Geophysical Research Abstracts
Vol. 17, EGU2015-15631, 2015
EGU General Assembly 2015

The coupling of MPI HAMOCC module with LASG/IAP OGCM

Xiaolong Chen (1,3), Katharina Six (2), Tatiana Ilyina (2), Tianjun Zhou (1,4)

(1) LASG, Institute of Atmospheric Physics, Chinese Academy of Sciences, Beijing 100029, China, (2) Max Plank Institute for Meteorology, Hamburg, Germany, (3) University of the Chinese Academy of Sciences, Beijing 100049, China, (4) Climate Change Research Center, Chinese Academy of Sciences, Beijing 100029, China

The ocean carbon cycle (OCC) plays a critical role in the exchange of CO_2 between the atmospheric and oceanic reservoirs. Large uncertainties in modeling the OCC have been observed. To identify how much the uncertainties come from physical circulation, we need compare the same OCC model in differently structured physical ocean models. After it has been applied in two ocean models (MPIOM and MICOM), the Hamburg Ocean Carbon Cycle Model (HAMOCC) of the MPI-M is newly implemented into another ocean general circulation model LICOM developed by the LASG/IAP. After over 2000-year spin-up run, the new model can reproduce realistic surface distributions of carbonate and nutrients at the global scale. The pattern correlation coefficients of dissolved inorganic carbon, total alkalinity, phosphate and nitrate at the ocean surface exceed 0.9. However, the concentration of nutrients in the high latitudes is severely underestimated. The deficient nutrients correspond to the disappearance of active biological production in the North Pacific, North Atlantic and Southern Ocean. The weak production results in less organic matter remineralized and accumulated in the ocean interior. This can explain the low concentration of carbonate and nutrients in the intermediate and deep water. The bias patterns of the nutrients are consistent with those for the oxygen in different ocean basins. The weak ventilation in the Southern Ocean that is observed in the salinity bias also partly contributes to the low concentration of carbonate and nutrients in the intermediate water. In general, the simulation of nutrient distribution and related biological processes in the high latitude needs to be improved in the new OCC model.