Earliest evidence of Kerguelen mantle plume in the Abor Magmatic Complex, eastern Himalaya and its association with the break-up of eastern Gondwana

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The impact of Kerguelen mantle plume activity to the rearrangement of continental plates, especially the Indian, Australian and Antarctica plates had been phenomenal. The Abor magmatic complex (AMC) existed in the eastern Himalaya of northeast India is often treated as one of the early trails of Kerguelen mantle plume. However, the timing of emplacement of the AMC has been a matter of an unsettled debate due to wide range of age availability. This study brings a new outlook in the relationship between Kerguelen mantle plume and Indian plate tectonics based on the geochemical and geochronological results of the felsic rocks from the AMC. The felsic rocks are associated with coeval oceanic island basalts (OIB)-type mafic rocks and exhibit A-type granite geochemical characteristics such as low MgO (0.38-1.17 wt.%), CaO (1.06-5.31 wt.%), enrichment in LREE and LILE (Rb, K, Pb), depletion in HREE, Sr, Nb, Ti, along with strong negative Eu-anomaly (0.48-0.73) and high initial $^{87}\mathrm{Sr}/^{86}\mathrm{Sr}$ (0.707878–0.717650), and negative $\epsilon Nd(t)$ (-14.35 to -9.21). Such chemical compositions can be interpreted as the result of an interaction between the pre-existing crust and high temperature upwelling OIB-type basaltic magma. Zircon U-Pb dating results put the felsic rocks in a wide range of age constrain of 149 Ma to 132 Ma. Earlier studies estimated that the age of AMC is as old as 132 Ma, but the result which we get in our new investigation (149 Ma) suggests much older history of the AMC than previously thought. It opens a new direction to further investigate whether the Kerguelen mantle plume which is believed to have feeded the AMC was activated around ~149 Ma or there was already a plume-type magmatism affecting the Indian eastern margin at the triple junction (India-Autralia-Antarctica) before the inception of eastern Gondwana break-up and arrival of Kerguelen mantle plume.