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Late Cenomanian environmental changes in eastern Tethys as inferred from rock magnetic data

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It is generally believed that widespread occurrence of anoxia occurred in major oceans near the end of Cenomanian in the mid-Cretaceous greenhouse "equable-climate" conditions, leading to enhanced burial of organic-rich sediments, or black shales, in ocean basins and a pronounced carbon isotope excursion (CIE), representing a major climate change in the mid-Cretaceous greenhouse world, i.e. oceanic anoxic event 2 (OAE2). The occurrence of black shales is thus considered a hallmark of this climate event. However, this diagnostic sedimentary feature is absent in the similar interval of a marine succession in Tingri area, southern Tibet, China that was situated in eastern Tethys in the mid-Cretaceous, yet a pronounced CIE characterizing the climate event is present and is correlatable with those from western Tethys. To better understand the environmental change history of this area during late Cenomanian, we have carried out a rock magnetic study of the Upper Cenomanian succession in Tingri area that consists mainly of limestone and marly limestone. A number of rock magnetic parameters including magnetic susceptibility and isothermal remanent magnetization were measured to characterize magnetic mineralogy and abundance of magnetic minerals. Magnetic mineral abundance appears to show an overall gradual decline prior to the climate event and then remains largely constant with fluctuations of small amplitude. Magnetite is the main magnetic mineral phase in the studied section, while hematite and iron sulfide are also present, but appear to occur episodically and vary in abundance. We interpret that these rock magnetic properties indicate variations in oxic and suboxic conditions associated with sea level changes in greenhouse warming conditions.