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Stratigraphy of the 1883 Krakatau Mega Eruption and Tsunami in the Coastal Area of Java and Sumatra, Indonesia

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The 1883 mega eruption destroyed large part of Krakatau and formed a 7 km diameter caldera. During the paroxysmal stage, a series of eruption and tsunami occurred and destroyed more than 250 coastal villages along the Sunda Strait. This tsunamigenic volcanic activity left a unique stratigraphy along the coastal zone of Sunda Strait. This stratigraphy was formed by successive deposition of tephra and tsunami deposit, and also erosion by tsunamis. These near-field volcano-related tsunami deposits are different from usual sandy tsunami deposit caused by subduction-type earthquakes. The tsunami layers sometimes contain pumice and/or ash that have been carried up inland together with beach sand from their original position by the tsunami run up. In this study, we conducted field work at two sites in the coastal area of Java (Anyer, located 45 km east of Krakatau volcano and Carita, located 40 southeast of Krakatau volcano) and two other sites in the coastal area of Sumatra (Tarahan, located around 50 km north of Krakatau volcano and Limus, located around 70 km northwest of Krakatau). This geological work is important to reveal transport and depositional processes of the tsunami deposits. Beside careful examination of sedimentology characteristics, we used historical record account in conjunction with the stratigraphy characteristics. At each site, the stratigraphic profile is different, but all composed of sand layers intercalated by ash and pumice layers. The ash layers contain shell fragments with no lithic in Tarahan, and they contain shell fragments and foraminifera with minor lithic and heavy mineral in Anyer. We interpreted this layers had been deposited by the tsunami. The shape of the pumice is also a key feature for this recognition. The shape of pumice fragments in Limus is more angular than that of other locations. This pumice layer does not contain any shell fragments nor foraminifera. We interpreted this layer as the primary tephra fallout deposit. This conclusion is also supported by historical record in which the pumice fall was apparently directed to the west. As the depositional processes of the deposits obtained, thus the chronology of eruption and tsunami during the paroxysmal stage of the 1883 Krakatau eruption can be described.

Keywords: Krakatau, eruption, tsunami deposit, stratigraphy, historical record, 1883