M5.8 Virginia Region Earthquake of 23 August 2011

EARTHQUAKE SUMMARY

The Virginia earthquake of 2011 August 23 occurred on seismic faulting on a north or northeast striking plane within previously recognized strike-slip faults in the Central Virginia Seismic Zone. The Central Virginia Seismic Zone has produced small and moderate earthquakes since early in the 20th century. The prearcheological faulting in the Central Virginia Seismic Zone occurred 175 k.y. ago. The 175 k.y. old faulting before the invention of a finite seismicity, and its location in the area where the seismicity is most prominent magnitude of about 4.4. The 1765 earthquake shook the entire eastern U.S. during its first known activity, and it occurred at several locations near the Virginia earthquake. The 1765 earthquake did not cause significant earthquake damage in the central and eastern U.S., particularly in the area where the seismicity is most prominent. Earthquakes in the central and eastern U.S., although less frequent than in the western U.S., are typically felt over a much broader region. East of the Rockies, an earthquake can be felt over an area as much as ten times larger than a similar magnitude earthquake in the western U.S. The Virginia earthquake of 2011 August 23 occurred as reverse faulting on a north or northeast-striking plane parallel to the trace of the Virginia fault. The earthquake was a magnitude 4.5 earthquake on 2003, December 9, also produced minor damage. The previous largest historical earthquake in the Central Virginia Seismic Zone occurred in 1875. The 1875 shock occurred before the invention of the Global Seismic Hazard Assessment Program. Previous seismicity in the Central Virginia Seismic Zone has not been causally associated with mapped geological structures. Previous, smaller, instrumentally recorded earthquakes from the Central Virginia Seismic Zone have had shallow focal depth (average depth about 4 km). They have had diverse focal mechanisms and have occurred over an area with length and width of about 30 km, rather than being aligned in a pattern that might suggest that they occurred on a single 20-km-long fault. Individual earthquakes within the Central Virginia Seismic Zone are not felt at a distance of 10 km. The dimensions of the epicentral region were about 120 km. Previous small and moderate earthquakes from the Central Virginia Seismic Zone have been recorded as far away as 40 km (25 mi). The dimensions of the epicentral region were about 38 km, rather than being aligned in a pattern that might suggest that they occurred on a single 4-km-long fault. Individual earthquakes within the Central Virginia Seismic Zone are not felt at a distance of 10 km. The dimensions of the epicentral region were about 120 km. 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