Geophysical Research Abstracts, Vol. 9, 10648, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-10648

OSL and cosmogenic-ray nuclide dating of glacial advances in the Rongbuk Valley of Mt Everest, Tibet

R.A.J Robinson (1), L.A. Owen (2), D.I. Benn (1), R.C. Finkel (3), C. Yi (4), J.K. Putkonen (5), N. Davis (2), and L. Dewen, (4).

(1) School of Geography and Geosciences, University of St Andrews, St Andrews, Fife KY16 9AL, UK (rajr@st-andrews.ac.uk), (2) Department of Geology, University of Cincinnati, Cincinnati, Ohio 45221, (3) Center for Accelerator Mass Spectrometry, Lawrence Livermore National Laboratory, Livermore, CA 94550, USA, (4) Institute for Tibetan Plateau Research, Chinese Academy of Sciences, Beijing 100085, China, (5) Earth and Space Science, University of Washington, Seattle WA 98195, USA, (6) Nordic Laboratory for Luminescence Dating, Dept of Earth Sciences, University of Aarhus, Risø National Laboratory, DK4000 Roskilde, Denmark.

The Rongbuk Valley in Tibet is the main catchment draining the north face of Mt Everest and contains at least four suites of lateral and frontal moraines. Apart from one radiocarbon date, there is no chronology for the glacial sequences in this valley. However, the timing of glacial advances across the Himalayan region needs to be understood in order to document how global climate variability impacts the regional and local Himalayan glaciations. This includes determining glacial chronologies and constructing equilibrium line altitudes for sequences on both the northern and southern side of the Himalayas in order to evaluate the relative contributions of south Asian summer monsoon precipitation and mid-latitude cooling to glaciation.

We have combined OSL and ^{10}Be cosmogenic-ray nuclide dating to determine the timing of deposition of glacial debris and the surface exposure ages of moraine surfaces for several glacial advances in the Rongbuk valley. Quartz, primarily derived from the leucogranite bedrock of the catchment, was extracted from samples of subaerial debris flow deposits incorporated in moraine ridges, and from glaciofluvial and glaciolacustrine deposits for OSL dating. Leucogranite boulders ($\sim$70) exposed on moraine surfaces were sampled for ^{10}Be exposure dating. Nine OSL samples range in age from the early MIS 2 ($\sim$26ka) to global Late Glacial ($\sim$16ka) and the Holocene

(∼7ka and 2ka). Three samples (one for each moraine advance) give OSL ages of ∼38-40ka and are considered to be from older deposits (MIS 3) that were incorporated into younger glacial landforms. ^{10}Be exposure ages for the moraine sequences cluster around 21-28ka, 10-15ka, and 2.5ka, and 1.5ka. For three of the four moraines, the ^{10}Be ages are similar, but somewhat younger, than the OSL ages assuming an erosion rate of 2.7m/ma derived from bedrock samples. The OSL and ^{10}Be ages are internally consistent and similar to the timing of glacial advances in other parts of Tibet. Glaciers in the Rongbuk Valley retreated 5-6km between the local LGM (26-24ka) and Late Glacial time (16-15ka) and a further 6-8km by the mid-late Holocene (∼7ka and ∼2ka).