

## Dating aeolian landforms using cosmogenic $^{10}\text{Be}$ in Hungary, Central Europe

Csillag G.<sup>1</sup>, Ruzkiczay-Rüdiger Zs.<sup>2</sup>, Braucher R.<sup>3</sup>, Fodor L.<sup>1</sup>, Dunai T.J.<sup>4</sup>, Bada G.<sup>5</sup>, Bourlés D.<sup>3</sup> and Müller P.<sup>1</sup>

<sup>1</sup>*Geological Institute of Hungary, Stefánia út 14, 1143, Budapest, Hungary, sillag@maf.hu, fodor@maf.hu*

<sup>2</sup>*Department of Physical Geography, Eötvös University, Pázmány P. sétány 1/C, 1117, Budapest, Hungary, rzsofi2@gmail.com*

<sup>3</sup>*CEREGE, UMR6635, CNRS, Aix Marseille Universités, BP80 13545, Aix en Provence, France, braucher@cerge.fr*

<sup>4</sup>*School of Geosciences, Institute of Geography, University of Edinburgh; Drummond street, Edinburgh, EH8 9XP, United Kingdom*

<sup>5</sup>*Department of Geophysics, Eötvös University, Pázmány P. sétány 1/C, 1117, Budapest, Hungary*

In the Western Pannonian Basin the widespread occurrence of ventifacts and large scale deflation features – like a system of yardangs, deflation hollows and basaltic buttes at least in part exposed by wind erosion – indicate strong wind activity during the Quaternary. This is supported by common presence of wind-blown sediments, like loess and aeolian sand. The Pleistocene glaciations are probably the most important periods of deflation, when the Pannonian Basin was a dry, periglacial area with scarce vegetation and strong winds. However, age of the wind-polished rock surfaces exposed on different geomorphic horizons of the Transdanubian Range – an uplifted low elevation (up to 750 m asl.) range in the Western Pannonian Basin – has remained unknown so far, although they can provide time constraints of landscape evolution. We used in situ produced cosmogenic  $^{10}\text{Be}$  to determine exposure time and denudation rate of wind-polished rock surfaces and regional (basin) scale denudation rates are also inferred. In view of surface samples only, minimum exposure ages assuming no denudation are ranging from 0.09 to 1.3 My with most of the ages between 100 and 400 ky. Considering the maximum denudation rates assuming that steady state is reached, yield to rates ranging from 0.36 to 8.42 m/My. In both assumptions, allowing for all surface samples, there is a weak, maybe apparent correlation between age and/or denudation rates versus altitude; saying that the higher is older and/or more resistant. Allowing for the maximum denudation rates of samples from the depth profiles one can observe that for the uppermost samples these rates are the same within uncertainties. This evidences the fact that steady state has been reached. However, for deepest samples, denudation rates become higher. This thus implies that steady state has not been reached at those depths. Accordingly, depth profiles allow determining simultaneously both denudation rate and exposure age. Measurements of  $^{10}\text{Be}$  concentrations along depth profiles of exposed, ventifacted rocks allow to derive a local denudation rate of 3.46-3.88 m/My and exposure ages as old as 1.5 My. Regional denudation, which occurred mainly via deflation of the loose sediments, varies between 40 and 80 m/My. Our results show that aeolian erosion in continental, periglacial areas of Central Europe played an important role in Quaternary landscape modification. Besides, the newly determined exposure ages are strong time constraints on the onset of denudation, exhumation of the Transdanubian Range, which is indicative of the minimum time of the uplift of the range.

## Ecological aspects of the operational Hail Suppression Project in Serbia

Ćurić M. and Janc D.

*Institute of Meteorology, University of Belgrade, 11000 Belgrade, Serbia, curic@ff.bg.ac.rs*

An analysis of the operational “Hail Suppression Project” in Serbia that used silver iodide dispensed from anti-hail rockets was performed for the period 1981-1986 in order to estimate the seeding agent amount reaching the surface of the target area in precipitation. The primary aim of our investigation is to estimate whether amounts of silver iodide exceeds the