

Paper Number: 467

Neo-Tectonic Evidences of Rejuvenation in Spiti Valley Fault, Lahaul and Spiti District, Northwestern Himalayas, India

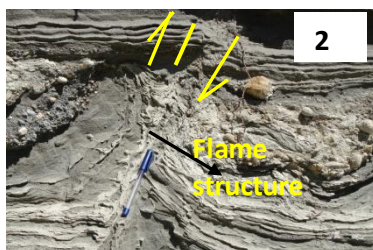
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The Himalayan region is dissected by several NW-SE trending regional and subsidiary thrusts, which are the foci of devastating earthquakes. The Lahaul and Spiti area falls under Tethys Himalayan tectogen. The Spiti Valley fault (SVF) is a NW-SE trending high angle strike fault.

The area exposes rock successions from Precambrian to Cretaceous age [1]. The Proterozoic Vaikrita Group is composed of granite gneiss, slates, and quartzites. The Palaeozoic sequence is dominated by sandstone, shale and carbonates with reef. The Mesozoic sequence is dominated by sandstone, shale, carbonate with reef. The Quaternary sediments include glacial/glacial-fluvial, fluvial, lacustrine and talus deposits, exposed on both banks of the Spiti river. The Spiti river from Rangrik to Lari along the Spiti valley fault was examined using field methods, satellite imagery, Thermo luminescence dating and Micro-earthquake monitoring. The aim of the study was to document evidences of neo-tectonic and seismic activity along Spiti Valley fault.

Paleoseismic activity has been recorded in fluvial and fluvial-lacustrine sediments resulting from liquefaction and fluidization (Figure 1) [2].



Slump folds

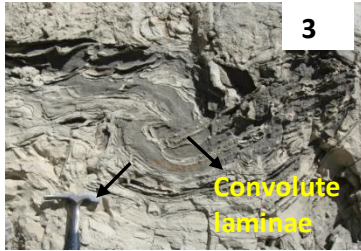


Figure 1: (1) Hydroplastic injection of fine silty clay sediment. (2) Faulted clay, sand sequence; silty clay material has been hydroplastically injected in overlying sand layer forming flame structure. (3) Soft sediment deformation structures: slump folds and convolute laminae

The reactivation of Spiti Valley fault was corroborated by Thermo luminescence (TL) dating and it was found that at least four seismic events took place at approximately 55, 14, 10 and 7 ka before present.

Microearthquake (MEQ) Monitoring study was conducted by a temporary seismic network of four stations. It shows that the seismicity is 1-2 events per day at Lalung, Rangrik and Tabo while at Mikkim it is one event in two days. The seismicity was comparatively higher in the north of the Spiti river, especially near Rangrik and Atargoo. The hypocentral depth section indicates that the majority of the earthquakes originated from depth range of 10-25 km (shallow focus).

From the present day landscape, seismites, TL dating and MEQ study we can conclude that the Spiti valley had been seismically active all through the Quaternary Period.

References:

- [1] Bassi UK et al. (1983) J Geol Soc India 24:281-290
- [2] Singh S and Jain AK (2007) Sediment Geol 196:47-57

