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Barium abundance below K/T boundary: Triggered by the release of Gas hydrates ? Few requests on terminal Cretaceous events

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Geochemical profiles of Maastrichtian-Danian strata of the Cauvery basin, south India, reveal positive and negative excursions of different elements above or below the K/T boundary. Among all the elements, only Ba shows prominent positive excursions at about 67.35 my and 68.32 my. Except these two, Ba does not show any significant shifts or change from mean value of the entire section or mean values of Maastrichtian or Danian. Computation of excess Ba with reference to PAAS has also indicated overwhelming availability of Ba between 68.32 my and 67.35 my. It is to be noted that there is no any associated bio-event or lithological change. X-ray diffractograms have shown the presence of Ba-Orthoclase at negligible to minor proportions.

Petrographic observations show stratigraphically uniform distribution of feldspathic grains, and hence, influence of Ba-orthoclase could be ruled out. As Ba adheres onto clay mineral surfaces, influx of clay could be inferred. However, clay admixture in the sandstones seldom exceeds 5%. If all the clay in the sandstones were assumed to contain adhered Ba on their surfaces, source for the free Ba has to be accounted. Assuming adherence of Ba onto clays calls for weathering of Ba-orthoclase in the continental regions to form clay, transport and deposition of them in the marine basin to cause Ba anomaly, which in turn is countered by the occurrence of fresh Ba-orthoclase clasts. The profiles of Si, Al, Na, Mg and K show peaks during 68.32 my signifying detrital influx in the form of Ba-orthoclase or albite or clay. While the element Zr has coeval peak along with Ba peak also during 67.35 my, the elements Si, Al, Na, Mg and K show multiple peaks away from this major Ba peak. If primary source of Ba

was considered to be detrital and influx of it in the form of Ba-orthoclase or its weathered derivatives, then Ba should show coeval peaks along with all other peaks of these elemental profiles. Absence of such coeval peaks of Ba except at 68.32 my indicates either Ba has not been drawn from detrital sources or Ba has got terrestrial source only during 68.32 my. The magnitudes of peaks of Si, Al, Na, Mg and K are subdued during 67.35 my and the peaks of Zr and Ti are prominent during 68.32 and low during 67.35 my. This observation signifies that had there been prime detrital source for Ba, then the major Ba anomaly should have been at 68.35 my instead of 67.35 my. These observations could be interpreted as dual source for Ba. The profiles of Ca and Corg record negative anomalies coeval with positive anomalies of Ba. As Corg accumulation and preservation of Corg occur during sea level highstands and higher primary productivity, fall in productivity and sea level are inferred to have caused Ba anomaly. Reduction in productivity as reflected in Ca, Corg profiles exactly at positive anomalies of Ba, together with broad scale change of lithology from carbonates to shallow marine siliciclastics may be linked to major climatic and or environmental perturbation. It is also recognized that similar Ba anomalies occur below K/T boundary at sites located in Mexico, Israel, Tunisia, etc, and thus it appears that the anomaly may be related with major global phenomenon. Possible causes of this phenomenon namely, release of methane gas (Gas hydrates) from continental shelves due to sea level change, Deccan volcanism and meteoritic impact is discussed.