



The basis for a global thematic framework for geodiversity and geoheritage

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Geodiversity – the diversity of geological nature can be assessed, conserved, preserved and exploited through geosystems services for human benefit. In order to understand the extent and value of geodiversity, it would be useful have a global overview and have a global framework into which the diversity can be placed. This year we have proposed a global geological framework (published in *Global and Planetary Change*) to put the Earth in context, and now we use this to develop a thematic estimation of the Earth's geodiversity. The framework allows us to rapidly present the main environments, or geosystems that are found on Earth. Importantly, it also allows us to explore the links between such systems and other components of the Earth's system (e.g. ecosystems, the atmosphere, deep and shallow processes). Geodiversity deals with both the tangible features of the Earth and processes, so the thematic framework should deal with both, and to show how processes create geological features and how such features display the underlying processes. (For example the framework should show how glacier flow can create a sedimentary feature like an esker, and the esker landform can illustrate glacier flow). For this study, we start from two standpoints: 1) from a process standpoint where the underlying plate tectonic diversity underpins a branched diversity of processes and landforms; and 2) where we take every continent, and look at the diversity of representative features on each. Both approaches produce a list of processes and features that describe global geodiversity and the inseparable links to ecosystems and other Earth systems (e.g. atmosphere and oceans). They both lead to an equivalent number of categories and sites that are required to fully cover all aspects of geodiversity that should be, for example covered by World Heritage. Both approaches also emphasise how all ecosystems (including human systems) are based on their fundamental geological processes and we suggest that no ecological site, from World Heritage to local reserve, should be without a sound geosystem assessment, just like a building should not be designed without a foundation. The study shows that there could be ample room for geological sites at UNESCO, where the full and essential geodiversity has not yet been taken into account, especially in relation to the full range of tectonic environments.