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The historical global carbon cycle simulation of FIO-ESM

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The earth system model FIO-ESM includes the ocean surface wave model besides the atmosphere, ocean, land and ice components, and is coupled with the fully global carbon cycle process and its interactions with the climate system. The historical simulation of the global carbon cycle is following the CMIP5 (Climate Model Inter-comparison Project phase 5) long-term experiments design and the simulation results are used to evaluate the performance of the model including the atmosphere, ocean, land surface and biogeochemical process of ocean and terrestrial ecosystem. The atmospheric bottom CO_2 concentration is reasonably reproduced based on the atmospheric CO_2 transport equation, the historical anthropogenic emission data and the simulated air-sea and land-sea CO_2 exchange. The variation of the surface air temperature is also reasonably simulated by the model. Model results of other climate and biogeochemical processes variables including the air-sea CO_2 flux, Dissolved Inorganic Carbon and alkalinity in the ocean, leaf area index and gross primary production of the land and so on are also agree with the historical observation. Then the absorption and transportation of the oceanic anthropogenic carbon under the changing climate are further analyzed.