Continental vegetation and climate dynamics during Oceanic Anoxic Event 2

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The Cenomanian-Turonian boundary witnessed major perturbations in global biogeochemical cycling, oceanography and climate expressed in the widespread deposition of organic-rich marine shales (OAE2) and a pronounced positive carbon isotope excursion (CIE). Despite the global significance of this event, information on the dynamics of continental ecosystems during OAE2 is still lacking. Given the outstanding warm sea-surface temperatures (SSTs) reconstructed from proxy data for the OAE2 interval, the composition of terrestrial biomes must have responded to the inferred climatic changes. Here we present palynological and organic-geochemical data from a stratigraphically well-constrained marine succession from the Southern Provence Basin (SPB) located in the western Tethys domain. New biostratigraphic results (calcareous nannofossils, planktonic foraminifera) coupled with carbon isotope stratigraphy show that the interval corresponding to the OAE2 and associated CIE is represented by a ~150 m thick section composed of marls with few limestone intercalations. TEX_{86} data indicate very warm SSTs of up to 33°C, which is in line with previous mid-latitude temperature records. An interval with lower TEX_{86}-derived temperature estimates is paralleled by a trough-shaped decline in carbon-isotopes and tentatively correlated with the so-called Plenus Cold Event, a phase of distinct cooling in the early phase of OAE2. The spore-pollen assemblage is dominated by non-saccate gymnosperm (*Inaperturopollenites*, *Araucariacites*, *Classopollis*) and angiosperm pollen (mainly representatives of the Normapolles group incl. *Atlantopollis* and *Complexiopollis*), with pteridophyte spores being diverse but quantitatively less important. With stratigraphic height, the spore-pollen assemblage shows distinct changes in frequency distribution patterns including a pronounced increase in *Inaperturopollenites* and *Classpollis*. In contrast, the interval assigned to the Plenus Cold Event is characterized by a distinct rise in the angiosperm pollen *Atlantopollis microreticulatus*, reaching up to 16.4 % of the total palynoflora. In summary, the integrated palynological and geochemical dataset from the SPB documents the dynamics of mid-latitude vegetation during a phase of outstanding global warmth during OAE2. Despite the exceptional temperatures, a diverse and rich flora occupying various habitats in the hinterland of the SPB can be observed. Fluctuations in spore-pollen frequency distribution are considered to reflect significant climatic changes in the course of OAE2 controlled ultimately by the interplay of large-scale magmatic activity and enhanced organic carbon burial.