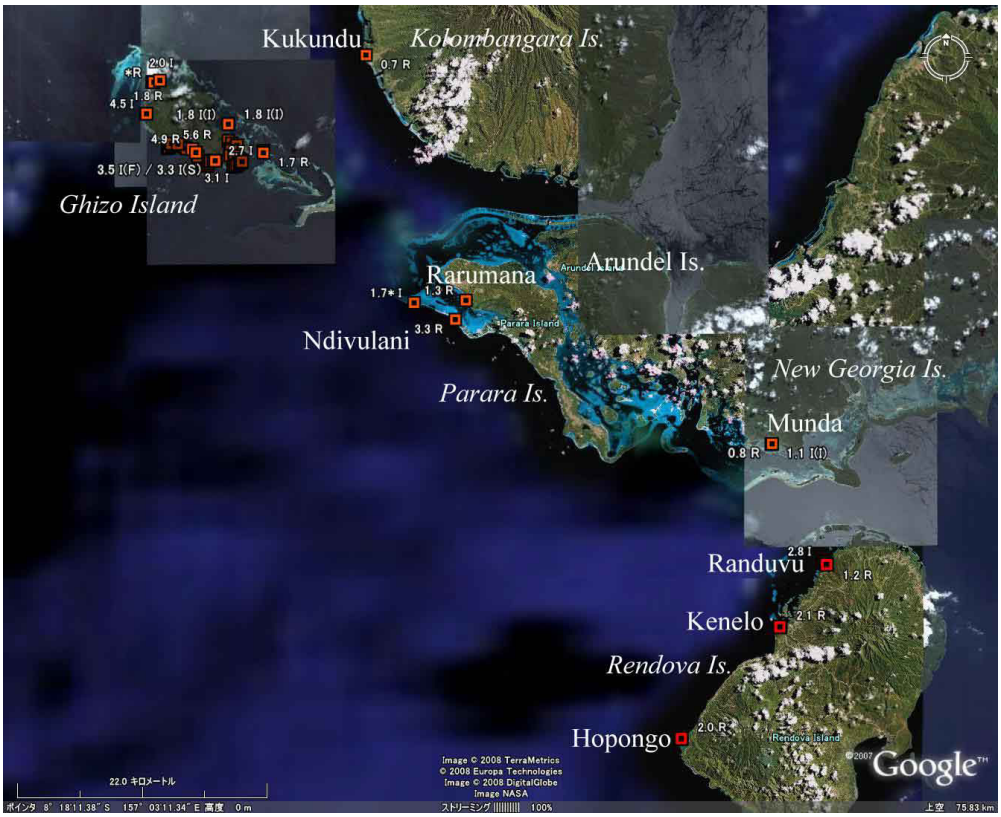
3.5 Islands in the east side

3.5.1 Location and topography

The findings in the islands in the east of Ghizo Island are stated in this section. The surveyed islands are Parara (~S8° 13', E157° 0'), New Georgia (Munda, ~S8° 20', E157° 16'), Kolombangara (~S8° 1', E156° 57') and Rendova (~S8° 25', E157° 15'). The surveyed sites are shown in Figure 3.5.1.1.

The bathymetry of this region is shown in Figure 3.5.1.2. Parara Island lies 20km southeast of Ghizo Island. The island in the northeast of Parara is Arundel Island. New Georgia Island is the big island lying east of Arundel Island. A very narrow channel separates New Georgia and Arundel Island. There is a well-developed coral reef between Parara and New Georgia islands; the coral reefs extend from both Parara and Arundel islands to Ferguson Passage like spits. Parara, New Georgia and Arundel islands form the calm inner sea like an atoll. Kolombangara Island is the circular big island lying northeast of Ghizo.

The location of the epicenter is estimated to be south of these islands, near S8° 30', E157° 0'. It is thought that the line from Ghizo to Parara is parallel to the strike of fault plane. Thus, Kolombangara Island is sheltered from the tsunami by Ghizo, Parara, and the reef complex.



