A COMPUTATIONAL STUDY OF TWO POSSIBLE INTRAPLATE EARTHQUAKE TRIGGERING MECHANISMS

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The efficacy of two potential mechanisms for either triggering or causing seismicity is examined in this computational study. The conclusions reached in this study are specifically applied to the seismicity of the New Madrid seismic zone, where they are found to have no demonstrable effect.

The effect of water-loading in the Mississippi River is examined first. The modeling of a river load by a finite length of rectangular load approximations results in a non-unique determination of the stress distribution which is dependent on the load geometry far outside of the region of interest. A statistical study of the relation between seismicity, river stage, and their tendency functions for 1976 in the northern Mississippi Embayment is also presented.

As a prelude to the investigation of thermal stresses related to cylindrical plutonic intrusions, a detailed computational study of the thermal effects of such intrusions is also presented. The thermal effects studied are the temperature, the reduced temperature, and the surface heat flow for various intrusion geometries. Both two-dimensional plots of parameter-dependent curves and two-dimensional projections of three-dimensional plots are used to study the thermal effects.

The computational study of the thermal stresses associated with cylindrical plutonic intrusions is done using plots of the radial-dependence of the principal stresses associated with a given intrusion geometry at particular times after the initiation of intrusion and using focal mechanism plots based on the principal stress distribution.

The results of the above studies are discussed with relation to the seismicity and tectonic environment of the northern Mississippi Embayment.