



Geodiversity of Ceará State (Brazil): assessment and mapping

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The results on the geodiversity assessment of Ceará State (148,016 km², northeast Brazil) are presented. The assessment was performed using a methodology based on the counting of occurrences of geodiversity with cartographical data and GIS procedures. This work is part of the methodological approaches applied in other large territories in Brazil and Portugal considering geodiversity as the diversity of rocks, fossils, landforms, soils, water resources, and mineral and energy sources occurrences. Therefore, the geodiversity index resulted from the sum of the six partial indices: i) lithological; ii) paleontological; iii) geomorphological; iv) pedological; v) hydrological; vi) mineral occurrences. The Geodiversity Index score of each grid square is the sum of all partial indices. Hydrological partial index was an upgrade to the previous five-partial indices methodological proposal, considering both surface water resources and ground water as essential components of geodiversity. Furthermore, the traditional cell grid used to operate the counting of geodiversity elements was substituted by a territorial organization by drainage sub-basins. Vector cartographical data were obtained from official Brazilian institutions and treated with GIS software to generate the six partial indices. According to the type of occurrences these indices may have very different ranges thus values were normalized to a maximum of 5 points each. The sum of partial indices in each drainage sub-basin resulted in a quantitative map of geodiversity with values from 4 to 26. Subsequently the values were interpolated using the Kriging method delivering the geodiversity map of the Ceará State. Geodiversity index was here defined with qualitative values ranging from “very low” to “very high”. The regions Noroeste Cearense and Sul Cearense have the highest geodiversity in the state while the region Sertões Cearenses has the lowest. The use of specific GIS procedures increases the mapping options and confirmed that they can speed-up spatial analysis to calculate geodiversity if official digital maps are available.