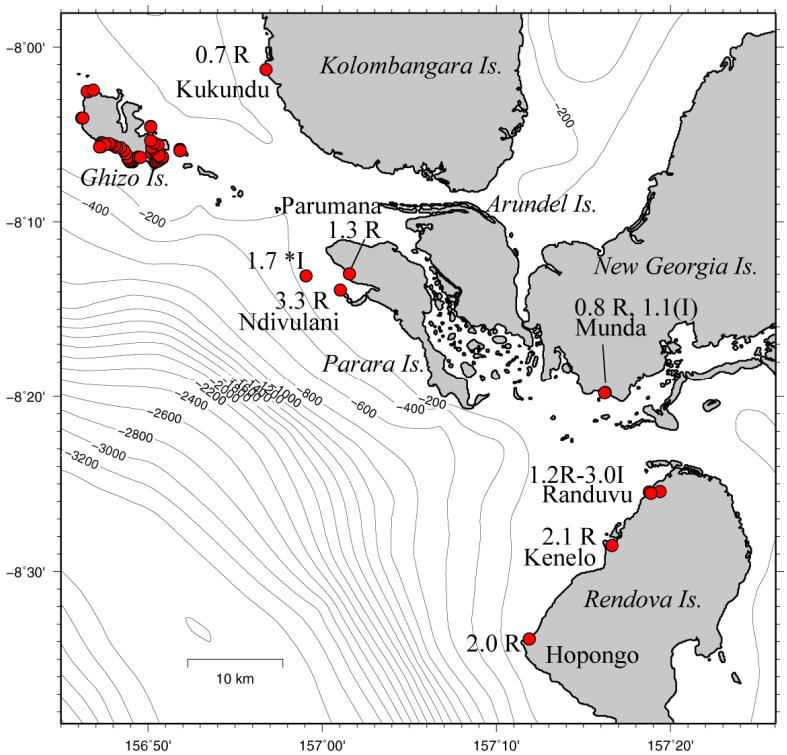


Figure 3.5.1.1 Surveyed sites in Parara, New Georgia and Kolombangara islands

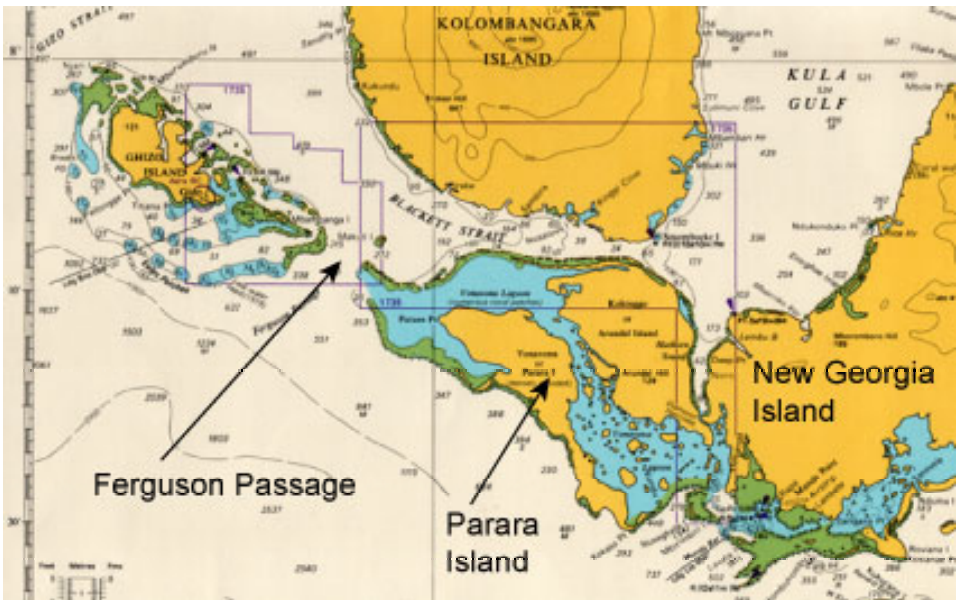


Figure 3.5.1.2 Bathymetry around Parara, New Georgia and Kolombangara islands

3.5.2 Parara Island

Parara Island has coral keys extending to the northwest direction. JAXA (Japan Aerospace Exploration Agency) had taken the satellite image of this region on 8 April

2007 as shown in Figures 3.5.2.1 and 3.5.2.2. By comparing the image taken before the earthquake, Figure 3.5.2.3, the uplift of the ground is clear in 'Area A' in Figure 3.5.2.2 (JAXA, 2007. See http://www.jaxa.jp/press/2007/04/20070409_daichi_e.html). This observation was supported by our field survey as shown in sections 2 and 3.

