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An algorithm for the search of homogeneous strain-rate fields

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The aim of this paper is to describe the theoretical fundamentals and the main features of a software suitably implemented to estimate the strain-rate tensor from continuous GPS data.
Current softwares developed for geophysical applications generally estimate or compute bi-dimensional strain, since this is the most requested use. On the contrary, this software allows for a three-dimensional estimate of the strain-rate tensor. It accounts for all the significant GPS velocities and estimates the strain-rate components by the least squares method starting from the hypothesis of one homogeneous strain-rate field.
An initial field has to be defined by at least 4 sites which pass the chi-squared test on the strain-rate homogeneity. The developed algorithm automatically searches for sites belonging to this initial homogeneous field, starting from the site nearest to the barycentre of the first 4 sites and proceeding until a user-defined limit distance. Each time a site is added, the homogeneity of the whole field is suitably tested by a number of statistic tests.
In this work the algorithm has been also applied to some areas of geophysical interest.