

Impact of Deccan volcanism on the mass extinction of the KPg boundary: Relation between dykes, sills and coals of the early Permian, India

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Context

This project is focused on the Deccan Traps (India). Recent studies indicate that the bulk (80%) of Deccan trap eruptions occurred over a relatively short time interval in magnetic polarity C29r. U-Pb zircon geochronology shows that the main phase began 250 ky before the Cretaceous-Paleogene (KPg) mass extinction and continued into the early Danian suggesting a cause-and-effect relationship. Main part of the basalts released in northern Deccan area appears to be of latest Maastrichtian age. Moreover recent geophysical and field observations show that the Malwa and Mandla basalt plateaus erupted in the Narmada-Tapti rift, made up of 2-3.5 km of Carboniferous to Cretaceous sedimentary rocks, including up to 60m thick Lower Permian coal interval. Numerous dolerite dykes and sills intersecting these coal beds have been observed in open and underground mines from the Satpura area (N-India). The interaction between these dykes and the coal seams may have significantly contributed to the latest Maastrichtian warming by releasing high amounts of CO₂, SO₂ and halogens into the atmosphere. The sum up question: Thermal metamorphism of these sediments could have been a source of sufficient CO₂, SO₂ and other halogens to drive the Late Maastrichtian warming event?

Objectives and Methods

This research project is a collaborative work with Prof S. Khadri (Amravati University). It consists of a multidisciplinary project combining a fieldwork, sedimentological, biostratigraphical, geochemical and mineralogical approach. The master student will conduct a detailed study of the Permian coals and examine their relations with the Deccan sills and dykes. The main objectives are: (1) To produce a detailed mapping of the dykes and sills associated with the permian coals sediments in quarries and underground mines from the Narmada rift (2) to study the interaction between these dykes and the permian coal seams and evaluate their contents in CO₂, SO₂, halogens and, which may have contributed to the latest Maastrichtian warming.

Literature

Eddy, M.P., Schoene, B., Samperton K. M., Keller G., Adatte, T., Khadri, S. (2020) U-Pb zircon age constraints on the earliest eruptions of the Deccan Large Igneous Province, Malwa Plateau, India, EPSL, 540, 116249.



Sites WEB

<https://www.unil.ch/iste/fr/home/menuinst/personnel/interpersonal-web-pages/thierry-adatte.html>

Choice of orientation : (supprimer les orientations qui ne conviendraient pas)

Sedimentary, Environmental and Reservoir Geology