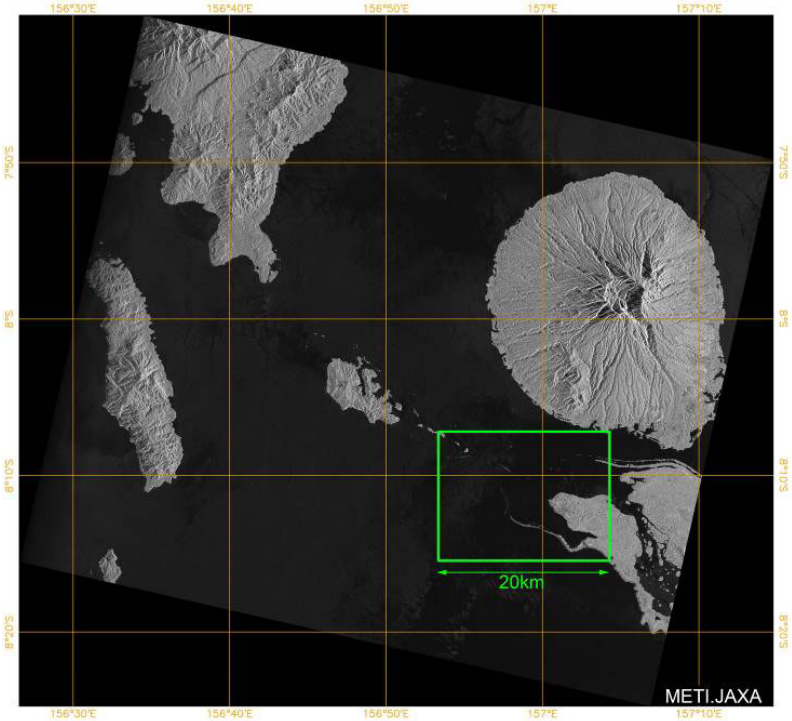


Figure 3.5.2.1 Satellite image taken at 10:38 AM (local time) on 8 April 2007 (@JAXA)

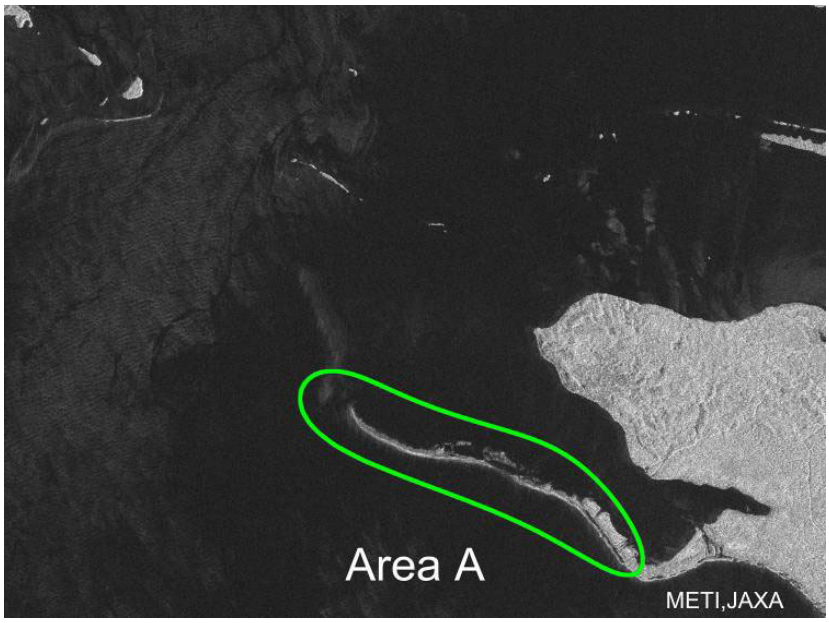


Figure 3.5.2.2 Enlarged image of the square in Figure 3.5.2.1 (@JAXA)

