

Climate-driven coupling of weathering and carbon burial across the Cenomanian–Turonian boundary at ODP Site 1138 (Kerguelen Plateau)

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Despite its assumed global nature, there are few detailed stratigraphic records from the southern hemisphere of the environmental perturbation that affected the Earth from the Late Cenomanian to the early Turonian (Oceanic Anoxic Event (OAE) 2) from the southern hemisphere. A highly resolved record of environmental changes during the Cenomanian–Turonian boundary interval is presented from Ocean Drilling Program Site 1138 on the central Kerguelen Plateau (CKP). Detailed nannofossil and carbon-isotope stratigraphy indicates that the record of OAE-2 is not complete, with a hiatus spanning the onset of the event. Coupled changes in the quantity and composition of marine organic matter being buried on the CKP during the early Turonian correlates closely with decreases in bottom water oxygenation. These sedimentary features vary with a periodicity between ~15–50 ka, suggesting a close link with orbital-scale climatic variations. New, detailed TEX₈₆ data from the same section do not support the hypothesis that variations in the upwelling of cold, nutrient-rich subsurface waters could have acted as a major control on organic-carbon production. Instead, a close correlation between organic-carbon parameters with the composition of detrital sediments points towards weathering of the CKP as the primary mechanism controlling availability of nutrients. Although deep bottom waters at Site 1138 did not become sulphidic during OAE-2, geochemical cross-plots provide the first evidence outside of the proto-North Atlantic region for a global drawdown in seawater trace-metal inventories.