AGU FALL MEETING
San Francisco | 12–16 December 2016

V11A-2753: Are there Tuffs from Toba Supereruptions in Singapore?

Monday, 12 December 2016
08:00 - 12:20
Moscone South - Poster Hall

Singapore is a dense transportation hub and the most highly populated area of SE Asia. In order to assess volcanic hazards for Singapore, we compiled a database of Quaternary eruptions from neighboring volcanoes and we investigated samples from 20 boreholes collected across 11 reservoirs and several natural outcrops in the NW parts of the city. We identified a deposit of white to slightly yellow clay with a visible thickness of 6-8 meters in the western part of Singapore. This deposit of very fine ash is silicic (SiO_2 72-75 wt.%) and calk-alkaline (K_2O 3.7-4.5 wt.%). The ash layer is clearly weathered as the LOI is around 5 wt.% and SEM images show the presence of clay minerals almost exclusively. Geochemical mapping shows that quartz crystals are characterized by textures similar to volcanic deposits. N-MORB normalized spiderdiagrams of whole-rocks show minimums in Nb and Ti, enrichments in LREE, and depletions of HREE. This suggests a subduction origin. One possible source for this voluminous weathered ash layer is the Toba caldera, which produced several super eruptions in the Quaternary (the Young Toba Tuff at 0.074 Ma, Middle Toba Tuff at 0.5 Ma, Old Toba Tuff at 0.84 Ma, and Haranggoal Dacite Tuff at 1.2 Ma). Recognizing distal Toba tuffs is problematic because most deposits are underwater. Most of the analyzed samples have geochemical compositions that are statistically similar to the Toba tuffs and characterized by high contents of HREE elements (e.g. Y, Er, Yb) and some REE (e.g. Eu, Ba, La, Th). Preliminary dating shows the presence of Triassic zircons, possibly due to geologic contamination. Additional dating is needed to ascertain the source and age of this ash. Our new geochemical data of likely distal Toba deposits will be an important component for tephrochronological and paleoenvironmental studies in addition to being of importance for hazards assessments in Singapore.

Authors

Olga Bergal-Kuvikas *
Nanyang Technological University

Caroline Bouvet de Maisonneuve
Nanyang Technological University

Jorge A Vazquez
USGS Baltimore

View Related Events