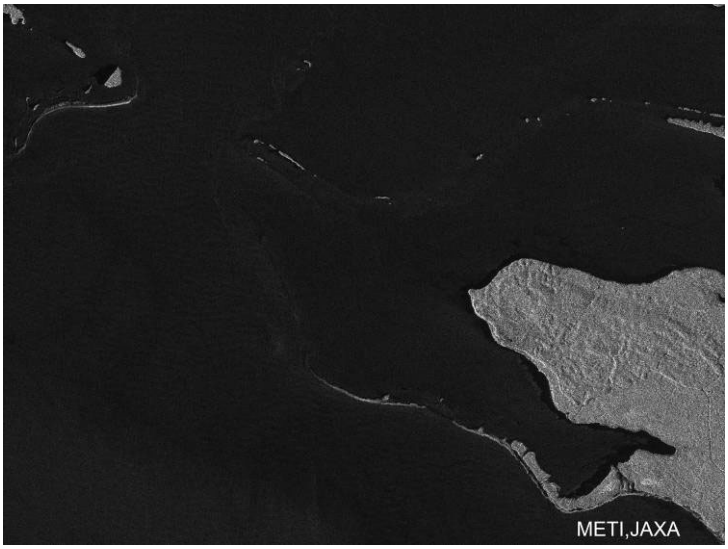


Figure 3.5.2.3　Image taken at the time of low-tide on 31 January 2007 (@JAXA)

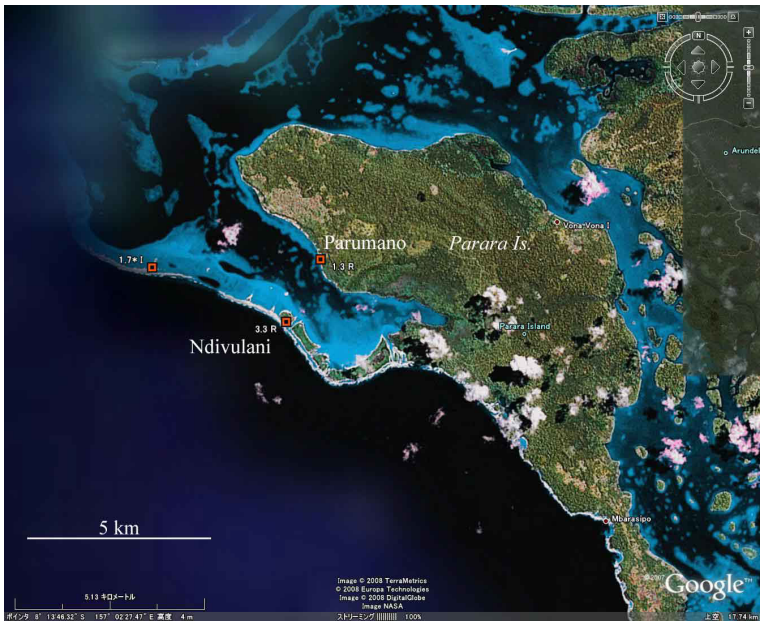


Figure 3.5.2.4　Trace heights surveyed in Parara (image by Google Earth)

The surveyed tsunami-trace heights in Parara Island are shown in Figure 3.5.2.4.

A runup height of 3.3 m was measured at Ndivulani, which is one of the chain of islands on the extending coral reef. Because no one lived in this island, there was no damage to structures here. Debris was found on the slope as shown in Photo 3.5.2.1. However, the debris seemed to have stopped there by being caught on vegetation. Thus, there is a possibility that the actual runup height was slightly higher than this measurement data.

Uplift was clearly observed in this island, e.g. the coral reef was cropped out from the sea surface. The uplift of the ground was estimated as about 1m. The surveying staff in Photo 3.5.2.2 marks the location of the pre-earthquake shoreline, shown as a sharp line from gray to white on the coral rubble.

Photo 3.5.2.1 Runup point at Ndivulani

Photo 3.5.2.2 Exposed coral reef at Ndivulani

The runup height of 1.3 m was measured at Rarumana, the village on the main island of Parara. The runup point was determined by eyewitness accounts of the tsunami. The place of the staff in Photo 3.5.2.3 shows the runup point. In addition, the residents told us that the first tsunami motion was rundown and the low-tide level before the earthquake was near the white line in Photo 3.5.2.4. The uplift of this location was estimated as 0.8 m. This village suffered no damage, because the coast is sheltered by the extending reef and the ground was uplifted by the earthquake.

Photo 3.5.2.3　Runup point at Rarumana

Photo 3.5.2.4　Uplift of ground at Rarumana

The record of 1.7 m was measured at an unidentified small island (Photo 3.5.2.5) near the end of the keys. The tsunami might intrude the whole island, because the debris was found in every place of the island. While the height of the debris shown in Photo 3.5.2.6 was measured, it is possible that the water level of the overflow on the island was higher than 1.7 m. The uplift of this location was estimated as 1.2 m.

Photo 3.5.2.5　Surveyed island near the end of the chain of keys

Photo 3.5.2.6　Tsunami trace at the surveyed island

3.5.3　New Georgia Island

In Munda of New Georgia Island, the tsunami field survey was conducted. The measurement points in Munda were approximately 40 km apart from the epicenter, as shown in Fig. 3.5.3.1.

