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Systematic detection of anisotropy in spatial data obtained from environmental monitoring networks

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The efficient mapping of environmental hazards requires the development of methods for the analysis of the spatial distributions sampled from environmental monitoring networks. We focus on the detection of the geometric (elliptic) anisotropy parameters of spatially distributed variables represented by means of random fields. The geostatistical estimation of anisotropy parameters often relies on empirical methods or maximum likelihood approaches that are impractical for large data sets. We present a non-parametric, computationally fast method for the identification of the anisotropy parameters of scalar random fields. The method uses sample based estimates of the spatial derivatives that are related through closed form expressions to the anisotropy parameters. We investigate the performance of the method on synthetic samples on regular and irregular supports. We estimate the anisotropy of radioactivity distributions (gamma dose rates) obtained from the EURDEP (EUropean Radiological Data Exchange Platform).

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