Geophysical Research Abstracts
Vol. 16, EGU2014-14314, 2014
EGU General Assembly 2014

Geodiversity characterization and assessment of the Morainic Amphitheatre of Rivoli -Avigliana (NW-Italy)

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The concept of Geodiversity in its wide sense refers specifically to particular geosystems that are in themselves complex (e.g diverse) assemblages of bedrock, landform, and soil features. Therefore, geodiversity assessment is strictly related to landscape structure, whose studies are in the field of complex Physical Geography. Moreover, Geodiversity studies provide a fundamental base for geoconservation and environmental management in a holistic way. This is particularly true within complex geomorphological environments, where many intrinsic and extrinsic factors are interconnected. Various procedures has been already applied for the creation of geodiversity maps in different geomorphological context, but especially in wide areas with a large geodiversity of landforms.
Pleistocene morainic amphitheatres of the Alpine piedmont regions are indeed particular and complex environments: not only for the geological and geomorphological points of view, but also for their relationships with biotic components and human life. The aim of this study is to carry out a geodiversity characterization of the Rivoli-Avigliana Morainic Amphitheatre (AMRA; NW Italy). The AMRA separates the lower Susa Valley from the middle course of the Sangone River; it is a set of low hills and depressions related to glacial pulsations aged between 750,000 and 12,000 years ago. Earth Sciences knowledge of the area has been compared to detailed field geomorphological and territorial data in order to determine qualitative and quantitative landscape parameters and to evaluate their validity for geodiversity assessment.
A first qualitative characterization of the AMRA and an estimation of its geodiversity have been performed by means of geomorphological mapping and stratigraphic studies, including geomorphosites assessment for the same area. Then, geodiversity characterization and evaluation have been performed through the definition and application of quantitative parameters (landform energy, slope, land use, roughness, and other geomorphologic, hydrologic and geologic indexes). After acquisition of vector data, satellite and aerial images, GIS procedures allowed to manage and to process images and data: this allowed to interpret morphometric indexes and to obtain thematic maps with 3D views. Finally, results from the calculation of geodiversity and geomorphosites have been compared. Results turned out to be very effective for the study and for the reconstruction of the AMRA evolutionary stages, also for interpreting scenarios of future natural hazards, land occupation and risks posed to geodiversity for natural and anthropogenic causes.
Geomatics devices and digital data demonstrated to be really suitable for improved analysis and representation of the observed phenomena. They can be easily integrated within GIS for decision support requirements. In this way, field and remote sensing data, together with indexes of biotic and abiotic aspects can generate synthetic information, to produce effective spatial interpolations and impressive 3D scenarios useful for Earth Science simulations and environmental/territorial advertising.