Geochemical correlations of Shu'aiba sections: Stop trusting the trends!

Granier, B.

Departement des Sciences de la Terre et de l'Univers, UFR des Sciences et Techniques, Universite de Bretagne Occidentale (UBO), 6 avenue Le Gorgeu - CS 93837, 29238 Brest Cedex 3, France (bruno.granier@univ-brest.fr)

Chemostratigraphy in basinal series of Cretaceous age led to the identification of several oceanic anoxic events. Menegatti et al. (1998) provide a first high-resolution $\delta^{13}$C curve for basinal sections of “Early Aptian” age (now identified as Bedoulian age sensu Moullade et al. 2011). They identify eight intervals, numbered from base to top C1 to C8, that are used for interregional correlation. Their curve gradually increases from 1-2‰ PDB to more than 4‰ PDB along their C4 segment (Menegatti et al. 1998). According to Kuhnt et al. (2011), the widespread OAE1a (i.e. Oceanic Anoxic Sub-Event 1a), which spans segments C4 to C6, corresponds to most of the portion of the Cabri Zone, below the acme of this planktonic foraminifer, i.e. it is almost a time-equivalent to the ammonite Hambrovi Subzone (Deshayesi Zone) of Bedoulian age.

In the Persian Gulf region, the location of the OAE1a was not directly identified. But, because there are striking similarities in the trends of carbon-isotope curves for both pelagic, accurately dated, and shallow-water, less age-constrained, carbonate rocks $\delta^{13}$C was - over the last decade and until now - routinely used for stratigraphic correlations in the Persian Gulf region (Vahrenkamp 1996, 2010). Vahrenkamp (2010) reports intermittent reversals, R1 to R4, along the increasing portion of the $\delta^{13}$C curve. He assumes that the OAE1a starts “with the MFI” (Maximum Flooding Interval) “of the Shu’aiba Formation”, which falls between his reversals R2 and R3, “and continues into the later part of this period of organic carbon withdrawal”.

However, on the basis of the strongest biostratigraphic evidence when dealing with Cretaceous series (i.e. ammonites), Granier and Busnardo (2012) demonstrate that Vahrenkamp’s MFI falls into the ammonite Furcata Zone of “Middle Aptian” age (= “Gargasian” age, now synonymized with Aptian age sensu Moullade et al. 2011). Because the OAE1a is much older than the MFI, Vahrenkamp’s working hypothesis is definitively invalidated. The isotopic analyses were derived from bulk samples and diagenesis alone would suffice to explain how the resemblance of the $\delta^{13}$C curves is misleading. Actually such bulk curves are not better - nor worse - than any basic wireline log (NPhi, i.e. Neutron porosity; RhoB, i.e. Bulk density; etc.) for stratigraphic correlations in shallow-water carbonate environments.