



Volcanic ash-falls (bentonites) in the Valanginian deposits of the Vocontian Basin (south-east France): oceanic and climatic implications.

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Detailed fieldwork on three sections from the Vocontian Basin (SE France) reveals the occurrence of ochre layers, interpreted as bentonites in the Valanginian deposits. At least ten of these are identified from the Pertransiens to Furcillata ammonite Zones. The bentonites are highlighted by the occurrence of iron oxi-hydroxides derived from the meteoric weathering of pyrite, and can be used as marker beds for correlations. These volcanic horizons are very thin and devoid of typical volcanic minerals indicating distal aerial deposits. Mineralogical and geochemical analyses from the bentonites and their enclosing marls reveal a contamination of the volcanic horizons by terrigenous components. One of the bentonites occurring in the Campylotoxus Zone is thicker and less contaminated by detrital clays. The bentonite clay fraction is mainly composed of smectite derived from submarine weathering of volcanic glass. Enrichment in volcanic affinity trace elements confirms the bentonitic origin of this horizon. Volcanic ash was probably transported westward by trade winds from active centres located along the northern active margin of the Tethys. The onset of ash-falls occurs prior to a $\delta^{13}\text{C}$ excursion recording increased organic carbon burial, possibly caused by elevated marine productivity. This suggests that aerial volcanism may have triggered primary productivity through fertilisation of the Tethys Ocean. The following CO_2 uptake may be responsible for climatic cooling and sea-level fall during the Verucosum ammonite Zone expressed by the occurrence of turbidites in the Vocontian Basin.

This study shows that aerial volcanism may have played a significant role in paleoceanographic changes including productivity and climate cooling during the Valanginian.