Geophysical Research Abstracts,
Vol. 10, EGU2008-A-05183, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-05183
EGU General Assembly 2008

Rates of sheet erosion and gully head retreat compared in tectonically active areas - a study on growth rings in deciduous tree roots

M. Kázmér (1), G. Kóródy (1), B. Székely (2,3)

(1) Department of Palaeontology, Eötvös University, Budapest, Hungary, (2) Christian Doppler Laboratory, Institute of Remote Sensing and Photogrammetry, Vienna University of Technology, Vienna, Austria (3) Dept. of Geophysics and Space Science, Eötvös University, Budapest, Hungary (mkazmer@gmail.com)

Growth of tree roots is initiated under soil cover. Erosion due to natural or man-made processes exhume roots. Growth increments (rings) indicates the time passed since root formation, and is used here to assess erosion rate in various geomorphological situations.

We measured slope tilt, elevation of roots of deciduous trees above soil surface, and position of roots within gullies. Disks were sawed from exhumed roots, prepared by standard techniques, and tree rings were counted under the microscope.

Elevation of root pith above soil surface (measured in mm) was subdivided by cambial age of root, to yield erosion rate in mm/year. This is a minimum rate only, since we don't know the original position of roots within the soil.

We applied this method to measure erosion rate at localities selected for industrial interests or supposed tectonic activity.

Erosion rate measurement was carried out at Bátaapáti low- end medium level nuclear waste repository site. Measured ages of 82 exhumed roots range from 4 years to 42 years in age. 0.7 to 10.8 mm/yr sheet erosion rate was calculated on loess and loose sandstone as function of slope angle.

At Budaörs ages of 42 exhumed roots range from 20 to 60 years in age. One to 3

mm/yr sheet erosion rate was calculated on a 30-40 degrees steep slope of loosely cemented sandstone.

At Jeno 30 roots range from 8 to 47 years in age. 1.7 mm/yr average erosion was calculated (with extremes up to 5 mm/yr).

Gully retreat into forested hillslopes, into partially reforested former wineyards and formerly ploughed land at Bátaapáti ranges from 30 to more than 5000(!) mm/yr, dependent on local conditions. Dissection of landforms is expected in the near future, therefore proper precautions are advisable when planning hazardous facilities.

Gully headcut erosion rate is 1 to 3 magnitudes higher than sheet erosion rate. Also, this process is more prone to produce spectacular landforms, and more dangerous to man-made objects due to concentrated removal of soil and rock than sheet erosion. Still, sheet erosion is responsible for more material removed, and ultimately for more material deposited than gully headcut retreat.

Supported by Hungarian National Science Foundation (OTKA) grants T43666, T47104, K67583, ETV- ERŐTERV, and Hungarian Geological Institute.