A Geochemical Investigation of Volcaniclastic Rocks from Northern Taiwan: A Provenance Study

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The Western Pacific region is one of the most populous regions on Earth and also one of the most volcanically active regions. There are at least twenty-five active or dormant volcanoes within 1200 km of Taiwan. Most of the volcanoes are related to the subduction of the Philippine Sea Plate or the Pacific Plate beneath the East Asia continental margin. Subduction-related volcanoes are known to produce significant eruptions of pyroclastic material. Volcaniclastic (pumice) rocks are commonly found along the coastal areas of Taiwan, especially the northern margin. The precise origin of the pumice is unknown but anecdotal evidence and local folklore suggests that it was derived from distant volcanoes located in the Philippines or Ryukyu Islands and brought to Taiwan by means of ocean currents. Our investigation attempts to ascertain the likely provenance of the pumice. We collected 16 samples from two different locations (10 from Jinshan; 6 from Guoshengbu) along the northern coast of Taiwan and measured their whole rock geochemistry in order to compare their compositions to rocks from neighboring volcanoes. The pumice collected from Northern Taiwan has distinct chemical characteristics (SiO_2 and Mg#) that distinguish them from the volcaniclastic rocks of Japan, Ryukyu Islands and the Philippines. Our results indicate that the pumice is most likely derived from the volcanic system in Northern Taiwan. It is possible that the pumice was ejected from a volcanic crater during the main eruption event and landed in the East China Sea only to drift back to Taiwan and become a beach deposit.