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Integrated slope stability and sliding susceptibility assessment of the Jasmund cliff area (Rügen Island, Germany)

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The famous Jasmund Cliff of the Rügen Island in Germany is composed of soft, intensely jointed, chalky Cretaceous rocks that are in many parts psoeudoconcordantly overlain by Pleistocene glacial deposits, consisting of clay, till and sand. Both stratigraphic successions have undergone strong subglacial deformations in the late Quaternary, resulting in tight folding and shearing of the Pleistocene deposits and thrusting and more open folding of the Cretaceous chalkstones.

Since the last glacial period, the Jasmund Cliff is subject to mass movements. The stability of the Cretaceous chalk is mostly controlled by the orientation and condition of discontinuities (joints, bedding planes), while the sliding susceptibility of the Pleistocene sediments is mainly governed by their structural position, geomorphological setting and material composition. The slope instabilities in the vicinity of the Jasmund Cliff have an elevated risk potential when endangering constructed areas or infrastructure and safety of the National Park Jasmund of Rügen.

We present preliminary results of an integrated, spatially distributed slope failure susceptibility and landslide hazard assessment of the Jasmund Cliff area. Based on a detailed geological cliff record, geomorphological and landslide inventory mapping, and structural geological as well as slope mass material analysis, we evaluate the landslide susceptibility and cliff slope stability of a pilot study area both with physically based and statistical, landslide inventory based methodologies and a combination of

these. First results indicate that our assessment will be useful for predictive terrain stability analysis of the Jasmund Cliff area and can be used to determine critical slope portions that will be further investigated by long-term monitoring with a terrestrial laser scanner.