

TITLE: Volcaniclastic stratigraphy of Gede volcano in West Java.

AUTHORS (FIRST NAME, LAST NAME): Alexander Belousov^{1,3}, Marina Belousova^{1,3}, Akhmad Zaennudin², Oktory Prambada²

INSTITUTIONS (ALL): 1. Earth Observatory of Singapore, Singapore, Singapore.
2. Center for Volcanology and Geological Hazards Mitigation, Bandung, Indonesia.
3. Institute of Volcanology and Seismology, Petropavlovsk-Kamchatsky, Russia

ABSTRACT BODY: Gede volcano (2958 m a.s.l.) and the adjacent Pangrango volcano (3019 m a.s.l.) form large (base diameter 35 km) volcanic massif 60 km south of Jakarta. While Pangrango has no recorded eruptions, Gede is one of the most active volcanoes in Indonesia: eruptions were reported 26 times starting from 1747 (Petroeshevsky 1943; van Bemmelen 1949). Historic eruptions were mildly explosive (Vulcanian) with at least one lava flow. Modern activity of the volcano includes persistent solfataric activity in the summit crater and periodic seismic swarms – in 1990, 1991, 1992, 1995, 1996, 1997, 2000, 2010, and 2012 (CVGHM). Lands around the Gede-Pangrango massif are densely populated with villages up to 1500-2000 m a.s.l. Higher, the volcano is covered by rain forest of the Gede-Pangrango Natural Park, which is visited every day by numerous tourists who camp in the summit area.

We report the results of the detailed reinvestigation of volcaniclastic stratigraphy of Gede volcano. This work has allowed us to obtain 24 new radiocarbon dates for the area. As a result the timing and character of activity of Gede in Holocene has been revealed. The edifice of Gede volcano consists of main stratocone (Gumuruh) with 1.8 km-wide summit caldera; intra-caldera lava cone (Gede proper) with a 900 m wide summit crater, having 2 breaches toward N-NE; and intra-crater infill (lava dome/flow capped with 3 small craters surrounded by pyroclastic aprons). The Gumuruh edifice, composed mostly of lava flows, comprises more than 90% of the total volume of the volcano. Deep weathering of rocks and thick (2-4 m) red laterite soil covering Gumuruh indicates its very old age. Attempts to get ¹⁴C dates in 4 different locations of Gumuruh (including a large debris avalanche deposit on its SE foot) provided ages older than 45,000 years – beyond the limit for ¹⁴C dating. Outside the summit caldera, notable volumes of fresh, ¹⁴C datable volcaniclastic deposits were found only in the NNE sector of the volcano where they form a fan below the breached summit crater. The fan is composed of pyroclastic flows (PFs) and lahars of Holocene age that were deposited in 4 major stages: ~ 10 000 BP - voluminous PF of black scoria; ~ 4000 BP - two PFs of mingled grey/black scoria; ~ 1200 BP - multiple voluminous PFs strongly enriched by accidental material; ~ 1000 BP - a small scale debris avalanche (breaching of the crater wall) followed by small scale PFs of black scoria.

The intra-crater lava dome/flow was erupted in 1840 (Petroeshevsky, 1943). Three small craters on the top of the lava dome were formed by multiple post-1840 small-scale phreatomagmatic eruptions. Ejected pyroclasts are lithic hydrothermally altered material containing a few breadcrust bombs. The Holocene eruptive history of Gede indicates that the volcano can produce moderately strong (VEI 3-4) explosive eruptions and send PFs and lahars onto the NE foot of the volcano.