



The Rotational and Gravitational Signature of Recent Great Earthquakes

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Besides generating seismic waves, which eventually dissipate, an earthquake also generates a static displacement field everywhere within the Earth. This global displacement field rearranges the Earth's mass thereby causing the Earth's rotation and gravitational field to change. The size of this change depends upon the magnitude, focal mechanism, and location of the earthquake. Using a spherical, layered Earth model, the coseismic effect of the recent great 2004 Sumatran, 2010 Chilean, and 2011 Japanese earthquakes upon the Earth's length-of-day, polar motion, and low-degree harmonic coefficients of the gravitational field are computed. While the effects of these earthquakes have been observed in GRACE gravity measurements, the challenge of observing them in Earth rotation and low-degree SLR gravity measurements lies in being able to accurately model and remove the much larger atmospheric, oceanic, and hydrologic signals.