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EDITORIAL

Current Research on Geomorphosites

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Geomorphosites are landforms of special interest for society. Their recognition as such by increasingly larger sectors—including political, educational, tourism and nature conservation—is the result of a process of 'heritage making' in which different groups (Earth scientists, conservationists, tourism providers, etc.) are involved. The recognition of geological structures and geomorphological landforms as heritage, however, is relatively ancient (Reynard et al. 2011a), but over the last 20 years, or so, this view has been influenced by a renewed interest in Earth sciences sites led mainly by geoscientists. This new development necessitates conceptual and methodological improvements in various domains of the Earth sciences. In the field of Geomorphology, it is the Working Group on Geomorphosites created by the International Association of Geomorphologists (IAG) at the 5th International Conference on Geomorphology held in Tokyo in 2001 that has acted as the principal arena for the development of a specific field of research on geomorphological heritage within the community of geomorphologists (for a review of the scientific production of the Working Group's members, see Reynard and Coratza 2013).

Research results have been published in various special issues of journals (e.g. in a volume of *Il Quaternario* (Piacente and Coratza, 2005) on geomorphosites and geodiversity; thematic issues on geomorphosite assessment in *Géomorphologie* (Reynard and Panizza, 2005) and *Geographica Helvetica* (Reynard and Coratza 2007); a volume on geomorphosites and culture in the *Memorie Descrittive della Carta Geologica d'Italia* (Coratza and Panizza, 2010); a second volume of *Géomorphologie* (Giusti, 2010); a special issue on geomorphosites and geotourism in *Geoheritage* (Reynard et al., 2011b); the *Collection EDYTEM* volume (Hobléa et al. 2013) on the management of geoheritage in protected areas; a second special issue of *Geoheritage* on digital technologies applied to geoheritage studies (Cayla et al., 2014); and a book on geomorphosites by Reynard et al (2009).

Currently, the research on geomorphosites is developing in the following directions:

1. Methodological issues that were at the centre of the activities of the Working Group during the years 2001–2009 continue to remain an important research field, in particular concerning geoheritage assessment and inventories (Brilha 2015) and digital technologies applied to geoheritage management (Cayla 2014);
2. A focus on specific geomorphological contexts such as mountain environments (Reynard and Coratza 2015) and urban contexts (Pica 2014) aims at exploring the challenges concerning particular types of landforms;
3. Finally, the community of researchers working on geomorphological heritage is collaborating with others working on other fields of geoheritage studies, in particular geodiversity and geotourism research, and with other

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specialised fields of geomorphological research such as geoarchaeology, geohazards and process geomorphology.

The Working Group on Geomorphosites organised a thematic session on geomorphosites during the 8th International Conference on Geomorphology held in Paris on August 27–31, 2013. Emmanuel Reynard (University of Lausanne), Paola Coratza (University of Modena and Reggio Emilia) and Dominique Sellier (University of Nantes) chaired the session that included 22 oral presentations and 34 posters covering three main topics (methodological issues—scale and assessment; characterisation and dissemination of geomorphological value; cultural and urban geomorphological heritage).

This issue of *Geoheritage* presents seven papers from the Paris Conference session. The first two texts deal with methodological issues. Dominique Sellier proposes a method that can be used for the selection of sites used for the popularisation of geomorphological heritage in educational and tourist contexts. This methodology is divided in two stages: the first is a comprehensive geomorphological analysis that allows the definition of different geomorphotypes that are the basic geomorphological units representative of the regional geomorphology; the second stage comprises the selection of the geosites that should represent each geomorphotype and that can then be used for popularising the regional geomorphology. The proposed method is applied to Mont Ventoux in Southern France.

The issue of the pre-selection of potential geomorphosites is also discussed in the paper by Emmanuel Reynard et al., which proposes an integrative approach for the selection and assessment of geomorphological heritage at the regional scale. The article not only extensively describes the various steps of the assessment method; it also discusses cartographic issues concerning the management of geomorphosites. The main improvement proposed by these two contributions to methodological debates concerning geomorphosite inventories is the focus on the pre-selection of potential geomorphosites, a process that was appeared almost as a 'black box' in numerous methods proposed previously.

Two papers relate to integrative approaches aimed at inventorying geomorphological heritage at a regional scale in a context of geotourism development in the Czech Republic and in Malta, respectively. Lucie Kubalíková and Karel Kirchner carried out a geosite and geomorphosite inventory in the Vizovická vrchovina region in the Eastern Czech Republic. Based on the assessment of various values (scientific, educational, economical and conservation values), six geosites were assessed using a SWOT analysis (Strengths, Weaknesses, Opportunities and Threats). The assessment and the SWOT analysis serve as a basis for the geotourism promotion of the selected sites. In Malta, Paola Coratza et al. discuss the issues of linking natural and cultural heritage on sites considered worthy to be inserted into the World Heritage List. The paper shows the interest of bridging the cultural and natural values of the outstanding scenery of the Dwejra area in Gozo Island (Malta) and focuses on the threats the landforms are suffering and their geotourism potential.

The three remaining papers are case studies focusing on specific contexts and approaches that are currently at the core of research on geomorphosites, as summarised above. The study by Irene Bollati et al. aims at measuring the evolution of active geomorphosites. Indeed, it is a specific requirement for geomorphological heritage, when compared to most other types of geoheritage, that this is taken into account when there are a large number of active sites, especially in mountainous contexts. Until now, the study of these sites has mainly focused on the evaluation of their quality; the use of process geomorphological approaches, as it is the example here using dendrogeomorphological methods, is an encouraging and significant development within geomorphosite studies, in particular on active geomorphological contexts such as coastal and mountain environments. The paper by Alessia Pica et al. proposes an original approach for the analysis of geomorphological heritage in urban contexts (in this case, Rome). This approach combines 'classical' geomorphological survey—in particular geomorphological mapping (for which specific labels for anthropogenic landforms had to be created)—with geohistorical approaches (diachronic analysis of historical maps), as well as geomorphosite assessment methods and the creation of geotourist itineraries. The final aim is to propose geomorphological interpretive tools that could be used by cultural guides. Finally, in line with the work presented in the special issue on the use of new digital technologies in geomorphosite studies (Cayla et al 2014), Barbara Aldighieri et al. propose a tool for the development of virtual tours within 3D digital environments. The tool—Openalp 3D—allows the visualisation of impressive mesoscale landforms and the preparation of virtual field trips and is tested within the Dolomites World Heritage Site.

This selection of papers shows how research on geomorphosites continues to develop. After a first phase dedicated to methodological developments, particularly for the evaluation and the cartography of geomorphosites, the researchers explore new methods for the selection, monitoring and visualisation of geomorphosites, leading to new approaches specifically aimed at integration with other fields of research (culture, tourism, education) and new contexts, in particular urban and virtual environments.

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