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DISSERTATION TITLE:	Debris flows - Initiation conditions and impact on functionality of Norwegian road network

The Norwegian road network is exposed to debris flows in large parts of the country, particularly at the steep hillsides of the west coast. Debris flows are landslide processes associated with fast downward movements of slope material consisting of poorly sorted particles transported by a large quantity of water. Due to their high velocities, debris flows can be regarded as one of the most destructive mass wasting processes. In Norway the road network is frequently affected by debris flows causing route closures and traffic disruption, and may also cause severe traffic accidents.

The aim of this PhD thesis is to analyze the risk posed by debris flows to the functionality of the Norwegian road network. To quantify the associated risk, the initiation conditions of debris flows are assessed. This is accomplished by relating critical initiation conditions (rainfall, snow melt) to documented debris flow events in the past, and country-wide critical hydro-meteorological threshold maps are established.
Trigger frequency maps are calculated from daily hydro-meteorological data for the time period 1981-2010. In a second step, the regional susceptibility to debris flows is analyzed for a test area in western Norway. It is found that slope and contributing catchment area are the main topographic parameters that control debris flow initiation. Finally, the calculated trigger frequency and topographic susceptibility maps are input for a hazard analysis in southern Norway.

The impact of debris flow hazards on the functionality of the road network is quantified as total additional annual traffic load expressed in vehicle kilometers. Scenarios illustrate that the information status of drivers is crucial to minimize the debris flow related route failure risk. The risk estimates may contribute to the safety on roads by identifying critical road sections, both in terms of debris flow likelihood and excess distances.