Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Forecasting large earthquakes using small-quake correlations BRADEN BRINKMAN, MICHAEL LEBLANC, University of Illinois at Urbana-Champaign, YEHUDA BEN-ZION, University of Southern California, J.T. UHL, Retired, KARIN DAHMEN, University of Illinois at Urbana-Champaign — It has long been speculated that periodic stress variations, such as the tides, may trigger earthquakes, and hence tide-earthquake correlations could be used as signals for predicting large earthquakes prior to failure. We developed a simple probabilistic model of earthquake triggering which we used to simulate series of earthquake events in a fault subjected to external periodic stresses of amplitudes and frequencies representative of tidal or seasonal stress variations. By analyzing correlations between small events and periodic stress cycles, we compute the probability that a large event will occur. We find that seasonal stresses are better predictors of impending large earthquakes. In addition, our results also apply to many other sheared frictional stick-slip systems which display small slips, such as rock interfaces or granular matter.

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Date submitted: 07 Nov 2012 Electronic form version 1.4