Field Survey of 2018 Krakatau tsunami

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INTRODUCTION

At 21:30 local time (UTC+7h) on the 22nd of December 2018 the shorelines of the Sunda Strait, Indonesia, were flooded by tsunami waves. As a result there was widespread destruction and there were 437 casualties, 31,943 injuries, 10 still missing and over 16,000 people displaced (as of the 14th January 2019 National Disaster Management Agency (BNBP), 2019). The tsunami was caused by the flank collapse of the Anak Krakatau volcano (Robertson et al. 2018), located roughly at the centre of the Sunda Strait, which separates eastern Sumatra and western Java islands. Takabatake et al. (2019) performed a field survey of the affected areas. The survey results showed that inundation heights were more than 4 m high along the coastline of Sumatra island (situated to the north-north-east of Anak Krakatau), while less than 4 m were measured along the north-western direction. In Java island Inundation heights of over 10 m were measured at Cipenyu Beach (south-south-eastern direction from Anak Krakatau). However, at the time it was not possible to survey the actual vicinity of Anak Krakatau.

METHODOLOGY

A field survey was conducted eight months after the volcanic eruption that generated the tsunami, between the 14 and 18th August 2019, focusing on the four islands that form the Krakatoa group (the three remnants of the original Krakatoa island and a fourth island, Anak Krakatau that formed in the early 20th century). The main objectives were to measure the run-up heights, establish how the tsunami propagated immediately after the flank collapse, estimate the volume of the material lost, and document the present state of the volcano to establish a benchmark to measure future geomorphological changes. For this purpose, a variety of different complementary methods were employed, including a survey of inundation heights, a bathymetry survey, an aerial drone survey, 360˚ degree video surveys and key informant interviews.

RESULTS

As shown in Fig. $$$, the maximum measured run-ups in Kecil island (local name: Panjang island) were 83.1 m, and the island was overtopped according to key informant interviews. In Rakata island the maximum run-ups were 47.6 and 50.2 m. As the island was much higher than the other islands surrounding it, with steep slopes facing Anak Krakatau, it was not overtopped. In Sertung island the maximum run-up was 40.6 m.

Figure 2 shows the results of the aerial survey of the area, which was then used to produce vertical elevation profiles of the island to estimate the amount of volume that was lost during the flank collapse. Such information is of crucial importance to the correct simulation of the event, which will be the objective of future work.

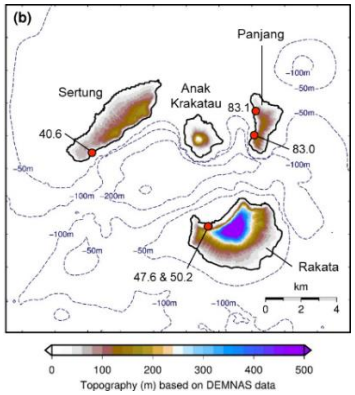

Figure 1. Bathymetry and surveyed run-up heights of the Krakatoa islands

Figure 2. Aerial map of Anak Krakatau

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