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# Isotope provenance of Eastern Himalayan rivers draining to the south into India, Nepal and Bhutan.

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The two syntaxis of the Himalaya (Eastern and western) are exhuming anomalously fast compared to the rest of Himalaya , and various hypothesis and models have been proposed to explain this, including coupled tectonic-erosion model of (Tectonic Aneurism)[1−2] and ductile extrusion of weak lower crust from beneath Tibet by "channel flow" [3] . The Namche Barwa metamorphic massif constitutes the eastern syntaxis of the belt and has experienced a complex history of uplift and deformation both influenced by intense fluvial erosion associated with the Yarlung-Tzangpo.

Therefore, the Himalayas represent a unique natural laboratory where the interactions between the tectonics, erosion, climate and drainage evolution can be investigated. The purpose of the work is to understand in collaboration with other PhD students and European researchers collaborating in the iTECC Marie Curie Initial training Network the importance of processes involving the complex links and feedbacks between climate, tectonics and erosion.

In this multi–disciplinary and multi-technique study the mains goals will be to assess the timing of rapid exhumation, to determine provenance source area exhumation of the syntaxis in relation to the big river capture event that has implicates the Yarlung-Tsangpo by the Brahmaputra, and the effect of the dilution of the syntaxis signal 's downstream. During the work the $^{40}Ar/^{39}Ar$ dating of single-grain detrital micas technique will be used to analyze smaller and younger grains using newly developed high sensitivity multi-collection noble gas mass spectrometry. Detrital zircon fission-track is perform to provides robust cooling age time of the sources terrains.

Input from eastern syntaxis has been identified in the Brahmaputra sedimentary record by the appearance of very young grains (from 10 Ma to 6 Ma)[4]. To compare and to increase the previously collected data, fifteen samples from the Yarlung-Brahmaputra River system and from tributaries draining the Himalaya, the Arakan belt and the Shillong plateau, have been collected in the Arunachal Pradesh and Assam regions of the North-east India. The sampling work, and subsequent $^{40}Ar/^{39}Ar$ dating of single-grain micas, are used to determine provenance source area exhumation to obtain an overview of the age and the tectonic processes that have driven the exhumation of the Himalayan syntaxes in the late Neogene exhumation history. At a later stage the focus will be on the Ganges drainage system to obtain a more detailed overview of the processes laid by the late stage of the exhumation of the Eastern Himalaya.

In this scenario is it possible to assume a Neogene rapid exhumation of the eastern syntaxis or is simply the effect of dilution which prevents the young ages doing to high erosion rate affecting the Namche Barwa from the last millions of years. How is the distribution of the syntaxis signal's in the main Siang and Brahmaputra drainage system at different position upstream and downstream, and how this aspect is related with influence of the main Himalayan tributaries, are questions to investigate.