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Earth sciences, GIS and geomatics for natural hazards assessment and risks mitigation: a civil protection perspective

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Geo-information and remote sensing are proper tools to enhance functional strategies for increasing awareness on natural hazards and risks and for supporting research and operational activities devoted to disaster reduction.
An improved Earth Sciences knowledge coupled with Geomatics advanced technologies has been developed by the joint research group and applied by the ITHACA (Information Technology for Humanitarian Assistance, Cooperation and Action) centre, within its partnership with the UN World Food Programme (WFP) with the goal of reducing human, social, economic and environmental losses due to natural hazards and related disasters. By cooperating with local and regional authorities (Municipalities, Centro Funzionale of the Aosta Valley, Civil Protection Agency of Regione Piemonte), data on natural hazards and risks have been collected, compared to national and global data, then interpreted for helping communities and civil protection agencies of sensitive mountain regions to make strategic choices and decisions to better mitigation and adaption measures.
To enhance the application of GIS and Remote-sensing technologies for geothematic mapping of geological and geomorphological risks of mountain territories of Europe and Developing Countries, research activities led to the collection and evaluation of data from scientific literature and historical technical archives, for the definition of predisposing/triggering factors and evolutionary processes of natural instability phenomena (landslides, floods, storms, ...) and for the design and implementation of early-warning and early-impact systems.
Geodatabases, Remote Sensing and Mobile-GIS applications were developed to perform analysis of : 1) large climate-related disaster (Hurricane Mitch, Central America), by the application of remote sensing techniques, either for early warning or mitigation measures at the national and international scale; 2) distribution of slope instabilities at the regional scale (Aosta Valley, NW-Italy), for preventing and recovering measures; 3) geological and geomorphological controlling factors of seismicity, to provide microzonation maps and scenarios for co-seismic response of instable zones (Dronero, NW- Italian Alps); 4) earthquake effects on ground and infrastructures, in order to register early assessment for awareness situations and for compile damage inventories (Asti-Alessandria seismic events, 2000, 2001, 2003).
The research results has been able to substantiate early warning models by structuring geodatabases on natural disasters, and to support humanitarian relief and disaster management activities by creating and testing SRG2, a mobile-GIS application for field-data collection on natural hazards and risks.