MorphoSAT – Automated geomorpological mapping based on satellite data

Clemens Eisank (1), Frederic Petrini-Monteferri (2), Gertraud Meißl (3), Sebastian d'Oleire-Oltmanns (4), Filippo Vecchiotti (5), Volker Wichmann (2), Christian Georges (2), Arben Kociu (5), and Johann Stötter (3)

(1) GRID-IT, Innsbruck, Austria, (2) Laserdata, Innsbruck, Austria, (3) Institute of Geography, University of Innsbruck, Innsbruck, Austria, (4) Interfaculty Department of Geoinformatics - Z_GIS, University of Salzburg, Salzburg, Austria, (5) Geological Survey of Austria (GBA), Vienna, Austria

GIS-ready geomorphological maps and information are required by decision makers, spatial planners, energy companies and others, as they support various applications such as natural hazard zonation, water management, land conservation, as well as exploration and management of natural resources. Traditional symbol-based maps cannot be integrated into a GIS. By applying automated methods such as object-based image analysis (OBIA) to DEMs and satellite imagery from recent missions, GIS-ready geomorphological information at various spatial scales can be derived automatically. With the availability of new consistent near-global high-resolution satellite data and products, the time is right to increase objectivity, applicability and automation in the field of digital geomorphological mapping with the main aim to produce consistent, objective and GIS-ready geomorphological maps at regional/near-global scales.

The MorphoSAT project (FFG-ASAP, no. 859727) implements and validates an innovative system for automated mapping of selected geomorphological feature types such as alluvial fans and landslides. The feature types have been qualitatively and quantitatively specified a priori. The workflow exploits and integrates recent (near-)global consistent satellite data and products (WorldDEM, Sentinel-2, Copernicus land services, etc.). The project involves experts and stakeholders in the specification and validation phase to ensure that MorphoSAT outcomes (GIS-ready geomorphological feature maps and mapping tools) are targeted to user needs. The project will propose new standards for geomorphological mapping in terms of input data, segmentation and classification strategy, and knowledge integration. The MorphoSAT geomorphological mapping system is expected to be significantly more objective, interoperable and spatially independent than previous workflows, and therefore, will enable large-scale production of semantically-rich geomorphological information.