Geophysical Research Abstracts
Vol. 17, EGU2015-15847, 2015
EGU General Assembly 2015

In situ produced ^{10}Be depth profiles and luminescence data tracing climatic and tectonic control on terrace formation, Danube River, Central Europe, Hungary

Zsófia Ruszkiczay-Rüdiger (1), Régis Braucher (2), Ágnes Novothny (3), Gábor Csillag (4), László Fodor (5), Gábor Molnár (5), Balázs Madarász (6), and Aster Team (2)

(1) Hungarian Academy of Sciences (MTA); Research Centre for Astronomy and Earth Sciences, Institute for Geological and Geochemical Research, Budaörsi út 45. 1112 Budapest, Hungary, (2) Aix-Marseille University, CEREGE, CNRS-IRD UM34, BP 80, 13545 Aix-en-Provence Cedex 4, France, (3) Department of Physical Geography, Eötvös University, Pázmány P. sétány 1/C, 1117, Budapest, Hungary, (4) Geological and Geophysical Institute of Hungary, Stefánia út 14, 1143, Budapest, Hungary, (5) MTA-ELTE Geological, Geophysical and Space Research Group of the Hungarian Academy of Sciences at Eötvös University, Pázmány P. sétány 1/C, 1117, Budapest, Hungary, (6) Hungarian Academy of Sciences (MTA); Research Centre for Astronomy and Earth Sciences, Geographical Institute, Budaörsi út 45. 1112 Budapest, Hungary

The terrace sequence of the Hungarian part of the Danube valley preserves a record of varying tectonic uplift rates along the river course and throughout several climate stages. To establish the chronology of formation of these terraces, two different dating methods on alluvial terraces were used: 1) in situ produced cosmogenic ^{10}Be, which yield the time of abandonment of the terrace and 2) luminescence dating, which provides burial ages of the sediment. In situ produced cosmogenic ^{10}Be samples originated from vertical depth profiles to enable the determination of both the exposure time and the denudation rate at each locality. We used Monte Carlo approach to model the denudation rate-corrected exposure ages. Post-IR IRSL measurements were carried out on K-feldspar samples to obtain the ages of sedimentation.

The highest and oldest terrace remnants (tIV-VI) yield a minimum ^{10}Be exposure age of 800 ka close to MIS 22, the onset of major continental glaciations of Quaternary age, suggesting climatic signal of the abandonment of the uppermost terrace levels. For the lower terraces it was possible to reveal close correlation with MIS stages using IRSL ages. The new chronology enables the distinction of tIIb (60-110 ka; MIS 4-5d) and tIIIa (130-190 ka; MIS 6) in the study area. Surface denudation rates were well constrained by the cosmogenic ^{10}Be depth profiles between 5.9 m/Ma and 10.0 m/Ma for all terraces. Maximum incision rates of the Danube were calculated for middle and late Pleistocene times. These rates were increasing from west to east, toward the more elevated Transdanubian Range from 0.05 mm/a to 0.12 mm/a. Incision rates derived from the age of the low terraces (0.13 mm/a) may suggest a slight acceleration of uplift towards present.

Our research was supported by the OTKA PD83610, PD100315, NK60455, K062478, K83150 and F042799, the French-Hungarian Balaton-Tét Project (FR-32/2007; TÉT_11-2-2012-0005), the Bolyai János Scholarship of the Hungarian Academy of Sciences and by the "Lendület" program of the Hungarian Academy of Sciences (LP2012-27/2012).

The ^{10}Be measurements performed at the ASTER AMS national facility (CEREGE, Aix en Provence) were supported by the INSU/CNRS, the French Ministry of Research and Higher Education, IRD and CEA. The gamma-spectrometry measurements and part of the preparation of the luminescence samples were carried out at the Leibniz Institute for Applied Geophysics, Hannover, Germany.