

Earthquake mechanism in post-megathrust intraplate stress Earthquake mechanism in post-megathrust intraplate stress

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Megathrusts produce large permanent lithospheric displacements as well as strong transient ground shaking up to regional distances. The lateral permanent displacements construct stress shadows in a wide backarc region. The Korean Peninsula is placed in the far-eastern Eurasian plate that belongs to a stable intraplate region with a low earthquake occurrence rate and diffused seismicity, and is located in the backarc at ~1300 km in the west from the epicenter of the 11 March 2011 M9.0 Tohoku-Oki earthquake. The seismicity around the Korean Peninsula was increased significantly after the 2011 M9.0 Tohoku-Oki earthquake, which is not consistent with the expected seismic-quietness. Strong seismic waves cause large dynamic stress changes, incurring fluid migration and increasing pore fluid pressure in the media. The lithospheric displacements directing to the epicenter on the convergent plate boundary develop transient radial tension field over the backarc lithospheres, which is subparallel with the preseismic ambient compressional field. The pore pressure growth and radial tension field decrease the Coulomb failure stress, increasing episodic increases of seismicity in both fault zones and intact media. The ambient stress field is recovered gradually as the induced stress field diminishes with time by tectonic loading. The seismicity changes with the temporal evolution of stress field. A series of moderate-size earthquakes and earthquake swarms occur as a consequence of medium response to the temporal evolution of stress field. The long-term evolution of seismicity is expected to continue until the preseismic ambient stress field is fully recovered.

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