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Applying a generalized Hough-Transform algorithm within a GIS environment to detect earthquake alignments. (Examples in the Betics)

Pérez-Peña José Vicente (1), Jiménez-Gutiérrez Alicia (1), Azañón José Miguel (1,2), Delgado Jorge (3), Booth-Rea Guillermo (1,2)

(1) Departamento de Geodinámica, Universidad de Granada. Granada, Spain, (2) Instituto Andaluz de Ciencias de la Tierra (CSIC-UGR). Granada, Spain, (3) Departamento de Ingeniería Cartográfica, Geodésica y Fotogrametría, Universidad de Jaén, Jaén, Spain

Studies of the distribution of the seismicity are very useful in order to recognize active areas, imagine fault geometries, and to relate earthquake activity to particular tectonic structures. The identification of straight-linear earthquake-epicentres alignments can reflect underlying active tectonic structures as faults. Nevertheless, these point-alignments become complicated to detect with diffuse seismic patterns in areas of low to moderate seismicity. In such cases, it is necessary to apply specific methods to detect and analyze preferential earthquakes alignments. The Hough Transform (HT) is a method that has widely used to detect lines in digital images. Despite of this technique was initially developed to work with pixels from digital images, a generalized algorithm based in the HT could be used to detect specific alignments in a disperse point distribution such as earthquake events. This method focuses in to reduce the number of possible lines by analyzing only those with mathematical significance. In this work we presented a GIS integrated methodology to apply a generalized HT to point distributions. In order to test the algorithm, we presented examples from the Betic Cordillera (SE of Spain), where the seismicity is low to moderate (< 5Mb) and geographically disperse