Influence Of Viscoelastic Relaxation On Triggered Seismicity Due To The March 25, 1990 Nicoya Gulf, Costa Rica Earthquake

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The March 1990 Mw=7.0 earthquake off the coast of Nicoya Peninsula, Costa Rica is thought to have been caused by the rupture of a seamount which acted as an asperity [*Protti*, 1995; *Husen, et al.*, 2002]. An extensive local network recorded the event and the subsequent seismicity in the region, including aftershocks with magnitude greater than 1.5. These earthquakes were located not only in the offshore region near the mainshock, but also approximately 70 km inland, in a region of shallow strike slip faults well away from the interplate thrust. We examined the static stress changes associated with this event using Coulomb failure criteria and found that most of the subsequent seismicity located near the mainshock occurred in regions of increased Coulomb stress, ranging from 0.4 to 2 bars. Additionally, inland patches of seismicity can be attributed to an increase in Coulomb static stress. Because the stress increases are well within minimum thresholds for stress triggering [*Stein, et al.*, 1992; *Taylor, et al.*, 1996], we suggest that these inland earthquakes were related to the Mw=7.0 earthquake. However, further examination of the catalog of data, provided by OVSICORI, indicates a temporal relationship of stress-triggering of inland events, suggesting possible viscoelastic influences on the triggering. For example, the seismicity rate in one inland region increased from 1.74 events per day for the 84 days prior to the Mw 7.0 earthquake to 6.17 events per day for the 90 days following the event. Both seismic activity and moment release peaked between 70 and 90 days after the March 25 mainshock. Using a 2-D finite element model that is similar in geometry to the simpler elastic model used for the earlier Coloumb modeling, we incorporate viscoelastic relaxation to calculate the stress increases in the inland regions and compare with the results of the elastic version. In addition, we will parameterize the model to include possible material property variations on the fault surface, mimicking the likely variations introduced by the subducting seamount asperity surface.

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Biographical Sketch:

Candy E. Elliott, known to many of you as “Casey” was born in Durham, North Carolina, where she lived until age 17. She then moved to the east coast, and followed her loved of the outdoors by working on and delivering boats from Maryland to the Virgin Islands. She has two children, Hunter and Elizabeth, ages ten and eight with whom she stayed at home full time until her daughter started school. At that time she enrolled at the University of North Carolina at Wilmington, where she obtained a B.S. in geology. She came to New Mexico Tech with her family in 2005 to pursue a Master’s in geophysics with Dr. Susan Bilek. Casey is slated to finish her degree later this year, after which she will pursue a career in industry.