Geophysical Research Abstracts
Vol. 14, EGU2012-7512, 2012
EGU General Assembly 2012

The Oeschinensee rock avalanche: reconstruction and dating of a prehistoric event

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Some of the most dramatic examples of alpine rock avalanches can be found in the Kandersteg area of the central Swiss Alps. Most of these slope failures have been interpreted to be late- or postglacial in age, however the precise failure timing is rarely known. Here we present a case study of the prehistoric Oeschinensee rock avalanche, whose deposit dams the lake Oeschinen in the UNESCO world heritage site Jungfrau-Aletsch-Bietschhorn. Detailed field investigations revealed a deposit area of roughly 1.8 million m2, composed of scattered and fractured blocks and large boulders, which is in places more than 100 m thick. The release area consists of an inclined sliding plane (dipping about 35 degrees) and steep rock cliff on the southern side of the valley above the lake. Preliminary estimates show that the failure released roughly 135 million m3 of sedimentary rock, which travelled first across the valley then turned downstream. We investigate geomorphological features and the distribution of material within the rock avalanche deposit, and in addition reconstruct past topography and model the event runout to determine relevant physical and frictional flow parameters. We then use Cl-36 cosmogenic surface exposure dating of boulders on top of the deposit to determine the age of the failure. These results will help clarify when the rock avalanche occurred, the failure scenario in relation to deglaciation and changing climate, and the age of formation of the lake Oeschinen.