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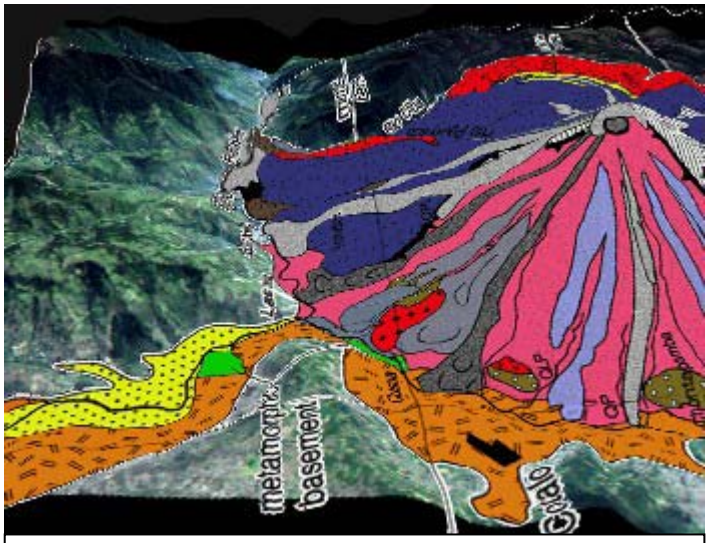
Geo-spatial Dynamic Response Assessment Tool (GeoDRAT)

Introduction: Based on the available records and data of the extent of historical eruption products in a region surrounding a volcano, the proposed research provides a scientific framework to create a practical assessment tool for volcano hazard evaluation: The Geo-spatial Dynamic Response Assessment Tool (GeoDRAT). This new type of dynamic assessment tool is based on Geographical Information System (GIS) technology and is customized for its specific purpose of evaluating various likely hazard scenarios in a volcano landscape. GeoDRAT is a platform for communication among various interest groups, such as civil protection authorities, government officials, scientists, and stakeholders, for efficient assessment and management of risks related to volcanic hazards. It has low input requirements but provides max output for rapid analysis and decision-making.



GeoDRAT enables overlaying various data layers in 3D.

In our case study of Tungurahua Volcano in Ecuador (see figure) we supplied GeoWEPP with data from a volcanic map, a terrain model (Digital Elevation Model), satellite images, a hazard map, and other GIS data layers. In the future we will also incorporate computer simulations of flow models, ash fallout, and probability analysis of events. Field studies and theoretical considerations related to the development of spatial and temporal probabilistic hazard studies and modeling are important tasks for the coming years that need to be developed in close collaboration with the civil protection authorities, scientists and stakeholders in the affected regions. This type of work has a foundation both in basic science to develop concepts and tools as well as in public benefit by training to use and implement tools such as GeoDRAT. We draw expertise from the ongoing development and implementation of the Geospatial interface of the Water Erosion Prediction Project (GeoWEPP) developed by Chris Renschler in collaboration with the U.S. Department of Agriculture - Agricultural Research Service (USDA-ARS). GeoWEPP allows preparing and beginning site-specific soil and water conservation planning for a small watershed with a single soil and land use for each sub-catchment based on commonly available data in the U.S. (for more information: http://www.geog.buffalo.edu/~rensch/geowepp/).

A critical element that allows GeoDRAT to be a successful instrument for hazard planning and management is its facility for visualization, communication, and interactive modification of data and scenarios among interest groups with various scales of spatial and temporal interest. It also accommodates users with various levels of technical competence and phenomenological understanding. We propose to establish this new multi-level information and communication tool for volcanic hazards (such as avalanches, debris flow, pyroclastic flows, ash falls) in collaboration with civil protection agencies and scientists in areas endangered of volcanic hazards.

The GeoDRAT approach will be used as a mitigation tool for volcanic disaster planning through scenario assessment as well as a reaction tool for coordinating disaster planning in case of emergencies. The tool will be designed by gathering all potential links to and existing data of all information sources providing information to support decision making for disaster planning and management. The imported existing data is then used as spatial and temporal information for risk assessment and hazard mapping in case of the occurrence of a volcanic hazard. The database includes a static part that consists of non-dynamic data of a non-emergency situation and a dynamic part that allows updating of information in case of an emergency or a training scenario.

GeoDRAT is a decentralized system for access and processing of geo-spatial data that is based on standardized and agreed-upon protocols. GeoDRAT is extensible, buzzword-compliant, platform-independent, and does not preclude access from mobile devices. The main GeoDRAT functions are access, cataloging, discovery, conversion and processing of spatial data. The purpose of GeoDRAT is to provide a framework for effective and seamless spatial data sharing for environmental modeling community. GeoDRAT is targeted at reducing costs of handling spatial data in the projects involving geo-visualization, environmental modeling and decision-making components. GeoDRAT key features are:

- Import available Digital Elevation Models (DEMs), geological maps, satellite images, and lots of other geo-spatial data
- Derive topographical parameters to prepare model exercise
- Simulate a variety of potential hazards and assess potential strategy to react in a dynamic fashion.

For more information connect to the GeoDRAT home page at http://lesam.geog.buffalo.edu/lesam/geodrat.htm or contact:

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