Recent Activities of the USGS Earthquake Hazards Program

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This talk will summarize some recent accomplishments and new research directions of the USGS Earthquake Hazards Program (EHP). The EHP is the applied Earth science component of the United States' four-agency National Earthquake Hazards Reduction Program, created in 1980 with the goal of reducing the nation's earthquake risk. The EHP supports a coordinated set of activities in the areas of seismic and geodetic monitoring, seismic hazards assessment, applied earthquake research, and risk communication.

The USGS has created several new products for earthquake planning and response. Among these is a library of scenario earthquakes, each with ShakeMap shaking distribution and PAGER impact estimates, covering the earthquake-prone regions of the United States. (b) (c) A ground failure post-earthquake web page that provides maps of the expected locations and severity of earthquake-triggered landslides and liquefaction. In addition, the USGS and FEMA (Federal Emergency Management Agency) are working to create a "2PAGER" post-earthquake product that will estimate many types of impacts following large earthquakes in the United States.

The USGS is engaged in research to quantify changes in earthquake likelihoods with time, and to develop and deploy a nationwide capability to release aftershock advisories during major earthquake sequences. In 2018 the USGS began producing aftershock forecasts following large earthquakes in the U.S. These forecasts estimate the likelihood of—and expected number of-- aftershocks of each magnitude level. With time we hope to develop a consistent suite of forecast models that span the temporal range from the National Seismic Hazard Model (which estimates hazard over long time periods appropriate for building codes) to intermediate- (decade, year) and short-term (months, days, hours) aftershock forecasts.

The last damaging subduction zone earthquake in the United States was the M9.2 earthquake that damaged Anchorage, Alaska in 1964. The Cascadia subduction zone threatens coastal areas of Washington, Oregon, and northern California, and U.S. territories in the Caribbean are also at risk from subduction zone earthquakes. The USGS natural hazard programs, including the EHP, are investigating with greater emphasis the processes leading to subduction earthquakes, the likely magnitudes of potential earthquakes and their impacts, and providing science to inform policies and actions by Federal, State, and local partners to increase our Nation's resilience to these hazards.

Finally, the USGS is also working with several university and state partners to construct an earthquake early warning (EEW) system for the west coast of the nation. The ShakeAlert EEW system is now issuing warnings to many beta-testers, and work is underway to complete the necessary seismic and geodetic monitoring stations, telemetry, and computation centers required to create warnings, to create the communication pathways that will rapidly transmit warnings, and educate users on use of the warnings.