Biotic response to early Paleogene short-term climate changes and their precursors

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The late Paleocene–early Eocene interval records a long-term warming culminating at the Early Eocene Climatic Optimum (EECO) when the highest temperature of the last 66 million of years occurred. Superimposed on this trend, a series of transient episodes of global warming and ocean acidification, known as hyperthermals, arisen. These short-term events began with rapid warming across the globe and massive input of ^{13}C-depleted carbon to the ocean and atmosphere. They were also times of extreme variations in the ecosystems, biota, hydrological cycle and ocean acidification. For these reasons, these events, especially the Paleocene Eocene Thermal Maximum (PETM), the most iconic hyperthermal, are often suggested as the best past analogue for current and future climate change. Although causes of hyperthermal events still remain uncertain, they are crucial intervals for investigating past global warming and their repercussions on environment and biota. On the other hand, also the poorly investigated short-term precursors of the hyperthermal events could offer the opportunity to understand if and how far the biota is affected by environmental changes leading to the release of light carbon under enhanced greenhouse conditions. The focus of the proposed research is to explore climatic perturbations and their precursors in the lower Paleogene hemipelagic successions of the Veneto region (Italy) using an integrated approach and multidisciplinary methodologies. Joint actions by Padova, Urbino, and CNR will move along a synergistic line of interaction focused on the analysis of such events. The main goals of the project are: 1) to investigate how these extreme climatic events and their precursors affected deep-sea calcareous nannofossil community 2) to provide details about the isotopic, geochemical and mineralogical changes in order to contribute to a better understanding of the mechanisms triggering these short-lived perturbations in a critical area as the central-western Tethys.

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