Geophysical Research Abstracts
Vol. 14, EGU2012-6948, 2012
EGU General Assembly 2012


# Reconstruction of landslide activity by tree-ring analysis - a case study for Jiufangshan landslide, Gansu

T. Hong (1), S.B. Bai (1,2), J. Wang (1,2), B. Thiebes (1), and Z.G. Zhang (1)

(1) School of Geography Science, Nanjing Normal University, Nanjing 210046, (2) Key Laboratory of Virtual Geographical Environment (Ministry of Education), Nanjing Normal University

The understanding of geomorphic processes and knowledge of past events are important elements for the assessment of natural hazards. With the increased damage due to landslides and debris-flows in recent years, risk management and evaluation of geological disasters received more attention. The analysis of tree-ring data has widely been used to facilitate landslide research, and in particular the dating of previous process activations. Tree-ring analysis has been proven to be able to precisely determine the time of landslide failure in previous studies.

The main goal of this research is the investigations of previous reactivation phases for the large Jiufangshan landslide using tree-ring analysis. The study area of the described investigations is located in Wudu District of south of Gansu Province in Northwestern China. The landslide has a length of 1050 m and a width of 400 m. The maximum elevation is 1320 m while the lowest elevation is 876 m. The mean slope angle is 40°. Local archives report several reactivation phases of Jiufangshan landslide which mostly occurred in the rainy season. In addition to heavy precipitation, seismic shaking and poorly adapted irrigation activities are likely triggers.

In the field, a standard borer was used to drill pine trees on the landslide body and to extract samples. Samples were taken to the laboratory and tree-rings were measured by microscope analysis. To distinguish regular years from years with growth anomalies the following method was applied: every year with a 40% smaller or 50% larger tree ring than observed in the four previous years was determined as a year of growth reduction or growth recovery, respectively. Growth anomalies which could be observed for three or more successive years, were interpreted as a result of landslide activity.
The preliminary results show eccentric wood and false rings in the tree-ring samples. Particular periods of abrupt growth reduction or growth recovery can be found for 1980-1982, 1984-1987 and 1991-1993. It is assumed that these anomalies in the tree-ring samples are related to landslide reactivation. At least for the period 1992 to 1993 this could be validated by local archive data.

Keywords: Tree-ring analysis, Jiufangshan landslide, landslide dating, Wudu District, China