hobart, Tasmania, (43∘S) and Terre-Adèlie, Antarctic, (65∘S), and has the goal of understand the variability of FCO2. In this region, the Polar Front (around 60.5∘S) separates the Subantarctic region (SAR) from the Antarctic zone (AZ). This work analyzed the annual means of FCO2 from 2009 to 2013, considering the sea surface and atmospheric CO2 partial pressure, and wind speed collected during the oceanographic cruises on board of R/V Astrolabe. The velocity transfer rate used was from Takahashi et al. (2014). Results show that CO2 uptake decreased from 2009 to 2013, with mean ± standard deviation FCO2 (mmol CO2 m-2 d-1) of -18.8 ± 33.2 and -6.0 ± 17.7, respectively. When considering the subregions, FCO2 was, in general, more intense in SAR than AZ, with respective averages of -18.6 ± 26.1 and -9.3 ± 11.8 (SAR), and -37.9 ± 43.3 and -9.0 ± 10.8 (AZ) for 2009 and 2013. All years were significantly different from each other, except between years 2009 and 2010 for SAR. The year of 2011 seems to have been atypical, with low and high FCO2 peaks for SAR and AZ, respectively. The next step will be to increase the temporal scale to better comprehend this FCO2 trend.

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