



The Aptian oceanic anoxic event (OAE1a) in Svalbard and the age of the Barremian-Aptian boundary

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The age of the Cretaceous Barremian-Aptian boundary has been a long-standing problem in the geological timescale. Age suggestions range between 126 Ma and 117 Ma, making causal links between environmental crises and large-scale processes such as Large Igneous Provinces (LIPs) problematic. New stratigraphic and radiometric data from three drill cores in Svalbard show that Barremian shelf siltstones and sandstones are overlain by Aptian shallow marine mudstones. The organic carbon content in the mudstones varies between 0.5 and 4.8 wt.% total organic carbon, with the early Aptian Oceanic Anoxic Event 1a (OAE1a) positive $\delta^{13}\text{C}_{\text{TOC}}$ excursion of 6‰ identified within a 10 m interval. The isotopic pattern of the excursion is in perfect agreement with excursions from lower latitude sections of the same age. A ~10 cm thick zircon-bearing bentonite was discovered in the lower parts of the Barremian, about 40 meters below the OAE1a interval. U-Pb TIMS zircon analyses of two equivalent bentonites in adjacent boreholes gave a robust age of 123.1 ± 0.3 Ma. Based on the Barremian depositional systems, we estimate that a time interval of 1-2 m.y. separates the bentonite and the OAE1a, providing an age of about 121-122 Ma for the Barremian-Aptian boundary. Our results stress that the geological timescale needs revision, and provide a benchmark test for the correlation between the OAE1a and LIPs.