Geophysical Research Abstracts, Vol. 7, 08217, 2005
SRef-ID: 1607-7962/gra/EGU05-A-08217

Flood Management System that integrates Satellite Products, In-situ Measurements, Hydrological Products and Geographical Maps

G.J.<space>**Evertsen**<space>(1),<space>T.A.<space>Tollefsen<space>(1),
<space>I.<space>Solheim<space>(1),<space>A.<space>Finnseth<space>(1),<space>M.<spac
(1)<space>Norut Information
Technology,<space>Tromso,<space>Norway<space>,<space>(2)<space>Kongsberg
Satellite Services<space>,<space>Tromso,<space>Norway<space>

In case of a natural hazard, time is critical and national and regional civil protection authorities, national and regional environmental agencies, and insurance and reinsurance companies should not have to deal with the aspect of finding, collecting and combining the different kind of data available. Based on end user's requirements we have developed a web system, that helps in getting relevant information before, during and after flood hazards. The system supports integration of relevant flood products and merged with geographical map this is even more informative. Data is stored locally at the data owners and accessed globally at the web interface. This paper will summarize the lessons learned from research projects where we have developed prototype information systems for natural hazards.

Norut IT is involved in several research projects funded by the European Commission where natural hazards plays an important role (EnviSnow, FloodMan, Omega, EuroClim). The common denominator for these projects is the development of information systems for modeling and visualization of the relevant spatially distributed Earth Observation parameters with references to geographical information.

A common primary objective for these projects is the development of an information system for management and visualization of data. In addition there is a need for storing a wide variety of data / products. These products are in the form of raw or processed satellite data, in-situ measurements, hydrological and hydraulic products and other supportive products like DEMs, statistics, reports or photos. The multi-source data are

processed and transferred in a wide variety of formats. Another characteristic is that there are often multiple organizations involved in retrieving, processing, analyzing and presenting each source of data. Organizations form chains of value-adding processing towards information at higher abstraction levels.

To create added value to operational information systems, a perspective of distributed systems is included. This simplifies the process of transferring relevant information from one data provider to another. An excellent example is the river Rhine. Authorities in the Netherlands will be interested in getting access to information from the German part of Rhine in order to better predict the risk of flooding in the Netherlands. The local databases are integrated in a distributed system in a geographic information network that is based on the Norut IT's Geographic Information Network concept, that uses several distributed interconnected large spatial databases for storing, accessing and maintaining seamless and multi-scale representation of geographical data. Hence data is stored locally at the data owners, and on the user's request data is made available in the web browser. Merging of product types, and a geographical map is possible in one single search and retrieval.

All products are presented in the same way in the web browser hiding their original data formats from the end user, through a common visualization / quicklook of each product type. This is realized in this system by defining a common flood product format. A first step in the development process was to define the term "Product" as the unit of storage in the storage system. In recent years the XML notation has become the lingua franca of data representation in general and on the Internet in particular. We decided to accept *almost* any valid XML structure as a representation of a Product. This anarchistic approach gives us maximum flexibility in terms of meeting the data representation requirements of the different projects. Individual projects like FloodMan have in addition a more restrictive policy, by listing for each product type some mandatory parameters that have to be filled in.

The original product formats are however also available for presentation in the web browser.

Generation of higher level natural flood products, feed of relevant in-situ measurements, and feed of relevant products based on hydrologic and hydraulic models is done automatic. Uploading products into distributed database through the web interface is also possible.

Based on end user surveys two value adding services are offered in close interaction with the distributed database: Simple ordering of satellite data and map services.

Geographical maps are widely integrated into this system. We have mainly focused on

Open GIS Web Map Services as this provides open and extensible software application programming interfaces for geographic information systems, and this is realized on top of the distributed database. In the search tool the map is used to select the searching area, and it is also used to visualize area of each product in the result list. This is also done in the ordering tool. The map is reached on-the-fly from the map suppliers. A quicklook image is a compressed version of the original product with less quality and often with a smaller vertical and horizontal size. This image is merged with a map image unless the quicklook image itself includes a background map. The quicklook must have a background, which will be transparent when merged with the map image.

The system offers a simple ordering interface for satellite products from the web browser regardless of satellite type and supplier. The end user just selects the area of interest in a map and the wanted product type and no more details are needed to fill in.

Our prototype system demonstrates that it is possible to integrate complicated/dedicated systems into one single system offering common interface suitable for managers of natural hazards. To deal with a system, which is based on openness, scalability, distribution and integration of data on-demand, will make the management work easier to deal with. Our intention is to promote a model for integration and defining objects for communication, following the principles of GMES, INSPIRE and the FGDC Digital Earth. This will help the development of a network of relevant information that will be accessible across research fields and national borders. The end users will benefit from improved calculations of natural hazards risks and better management of environmental resources.