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# Timing of Early Aptian demise of northern Tethyan carbonate platforms - chemostratigraphic versus biostratigraphic evidence

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A lively controversy still exists between different authors dealing with the timing of northern Tethyan platform drowning and the Early Aptian oceanic anoxic event (OAE 1a). To the present day, there is no consensus if the OAE 1a black shales must be attributed to the *Deshayesites weissi* or the *Deshayesites deshayesi* zone (see discussion in Moreno-Bedmar et al., 2009). OAE 1a black shale deposition has been traditionally attributed to the *Deshayesites weissi* zone (Gradstein et al., 2004). Despite this disagreement about the biostratigraphic timing, several authors postulate a relation between biotic perturbations and environmental changes linked to OAE 1a, e. g. the disappearance of coral-rudist reefs related with the demise of the northern Tethyan Urgonian platforms in the Helvetic Alps (Weissert et al., 1998; Föllmi et al., 2008). In the central and southern Tethyan realm (Istria, Oman), OAE 1a is likely expressed as the transient mass occurrence of microencrusters (*Lithocodium-Bacinella*) and the coeval demise of the characteristic mid-Cretaceous framework-builders (rudists, corals). Chemostratigraphic data indicate that these microbial blooms coincide with the *Deshayesites weissi* zone (Huck et al., 2010, Rameil et al, 2010). These observations raise the question whether northern Tethyan platform drowning is coeval to microbial bloom periods in the central and southern Tethys? The analysis of all available literature and unpublished evidence demonstrates that well constrained age data are surprisingly scarce and controversial. The goal of the present research project is to compile a chemostratigraphic framework for the northern Tethyan platform drowning (Haute-Savoie, SE France) in order to shed light on the temporal constraints of platform drowning versus pelagic black shale deposition versus microbial blooms.

Two Barremian to Aptian shoalwater sections (Cluses section, Grande Forclaz section) in the Subalpine Chains were investigated applying chemostratigraphy (carbon, strontium) and detailed sedimentological analysis. The lower part of the studied interval of both sections comprises limestones rich in rudist bivalves and intercalated oncoidal beds (including *Lithocodium-Bacinella*). The upper part consists of open to slightly protected lagoonal limestones (peloidal-foraminiferal grainstones) alternating with Orbitolina-rich intervals (Lower Orbitolina limestones?). Rudist shells are well preserved and relatively common. In the uppermost part, pulsed shedding of silt-sized siliciclastics is recorded and both sections are finally truncated and capped by the helvetic Garschella Formation, represented by siliciclastic glauconite-rich sedimentary rocks alternating with more argillaceous intervals. In essence, this stratigraphic succession is typical for the drowned Lower Aptian platforms observed along the northern Tethyan margin. Due to the lack of ammonites and a debated biostratigraphic control based on orbitolinids, a high-resolution chemostratigraphic framework (carbon and strontium) for the studied sections is established. Carbon-isotope chemostratigraphy is based on carbonate bulk samples. The obtained ages derived by $^{86}Sr/^{87}Sr$ isotope ratios (Strontium Isotope Stratigraphy, SIS) from screened rudists' low-Mg calcite are used to calibrate the carbon isotope stratigraphy as well as to pinpoint the timing of platform drowning.

With respect to the timescale of Gradstein et al. (2004) preliminary chemostratigraphic data from Urgonian shoalwater sections in SE France indicate that the platforms at the northern margin of the Tethys Ocean drowned at the onset of OAE 1a black shale interval (*Deshayesites weissi* zone, close to the Aptian/Barremian boundary). This points to a near-coeval nature of pelagic black shale deposition, Oman and Istrian *Lithocodium-Bacinella* facies and platform demise in the northern Tethyan realm.

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