



The Importance of Oceanic Vertical Mixing on the Glacial-Interglacial Atmospheric Carbondioxide Concentrations

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A global Earth System Model with an active ecosystem model is used to investigate the importance of oceanic vertical mixing on changes in ocean-atmosphere carbon fluxes and climate due to changes in solar insolation using two setups: one with a fixed vertical background and enhanced bottom diffusivity in the ocean and one with a numerical scheme that evaluates vertical diffusion from internal wave energy and stratification. In both setups, a pre-industrial simulation is compared to one with solar forcing comparable to that 115 kyr ago. Using a more realistic mixing scheme rather than a fixed background diffusivity gives rise to changes in the atmospheric CO₂ concentration of up to 5 ppm and causes changes in spatial outgassing patterns as a result of changed solar forcing. Implications are also found in sea ice extent as well as in ocean circulation with a more unstable AMOC in the case of an energetically consistent mixing parameterization.