



Erratic boulders in Switzerland, a geological and cultural heritage

Emmanuel Reynard

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

Erratic boulders are stones transported over quite long distances by glaciers and that differ from the type of rock upon which they rely. They range from the size of pebbles to large boulders weighing several thousand tons.

Erratic boulders are significant geosites (Reynard, 2004) for several reasons. (1) First, they are indicators of former glacier extensions by marking glaciers' path, size and volume. In Switzerland, they allowed mapping the extension of large Alpine glaciers (the Rhine and Rhone glaciers, in particular) and their retreat stages (e.g. the Monthey erratic boulders that mark an important lateglacial stage of the Rhone glacier). Crystalline erratic boulders along the Jura range (limestone mountains) were used to map the altitude reached by the Rhone glacier during the two last glaciations. Precise mapping of crystalline and limestone boulders distribution also enabled mapping local Jura glaciers' recurrences after the Rhone glacier retreat. (2) During the last decades, several erratic boulders were used for cosmogenic nuclide exposure dating, which allowed impressive advances in palaeoclimatic research. (3) Erratic blocks have also an ecological interest by the fact that they "have transported" specific habitats in areas far away from their origin (e.g. acid crystalline rocks and soils in limestone areas such as in the Jura). For all these reasons, several erratic boulders were classified in the inventory of Swiss geosites.

Erratic boulders also have a significant cultural value (Lugon et al., 2006). (1) The Glacier Garden in Lucerne was discovered in 1872. It comprises various surfaces of "roches moutonnées", potholes and large erratic blocks that document the presence of the Reuss glacier. Considered as a natural monument it is now one of the most famous touristic attraction of Lucerne and Central Switzerland. (2) The Pierre Bergère stone, situated in Salvan (Mont-Blanc massif, South-western Switzerland), is the place where future Nobel Prize Guglielmo Marconi made his first wireless experiments in the late 19th century. An interpretive panel explaining the origin of the block was posted near the site along a cultural path created by the Marconi Foundation. (3) The Pierre des Marmettes, in Monthey, is one of the key-sites where the nature conservation movement was initiated in the first decade of the 20th century. The block is the property of the Swiss Academy of Sciences and was chosen as an emblematic site for celebrating the 200 years of the Academy in 2015. Moreover, in several cantons the protection of erratic blocks was the first initiative for nature conservation. (4) Several blocks were dedicated or offered to famous scientists (De Charpentier, Agassiz, Studer, Venetz) involved in the development of glaciology during the 19th century. Their names (e.g. Agassiz Block, Studer Block, Venetz Block) remind this important period in the history of Swiss geosciences. In fact, several of these scientists – in particular Jean de Charpentier – not only demonstrated the glacial origin of these blocks, but also used them as a proof of former glacial extensions. (5) Finally, several blocks have a symbolic (most of them have a name, several refer to legends), mythical, religious or an archaeological value – with the presence of petroglyphs.

This communication will focus on the cultural value of erratic boulders – in particular for the nature conservation movement and for the history of glaciology and geosciences – and will propose a strategy for their geotourist promotion.

References

- Lugon R., Pralong J.-P., Reynard E. (2006). Patrimoine culturel et géomorphologie: le cas valaisan de quelques blocs erratiques, d'une marmite glaciaire et d'une moraine. *Bull. Murithienne*, 124, 73-87.
- Reynard E. (2004). Protecting Stones: conservation of erratic blocks in Switzerland. In: Prikryl R. (ed.) *Dimension Stone 2004. New perspectives for a traditional building material*, Leiden, Balkema, 3-7.