# Three-dimensional observations for spatial analysis of landscape dynamics

**Manoel do Couto Fernandes, Tata Lacale C. dos Santos, Pedro Henrique F. Coura, Paulo Márcio L. de Menezes, Alan José S. Graça**

Laboratory of Cartography (GEOCART) - Department of Geography - Federal University of Rio de Janeiro (UFRJ) - Brazil

**Abstract.** Landscape dynamics is a geoecological characteristic that defines changes in a landscape spatial structure and function during an established time scale. In this kind of analysis, geoprocessing is an essential tool, because it combines several technologies that help in this work. However, some questions arise and they need to be addressed through scientific investigation. One of these questions is that geoprocessing does not consider the dimensionality of the data and the information to be used, which is projected, not measured from modeled surface observations, thus it cannot interpret the structure, function and dynamics of geoecological elements of a landscape correctly. This difference is greater in landscapes of irregular relief. Even having a range of options to work with the dimensionality of the elements of a landscape, like the use of digital elevation models (DEM), geoprocessing has a limitation established by the non-consideration of the irregularity of the area to be examined. In this sense, even when working with 3D data, the area is not taken into account as being continuous, endowed with relief, so measurements of area and distance of the elements that make up the landscape may be under-estimated, particularly in areas with a rough relief. Considering that, this paper intends to assess the difference between observations on modeled and planimetric surfaces on the interpretation of landscape dynamics. The study was conducted in the massif of Tijuca, Rio de Janeiro (Brazil) using land use and soil cover maps of different times. The results show an increase of dynamic areas values when observations were carried out on modeled surface, as well as the deforestation rate (17.57% or 0.13 $km^2$/year). This survey showed higher values in comparison with observations on planimetric surface, characterizing more modeledistic interpretations of how the structural elements and analyses made from these are structured in the landscape.

**Keywords:** DEM, Modeled Surface, Landscape Change