



Hydrologic modulation of seismicity in western China 1991-2014

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Hydrologic loading, changes in pore fluid pressures, solid earth tides, and stresses due to thermoelastic expansion have all been proposed to modulate seismicity in a range of tectonic and climatic settings. Seismicity from 1991-2014 (24,892 events) in western China, between 20° and 60° N and between 105° and 70° E, appears to be seasonally modulated with 50% more shallow events in the spring and fall than the summer and winter. We show that this modulation is statistically significant using Schuster tests, analysis of variance tests, and the multifrequency periodogram approach on complete catalogs, a catalog of repeating earthquakes (Schaff and Richards, JGR, 2011), and declustered catalogs. Leveraging the tectonic and climatic heterogeneity in our study region, we compare each of the proposed causes of modulation to observations. We find that the spatial variation of modulation correlates best with spatial variation in hydrologic loading as measured by the GRACE satellites.