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Uptake of anthropogenic CO_2 in the Bern3D ocean model

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We investigate the uptake of anthropogenic carbon simulated with the Bern3D ocean model (Müller et al., Journal of Climate, 2005, submitted) regionally. The Bern3D model is a computationally-efficient, 3-dimensional coarse resolution ocean model. Atmospheric CO_2 concentrations are prescribed from ice core measurements and direct atmospheric observations throughout the runs. In a first step, anthropogenic CO_2 uptake is modeled following the perturbation approach by Sarmiento et al. (Journal of Geophysical Research,1992), thereby assuming steady state conditions for ocean circulation and ocean biogeochemistry. We compare our forward model results from an ocean inversion technique that estimates regional anthropogenic CO_2 fluxes from observations of DIC and other tracers and OGCMs (Mikaloff Fletcher et al., GBC, 2006, in press). Our results from both approaches (ocean inversion and forward simulation) match the observation based estimates quite well, despite the coarse resolution of the Bern3D ocean model.