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Climatic control on Oxfordian–Kimmeridgian shallow–marine sedimentation: Evidence by oyster shells oxygen isotopes and clay mineralogy from the Eastern Paris basin (France)

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Recent paleontological and oxygen isotope data inferred from fish teeth, brachiopods, and belemnites have revealed a cold episode around the Callovian–Oxfordian boundary, followed by a global warming trend from the earliest Oxfordian to the Kimmeridgian. We present here both new oxygen isotope data from oyster shells and clay mineralogy from Oxfordian–Kimmeridgian well biostratigraphically constrained sections of the eastern Paris Basin. These new data allow to characterize the evolution of the western Tethys sea–surface temperatures in parallel to the evolution of humidity/aridity conditions, and thus to define relationships between climatic variations and major lithological modifications. The lithological change from clayey deposits to recifal carbonates in the Lower–Middle Oxfordian transition is associated with a temperature increase of 3°C. This warming corresponds to a modification in the clay mineralogy (appearance of kaolinite). A second major lithological change, recorded at the Middle/Upper Oxfordian boundary, recognized in other sections of the northern Europe, consists of a carbonate production crisis combined with an increase of siliciclastic sediments. It coincides with a decrease of 6 °C in seawater temperature and the disappearance of kaolinite in the clay fraction. This coeval thermal and humidity parameters evolution suggests that the Middle Oxfordian and Upper Oxfordian sedimentation is mainly influenced by climate variation. During the Lower Kimmeridgian, sedimentation mainly depends on eustatic variations.