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Volcanology
Summary #1

# The 1883 Eruption

The Krakatau volcanic complex is located in the Sunda Straits of Indonesia. In 1883, Krakatau experienced large-scale eruptions that transformed the configuration of the islands so that the bulk of the Krakatau Island vanished and in its place was the formation of a 270-m-deep caldera. The eruptive activity began in May and continued with trifling eruptions that added ash-fall on Krakatau and adjacent islands. Surrounding vents were increasing in explosive activity and finally on August 26$^{th}$ a violent eruption took place where a large column of ash rose to a height of about 26Km.

The volcanic deposits surrounding the area were further studied through sediment cores that displayed varying colors of soil, coarseness in sediment, and grades of sorting to determine the characteristics of the numerous eruptions in 1883. The sediment cores indicated major shifts in eruptive activity starting with low-level activity and increasing to major eruptions associated with massive pyroclastic flows. More specifically, five colossal explosions were recorded and indicated to be related to the destructive tsunamis that took place on the coasts near the Sunda Straits.

Surveys of the bathymetry of the Krakatau region were compared in a before and after depiction of the eruption. The contour maps helped determine that within a 15 km range of the volcano, $\sim$12km$^3$ of material was added to the submarine region during the eruption. However, after studying more intensely on the volume and distribution of submarine deposits, results showed that the total volume of the original submarine deposits were 13.6km$^3$. This substantial difference in proximal volume indicated close matches in caldera volume and the volume of erupted products to support the argument of caldera formation by collapse into a shallow crustal magma chamber.

In order to find out more about the distal pyroclastic flow and surge deposits, stratigraphic sections of the 1883 deposits on Sebesi and Sebuku Islands were studied. The deposits were poorly sorted, gray pumice-rich ash, and ranged from massive to loosely stratified. Another unit of deposition had well-rounded clasts of light gray pumice that

ranged from 5 to 24 cm. These units subsequent from deposition suggest probable pyroclastic surge or flow deposit that may have been eroded and re-deposited by the tsunamis that was supplementary of the eruptions.

Although interaction between a hot pyroclastic flow and seawater is inadequately comprehended, newfound observations of poorly sorted submarine deposits suggest transport and support of material by a high yield strength matrix.

The possibility that tsunamis were generated by sub aerial flows into the sea is most likely caused due to displacement of seawater, great enough to result in multiple catastrophic waves. The evidence for multiple pyroclastic flows follows and supports the argument that entry of flows into the sea is indeed an important aspect of tsunami generation. After the violent volcanic activity, a caldera formed and is presumed to have formed at the time of older caldera collapse where magma might have spewed out at a high frequency in relation to the massive pyroclastic flows. Models demonstrated large explosive eruptions that suggest peak magma release is expected to occur at the time of caldera formation as a result of the forceful pressure applied on the underlying magma chamber.