Geophysical Research Abstracts, Vol. 9, 02541, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-02541

The influence of bedrock geology on landslide susceptibility: a regional approach from Storfjorden in western Norway

I. Henderson & A. Saintot
Geological Survey of Norway, 7491 Trondheim, Norway.

The western coast of Norway is particularly vulnerable to active rockslide development due to the recent post-glacial uplift and the deep incision of the fjords created by glacial activity. On a regional scale, we examine the influence of structural geology on landslide susceptibility related to large rock avalanches in the Storfjorden area, where several historical rock avalanches and related tsunamis have led to disasters with many people killed. Geological studies in the fjords have also shown that such large-scale events are relatively frequent in the region. The investigated area is 360 km^2 and comprises Sunnylyvsfjorden, Geirangerfjorden, Norddalsfjorden, Tafjorden and the southern part of Storfjorden and includes the potential landslide sites of Åknes and Heggursaksla. We have examined 48 potential landslide sites within this area, which were initially identified from aerial photos, in order to determine if a series of particular geological factors are important for landslide evolution. From this we construct a predictive geometrical model for the development of landslides within the area. Regional foliation mapping has shown a series of complex recumbent isoclinal folds in the host granodioritic to dioritic gneisses, where the average dip of the foliation is between 20-40˚. The fjord system in Storfjorden consists of several east-west and several north-south trending fjords. At many sites, we have observed basal planes of possible rockslides developed parallel to foliation. Therefore, the orientation of the foliation with respect to the fjord can result in geometrically different types of landslide geometry and related hazard. Detailed structural fieldwork has demonstrated that classic 'toppling' geometries make up the smallest volumes of potential landslides and in particular in specific areas where the foliation dips in the opposite direction to the fjord. Rockslides display the largest potential landslide volumes and occur specifically where the pre-existing structural geometries are favourable. i.e. where the foliation

dips between 20-35˚ *towards the fjord*. This allows for the construction of a predictive spatial-geometrical model for the development of large rockslides in the Storfjorden area. We determine that several critical factors must be present for the development of large potential rockslides: 1) Foliation orientation with respect to the fjord. 2) A Basal Shear Plane (BSP) at the base of the block. 3) The presence of a fault breccia on the BSP. 4) The presence of exfoliation which weakens the BSP. 5) The presence of a steep extensional fracture at the back of the detached block. 6) The presence of transfer faults with strikes parallel to the movement direction of the block. We present a geometrical model for the development and predicted location of the largest potential rockslides in the Storfjorden area based on regional patterns of these structures.