Geophysical Research Abstracts, Vol. 9, 02134, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-02134

Dendroecological analysis of the impact of debris flows on a high montane forest ecosystem: a case study in the Northern Limestone Alps (Tyrol, Austria)

P. Zangerle and **W. Oberhuber**
Institute of Botany, University of Innsbruck, Austria (walter.oberhuber@uibk.ac.at)

Radial growth variability and response to debris flows were studied on an alluvial fan (*c.* 2 ha) covered by Norway spruce (*Picea abies* [L.] Karst.) and scattered sycamore maple (*Acer pseudoplatanus* L.). The study area (*c.* 1200 m a.s.l.) is situated in the Northern Limestone Alps (Karwendel, Tyrol, Austria) and is characterized by recurrent substantial debris flows triggered by heavy rain fall.

Ring width chronologies from three *Picea abies* stands including 23 dead standing trees and *Acer pseudoplatanus* (n = 12) as well as an undisturbed *Picea abies* stand nearby, representing climatically driven tree growth of the study area, were developed. Tree-ring growth data from a total of 115 trees (218 cores) were analyzed. Dating of debris flows were based on aerial views of the study area and evaluation of heavy rain fall events in local climate records dating back to 1896.

Pearson correlations between residual chronologies and climate variables revealed that *Picea abies* growth appears to be primarily limited by cool summers (May-July). Concurrent abrupt growth depressions in selected stands due to debris flows were not apparent in increment series during the last 100 yr. On the other hand, annual increments of dead trees revealed that individual tree mortality was predominantly a long-term process caused by damage of the root system due to tilting in course of debris flows. Hence, we suppose that successive burying of surviving trees in the past stabilized stems against tilting and subsequent impairment of the adventitious root system developed *c.* 1 m below the soil surface.

Radial growth data also revealed that annual increments of *Acer pseudoplatanus* successively diverge from *Picea abies* growth during last decades, indicating higher resis-

tance of the former species against long-term burying. Furthermore, a sudden growth release was detected in several ring width series around 1890, which possibly represents improved growth conditions due to removal of dominant neighbouring trees by an exceptional flow event. This is supported by age structure analysis of selected stands, which revealed a widespread re-colonization of the alluvial fan at this time.