



The expanding Earth: evidences from temporary gravity fields and space-geodetic data

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In geoscience there is a problem which attracts many scientists' attention: is the Earth expanding or contracting? Our investigations show that the Earth is expanding, which is supported at least by the evidences from two information sources: temporary gravity fields, and space-geodetic data. Based on the temporary gravity field model EGM96 as well as EIGEN-GL04C, the principal moments of inertia and especially their temporal variations are determined: all the three principal moments of inertia are gradually increasing at almost the same rate 9×10^{-11} /yr. This clearly demonstrates the expansion of the Earth. Numerical calculations show that the Earth is expanding at the rate 0.3 to 0.6 mm/yr. In another aspect, the International Terrestrial Reference Frame (ITRF), which is provided by the International Earth Rotation Service (IERS) using various kinds of space techniques with high accuracy, is accepted internationally as the reference frame with high accuracy and good stability. We collected the data, i.e. the coordinates and velocities of 736 GPS (Global Positioning System) stations spread in the world, covering a period of about 10 years under the frame of ITRF2000. Then, the volume variation of the Earth is estimated by the triangular network based on the Delaunay approach. The calculated results show that the Earth is expanding at the rate about 0.54 mm/yr. Hence, evidences coming from both the sources mentioned above support the conclusion that the Earth is expanding at a rate about 0.5 mm/yr. Taking into account the Dirac's large numbers hypothesis as well as many previous studies provided by various authors, it could be concluded that the Earth expansion has and will have happened continuously in a long geological history. This study is supported

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