

The origin and its environmental significance of thick colluvium on the coast of Xiaolanyu Isle, Taiwan

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The thick colluvium and a terrace are located at the northern and southern coast of Xiaolanyu Isle, Taiwan. Xiaolanyu Isle is the youngest volcanic island in the northern Luzon Arc, which lava was dated as 0.04 to 0.02 Ma. In its southern coast, the horizontal layers of sedimentary sequences are exposed on the 20-meter-high terrace scarp which mainly consisted of fine-grained, volcanic origin materials with soft-sediment deformation structures, which indicate the sediment layers are clastic origin. The sediment layers are extended to the hill of lava and covered by the thick colluvium in the southeast corner of the island. Six ^{14}C samples collected from those sediment layers yield the dates between 1.0 ka and 1.3 ka. The results of our works show that the collapse of volcanic materials and the formation of dammed lake created the horizontal sediment layers near the edge of the exposed terrace scarp. The residual collapsed material near the eastern part of the south coast of Xiaolanyu Isle was the volcanic debris without clear layers, and the previous volcanic landform, which caused the colluvium and the nature dam was vanished. In the northern coast, the hill of lava in the northeast corner is also covered by a thick colluvium. There is an erosional surface near the bottom of the collapsed material with rounded pebbles of 1 meter diameter and coarse sand layer on the top. It should be the strath surface and sediments near the coast before the collapsing of colluvium. Five ^{14}C samples of seashell, charcoal and coral were collected from the rounded boulder layer and the bottom of colluvium. The date of four seashell and charcoal samples were between 1.7 ka and 1.9 ka and the coral sample was about 2.7 ka. The results demonstrated that the volcano in the eastern Xiaolanyu Isle had been generated large landslides around 1.7 ka and 1.2 ka, which destroyed the volcanic landform. The main sliding bodies and dammed lake were destroyed afterwards. The coastal erosion caused by strong winter monsoons and typhoons could be the main cause of large landslides. However, the Isle could more likely to be influenced by other catastrophic events, such as the large earthquakes and nearby submarine volcano eruptions.