



Paraglacial rock mass movements in response to glacier retreat. Examples from Aletsch Glacier, Swiss Alps

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The pronounced recent glacier retreat observed for most mountain regions of the world leads to glacier volume losses in particular in the glacier terminus sections. The related debutressing of the adjacent valley flanks may under certain geological conditions cause a number of types of slope instabilities, not least deep-seated rock mass movements. Such rock slides increasingly present problems and threats to mountain infrastructure. The tongue of Aletsch Glacier, Switzerland, appears as a natural laboratory for such mass movements due to the significant glacier thickness loss and the geologic conditions found. A number of rock mass movements is currently active in the area.

A combination of field mappings, GPS and terrestrial surveys, digital photogrammetry based on repeat imagery, and satellite radar interferometry was applied to two rock mass creeps at Aletsch Glacier. At the glacier section studied, Aletsch Glacier lost about 200 m in ice thickness between 1850 and 1976 (-1.5 m/yr), 50 m between 1976 and 1995 (-2.5 m/yr), and 60 m between 1995 and 2006 (-6 m/yr). One of the instable rock masses studied (c. 0.5 km² in area) moved with velocities of 0.1 m/yr and more in average since 1976. The other mass (c. 1 km² in area) showed in the recent years an exponentially increasing acceleration towards close to 0.3 m/yr in 2008.

In this contribution we present and discuss the measurement results, and draw general conclusions for measurement methodology and hazard management.