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Three space geodetic signals left by the 2011 off the Pacific coast of Tohoku Earthquake

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The M9 massive earthquake hit offshore Tohoku region on March 11th 2011 causing widespread destructions and catastrophic damages to east Japan. This is the largest earthquake in Japan and the fifth in the world over the course of recorded history. Earthquake is a result of a fault dislocation under the ground, i.e. sudden deformation of surficial or inner structure of the earth. Therefore, such process leaves three kinds of space geodetic signatures, i.e. crustal deformations, gravity change, and polar motion. In this study, we derive fault parameters of this earthquake based on surficial displacement data by dense GPS network (GEONET), and perform numerical simulation on the extent of crustal deformation, gravity change, and polar motion under the realistic earth. In addition, if the data would be released on time, we will do comparative discussion using the actual observed data, such as the gravity change from GRACE and the excitation pole of Y axis from VLBI.

Keywords: The 2011 off the Pacific coast of Tohoku Earthquake, Space geodesy, Crustal deformation, Gravity change, Polar motion