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GPS measurement strain rate in the North China and its geodynamical implications

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Strain rates computed from GPS measurements can provide important information for continental dynamics research. In this research, we choose the velocities of 230 GPS survey stations obtained in the North China in the period of 2004 and 2007. By applying these GPS data, the strain rates in the North China are calculated. First of all, we introduce the Kriging method in geo-statistics to GPS velocity field. Interpolating the scattered GPS velocity data of the North China with the longitude of 112°- 121°, and latitude 37°- 42°, to grid point values by Kriging, then we calculate the strain rates from these nodal values in each grid cell similar to derivative of shape functions (essential Lagrange interpolation function) in finite element algorithm, and obtain the stable distribution of strain rate field in the North China. The results show that the orientations of maximum principal strain rates are consistent with those of the P axis and T axis in focal mechanism in general. The surface dilation strain rate is positive in Shanxi fault zone, where it is in the state of tectonic extension. The maximum shear strain rate is located in Tianjin and adjacent areas, basically corresponding to the seismic activities. Meanwhile, the errors of the GPS strain rates are analyzed, and also we found that the errors of the strain rates in the North China are not negligible. Therefore it is necessary to raise the accuracy of GPS data as soon as possible in order to carry out geodynamical research in more detail.