A logical framework for ranking landslide inventory maps

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Landslides inventory maps are essential for quantitative landslide hazard and risk assessments, and for geomorphological and ecological studies. Landslide maps, including geomorphological, event based, multi-temporal, and seasonal inventory maps, are most commonly prepared through the visual interpretation of (i) monoscopic and stereoscopic aerial photographs, (ii) satellite images, (iii) LiDAR derived images, aided by more or less extensive field surveys. Landslide inventory maps are the basic information for a number of different scientific, technical and civil protection purposes, such as: (i) quantitative geomorphic analyses, (ii) erosion studies, (iii) deriving landslide statistics, (iv) urban development planning (v) landslide susceptibility, hazard and risk evaluation, and (vi) landslide monitoring systems. Despite several decades of activity in landslide inventory making, still no worldwide-accepted standards, best practices and protocols exist for the ranking and the production of landslide inventory maps. Standards for the preparation (and/or ranking) of landslide inventories should indicate the minimum amount of information for a landslide inventory map, given the scale, the type of images, the instrumentation available, and the available ancillary data.

We recently attempted at a systematic description and evaluation of a total of 22 geomorphological inventories, 6 multi-temporal inventories, 10 event inventories, and 3 seasonal inventories, in the scale range between 1:10,000 and 1:500,000, prepared for areas in different geological and geomorphological settings. All of the analysed inventories were carried out by using image interpretation techniques, or field surveys. Firstly, a detailed characterisation was performed for each landslide inventory, mainly collecting metadata related (i) to the amount of information used for preparing the landslide inventory (i.e. images used, instrumentation, ancillary data, digitalisation method, legend, validation), and (ii) to the skills of the working team (i.e. number of operators, experience, and how much the team is multidisciplinary). Secondly, a relational database has been produced to rank the landslide inventories on the basis of the collected metadata. The organisation of the database will allow a systematic aggregation of the metadata (logical framework), in order to define the standards for the preparation of landslide inventories, and a ranking scheme for each type of landslide inventory map. Furthermore, each landslide inventory will be analysed in terms of its limitations and applicability.

We expect this work to have a broad potential interest in the landslide community, since a very large number of activities are carried out assuming the correctness of landslide inventory maps, such as (i) validation of landslide inventories produced by automatic and semi-automatic classification of remote sensing images, (ii) quantitative landslide hazard and risk assessment.