



Validating the usability of an interactive Earth Observation based web service for landslide investigation

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Regional authorities and infrastructure maintainers in almost all mountainous regions of the Earth need detailed and up-to-date landslide inventories for hazard and risk management. Landslide inventories usually are compiled through ground surveys and manual image interpretation following landslide triggering events. We developed a web service that uses Earth Observation (EO) data to support the mapping and monitoring tasks for improving the collection of landslide information. The planned validation of the EO-based web service does not only cover the analysis of the achievable landslide information quality but also the usability and user friendliness of the user interface. The underlying validation criteria are based on the user requirements and the defined tasks and aims in the work description of the FFG project Land@Slide (EO-based landslide mapping: from methodological developments to automated web-based information delivery). The service will be validated in collaboration with stakeholders, decision makers and experts. Users are requested to test the web service functionality and give feedback with a web-based questionnaire by following the subsequently described workflow.

The users will operate the web-service via the responsive user interface and can extract landslide information from EO data. They compare it to reference data for quality assessment, for monitoring changes and for assessing landslide-affected infrastructure. An overview page lets the user explore a list of example projects with resulting landslide maps and mapping workflow descriptions. The example projects include mapped landslides in several test areas in Austria and Northern Italy. Landslides were extracted from high resolution (HR) and very high resolution (VHR) satellite imagery, such as Landsat, Sentinel-2, SPOT-5, WorldView-2/3 or Pléiades. The user can create his/her own project by selecting available satellite imagery or by uploading new data. Subsequently, a new landslide extraction workflow can be initiated through the functionality that the web service provides: (1) a segmentation of the image into spectrally homogeneous objects, (2) a classification of the objects into landslide and non-landslide areas and (3) an editing tool for the manual refinement of extracted landslide boundaries. In addition, the user interface of the web service provides tools that enable the user (4) to perform a monitoring that identifies changes between landslide maps of different points in time, (5) to perform a validation of the landslide maps by comparing them to reference data, and (6) to perform an assessment of affected infrastructure by comparing the landslide maps to respective infrastructure data.

After exploring the web service functionality, the users are asked to fill in the online validation protocol in form of a questionnaire in order to provide their feedback. Concerning usability, we evaluate how intuitive the web service functionality can be operated, how well the integrated help information guides the users, and what kind of background information, e.g. remote sensing concepts and theory, is necessary for a practitioner to fully exploit the value of EO data. The feedback will be used for improving the user interface and for the implementation of additional functionality.