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# Palaeocene-Eocene Thermal Maximum continental sediments in the Barmer Basin, Rajasthan, India: A record of enhanced precipitation in South Asia

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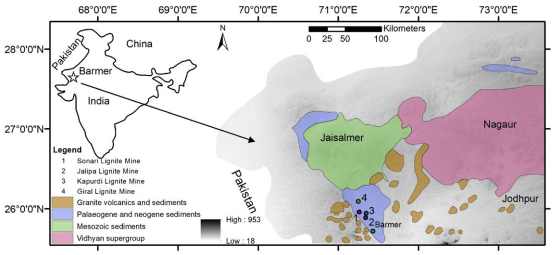


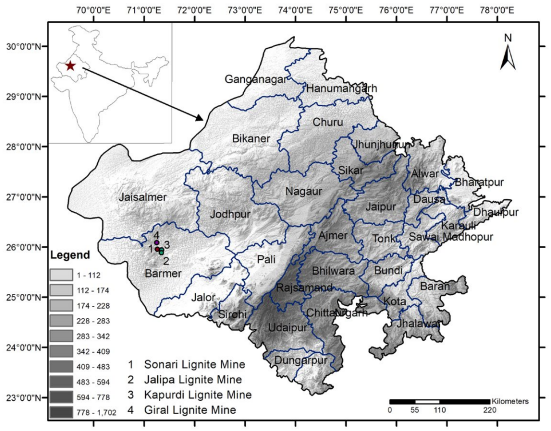


**Abstract:**

Climate change, particularly the rapid increase in temperature has a significant effect on global and regional hydrological cycles and is expected to exacerbate the uneven distribution of rainfall in various regions. This may also impact the food production yield, besides increase in the floods and draught frequencies in different parts of the world, especially in densely populated south Asia. However, we are not sure that how this rapid temperature increase will manifest and impact us, so as to get some clues to face this challenge. In this we find that the Palaeocene Eocene transition phase (also known as the PETM event; ~56 Ma) was the time when ~5-7°C temperature increases was noticed in a span of ~10,000 years. So, the sedimentary deposits of PETM time may provide us crucial information about climate change and its affects. It is important to mention here that such records from temperate regions as well as marine records are numerous, however, continental sedimentary records from tropical regions are meagre and need to be studied. The study present carbon isotope, geochemical and clay mineral analysis results of the biostratigraphically constrained continental lignite bearing sediments from the Barmer Basin, India to identify the environmental and hydrological changes across the PETM. The $\delta^{13}C$ values show variation of ~5.0 ‰ with maximum excursion of-29.00 ‰ observed in grey shale lying in the middle part of the section and the least (-24.03‰) value noticed in the mottled grey shale towards the terminal end of the sedimentary sequence. The most negative $\delta^{13}C$ values and lower TOC suggest an intense warm period. A gradual increase in chemical index of alteration (CIA), Rb/Sr ratio and increased smectite mineral abundance in the middle of the section, all possibly associated with the PETM, indicating an intensified silicate weathering in the catchment region in response to warmer and more humid climate. Our results corroborate the general understanding that an accelerated continental chemical weathering served as a negative feedback to sequester carbon and lower the atmospheric greenhouse-gas level subsequent to the PETM phase.

**Keywords:** PETM, lignite bearing sediments, continental records, carbon sequestration