Final Project Summary— PEER Lifelines Program

Project Title—**ID Number**	*Rupture model of the Duzce, Turkey EQ*—**1C03**		
Start/End Dates	4/4/01 – 3/31/02	Budget/ Funding Source	$49,947 / PG&E/CEC
Project Leader (boldface) and Other Team Members	**Somerville (URS Corporation)**		

1. Project goals and objectives

The main purpose of this project is the determination of the slip distribution and rupture history of the 1999 Duzce (Turkey) earthquake from teleseismic body waves and local strong motion data.

2. Benefits of the results of this project to develop technologies and protocols to mitigate the vulnerability of electric systems and other lifelines to damage directly and indirectly caused by earthquakes. Also, benefits to develop assessment techniques to evaluate damage to electric systems caused by earthquakes and to assess fiscal impacts due to the loss of electric service to the community.

The results of this project help us to understand and predict the ground shaking associated with large strike-slip earthquakes.

3. Brief description of the accomplishments of the project

Slip model

Our slip model inversion results are shown in Figure 1a The Düzce earthquake had a relatively simple slip distribution consisting of a single main asperity slightly eastward of the hypocenter and a centroid depth of approximately 10 km. The source-time function (Figure 1b) has a total duration of 20 seconds, but the moment release after the first 15 seconds is very low and insignificant. We therefore adopt a duration of 15 seconds for this event. The moment of $8.8\text{x}10^{26}$ dyne.cm corresponds to a moment magnitude (M_W) of 7.2. The waveform fits are plotted in Figures 1c and 1d.

4. Describe any instances where you are aware that your results have been used in industry

The resulting rupture model is used by the NGA project.

5. Methodology employed

We represented the rupture as a propagating band of slip across the fault plane that is subdivided into subfaults (4x4 km). The slip history in any of these subfaults was determined through a non-negative least squares inversion of the observed waveforms using Green's functions that were computed for a local velocity model.

6. Other related work conducted within and/or outside PEER

7. Recommendations for the future work: what do you think should be done next?

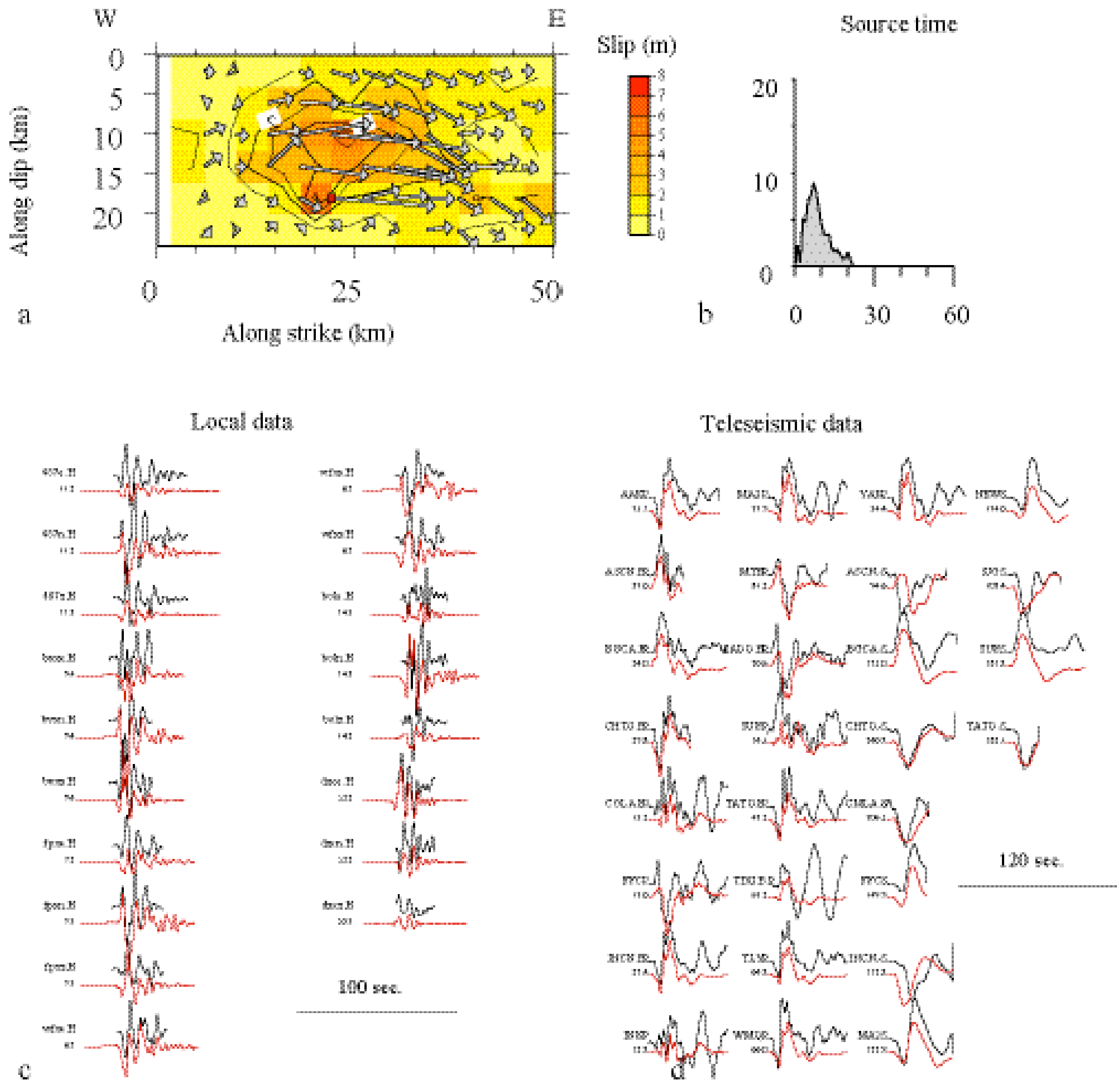

Figure 1. a - slip distribution and slip vectors on the fault plane. b - surce time function, c - strong motion waveforms (black) and synthetics (red). d - teleseismic waveforms (black) and synthetics (red).

8. <u>Author(s), Title, and Date</u> for the final report for this project

Hong Kie Thio, Robert Graves, Paul Somerville, US corp, april 6, 2002.