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Closing the carbon cycle in the EC EARTH earth system model

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A closed carbon cycle, i.e. the exchange of carbon fluxes between the terrestrial and marine carbon reservoirs (living biomass, soil carbon, sediments etc) via the atmosphere is essential for state of the art earth system models and it will become more and more important in the framework of the Coupled Model Intercomparison Project (CMIP). It is also a prerequisite for simulating the atmospheric pCO_2 in a fully prognostic mode and thus, for the realistic simulation of the important feedback of the carbon cycle to the predicted future climate change. The main challenges of this work are two fold: It requires close cooperation between physical oceanographers, meteorologists and biogeochemists. Moreover, especially the marine carbon cycle has very long internal time scales which demand for long spinup phases. The work presented here is the result of the joined efforts of the Meteorological Institute University of Stockholm, the Rossby Center for Climatic Research and the oceanographic department of the Swedish Meteorological and Hydrological Institute (SMHI), and the University of Lund. We here introduce our basic strategy for the implementation of the marine biogeochemistry model PISCES into EC Earth and first results for the marine carbon cycle model PISCES are presented.