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The Early Aptian carbon isotope excursion: time scales, associated environmental changes, causes

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The Mid-Cretaceous is known as a period of dramatic carbon cycle perturbations, recorded in the carbon isotopic composition (δ^{13}C) of both carbonate and organic matter of pelagic sediments. Our study focuses on the Early Aptian Oceanic Anoxic Event (OAE) 1a, characterized by a prominent negative δ^{13}C spike and followed by a positive carbon isotope excursion, associated with increased burial rates of organic matter. High volcanic activity has been proposed to have induced significant environmental changes, including a biotic crisis and oceanic anoxia, which may explain the OAE carbon cycle perturbation. A warmer world caused by massive volcanism may in addition have triggered subsequent processes, including methane hydrate dissociation. To investigate possible origins of the C-cycle perturbation, the production and preservation of the organic matter, reflecting variations in ocean conditions are studied. In this contribution we will present high resolution δ^{13}C records for different Early Aptian sections, exhibiting a negative isotopic carbon spike, and discuss the time scales for δ^{13}C evolution, likely indicating the possible mechanisms of isotopically light carbon release. Besides, environmental changes associated to such an event are investigated using biomarkers, preserved in the sedimentary record, and enable to discuss fluctuations in the temperature, productivity, marine biota, and climate.