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Global geodiversity mapping

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A wealth of geodiversity inventory techniques exist, ranging from full descriptive to full quantitative techniques. All methods have in common that they are (partly) based on expert-based information like (digital) geological, geomorphological and soil maps, often supplemented or integrated with topographical data derived from digital elevation models.
Geodiversity has been mapped with various grid sizes and has been applied to both local and regional extents. A global geodiversity map is essential for consistent global comparisons of geodiversity and its contributing factors: geodiversity can be compare between continents, countries, geoparks, lowland-highland areas and its correlations to other datasets such as global species distributions and global forest cover or land use and land cover can be quantified.
Mapping global geodiversity requires globally available, high quality, harmonized input data that is (pre)processed according to a transparent and consistent workflow.
Here, we present a global geodiversity map that uses global lithology, soil types, hydrology and topography as input for the calculation of a geodiversity index within a grid of 10x10km. Our semi-automated workflow in ArcGIS Pro includes preprocessing of the individual datasets, grid size selection, calculation of all diversity sub-indices, error handling and computation of global geodiversity using map algebra.
The patterns of global geodiversity show distinct global differences, with highest scores in Oceania and lowest scores in Africa. A comparison between our global geodiversity index map and geodiversity maps of the low-lying country of The Netherlands, the high altitude Andean country of Ecuador and the volcanic Hawaiian archipelago show similarities in general spatial patterns, despite the use of finer grid sizes, local datasets and slightly different workflows. This suggests that the newly presented global geodiversity map contains consistent and meaningful information.