Figure 3.5.3.1 Measurement points in Munda and epicenter

Fig. 3.5.3.2 shows the coastline and reef edges around Munda. Reefs have developed 800 m and 3000 m offshore along the south Munda coast; these reefs act as natural breakwaters. The survey points were in low-lying areas close to the sea surface as shown Photo 3.5.3.1. However, no severe damages were caused there, because the striking tsunami was approximately 1 m high as described later. The reason why the tsunami was not so high could be caused by tsunami reduction by reefs.

Photo 3.5.3.1 Survey location in low-lying area in Munda

Two tsunami traces, Marks 1 and 2, were measured in Munda, as shown in Fig. 3.5.3.3. Their transects are shown in Figs. 3.5.3.4 and 3.5.3.5. Mark 1 was an inundation mark on the front wall of a refrigerator in a house. The inundation height was 1.05 m. There was also another water mark with the same height on a side wall of the house. Mark 2 was at the border of discolored grass in a lawn. A resident said that the tsunami reached this location. The tsunami inundation height was 0.80 m.

According to residents' accounts, two tsunami waves struck the Munda coast. The second wave was bigger than the first wave. The tsunami form was not like a wave but was like a tide. The tsunami fluid velocity was not so fast. For example, a person could stand even in the tsunami whose surface rose to his knee near a shoreline.

