CHEMOSTRATIGRAPHY IN THE JURASSIC AND CRETACEOUS

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Chemostratigraphic studies of the Jurassic and Cretaceous currently involve primarily the use of one sedimentary parameter (organic carbon) and two isotopic tracers: strontium-isotope ratios (87Sr/86Sr) and carbon-isotope ratios (d13C). Preliminary data on osmium-isotope ratios (187O/188O) have also been published. These parameters allow correlation between biostratigraphically well-dated reference sections, against which the relevant sedimentary and isotopic data have been calibrated, and other sections that are less well known. The deposition of certain Jurassic and Cretaceous black shales (during the Toarcian, early Aptian and Cenomanian-Turonian boundary time) can be demonstrated to be regionally synchronous across parts of Europe, and the accompanying carbon-isotope excursion can, at least in the Cretaceous examples, be correlated globally.

Most powerful in terms of dating and correlation is a combination of strontium- and carbon-isotope stratigraphy for those parts of the Jurassic-Cretaceous characterized by steep Sr-isotope profiles and/or distinctive carbon-isotope excursions. Both pelagic and shallow-water platform carbonates can yield diagnostic and reproducible carbon-isotope signatures; strontium-isotope signatures are best obtained from unaltered macrofossils (belemnites, oysters) and clay-poor carbonates of deep- or shallow-water character. Carbon-isotope stratigraphy, derived from bulk carbonate or organic matter, has potential not only in marine sediments but also in lacustrine deposits. Carbon-isotope analysis of fossil wood from shallow-marine and continental sediments can also yield stratigraphic information. Correlation between wood-bearing fluvial-alluvial red beds and deep-marine carbonates should be possible for those parts of the stratigraphic record with diagnostic carbon-isotope signatures. Osmium-isotope stratigraphy, based on analyses of Jurassic-Cretaceous organic-rich mudrocks, also shows considerable promise.