# The origins of large, coastal, paleo-landslides in central Sweden

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Numerous large landslides, generally greater than one km in either length or width, have been recently discovered with the aid of LiDAR imagery. The presence of old landslides can indicate current instability. To assess the potential hazard associated with such landslides, it is necessary to understand the geology of the sites and the conditions that led to the landslides. Even apparently relic landslides may present hazards under changing climatic conditions.

Four such landslides were selected for study including a combination of, geomorphic, stratigraphic, and geotechnical investigations. All of these landslides occurred below the post-glacial marine limit and in settings that involve sand or gravel overlain by fine-grained sediments. Given the geologic settings, these landslides may be related to 1) sensitive clays, 2) hydrologic conditions, or 3) paleo-seismicity, each of which presents a different risk factor.

Results of the geomorphic investigation indicate the landslides are long runout features suggestive of a submarine origin. This, coupled with well-preserved and apparently not wave washed scarps, indicates that these landslides occurred at their respective shorelines. Thus, they are early Holocene in age. Preliminary stratigraphic results from an ongoing drilling campaign indicate that sliding occurred along the tops of confined aquifers. At the time of the landslides, the recharge areas of the aquifers would have been recently emerged above sea level. We hypothesize that these upland recharge areas were critical in generating water pressures significant enough to destabilize the coastlines and near-shore areas. At some locations, loading of the slopes with several meters of littoral sand would have also contributed to increased pore pressures in the confined aquifers.