Multiple eruptions of the Ontong Java Plateau as a trigger of the Early Aptian climatic event (OAE-1a)

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Massive volcanism associated with emplacements of Large Igneous Provinces (LIPs) is thought to make a significant impact on global climate. Although formation of Ontong Java Plateau (OJP) has been proposed as a trigger of Oceanic Anoxic Event (OAE)-1a in the Early Aptian because of age consistency, their linkage is still controversial. In this study we examine the possibility of the OJP volcanism instigating OAE-1a based on Pb isotopic records in pelagic sediments from three localities; western Tethys, central Pacific deep basin and plateau. The Pb isotopic ratios show a slight shift toward those of OJP rocks before the OAE-1a. The Pb isotopic ratios in deep Pacific and western Tethys display a shift toward upper continental crust during the OAE-1a. Sedimentary Os isotopic record illustrates two negative excursions across the OAE-1a, suggesting repeated inputs of unradiogenic Os from the OJP. The Pb isotopic shift toward OJP corresponds to the first Os isotopic excursion. It indicates a subaerial or explosive subaqueous eruption before the OAE-1a that possibly provided both Pb and Os over the wide area of the ocean. In contrast, the second Os isotopic excursion is not associated with Pb isotopic shift, suggesting less explosive eruption that released huge amount of Os but not Pb to the ocean. The former eruption would be related to global oceanic acidification whereas the second would be direct trigger of OAE-1a.