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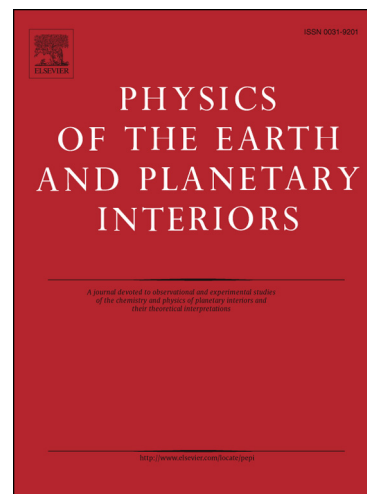
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*The 1952 Kern County, California Earthquake:
A Case Study of Issues in the Analysis of Historical Intensity Data for
Estimation of Source Parameters*

Leah Salditch^{1,}, Susan E. Hough², Seth Stein^{1,3}, Bruce D. Spencer^{3,4}, Edward M. Brooks^{1,3},
James S. Neely¹, Madeleine C. Lucas¹*

¹*Department of Earth and Planetary Sciences, Northwestern University, 2145 Sheridan Rd., Evanston, IL 60208
U.S.A*

²*United States Geological Survey, 525 South Wilson Ave., Pasadena, CA 91106 U.S.A*

³*Institute for Policy Research, Northwestern University, 2040 Sheridan Rd., Evanston, IL 60208 U.S.A.*

⁴*Department of Statistics, Northwestern University, 2006 Sheridan Rd., Evanston, IL 60208 U.S.A.*

**Corresponding Author*

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ABSTRACT

Seismic intensity data based on first-hand accounts of shaking give valuable insight into historical and early instrumental earthquakes. Comparing an observed intensity distribution to intensity-prediction models based on modern calibration events allows the magnitude to be estimated for many historic earthquakes. Magnitude estimates can also potentially be refined for earthquakes for which limited instrumental data are available. However, the complicated nature of macroseismic data and the methods used to collect and interpret the data introduce significant uncertainties. In this paper, we illustrate these challenges and possible solutions using the 1952 Kern County, California, earthquake as a case study. Published estimates of its magnitude vary from M_w 7.2 - 7.5, making it possibly the second largest in California during the 20th century. We considered over 1,100 first-hand reports of shaking, supplemented with other data, and inferred the magnitude in several ways using intensity prediction equations, yielding a preferred intensity magnitude M_I 7.2 ± 0.2 , where the uncertainty reflects our judgement. The revised intensity distribution reveals stronger shaking on the hanging wall, south of the surface expression of the White Wolf fault, than on the footwall. Characterizing the magnitude and shaking distribution of this early instrumental earthquake can help improve estimation of the seismic hazard of the region. Such reinterpreted intensities for historic earthquakes, combined with USGS Did You Feel It? data for more recent events, can be used to produce a uniform shaking dataset with which earthquake hazard map performance can be assessed.

1. INTRODUCTION

In this paper, we explore issues associated with analysis of seismic intensity data using the 21 July, 1952 Kern County, California, earthquake as a case study. Seismic intensity characterizes the level of earthquake shaking by human perceptions and effects on made-man structures and objects within them. The Modified Mercalli Intensity (MMI) scale introduced by Wood and

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