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Bridging the model-data divide: Use of sediment core modeling in interpreting the marine geologic record

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With the advent of computationally fast 'intermediate complexity' model representations of the Earth's climate and carbon cycle, it has become possible to interpret the marine sedimentary record much more directly than before. Specifically, the generation of synthetic sediment cores in models provides an important step in bridging the 'model-data divide' in paleoceanography. Here I illustrate the potential of this methodology and offer an alternative interpretation for the extreme shoaling of the carbonate compensation depth observed across the Paleocene-Eocene thermal maximum (PETM) in cores from Walvis Ridge, South Atlantic. I show how cessation of bioturbation in the Atlantic is critical to reproducing features such as the sharpness of the contact between carbonate rich late Paleocene sediments and the overlying clay at the Paleocene-Eocene boundary. Inter-basin differences in sedimentary bioturbation also help resolve the observed disparity in carbonate preservation response between Walvis Ridge (Atlantic) and Shatsky Rise (Pacific) sites.