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Landslide prediction system in Slovenia (Masprem)

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The landslide prediction system MASPREM has been developed in 2013 to (1) predict rainfall induced landslides on national and local level and (2) inform Civil Protection agency and inhabitants of an increased probability of landslide occurrences. A landslide prediction system on national level integrates three major components: (1) a landslide susceptibility map; (2) landslide triggering rainfall threshold values and (3) precipitation forecasting model's (i.e. ALADIN, INCA). Landslide prediction is also calculated on a local level, including exposure maps of inhabitants, buildings and different types of infrastructure to potential landslide occurrence at a scale of 1: 25,000 for 14 selected municipalities.
MASPREM system runs in a 12 hour cycling mode, for 24 hours ahead. The results of the probability of landslide models are classified into five classes, with values ranging from one to five; where class one represents areas with a negligible landslide probability and class five areas with a very high landslide probability. It is a fully automated system based on open source software (PostgreSQL) and web applications for displaying results (Java, GDAL). When precipitation forecasting models are transferred to the GeoZS server the conversion process to raster data starts, stores data in a PostgreSQL database and performs the calculation. Based on final results, the WMS service that is responsible for the distribution of data through the service for download and review of results in a web application is created.
In the period, from September 2013 to August 2016, MASPREM gave an alert about the probability of landslide occurrences in 84 cases. While the system has potential to become operational in use after the validation phase, there are also limitations related to the input data that should not be neglected: spatial resolution of the ALADIN model, the incomplete landslide inventory that is important for the validation, defining how many days of antecedent rainfall significantly influence the landslide occurrences, characteristic of lithological units according to water contents. Despite the limitations currently affecting the landslide prediction system, results show that the system demonstrates capability in predicting rainfall induced landslides. When the validation phase will be finished and the certainty of system will be high enough, the system will be able to inform infrastructure owners, civil agencies, and operators of potential landslide hazards.

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