

An Adjoint Data Assimilation Method for Optimizing Frictional Parameters on the Afterslip Area

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Afterslip sometimes triggers another earthquake in the time-scale of days to several years. Thus it may be possible to predict the occurrence of such a triggered earthquake by simulating the spatio-temporal evolution of afterslip with the estimated frictional parameters. To demonstrate the feasibility of this idea, we consider a plate interface model where afterslip propagates between two asperities following a rate and state friction law and adopt an adjoint data assimilation method to optimize frictional parameters. Synthetic observation data are sampled as the slip velocities on the plate interface during 20 days. It is found that 1) all frictional parameters are optimized if data set consist not only of the early phase of afterslip or acceleration, but also of decaying phase or deceleration and 2) that the prediction of the timing of the triggered earthquake is improved by using adjusted frictional parameters.

Keywords: afterslip, frictional parameters, data assimilation