

Shallow active magma body beneath Taal Volcano Island, Philippines

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Taal volcano, Philippines, is one the world's most dangerous volcanoes in view of its explosive eruption history and close proximity to populations. Electromagnetic, geodetic, and seismic studies have been extensively conducted at this volcano to reveal its magma system. Recent deployment of a realtime broadband seismic network has detected long-period (LP) and volcano-tectonic (VT) events that occurred beneath Taal. Our source location analysis of VT events using both onset arrival times and high-frequency seismic amplitudes points to the existence of a strong attenuation region with a shear-wave quality factor (Q) of around 10 near the surface at the eastern flank of Volcano Island in Taal Lake. This region is located just beneath the active fumarolic area and LP source and above inflation and deflation pressure sources, and is coincident with a low resistivity region. The attenuation region matches with that inferred from an active seismic survey conducted in 1993 at Taal volcano. These features strongly suggest that the attenuation region represents an active degassing magma body near the surface, which persistently existed for more than 20 years. Our study synthesized with previous studies clarifies the magma system beneath Taal, which further addresses volcanic risk at Volcano Island sitting on a shallow active magma body.