



Analysis and modelling of tree succession on the 1991 Randa rockslide (Switzerland)

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In 1991, a rockslide with a size of 30 x 106 m³ destroyed parts of Randa, a village in the canton of Valais (Switzerland). The local scenery is currently dominated by the massive talus cone stretching from ca. 1300 to 1500 m a.s.l. After the massive rockslide event, it was decided to leave the deposits unchanged to offer scientists to study the case. The focal point of this study was to reconstruct and model colonisation of the deposits and growth of trees, mainly larches (*Larix decidua*), birches (*Betula alba*), and spruces (*Picea abies*). The study area of 12.3 ha (18% of the cone) was divided into homogeneous plots, of which each is characterised by its substratum type, altitude, aspect, and slope; elements that can influence density and growth of vegetation. For a total of 171 plots, 84 were mapped as having a substratum of large blocks ($\geq 50\%$ of blocks with diameters > 1 m), 40 as having a substratum of medium and small blocks ($\geq 50\%$ of blocks with diameters 1–0.3 m), and 47 as having a substratum of fine grained debris and silt ($\geq 50\%$ of material with diameters < 0.3 m). By means of counting bud-scale scars and radial growth rings from 50,062 larches, birches and spruces, tree age, primary succession and colonisation rates were studied. The oldest trees were found on a substratum of large blocks, where tree recolonisation started already two years following the rockslide event. Comparison of our data with related studies shows that the colonisation of the rockslide surface developed 3 to 17 times faster than on other recently formed surfaces in the Alps (e.g., glacier forefields). Birch and larch are clearly the dominant species over the entire deposit and within the different substratum types, with differences between their respective abundance apparently diminishing with grain size. Highest tree densities were registered on fine-grained debris and silt. Tree height seems to be mainly correlated with tree age for all species, but also other variables such as tree density affected tree height. The findings of the Randa case study will help to increase dating accuracy of comparable but older rockslide deposits in the Alps.