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Wildfire frequency and its impacts on vegetation and soil in the north-eastern Alps

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On the south-exposed slopes of the northern Austrian Alps, wildfires are surprisingly widespread. In the subalpine belt, the fires cause severe damage to vegetation and soil. The organic-rich rendzic soils may be almost completely destroyed and vegetation is degraded for decades or centuries. We investigate the role of fire on landscape dynamics in the area, which includes historical aspects, vegetation succession, soil development and chemistry as well as erosional processes. One of the pivotal questions is the fire frequency under natural and anthopogenically disturbed conditions. We are studying historical fires by investigations in archives, forest offices and neighbouring communities, by 14C dating of charcoal fragments in soils and by pollen/charcoal analysis in adjacent mires.

The archive information on historical fires is very incomplete, with a strong bias of the number of fires towards the better reported and investigated 20th century. Many large burns in the study area occurred in the 1940's while in the second half of the 20th century, the number of fires markedly decreases due to improved fire fighting. However, some of the earlier fires (e.g. 1705, 1865) are reported to have had an enormous extent.

Charcoal fragments are found in many positions on the slopes. Due to erosion and relocation, it is difficult to reconstruct the extent of past fires from the charcoal distribution. Even if charred fragments are reduced in size, decomposed and eroded, the biochemical signatures of pyrogenic carbon can still be found in the soils of the slopes and in adjacent talus deposits. Regardless of effects of attenuation and erosion, it seems that virtually every position in the study area has been affected by wildfires in the past. Due to a combination of historical records and 14C datings, a mean fire interval of 200-300 years (five fires in c. 1200 years) was estimated for selected slopes. This value is in the same order of magnitude as the fire frequencies reported from central Switzerland, an area which was thought to be much more prone to wildfires. If these first estimates can be confirmed by further work, considerable impact on the climax vegetation has to be expected.

In order to establish the un-biased long-term fire frequency of the area, peat cores have been obtained at three mires in the wider study area which probably date back to the Late Glacial. High-resolution pollen and charcoal analysis is currently carried out. This will enable us to compare the current fire frequency as derived from historical records with the long-term natural background values. First results will be presented at the meeting.