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Title: A MORE COMPLETE AND ACCURATE HISTORIC EARTHQUAKE CATALOG FOR THE CENTRAL AND EASTERN U.S.

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TECHNICAL ABSTRACT

Note: The language used in this abstract fulfills the requirements of both the Technical and Non-Technical versions of the Abstract)

The overarching aim of this study was to improve the earthquake catalog for the eastern US during the pre-instrumental and the early instrumental period when felt and damage reports provide unique information about earthquakes. Several important results were achieved for this project in three distinct studies. First, we have continued to accumulate new intensity data for eastern US earthquakes, concentrating on events in the New York and New Madrid areas. With these new data we have significantly improved the catalog in completeness and accuracy for both locations and magnitudes. We have applied relationships derived by Johnston to assign moment magnitudes to all earthquakes in NCEER catalog whose source parameters were determined from intensity data. We have cooperated extensively with Ann Metzger (CERI) who combined her own new data with our data to improve historic source constraints in the central US. Secondly, we are developing further our MACRO algorithm to model intensity patterns. The new MACRO incorporates intensity fall-off with distance as derived by Johnston (1996). Also we have developed two versions of MACRO that accomplish distinct tasks: One version of MACRO is for the tasks of deriving source parameters; the other is for determining intensity residuals. We have started applying it to develop maps of intensity anomalies for the Central US based on all available data. These anomalies stem primarily from differences in site response. They can be applied as "station corrections" to improve constraints on source parameters derived from intensity data. Thirdly, we have cooperated with Sue Hough (USGS Pasadena) in a study of the 1811-1812 mainshocks in the central US. Our main conclusion is that the magnitudes of these critical events were overestimated, partly because the intensities were reported preferentially from sites with high site amplification. Population centers in the early 19th century were mostly along river banks where soft sediments are prevalent.

Following is a list of new earthquake data for the eastern US we have contributed in this project:

716 new intensity reports for 320 events (150 pages);
759 new intensity assigned from 716 new reports;
277 previously unknown earthquakes;
27 earthquakes with revised source parameters;
6 events of unclear origin (“doubtful”);
10 explosions previously identified as earthquakes.