

## **Ocean circulation and biogeochemistry during the Toarcian Oceanic Anoxic Event**

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The Toarcian Oceanic Anoxic Event (T-OAE; ~183 My), a past example of Earth's response to high  $p\text{CO}_2$ , was a long-lasting episode of widespread ocean deoxygenation during the early Jurassic. Here, we use 2 different general circulation models (FOAM and MITgcm) to better constrain ocean circulation during T-OAE. We specifically assess the response to changes in orbital parameters and bathymetry. While FOAM shows little sensitivity to orbital forcing, the results of both models are affected by changes in bathymetry. However, only the ocean circulation strength varies rather than its global pattern and, in both cases, a clockwise gyre is well demarcated in the North Tethys ocean. The differences between model runs are mainly observed at high latitudes. While FOAM suggests little water exchange between the Arctic and the Tethys, MITgcm finds the presence of significant southward currents bringing cold waters to the Tethys Ocean. These waters, which were likely nutrient-rich, could have increased primary productivity along the coast of SW Laurasia. Both, the clockwise gyre and the connection with Arctic waters may have contributed to the spatial trends in oxygen depletion inferred from geological observations.