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Constraints on tectonics of emplacement and evolution of the Ladakh Himalaya by understanding the role of Geochemistry

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Mafic dykes and enclaves traverse through the Ladakh Batholith, dominantly towards its southern margin, closer to the Indus Suture zone. The dykes have been dated to about 45My near Taru village, they vary in length from few meters to a few kms and their widths vary from a few cm's to 5 to 10 meters or more. The orientation of the dykes are E-W and NW-SE, showing cross cutting relationships. Sampling of the dykes were also carried out between the Taru Section, 20 km west of Leh city and Upshi section towards east, along the southern margin of the Ladakh batholith. Here the dykes show doleritic and andesitic nature. The dolerite dykes display wide range of crystallinity from fine to medium grained (depending upon the thickness of the dyke), equigranular to porphyritic texture. Ophitic to sub-ophitic texture are commonly observed between clinopyroxene and plagioclase laths. Some of the pyroxenes show alteration to amphiboles and chlorite at the grain boundaries. The andesitic dykes on the other hand are generally much thicker from a few meters to 10-15 meters in thickness, with laths of plagioclase with inclusions of pyroxenes, k-feldspar, opaques and rarely quartz. The dykes occur at restricted locations in the studied area indicating localised tensional features in the Ladakh batholith, probably during the final stages of the evolution of the Ladakh batholith. There is quite good amount of dioritic and mafic enclaves within the batholith, showing globular bodies with magma mixing and mingling textures indicating intrusion of the dioritic magma when the batholith was still crystallising, while the dykes were emplaced when the batholith had already crystallised. Further studies are going on to characterise these dykes and enclaves in terms of their mineralogical, petrographic and geochemical including isotopic characteristics. These studies are to understand whether the mafic dykes and the mafic enclaves are related genetically or these are of different ages, derived from different sources. The batholith is shown to have been derived from subduction processes, our study aims at understanding the derivation of the mafic dykes from deeper mantles sources or whether these were also derived from subduction processes.