## Isotopic Evidence of mantle contribution to Ladakh Accretionary Prism (India)

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Numerous quartz and calcite veins cris-crossed 23 Ma old sedimentary sequences of the Ladakh Accretionary Prism (LAP). These veins were formed through the fault planes due to tectonic deformation. Knowledge of source of these vein fluids would constrain history of tectonic activity along the Indus Tsangpo Suture Zone (ITSZ) since penultimate stage of the Himalayan Orogeny and help validate its proposed models. The veins of LAP (transverse section from Indus thrust to Zanskar thrust) have been studied by analysing a suit of isotopes (C, O, Sr and Pb) to determine their source. The  $\delta^{13}$ C and  $\hat{\delta}^{18}$ O values of calcite veins are akin to the mantle field<sup>[3]</sup>, near Indus thrust, which were fractionated toward Zanskar thrust. The  $\delta^{13}C$  and  $\delta^{18}O$  composition of calcite veins from Indus thrust to Zanskar thrust varies from -13.2% to -0.7‰(VPDB) and 10‰ to 21.2‰(VSMOW) due to alteration/mixing processes. The  $\delta^{18}$ O values of quartz veins display a range of 12.9‰ to 23.5‰(VSMOW), confirming its magmatic source<sup>[2]</sup>. The <sup>87</sup>Sr/<sup>86</sup>Sr ratio of the calcite veins varies from 0.705 to 0.709 that becomes more radiogenic from Indus thrust to Zanskar thrust. <sup>87</sup>Sr/<sup>86</sup>Sr ratio of calcite near Indus thrust is about 0.705-0.707, showing affinity to the mantle field and is similar to the adjacent Ladakh magmatic arc (0.703-0.707)<sup>[4]</sup>. The 206Pb/204Pb ratio of these veins ranges from 18.5776 to 18.7542 whereas <sup>207</sup>Pb/<sup>204</sup>Pb ratio varies from 15.6402 to 15.7154. The <sup>208</sup>Pb/<sup>204</sup>Pb shows small variation in range from 38.8309 to 39.2225. Both Sr and Pb isotope compositions of these vein carbonates display close resemblance to Enrich Mantle 2 (EM2) field<sup>[1]</sup>.

This study indicates that the vein forming fluids are derived from the mantle through the downgoing slab of the Indian plate due to tectonic deformation. The isotopic study of the veins of LAP, for the first time, reveal the presence of mantle related fluid movement taking place post 23 Ma, confirming continued tectonic activity along this region even after penultimate stage of the Himalayan orogeny.

[1] Hart (1988) EPSL, 90, 273-296. [2] Smith et al (1991) GSA Bulletin, 103, 559-569 [3] Taylor et al (1967) GCA, 31, 407-430 [4] Weinberg and Dunlap (2000) The Journal of Geology, 108, 303-320