Collection and sharing of field geological data in the Digital Era: tools and methods

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**Museo Regionale di Scienze Naturali
Our “Research” Mission

Mixing geomorphological approach with Geomatics PoV

The application context

Geomorphological characterization of the Alpine environment, using geomatics techniques integrating multiscale analysis (space and time), different methods of collecting, processing and data interpretation.
Geomatics Approach

GIS
Geographic Information System

Laser Scanner
Tecniche GPS
Telerilevamento
Fotogrammetria
Aerea e Terrestre
Rilevamento del terreno

Analisi dei dati

Cartografia GeoTematica

Utilizzo scientifico
Utilizzo tecnico
Utilizzo divulgativo
Instruments and Methodologies

Remote Sensing data analysis

Digital Photogrammetry
Aerial and Close Range and stereo data analysis

Mobile-GIS: Digital mapping and data collection

Data Analysis
GeoThematic Mapping

GIS
Geographic Information System

Remote Sensing
Laser Scanner
GPS/Techniques

Field Mapping
Digital Photogrammetry
Aerial, Close Range

Instruments and Methodologies
WHERE WE WORK

GEOMATICS PROVIDE BOOST TO GEOLOGICAL AND GEOMORPHOLOGICAL MAPPING IN RESEARCHES RELATED TO DISASTERS

1. CLIMATE RELATED DISASTERS
   - HURRICANES
   - FLOODS

2. LANDSLIDES

3. EARTHQUAKES
   - SEISMIC MICROZONATION
   - DAMAGE ASSESSMENT

4. GEOSITES

5. NATURAL RISKS MITIGATION

GEOMATICS SHOULD SPEED UP RELIEF OPERATIONS
WHAT WE DO

REMOTE SENSING AND PHOTOGRAMMETRY
multispectral sensors and stereo analysis

DIRECT MAPPING ON THE GROUND
entity and attributes

GEODATABASE / SDI
consistency – geoposition and shape

NO ANALOGIC / DIGITAL PASSAGE
less errors
From Data Collection
Field data collection

PocketPC/TabletPC (Windows)

GPS Outdoor (Embedded Systems)

Ipad – Iphone (IOS)

Smartphone and Tablet (Android)
FIRST STEP WAS SRG² 2006
PNGP Test Site

Fauna
Flora
Boundary Survey
Track Survey
HAITI TEST SITE

BEFORE HAITI EARTHQUAKE

Hut
Haitian typical buildings

AFTER HAITI EARTHQUAKE

Poor concrete frame house
Masonry church
The Italian National Seismic Survey (SSN) developed in 2000 a first level damage form (AeDES) utilized with minor revision until the recent “L’Aquila” earthquake.

GeoSITLab translates the form in English and modified some issues to adapt it to Developing Countries building structures.
TO THE WEB. 2.0
Virtual globes can integrate satellite imagery, aerial photography, and digital maps and present a 3-D interactive representation of data on a global scale. With the emergence of Web 2.0 and 3.0, research and applications are moving from local machine-based environments to online web-based platforms.

In order to disseminate information to a wide audience, virtual globe systems are recognized as an important trend in geoscience research and applications. These systems also enable researchers to conveniently collaborate and share their research projects and results.
WEB 2.0 GEODATA

Geoscientific results

Cartography

Interpretation

Simplified

Static

Dynamic

Specialized

Interpretation

Paper

Web

WEB 2.0 GEODATA

Geoscientific results

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**WEB 2.0 GEODATA**

**Geoheritage**

Places and areas that, for their peculiar features and/or unique characteristics, are of geological interest (i.e. geosites).

**Why?**

- Increasing the Knowledge
- Scientific conservation
- Touristic promotion
- Educational purposes

**How?**

- Geomatic and IT (Information Technology) tools
- Data Collection
- Database set-up
- Metadata compilation
- Geo-data visualization

**What?**
Geo-Database

Collected data

Geographic data

Alphanumeric and multimedia data

MySQL DB

PostgreSQL DB

XML

HTML

Tiling process

Fusion Tables

(Point)

(Geometry)

Shp

Raster

XXX

JPG

Web Mapping application

Metadata
Geo-Data visualization

Web Mapping application

Fusion Tables | KML | XML | Tiled JPG

Google Maps

Customization

Query Features

Query Database

Multimedia content

Toggle layers information

Google API V.3, AJAX, PHP

HTML, JS

JS, HTML

PHP

HTML

JS
Metadata

Descriptive information concerning contents, quality and provenance of data (e.g. the spatial reference or the organization that manage, maintain and distribute data)

Each geosite, as well as geological or geomorphological features are meta-described following the schema provided by the INSPIRE (Infrastructure for Spatial Information in Europe) geoportal (http://inspiregeoportal.ec.europa.eu), and following the ISO 19115 metadata standard for spatial data sets.

Most part of Metadata mandatory information are automatically retrieved from geosite’s digital inventory card.
Geosites Database on the Web

DYNAMIC WEB CARTOGRAPHY

Table of Content
Mobile: a technological revolution

The huge success of wireless communications.
The dramatic decrease of cell phones price.
The limited cost of a wireless infrastructure (with respect to a fixed line infrastructure).
The technological improvements of the ICTs.
The speed of deployment.

The massive diffusion of mobile devices, as smartphones and tablets.

Changed the information management and accessibility.
STRADA: Adaptation strategies to climate change for natural risk management in the transboundary Italy-Switzerland territory

A joint Italian-Swiss civic protection exercise drill, envisioning a major Lake Maggiore flood concerning the two countries.
Verbania Test Site

Requirements

Collecting data using mobile devices (Smartphones and Tablets)

Collecting multimedia file and coordinate position

Using skip logic in the form data collection

Sending data in real time (if possible) to a Web-Server repository

Storing data into SD card (if no connection)

Accessing data using Web Mapping application.
Web server repository

Operators equipped with mobile devices

Form data collection

Web Map application
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Tipologia evento: Frana

Tipologia criticità: viabilità

Descrizione criticità
Presenza di massi sulla ss34 all'altezza del km 28,6

Richiesta intervento: sì

Grado di urgenza: Alto

Descrizione urgenza
Viaabilità bloccata causa massi sulla ss34

Data invio segnalazione: 22/4/2013
Ora invio segnalazione: 10:17
Squadra: Squadra 4
CONCLUSIONS.....
THANX FOR YOUR ATTENTION!

Contacts

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