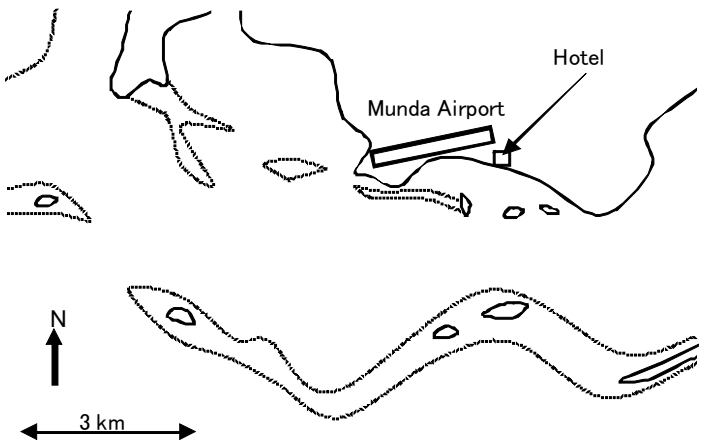


Figure 3.5.3.2 Coastal line (solid line) and reef edges (dotted lines) in Munda

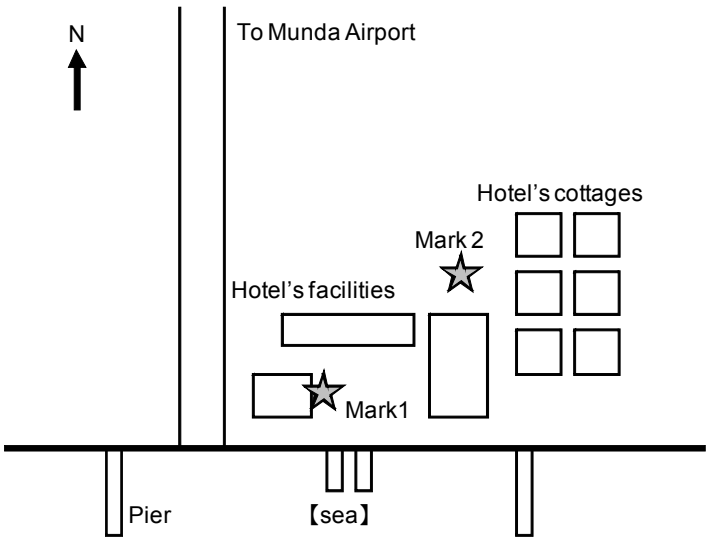


Figure 3.5.3.3 Locations of measured tsunami traces, Marks 1 and 2, in Munda

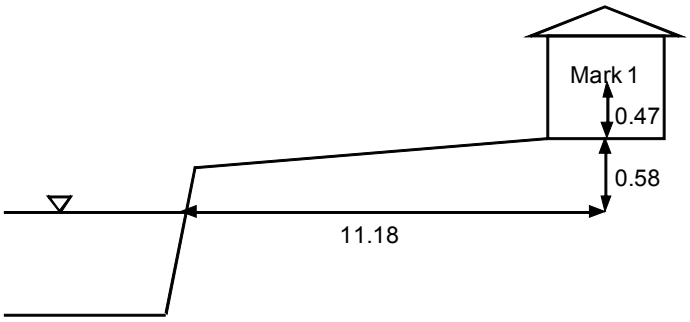


Figure 3.5.3.4 Transect near Mark 1

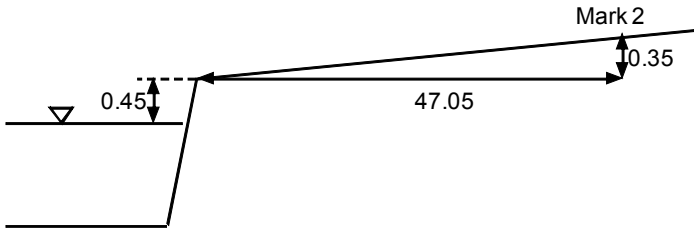


Figure 3.5.3.5 Transect near Mark 2

3.5.4 Kolombangara Island

Kolombangara Island is located at about 15 km east of Ghizo Island. On this island, we surveyed the tsunami height at Kukundu village. This village is located at the west side of Kolombangara Island which has an airport and a college. According to a lecturer of the college, one of 21 buildings was destroyed and 5 buildings were damaged by the tsunami. Before the tsunami arrival, the sea level dropped. Then, the tsunami

came about 5 minutes after the earthquake. The second wave came before the first wave passed. The temporal interval between the first and second waves was 1-2 minutes. The second one was the largest. The tsunami came from both the northwest and south directions. The land subsided by 0.35 m. Many inhabitants lived in their own houses after the tsunami, but the inhabitants, whose houses were damaged, lived in the school or with relatives temporarily. Some boats were swept away and destroyed. The water supply was also destroyed. Water to drink was now unavailable because of dirty water, and therefore they took the water from another village on the same island. The tsunami height is estimated as 0.72 m from an eyewitness account.

3.5.5 Rendova Island

The island is located near the eastern boundary of the earthquake fault (see chapter 2). Nishimura and Miyagi visited three villages at the western coast of the island in July 2007 and investigated the tsunami heights and vertical movement of the land based on eyewitness accounts.

3.5.5.1. Hoppongo

Hoppongo is located at the southwestern coast of Rendova Island. Local people identified coastal uplift and showed the original coastline at high tide. By comparing the original and present high tide lines we estimated the uplift to be 50 cm. Based on eyewitness accounts the tsunami came from the north. Before the tsunami attack, they observed the sea retreating for about 10 minutes. The tsunami did not damage houses. Inundation limit of the tsunami was inferred by a line of pumice that were carried up by the tsunami and re-deposited on the ground surface. The pumice probably originated from the submarine volcano off this island and composed the beach. The estimated tsunami runup height is 2.0 m (Photo 3.5.5.1.1).

Photo 3.5.5.1.1 Uplifted beach in Hoppongo, Rendova Island.

3.5.5.2. Kenero

Kenero is located at the middle of the west coast of the island. We interviewed a land owner, Mr. Lawry Wickham, about the earthquake and tsunami. Based on his accounts, we estimated about 20 cm uplift of the land and 2.1 m runup of the tsunami (Photo 3.5.5.2.1).

Photo 3.5.5.2.1 Measuring the tsunami inundation boundary in Kenero, Rendova Island.

3.5.5.3. Randuvu

We visited Mendali point, Randuvu, at the north western coast of the island. There is a village with more than 100 people. The village suffered significant damage from the tsunami. Local people say that the tsunami came from the east about five minutes after strong shaking. Before the tsunami attack, they observed the sea retreating. Some people were caught by the tsunami wave but escaped to the roof of the church. They showed the water level on the church wall and we measured the height from the sea level (Photo 3.5.5.3.1). The tsunami height there was about 3 m. Most of the people escaped inland to the bush and were safe. They showed the inundation boundary of the tsunami at about 200 m inland, and we measured the runup height of 1.2 m there (Photo 3.5.5.3.2). Based on eyewitness accounts, we estimated the ground subsidence as 41 cm.

Photo 3.5.5.3.1 Measuring the tsunami flow height on the wall of a church in Randuvu, Rendova Island.

Photo 3.5.5.3.2 Measuring the tsunami inundation boundary in Randuvu, Rendova Island.