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Late Paleocene to Early Eocene Magneto-Biostratigraphy from the Cicogna section (Belluno Basin, NE Italy): A record of continental weathering

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During the Late Paleocene–Early Eocene (∼60 Ma to 50 Ma), Earth's climate experienced a warming trend that culminated at the Early Eocene Climatic Optimum (EECO). The EECO was characterized by warm conditions at even extreme high latitudes, subdued latitudinal temperature gradients, and virtually nonexistent polar ice sheets. The early Paleogene long-term climate was punctuated by several short-lived hyperthermal events, the most prominent of which is the Paleocene Eocene Thermal Maximum (PETM). Here we present paleomagnetic and calcareous nannofossil data from the Tethyan marine Cicogna section (Belluno Basin, NE Italy). The paleomagnetic results, integrated with calcareous nannofossil biostratigraphy, indicate that the Cicogna section extends from Chron C25r to Chron C23r spanning the NP7/NP8-NP12 nannofossil Zones with a relatively constant sediment accumulation rate of ∼18 m/My. Rock-magnetic data show sediment enrichment in hematite–maghemite respect to magnetite generally across the PETM and from ∼54 Ma up to the section top. We observed a correlation between rock-magnetic properties and global climate as revealed by a standard benthic oxygen isotope record from the literature. Our interpretation is that the warm and humid conditions typical of the PETM and the EECO enhanced continental weathering with the consequent production, transport, and sedimentation of more oxidized iron oxide phases (e.g. hematite–maghemite) relative to less oxidized phases (e.g., magnetite). Our temporal coupling between oxidation state of sedimentary magnetic phases and global climate therefore demonstrates the existence in the Paleocene–Eocene of the silicate weathering negative feedback mechanism for the long-term stabilization of the Earth's surfaces temperature as proposed by various authors.