PRIMER ON THE 27 JULY 2019 EARTHQUAKES IN BATANES

27 July 2019

Where is Batanes?

Batanes is the northernmost province of the Philippines. It is composed of three major islands namely, Itbayat, Sabtang and Batan. Basco, the capital of Batanes, is located in Batan Island.

What is happening in Batanes?

At 4:16 AM on 27 July 2019, Saturday, a Magnitude 5.4 earthquake shook the Batanes Islands. Its epicenter is located 12 kilometers north of Itbayat, Batanes and originated at a depth of 12 kilometers. At 7:37 AM, an earthquake with Magnitude 5.9 occurred 21 kilometers north of Itbayat, Batanes at a depth of 7 kilometers. At 9:24 AM, a Magnitude 5.8 earthquake occurred, located 11 kilometers north of Itbayat, Batanes, with a depth of 11 kilometers. Each event was followed by small-magnitude earthquakes. As of 8:00 PM of 27 July 2019, 104 aftershocks have been recorded by the DOST-PHIVOLCS seismic monitoring network.

The Magnitude 5.4 earthquake generated ground shaking felt at PHIVOLCS Earthquake Intensity Scale (PEIS) VI (Very Strong) in Itbayat, Batanes. Intensity III (Weak) was also felt in Basco and Sabtang, Batanes.
The larger Magnitude 5.9 earthquake generated stronger ground shaking felt at Intensity VII (Destructive) in Itbayat, Batanes, Intensity V (Strong) in Basco, Ivana, Mahatao, Batanes, and Intensity IV (Moderately Strong) in Sabtang and Uyugan, Batanes. Both ground shaking events resulted to casualties and damages to buildings and infrastructure near the epicentral area.

Prior to the moderate-sized earthquakes on July 27, earthquakes with magnitudes ranging from 4.2 to 4.8 occurred from July 22 to 26, 2019. The maximum reported ground shaking intensity was IV.

In addition to the type of building materials used, these earthquake events could have weakened the buildings and structures prior to the M5.9 earthquake event, resulting in greater damage than would have been expected.

**Have strong to major earthquakes affected Batanes in the past?**

At least 18 moderate to strong earthquakes have occurred in the vicinity of Batanes in the past. Earthquake events up to Magnitude 6.9 and maximum Intensity VII ground shaking occurred in the area from 1892 to 2016 based on SEASEE Report and PHIVOLCS Earthquake Catalog. The 16 July 2000 M6.4 earthquake significantly damaged Basco Cathedral.

**Why do earthquakes occur in Batanes?**

Earthquakes in Batanes are generated by subduction activities along the Manila Trench or the East Luzon Trough. Earthquakes may also be a result of movement along offshore active faults. In addition, there are other nearby inland local faults, which may not be manifested on the surface, that could be potential sources of small to moderate-magnitude earthquakes.
What can we expect from the current earthquake activity?

The current seismic trend indicates that the M5.4 earthquake at 4:16 AM is likely one of the foreshocks of the M5.9 earthquake at 7:37 AM. The succeeding small-magnitude earthquakes are classified as aftershocks, which may continue to occur for several days to weeks. Some of these may be felt if the epicenter is closer to populated areas. The occurrence of an earthquake higher than M5.9 however may not be discounted.

Aside from strong ground shaking, what other seismic hazards are life-threatening?

Landslides, rock falls, and other types of mass movements may occur in mountainous or hilly areas. Liquefaction effects such as sand boils, lateral spread and subsidence may affect low-lying, water-saturated, sandy areas near the river banks or coasts. Tsunamis may be generated by large offshore magnitude earthquakes or by submarine landslides.

Did these earthquakes trigger a tsunami?

No. While the epicenters of these earthquakes are offshore and have shallow depths, no destructive tsunami waves were generated because the magnitude of these events are still small to significantly cause large surface displacements of the sea floor. Earthquakes with magnitude 6.5 or above may generate tsunamis. In addition, the movement of the fault that generated the earthquakes was mainly horizontal.

Can these present earthquakes indicate volcanic activity?

No. Although Iraya Volcano is located in Basco, Batanes, the present network of instruments shows no indication of any significant change of monitoring parameters suggesting renewed magmatic activity.

However, as part of PHIVOLCS’ monitoring procedures for moderately large earthquakes occurring near active volcanoes, the Institute will closely monitor the earthquake activity, as well as any unusual activity that may be monitored at Iraya Volcano.

What should be done by the affected communities?

People are reminded to be cautious of structures visibly weakened or with signs of damage by the 27 July 2019 earthquake events, as these impacts may further be aggravated by the aftershocks. In case of houses and other buildings with visible damage, it is recommended to temporarily avoid occupancy of these structures and immediate coordination and inspection by the Municipal/City Engineering Office be done. Engineers from the local government, other agencies and organizations should inspect buildings and other infrastructures to determine their integrity, and recommend appropriate actions to concerned affected groups or individuals.
Slopes should be checked for tension/incipient cracks that may have resulted from the strong ground shaking. Tension cracks may render slopes more susceptible to landslides. These areas should be avoided and appropriate warning signs should be placed.

The best course of action is preparedness. In case of another felt earthquake, it is recommended that people should first protect themselves by doing the "drop, cover and hold". At homes and offices, heavy furniture should be strapped to the walls, and appliances be secured to prevent them from toppling and causing injuries to persons. For offshore earthquakes capable of generating tsunamis, coastal communities are advised to immediately evacuate to higher grounds or farther inland as specified in their local tsunami evacuation plans.

What is the role of DOST-PHIVOLCS?

DOST-PHIVOLCS operates and maintains a network of 102 seismic stations spread across the Philippines. Data from the seismic stations are used to determine the location, magnitude and other characteristics of the earthquakes generated.

The closest seismic stations to Batanes are the staff-controlled Basco Seismic Station in Batanes and Pasuquin Seismic Station in Pasuquin Ilocos Norte; and remote-telemetered seismic stations in Calayan Island, Gonzaga and Pamplona, Cagayan, and Conner, Apayao.

Aside from monitoring the occurrence of earthquakes, DOST-PHIVOLCS also conducts hazards analyses and assessments and, information, education and communication campaigns to the public. DOST-PHIVOLCS works hand-in-hand with other government agencies in mitigating the damaging effects of earthquakes.

Please visit our website at http://www.phivolcs.dost.gov.ph, and our Facebook and Twitter accounts for earthquake bulletins, volcano updates, hazard maps, and other information on earthquakes and volcanoes. Earthquake observations may also be reported to DOST-PHIVOLCS at telephone numbers (02) 929-9254 and (02) 426-1468 to 79, local 124 and 125.