

Vertical seafloor deformation associated with the 2011 Tohoku-Oki earthquake

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The 2011 Tohoku-Oki earthquake was preceded by a large (Mw7.3) interplate earthquake which gave rise to evident afterslip and intensive aftershock activity. Although the studies on the afterslip and aftershocks suggested that the slow slip propagated towards the hypocenter of the mainshock of the Tohoku-oki earthquake, no clear evidences of the acceleration of fault slip related to the nucleation of the mainshock have been presented. In this report, we will present the results of reanalysis of the eight ocean bottom pressure records obtained around the hypocenter to inspect if there were any fluctuations of fault slip prior to the occurrence of the mainshock, other than the afterslip of the M7.3 earthquake. By removing short-term variation common to all of the records, assuming that the common component is caused by non-tidal physical oceanographic pressure variation, noise level of the pressure records was considerably reduced. The processed pressure records show that rates of seafloor deformation decayed gradually or were almost constant until the mainshock occurrence, but no remarkable accelerations exceeding noise level, ~ 2 cm. The noise level of the pressure data corresponds to vertical displacement caused by slip along the plate boundary with amount of ~ 20 cm and we conclude that the Tohoku-oki mainshock was not associated with a preslip larger than this amount within a couple of hours prior to the initial break of the mainshock. In the presentation we will report on the postseismic deformation following the M-9 mainshock.

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