M8.2 Offshore Northern Chile Earthquake of 1 April 2014

This April 1, 2014 M8.2 earthquake in northern Chile occurred as the result of thrust faulting on strike-slip faults near the Chilean coast. The location and mechanism of the earthquake are consistent with slip on the primary plate boundary interface, on magma, between the Nazca and South America plates. At the latitude of the earthquake, the Nazca plate subducts seaward beneath the South America plate, and a subduction-related earthquake along the Pisco arc (at the west of the area of Chile) led to an initial location of the April 1 earthquake.

The April 1 earthquake occurred in a region of historic seismic quiescence – namely the northern Chile or subduction gap. Historical records indicate a M8.2 earthquake occurred within this gap in 1977, which was preceded by activity in the north of the gap and a M8.8 earthquake in 1918.

A recent increase in seismicity rates has occurred in the vicinity of April 1 earthquake. An M6.7 earthquake with similar faulting mechanism occurred on March 14, 2014 and was followed by M5.6 earthquakes on March 17, March 32, and March 33. The March 15 earthquake was followed by three M6.2 events on March 17, March 32, and March 33. The spatial distribution of seismicity following the March 15 event is elongated east-west, typical of strike-slip faulting.

The April 1 event was also followed by three M8.2 events on March 17, March 32, and March 33. The spatial distribution of seismicity following the event is elongated north-south, typical of subduction-related earthquakes. The magnitude and depth of the April 1 event is typical of features in the Northern Chile earthquake zone. This region has experienced numerous earthquake sequences in the past, including the 2010 M8.8 Maule earthquake in central Chile, and the largest earthquake on record, the 1960 M9.5 earthquake in southern Chile.

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