Geophysical Research Abstracts, Vol. 9, 07093, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-07093

The role of pre-existing ductile and brittle fabrics in the development of large rockslides: examples from Norway.

A. Saintot (1), I. Henderson (1) & M.-H. Derron (1)
Geological Survey of Norway, Leif Eirikssons Vei 39, N-7491 Trondheim.

The bedrock geology of Norway reveals an extremely complex and protracted history which would intuitively have a strong influence on the spatial distribution of rockslide vulnerable areas. However, such influences are not well documented on a national or international scale. We present examples of the different ways in which the pre-existing geology can directly affect the development of rockslides. Norway is mainly covered by Lower Paleozoic and Precambrian rocks, which have been intensively deformed in subsequent and very large successive tectonic events; namely several poorly documented Precambrian events, the Caledonian orogeny, Devonian, Permo-Triassic and Jurassic rifting phases and the opening of the North Atlantic Ocean. Most recently Norway has undergone significant post-glacial rebound and a yet poorly documented Neotectonic activity. The uplift of Norway has brought the tectonically highly deformed rocks to the surface and in addition, the deep incision of glaciers has produced steep slopes. This has especially occurred in the coastal fjord areas of Norway and makes these areas especially vulnerable to rockslide activity. In such massive bedrocks, large rockslides can develop only if zones of weakness are present. It is then important to investigate how the complex interplay of the ductile and brittle structures has produced zones of weakness. The density, geometry and the nature of these structures have to be considered. We present national wide examples of rockslides that developed with inherited structures from Troms, Møre and Romsdal and the Sogn Fjordane regions of Norway. Recognized pre-existing structures affecting the slope stability are for examples: basal shear plane developed along mica-rich layer when foliation dips towards the fjord, back-crack fractures along hinges of upright anticlines, basal shear plane developed along axial planes of folds dipping towards the fjord, or large brecciated faults that detached blocks from their sides (acting as

transfer faults). Another important parameter to take into account to explain the high density of rockslides in some regions of Norway is the amount of precipitation leading to water circulation into the fractured rocks (with a value of 2250 mm/year in Bergen region). In the Storfjord area, Western Norway, 40 potential large rockslides, i.e. with volumes from 2 to 40 millions m^3, are present on a 360 km^2 surface. This high density of potential rockslides is to a very high degree linked to (1) the steep slope of the coastal areas (2) the high density of ductile and brittle structures of its rocks (3) the high rate of precipitations. Norway is definitively a place of choice to investigate the role of pre-existing ductile structures in the development of large rockslides.