

## The USGS Response to Recent Large Earthquakes

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In the first two months of 2010, the USGS National Earthquake Information Center (NEIC) led a rapid response to two major global earthquake crises – the January 12<sup>th</sup> Mw7.0 Haiti earthquake, and the February 27<sup>th</sup> Mw8.8 Chile earthquake. Within 4-8 minutes of both earthquakes, the NEIC had detected the events and began to assess the details of each earthquake’s seismological characteristics, tectonic setting and societal impacts. The subsequent release of initial estimates of earthquake location and magnitude triggered a collection of products and tools that inform governments, aid agencies, the public and the media of the earthquakes’ occurrence (the *Earthquake Notification System - ENS*), its estimated shaking hazards (*ShakeMap*) and population exposure (*Prompt Assessment of Global Earthquakes for Response - PAGER*). For the Haiti earthquake, *PAGER* showed that approximately 3 million people were exposed to severe-extreme shaking (Modified Mercalli Intensity VIII or greater), indicating a large-scale disaster had occurred; similarly in Chile, 5.5 million were exposed to severe shaking, indicating the necessity of a similarly large-scale response. Rapid, independent W-phase, surface-wave and body-wave moment tensor solutions allowed confirmation and updates of magnitudes, identified the mechanisms of each earthquake and facilitated early assessments of the tectonic setting of the respective events, interpretations that have been supported by subsequent analysis and research efforts. Modeling of mainshock rupture processes was completed and refined within several hours, and used to update *ShakeMap* and *PAGER* exposure estimates to provide more accurate assessments of the scale and spatial extent of each disaster. All of these products were distributed through the USGS Earthquake Hazards Program web pages, where they were viewed over 10-15 million times within the first 24 hours of each earthquake, and reproduced by many major media outlets. Here we summarize these products, what they reveal about the earthquakes, and how they have been used by various outlets to communicate population exposure in addition to standard reports of earthquake location and size - a major step in increasing our awareness of vulnerability to earthquake shaking hazards.