



The Albian oceanic anoxic events at the Apulian Platform Margin (southern Italy): regional record and global control

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This contribution, integrating original and published data, interprets the regional response to Albian oceanic anoxic events in the critical Tethyan area of the Apulian Platform margin, thus improving knowledge of Albian black shales, so far less investigated with respect to the late early Aptian OAE1a and latest Cenomanian OAE2. The Gargano Promontory, represents a distinctive Tethyan area where the transition from carbonate platform to adjacent basin is exposed on land. The Albian stratigraphic record, represented by shallow-water, slope and deep-water deposits, provides the occasion to investigate the regional response to oceanic anoxic events in different depositional settings by using an integrated, high-resolution micropalaeontological (planktonic foraminifers, calcareous nannofossils) approach. Results show that organic matter preservation is confined to the more distal areas, and consists of black shale intervals from the middle and late Albian that record the effects of Oceanic Anoxic Events 1b and 1c. Genetic models for the two episodes of organic matter preservation are proposed, taking into account both global and local controlling factors. Regional features of both the Urbino and Amadeus Level equivalents are: low planktonic foraminifer diversity, radiolarian abundance peaks, abundance of high-fertility calcareous nannofossil indices, and a 'nannoconids crisis' analogous to that recorded in the OAE1a. Features of OAEs 1b and 1c already extensively documented include: impoverished benthonic fauna (dysaerobic conditions at the sea floor), orbitally-controlled cyclicity, negative $\delta^{13}\text{C}$ shift, and positive followed by negative $\delta^{18}\text{O}$ trend (warming followed by cooling climate conditions), at least for the Urbino Level equivalent. Our results delineate a scenario for the Urbino and Amadeus Level equivalents of increased primary productivity due to climatic-geodynamic interactions, in many aspects similar to that

proposed for the OAE1a. We have focused on the general biotic trend across the Albian anoxic events recorded in the Gargano Promontory, thus we cannot exclude that analysis of a single component of the lithological cycle might indicate rhythmic intervals of water-mass stratification and stagnation alternating with episodes of increase primary productivity, as documented in the Vocontian Basin and Umbria-Marche Basin. Nevertheless, the inferred general palaeoceanographic model characterised by increased fertility is not surprising, as the climatic-geodynamic context is in many ways similar to that described for OAE1a. Changes in palaeogeography between the Aptian and Albian may have played a significant role in regional conditions, resulting in different local expression of the anoxic events.