Preferred Session

Unravelling eruptive histories of volcanoes to understand future behaviour
(Theme: 3. Volcanic processes)

Preferred Type of Presentation

poster

Abstract

Age of the pre-1883 caldera-forming eruption of Krakatau, Indonesia

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Krakatau is one of the most famous volcanoes on Earth due to its deadly caldera-forming eruption in 1883. During the eruption, about 20 km³ of pyroclastic material were erupted, and a caldera with diameter of 7 km was formed. The Volcanic Explosivity Index (VEI) of this eruption is 6, which is among the most violent volcanic events in modern history. The combined effect of pyroclastic flows and tsunamis along the coast of the Sunda Strait had disastrous results: more than 36,000 victims. Works of Steve Carey, Haraldur Sigurdsson, and Jennifer Beauregard (2001) have shown that during the Holocene, before 1883, Krakatau produced several strong explosive eruptions, one of which was caldera-forming (deposited thick layer of locally welded ignimbrite). We were able to find in a southern cape of Lang (Panjang) Island of the Krakatau Archipelago and date (using the ^{14}C AMS method) the sandy paleosol lying directly below the 10 m-thick deposit of welded ignimbrite of the pre-1883 caldera-forming eruption: 6930-6820 BP. The dated ignimbrite probably corresponds to Unit B of Beauregard (2001), and the obtained age is consistent with her date of 8000 BP for stratigraphically lower (older) pyroclasts from the same area. This result indicates that recurrence frequency for caldera-forming eruptions of Krakatau can be estimated as ~7000 years (rather ordinary for volcanic arcs). Definitely Krakatau did not produce a large caldera-forming eruption ca. 400 or 500 AD as was suggested by Wohletz (2000), basing on old epics and Chinese history.

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A detailed geologic map and volcanic stratigraphy underly almost all other geologic studies of volcanoes (petrology, geochemistry, physical volcanology, etc.). Detailed eruption histories are fundamental for understanding any volcano and provide context for eruptive behavior, hazard assessment and mitigation, monitoring, and subsequent research. Moreover they can provide detailed information on eruptive processes and products, as well as how these processes and products change over time and space. We invite contributions presenting eruption histories of regions, volcanoes, calderas, and volcanic fields delineated through geologic mapping, (tephro)stratigraphy, and geochronology. We also invite contributions on the challenges and limitations to field-based studies as well as the use of alternative methods to understand eruptive history and associated hazard and risk. Multidisciplinary contributions combining field-based methods with archival research, new techniques, or methods from other scientific disciplines are especially encouraged, as are ideas on integrating such studies with hazard and risk management strategies.
CONVENERS
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