COSMOGENIC $^3$HE DATING OF GLACIAL LANDFORM: PRECISE TIMING OF HOLOCENE GLACIATION IN THE GANESH HIMAL, CENTRAL NEPAL.


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In the framework of a more general study of erosion rates in the Himalayas, we have developed measurements and use of cosmogenic $^3$He ($^3$He$_{c}$) in garnets from moraines and glacially polished bedrock surfaces in the Paldor glacier, Central Nepal. As a reference we have also measured $^{10}$Be$_{c}$ in coexisting quartz from the same samples. Cosmogenic $^3$He$_{c}$ concentrations were derived from helium measured in garnet corrected for inherited $^3$He$_{c}$ component from shielded garnets sampled in a nearby mine. Exposure ages derived from $^3$He$_{c}$ concentrations are 2.7 times higher than those derived from $^{10}$Be$_{c}$. Careful check of methods and examination of other coupled He-Be data reveal that the discrepancy is dependant of altitude and therefore that published $^3$He$_{c}$ He production rate at high altitude are underestimated. A new and more rigorous model of $^3$He$_{c}$ He production rate provides a good compatibility between garnet-$^3$He$_{c}$ and quartz-$^{10}$Be$_{c}$ exposure ages. This accurate procedure in garnet represents a new and precise tool to investigate exposure histories for young high elevation mountain surfaces as those related to the last glacial history. This method has been used to investigate Holocene glacial events of the Paldor glacier. Preliminary
\(^3\)He\(^c\) exposure ages (uncorrected for the snow cover) allow to identify precisely three stages: (i) a rapid retreat of the glacier occurred from 9 to 7 kyrs BP in the main valley, along a distance of 3000m and for an altitudinal range varying from 3450m to 3925m. (ii) Stagnation or slow recession between 7 and 6 kyrs BP and (iii) an acceleration of retreat at 5.5 kyrs BP. Comparable data for the western Himalaya show that main retreat occurs mainly between 13 and 8 kyrs. This first result suggests that glacier retreat in Central Himalaya is in the lower end of this time interval and is synchronous of the monsoon intensification around 9 kyrs documented in western Tibetan lakes.