



Numerical Modeling of Recurrence Interval of Wenchuan Earthquake Based on Visco-elasticity

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Of interest is the recurrence interval of the devastating May 12, 2008 Wenchuan earthquake (Ms 8.0) which occurred on the Longmenshan fault area with slow strain accumulation. This study discusses this problem through 3-D numerical modeling based on visco-elasticity with the GPS data used to quantify the boundary conditions. We calculate the stress accumulation in the lithosphere of the Longmenshan fault area before the earthquake, and the co-seismic stress change and the post-seismic stress relaxation to estimate the Wenchuan earthquake recurrence interval. It is shown that during inter-seismic period stress increases almost linearly in brittle upper crust of the Longmenshan fault, and stress increasing rate increases with depth in upper crust. However stress increases exponentially in the ductile middle and lower crust and the upper lithosphere mantle. The stress accumulation is about -21.6MPa with increasing rate of -0.00356MPa/a at the bottom of the upper crust after about 6000 years. The maximum co-seismic stress drop is about 21.6Mpa in the section which is vertical to the depth at the epicenter, and it is relaxed about -2.6Mpa in 2000 years after the earthquake. We define the recurrence interval is the time needed to accumulate the magnitude of the stress drop of the earthquake. The recurrence interval of Wenchuan big earthquake is estimated about 5400 years correspondingly.