Geophysical Research Abstracts, Vol. 9, 10818, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-10818

Geo-information and space technologies-based geohazards-related disaster management support system

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In the past few decades, space and geo-information science and technology and their applications have had a growing importance in many aspects of daily life at regional, national and international level. Indeed, as noted by various sources (e.g., UNISPACE III conference of 1999, intergovernmental and non-governmental organizations,...) information derived from space-based technologies such as remote sensing Earth observation satellites (EOS), communication satellites and satellite-based geodetic technologies can be combined with other relevant data/information in geographic information systems (GIS) to provide insight and significant solutions to problems in such areas as: achieving a sustainable world, poverty alleviation, basic and applied research, disaster and natural resource management, monitoring and protecting the environment, promoting education/public outreach (E/PO) efforts and enhancing capacity building, weather and climate forecasting, public health, navigation, search and rescue efforts, and finance. Within several of these strongly linked sectors of activity there is urgent need to develop user-friendly online systems with readily accessible space technology data and information, along with the knowledge and tools required for analysis. Especially needed are value-added visualizations of different areas at different scales worldwide. This is particularly true for activities related to the reduction/management of natural and anthropogenic hazard-related disasters which have caused a large number of victims and significant damage to the natural and built environment over the last few years. In response to these needs, the overall aim of this work is to provide support, in the form of on-line products and services, to disaster reduction/management activities using geospatial data from EOS-based sensors together with relevant spatially distributed data from other sources (e.g., maps from aircraft and ground-based surveys of

various types) as well as GIS and information technologies (internet). We will focus on geohazards (namely, earthquakes, volcanoes, tsunami and landslides/mudslides) and geohazard- related disasters for hazard-prone and already disaster striken areas, in particular within developing countries. Towards these goals, we plan to build a web and geoscience data-based natural hazard information system. It is hoped that the system will have a wide audience and be of use for many disaster management phases such as: pre-disaster hazard identification, risk assessment and mitigation, early warning and disaster emergency phases, as well as post- disaster relief, rehabilitation, damage assessment and reconstruction. The system is built on our previous work on a dynamic web-enabled mapping interface (http://discoverourearth.org/webmap/) that accesses a variety of geoscience data sets relevant to natural hazard-related studies. The rich and robust system provides reliable services to research, education and decision making communities. The information system introduced in this work will consist of a series of geo-databases focusing on selected natural-disaster prone regions. The databases will contain geohazard-relevant spatially distributed data sets and associated metadata from a variety of sources including: baseline topography and slopes, EOS-based remote sensing imagery, time-series data, maps for tectonic features (e.g., faults), past seismicity distribution, land cover/land use, density of population, infrastructure,... as well as value added interactive, model and data based disaster management products, e.g., thematic image-maps obtained by integrating judiciously chosen regional geospatial data sets and modeling results in a GIS. At term, the system could seek to address user/regional specific needs as a real or near-real time interactive decision support system for various disaster management efforts. At this early stage of development, and as a demonstration project, resources of the natural disaster management support system will consist essentially of a geohazards database focusing on the eastern Mediterranean region, including geospatial data sets and value- added image maps as discussed above. We will present a selection of these thematic image-maps for several countries in the region which are particularly vulnerable to geohazards-related disasters, such as Lebanon, Turkey, Syria, and Morocco. Our efforts here are based on more than 10 years of experience in information system design and development as well as geoscience digital library development efforts for the Mediterranean region.