The significance of the lofty Himalayas in the context of the Indian sub-continent cannot be understated. The rise of Himalaya, apart from lending a unique identity to our nation, shares borders with Pakistan, Afghanistan, Bhutan, Nepal, Myanmar and Bangladesh. The 2400 km long rugged mountains between the Nanga Parbat syntaxis in Tibet and the Namche Barwa syntaxis forms a natural barrier and is host to several superlatives. The Himalaya-Tibet region supplies freshwater for more than one-fifth of the world’s population. It is the source of some of the greatest rivers and the highest concentration of glaciers outside of the polar regions.

Resulting due to a collision between two continental tectonic plates, which is still continuing, it boasts of the highest rate of uplift (nearly 10 mm/year at Nanga Parbat). The Himalayan region holds the record for highest erosion rates ranging from 2–12 mm/yr. The copious sediments generated are responsible for the fertile plains of Indo-Gangetic plains. The Himalaya mountain chain provides unparalleled opportunity to examine the complex ways in which continents respond to collisional tectonics, active fold-thrust system, formation of duplexes, seismogenesis and neotectonism in one of the youngest orogenic belts of the world. The evolution of Himalaya spans a long history encompassing the break-up of East Gondwana around ~250 Ma to the final closure of Tethys and continent-continent (India-Eurasia) collision at ~47 Ma. Traditionally, the Himalayas have been divided into five geo-tectonic elements. From South to North they are:

* SUB-HIMALAYA – Siwalik (Dagshai/Kasauli/Subathu)
* LESSER HIMALAYA – Rampur-Berinag/Shali/Simla/Blaini-Kroll-Tal
* HIGHER HIMALAYA – Crystallines / Tethys Himalaya
* INDUS-TSANGPO SUTURE ZONE (ITSZ) ophiolite / Ladakh granitoids
* TRANS HIMALAYA –Karakoram granitoids / associated sediments
* -The Ladakh Region of Jammu & Kashmir- the cold desert, exposing the ITSZ and Trans-Himalayan units, holds the key to the collisional processes. It is characterized by lofty mountain chains with broad open intermontane valleys dotted with saline water lakes and hot springs. Ladakh lies on the rain shadow side of the Himalayan region and has both arctic and desert climatic conditions, which in combination with the high altitude, poor oxygen and vegetation, low humidity as well as high solar radiation, make the region inhospitable. The nine storey Leh Palace is a distinguished historical monument of 17th century Tibetan architecture and is said to have inspired the famous Potala Palace of Lhasa.

Geologically, the area is bounded by the Karakoram Ranges in the north and the Zanskar Ranges in the south. From South to North, the Ladakh Himalaya is broadly divided into three litho-tectonic units.

* (i) Continental passive margin sediments, (Tethyan -Zanskar-Spiti)
* (ii) Indus Suture Zone (Ophiolites and related sediments) Ladakh-Gangdese batholith (calc-alkaline magmatism)
* (iii) Shyok Suture Zone (suturing of magmatic arc and the Asian margin and Karakoram Granitic Complex

The present studies concentrated in three areas to unravel the geological evolution of the area.

**SHYOK – NUBRA**

* Shyok Suture Zone (SSZ) separates the Karakoram block (Eurasian Plate) from the Ladakh Oceanic Arc (Asian Plate)
* Ophiolitic mélange (volcano-sedimentary sequence with minor ultramafic rocks) observed along the Shyok-Nubra valleys.

**NIDAR OPHIOLITE**

* More or less complete igneous ophiolitic sequence.
* Flysch sediments including radiolarian chert.
* Mollasse sequence

**SPONTANG OPHIOLITE and Dras Volcanics**

* Ophiolite sequence with ultramafics
* Dras volcanics
* Flysch sediments

Geological investigations in this area have yielded significant insights concerning the timing and evolution of the SSZ-ITSZ, the mechanism of subduction, obduction and emplacement of the Supra-Subduction Ophiolite suite and evolution of processes associated with continental collision as well as products generated as a result. Studies indicate that the Indian-Asian plate collision is not a simple subduction of Indian plate below the latter, as earlier surmised, but is a result of complex evolutionary process involving multiple episodes of subduction along with associated magmatism.