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Comparison of *grid* and *non-grid* types of scaling for geodiversity assessment

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The current state of geodiversity estimates still lack of complete strategy of assessments in comparison with its analogue, biodiversity. This issue connects with the number of differences between these terminologies and existing form of their elements. However, the basic understanding of geodiversity, which common among most researchers, is the numeric representation of the variety of abiotic elements includes geology, geomorphology, hydrology, climate, soils and other features and processes influencing non-living nature. In this research, two main elements of geodiversity (geology and geomorphology) have been assessed with two different scale systems defined as “grid” and “non-grid”. “Grid” system based on cells with side size of 2.5 km, where each cell contains an arithmetic average value of geodiversity for each region throughout the area of research (Figure). Meanwhile, “non-grid” system assesses the areas bordered by different values of geodiversity, which shows number of shapes with sizes and forms delineated by geodiversity values on the model (Figure). Both scales were calculated by qualitative-quantitative methodology of assessment of geodiversity. The methodology based on 5-point evaluation system for geological and geomorphological elements calculated by arithmetic average equation, where places with high values can be considered as potential geosites, which should be studied in detail for future research. The two islands (Upolu and Savai’i) of Western Samoa have been selected for the research due to their relatively simple geological history based on an early growth of a basaltic shield volcano(s) covered by small scoria and spatter cones formed during the post-shield rejuvenated volcanism. Even though the region is in the tropical climate zone with high rainfall, its geology provides an even relief throughout the islands, with only few short immature fluvial networks. The multiple extensive lava sheets also acted as erosion-resistant substrate further forming fluvial networks of deep but narrow canyon-like stream valleys with numerous high waterfalls. These regions are recognizable by qualitative-quantitative methodology, but differently represented on the models with mentioned scale systems (“grid” and “non-grid”). For Samoa Islands, fluvial networks are important as they expose volcanic stratigraphy and forming rugged morphological elements on the surface. Their limited geometry commonly prevents them to be clearly visible on the “grid-based” system of geodiversity assessment. Meanwhile, “non-grid” system accurately outlines these regions as locations with high values (especially Upolu Island) (Figure). In result, “grid” and “non-grid” scale systems utilized by one qualitative-quantitative methodology demonstrate different pictures: “Grid” scale system of geodiversity estimates is more suitable for a quick first order assessment of geodiversity with big databases, while “non-grid”

method fits better to outline exact location with high geodiversity in a large map scale, hence more useful to highlight valuable regions for geoconservation.