

## Terrestrial spore-pollen record across the Cenomanian-Turonian hothouse episode

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The Cenomanian-Turonian boundary interval (CTBE) witnessed major perturbations in global biogeochemical cycling, oceanography and climate expressed in the widespread deposition of organic-rich marine shales (OAE2) and a positive carbon isotope excursion (CIE). Whereas the response of marine biota has received considerable attention during the last decades, information on the dynamics of continental ecosystems during the CTBE is still lacking. Given the outstanding warm sea-surface temperatures (SSTs) reconstructed from proxy data for the CTBE, the composition of terrestrial biomes is expected to have responded to the inferred changes in climate. However, global sea-level high-stand and the widespread deposition of organic-rich shales composed almost exclusively of marine organic matter (OM) have hampered attempts to extract terrestrial palynological information from strata covering the CTBE. 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. Carbon isotope data from both carbonate fine-fraction as well as bulk OM show a positive CIE, although of smaller amplitude compared to existing records. TEX86 data indicate very warm SSTs of up to 33°C, which is in line with previous mid-latitude temperature records. The stratigraphic distribution of particulate OM shows high amounts and a stable flux of well-preserved continental OM to the basin, supported by RockEval pyrolysis data and BIT-index. The spore-pollen assemblage is dominated by non-saccate gymnosperm pollen (Inaperturopollenites, Araucariacites, Classopollis) and by angiosperm pollen of the Normapollis group (mainly representatives of Atlantopollis and Complexiopollis). Pteridophyte spores are diverse, but quantitatively less important. With stratigraphic height, the assemblage shows a distinct change due to an up-section increase in Inaperturopollenites and paralleled by a decline in certain species of Atlantopollis (most pronounced in *Atlantopollis microreticulatus*). These changes occur in concert with the onset of the positive CIE (in organic carbon) and predate the Cenomanian-Turonian boundary. The integrated palynological and geochemical dataset from the SPB documents the composition of mid-latitude floral assemblages during a phase of exceptional global warmth. Despite the outstanding temperatures, a diverse and rich flora occupying various habitats in the hinterland of the SPB is observed. The prominent shift in the spore-pollen stratigraphic distribution may reflect increasing temperatures during OAE2 resulting in an impoverished hothouse flora. However, effects of sea-level fluctuations and changing oceanographic patterns may also play a role in the observed stratigraphic patterns.