

Circulation and CO₂ impact on Paleocene oxygenation

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The Late Paleocene is a period of interest for understanding the impact of background conditions on the ocean's response to climate perturbations, such as the Paleocene-Eocene Thermal Maximum (PETM; ~56 Ma). The PETM experienced widespread deoxygenation, but it was less severe than Cretaceous Oceanic Anoxic Events and questions remain regarding the role of paleogeography and climate states in causing this difference. We will present results from simulations for the Paleocene (~60Ma) using IPSL-CM5A2, and its biogeochemical component model PISCES. Specifically, we conducted experiments with 2× (i.e. 560 ppm; base simulation) and 4× (i.e. 1120 ppm) pre-industrial atmospheric CO₂ concentrations, as well as a 2× simulation with a closed Tasman Gateway. Increased CO₂ and a closed Tasman Gateway affect deep-water formation and result in increased deoxygenation in intermediate and deep waters for the sensitivity runs. Generally, however, the percentage of anoxic/hypoxic ocean volume is lower for the Paleocene ocean than for Oceanic Anoxic Event 2 simulations using the same model.