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Cyanobacteria Blooms and Drowning Unconformities of Carbonate Platforms: Signs of Earth's Endogenic, Global Control on the Productivity of Carbonate Depositional System. Examples from the Jurassic-Cretaceous of the Mediterranean Tethys.

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Secular, regional to global oscillations of Earth's paleoceanographic and climatic conditions have provided fluctuating environmental controls thus inducing major shifts in the carbonate productivity modes of the oceans (namely: Chlorozoan, Foramol, Microbial). It is well-known that proper environmental conditions for a given mode (e.g.: seawater chemistry and temperature) are highly unfavourable for the others. By contrast, the background triggering mechanisms inducing major turning points in carbonate productivity modes are poorly understood both on regional and global scales

Detailed sedimentologic, palaeoecologic and stratigraphic investigations coupled to extensive field mapping have been carried out on several Jurassic-Cretaceous successions cropping out in central-southern Italy (Apennine Mountain belt and Apulia foreland) which deposited along different carbonate platform-to-basin transitions of the central Mediterranean Tethys (Lazio-Abruzzi carbonate platform – Umbria-Marche basin and Apulia carbonate platform – Ionian basin). Widespread deposition of microbial-rich successions occurred during discrete intervals of the Jurassic-Cretaceous in shallow-water environments (namely: Pliensbachian $p.p.$, Early Toarcian, Bajocian $p.p.$-Callovian $p.p.$, Late Valanginian, late Early Aptian and Early-Middle Turonian). These shallow-water microbial-rich intervals correlate to sharp facies changes recorded by deep-water pelagic successions. Additional geochemical data published recently on the same successions and an event stratigraphic approach

(including the evaluation of the role exherted by geodinamics on the regulation of major bio-sedimentary cycles in the Jurassic-Cretaceous oceans) allowed a well constrained geologic scenario to be hypothesized. It is assumed here that the proper environmental conditions for the flourishment of microbial associations allowed them to rapidly replace chlorozoan and/or foramol ones during drowning events of carbonate platforms, at the beginning of relevant perturbations of the global carbon cycle, basically coinciding with negative spikes of δ^{13}C curve and/or Oceanic Anoxic Events.

It is believed that the microbial-rich intervals above reflect the biotic response to increased alkalinity of sea waters caused by enhanced carbon dioxide supplies provided by huge, sea floor volcanic activities at the onset of impressive turning points of Earth's geodynamics. These phases are believed to represent a hinted, temporaneous restoration of the Paleozoic alkaline conditions of the oceanic waters during discrete intervals of the Mesozoic.

This study suggests that co-occurring black shales (Oceanic Anoxic Events), drowning unconformities of carbonate platforms, major turning points in global palaeoceanographic conditions, rapid fluctuations of the carbon isotope curve (negative-positive δ^{13}C spikes), relevant bio-events affecting the phyletic evolution and diversity reduction of the fossil assemblages, sedimentation of widespread microbialites horizons as well as major sedimentary changes in the marine realm are basically different but coherently linked responses of the evolving biosphere-hydrosphere system to a unique, obtrusive genetic process linked to geodynamic pulses originating in the Earth's interior.