



Mapping geomorphological diversity. A case study in Derborence (Valais, Swiss Alps)

Hélène Maret and Emmanuel Reynard

University of Lausanne, Institute of Geography and Sustainability, Lausanne, Switzerland (helene.maret@unil.ch; emmanuel.reynard@unil.ch)

“Geodiversity is the natural range (diversity) of geological (rocks, minerals, fossils), geomorphological (landforms, processes) and soils features. It includes their assemblages, relationships, properties, interpretations and systems.” (Gray, 2004: 6). Geodiversity has a strong spatial component and cartography is one good tool to characterize it. In this work, we focus on the geomorphological diversity defined as one part of geodiversity. The aim of this study is to assess geomorphological diversity based on a geomorphological map. A method was then developed to transform the latter into a map of geomorphological diversity. In other words, we transformed a qualitative geomorphological map (morphogenetic map) into a quantitative map (including the value of a geomorphological diversity index).

The University of Lausanne has recently developed a geomorphological mapping legend on ArcGIS (Lambiel et al., in press). This system classifies the landforms according to various morphogenetical contexts (glacial, periglacial, fluvial, karstic, etc.). Each form is represented as a surface (e.g. alluvial fan), a line (e.g. moraine) or a dot (e.g. spring, sinkhole). As the geomorphological mapping legend was basically developed for graphical purposes, a first step was to transform the geomorphological map into a map only filled with polygons in order to delimitate precisely areas occupied by points and lines elements (for example rivers or holes). After that, a grid was added to compute the geomorphological diversity by counting the number of elements per square. It results in a raster map with a geomorphological diversity index split into five categories (very high, high, medium, low, very low). We also tested which square size was the most accurate for our purpose and checked whether this index produced interesting results.

This attempt to define and test a new methodology for assessing geomorphological diversity could afterward be used to transform other maps (geology, pedology, hydrology...) into partial index maps of the geodiversity. Moreover, as geomorphological maps are quite complex and not easy to interpret by non-specialists, mapping geomorphological diversity can then also be used to communicate more easily with other specialists of territorial management (specialists of biodiversity, nature conservationists, land-planners) on the importance of geomorphology.

References

- Gray M. (2004). Geodiversity: valuing and conserving abiotic nature. Chichester, Wiley.
Lambiel C., Maillard B., Kummert M., Reynard E. (in press). Geomorphological map of the Hérens valley (Swiss Alps). *Journal of Maps*.