"USGS Earthquake Hazards Program Event Executive Summary"

Version #1

PRELIMINARY EARTHQUAKE INFO

M_w 8.2 **95KM NW OF IQUIQUE, CHILE**
2014-04-01 23:46:46 UTC
2014-04-01 18:46:46 GMT-05:00 at epicenter

Latitude: -19.642 Longitude: -70.817 Depth: 20.1 Km
Earthquake parameters last updated at 2014-04-01 23:55:20 UTC (local system time)

Nearest Cities
Note. Time on land is different than out to sea at the epicenter. Chile time was 20:46:46 GMT -3:00

- 79 km (49 miles) WNW of Iquique, Chile
- 160 km (99 miles) SSW of Arica, Chile
- 211 km (131 miles) SSW of Tacna, Peru
- 251 km (155 miles) SSE of Ilo, Peru
- 463 km (287 miles) SW of La Paz, Bolivia

USGS Event Link
http://earthquake.usgs.gov/earthquakes/eventpage/usc000nzvd

Additional Earthquake Links
Additional earthquake information for Chile
Earthquake Summary Poster
Preliminary Earthquake Information: Additional Comments:

The Pacific Tsunami Warning Center said a six-foot tsunami that hit Pisagua, Chile, at 8:04 p.m. ET. Coastal areas of Chile and Easter Island were evacuated.
A tsunami alert was initially issued for Chile, Peru and Ecuador, but was later extended to Colombia and Panama. Tsunami watches were issued for Costa Rica, Nicaragua, El Salvador, Guatemala, Honduras and Mexico. The warnings were later canceled for everywhere but Chile and Peru (where they are still in effect).

EARTHQUAKE SUMMARY

Talking Points

- Shallow angle thrust earthquake that occurred on the interface between the Nazca and South American plate
- Largest earthquake in a sequence of earthquakes in northern Chile that started on January 06, 2014.
- Within this sequence there have been 6 M6 or larger earthquakes and more than 38 M5 or larger earthquakes.
- Estimated source duration of the earthquake is approximately 90 seconds
- Despite the large magnitude, the estimated levels of ground shaking on land are expected to be in the range of MMI 6-7. Building codes are excellent in Chile and are strictly enforced. Most of the buildings in urban centers are designed for seismic loading. Only older dwellings, e.g., adobe and weak masonry houses located in the coastal communities, which predate modern seismic codes, are expected to experience severe damage or collapse. Overall, given the early shaking estimates, the modern buildings should escape significant structural damage.

SEISMOTECTONIC INFORMATION

Tectonic Summary

The April 1, 2014 M8.2 earthquake in northern Chile occurred as the result of thrust faulting at shallow depths near the Chilean coast. The location and mechanism of the earthquake are consistent with slip on the primary plate boundary interface, or megathrust, between the Nazca and South America plates. At the latitude of the earthquake, the Nazca plate subducts eastward beneath the South America plate at a rate of 65 mm/yr. Subduction along the Peru-Chile Trench to the west of Chile has led to uplift of the Andes mountain range and has produced some of the largest earthquakes in the world, including the 2010 M 8.8 Maule earthquake in central Chile, and the largest earthquake on record, the 1960 M 9.5 earthquake in southern Chile.

More information on regional seismicity and tectonics

Historical Seismicity

The April 1 earthquake occurred in a region of relative historic seismic quiescence compared to other rupture segments of the Nazca subduction zone – termed the northern Chile or Iquique seismic gap. Historical records indicate a M 8.8 earthquake occurred within the Iquique gap in 1877, which was preceded immediately to the north by an M 8.8 earthquake in 1868. However, plate motion indicators show partial to complete coupling between the overriding South America plate and downgoing Nazca plate that could lead to a significant earthquake.

A recent increase in seismicity rates has occurred in the vicinity of the April 1 earthquake. An M6.7 earthquake with similar faulting mechanism occurred on March 16, 2014 and was followed by 60+ earthquake of M4+, and 26 earthquakes of M5+. The March 16 earthquake was also followed by three M6.2 events on March 17, March 22, and March 23. The spatial distribution of seismicity following the March 16 event migrated spatially to the north through time, starting near 20S and moving to ~19.5S. The initial location of the April 1 earthquake places the event near the northern end of this seismic sequence. Initial aftershocks of the April 1 event overlap spatially with many of the earthquakes in the preceding foreshock sequence. Other recent large plate boundary ruptures bound the rupture area of the April 1 event, including the 2001 M 8.4 Peru earthquake adjacent to the south coast of Peru to the north, and the 2007 M 7.7 Tocopilla, Chile and 1995 M 8.1 Antofagasta, Chile earthquakes to the south. Smaller nearby events along the plate boundary interface include an M 7.4 in 1967 as well as an M 7.7 in 2005, a normal faulting event, in the deeper portion of the subduction zone beneath onland Chile.

EARTHQUAKE EFFECTS

Prompt Assessment of Earthquakes for Response

http://earthquake.usgs.gov/earthquakes/eventpage/usc000nzvd#pager

Population Exposure

Estimated Modified Mercalli Intensity		I	II-III	IV	V	VI	VII	VIII	IX	X
Est. Population Exposure		0*	0*	211k*	454k*	637k	96k	0	0	0
Perceived Shaking		Not Felt	Weak	Light	Moderate	Strong	Very Strong	Severe	Violent	Extreme
Potential Structural Damage	Resistant	None	None	None	V. Light	Light	Moderate	Moderate Heavy	Heavy	Very Heavy
	Vulnerable	None	None	None	Light	Moderate	Moderate Heavy	Heavy	V. Heavy	V. Heavy

*Estimated exposure only includes population within calculated shake map area

Damage Reports

Preliminary reports suggest that damage is not extensive and the region escaped major casualties. However, there are localized power and telephone outages, some minor

injuries were reported, and some homes made of adobe were destroyed. There was some damage reported on roads linking northern towns between Iquique and Alto Auspicio, but it was immediately clear how much. Landslides also have been reported to be blocking roads.
The Chilean-owned copper mine reported no injuries to employees and no damage to operations. Tall buildings swayed in La Paz, Bolivia and in nearby Peru.

DYFI Link
http://earthquake.usgs.gov/earthquakes/eventpage/usc000nzvd#dyfi

EARTHQUAKE SOURCE PARAMETERS

Style of Faulting: Thrust Fault
W-Phase Moment Tensor

Moment 2.35e+21 N-m
Magnitude 8.2
Percent DC 98%
Depth 25.5 km
Updated 2014-04-02 00:45:36 UTC

Nodal Planes

Plane Strike Dip Rake
NP1 161° 79° 87°
NP2 358° 12° 107°

MEDIA INFORMATION
Links to News Articles

http://www.washingtonpost.com/world/the_americas/magnitude-80-quake-strikes-northern-chile/2014/04/01/6c2c9fc2-b9fc-11e3-80de-2ff8801f27af_story.html

CONTACT INFORMATION
Event Coordinator: Earle, Paul S. (pearle@usgs.gov)
"If there are any changes, suggestions, questions, or comments about this particular email, please contact pearle@usgs.gov."

USGS - NEIC