

Numerical simulation study on recent changes in crustal deformation and seismicity in the Tokai area, central Japan

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Recently, crustal deformation rate and seismicity pattern have interestingly changed in the Tokai area. We formulate recurring earthquake model in the Tokai area and estimate the time when next Tokai Earthquake will occur and the location of plate interface by fitting simulated calculation to observed data. Some of the results explain the recent decrease in the uplift rate. The present model predicts the precursory change of seismic activity in the depth range of 10-20km in the south region of Mino-mikawa highlands, where the present seismicity with P axis almost horizontal will become more inactive several years before the occurrence of the Tokai earthquake, and/or the direction of P axis rotates abruptly about 80 degrees so as to be orthogonal to plate interface.

Recently, Tada(1998) and Matsumura(2000) reported that crustal deformation rate and seismicity pattern have interestingly changed in the Tokai area, central Japan. We formulate recurring earthquake model in the Tokai area based on rate- and state dependent frictional law derived from laboratory experiments of rock friction and on the location of a seismically locked region. Using the model parameter based on previous studies, we estimate the time when next Tokai Earthquake will occur and the location of plate interface by fitting simulated calculation to observed data. Some of the results explain the recent decrease in the uplift rate. The present model shows the vertical rotation of principal direction and predicts the precursory change of seismic activity in the depth range of 10-20km in the south region of Mino-mikawa highlands, where the distance from the trench along the horizontal backslip direction is about 150km. The present seismicity with P axis almost horizontal will become more inactive several years before the occurrence of the Tokai earthquake, and/or the direction of P axis rotates abruptly about 80 degrees so as to be orthogonal to plate interface