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Tsunami Hazard Assessment Special Series: Vol. 1
Tsunami hazard assessment for Guam

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Executive Summary

Several Pacific Ocean Basin tsunamis occurred in the mid 20th century, causing destruction to United States coastal communities over a wide spatial scale. The destruction and unprecedented loss of life following the December 2004 Sumatra tsunami provided a reminder of the potential hazard posed to coastal communities and served as the catalyst for the formation of a partnership between the Pacific Risk Management ‘Ohana and the National Oceanic and Atmospheric Administration Center for Tsunami Research. The goal of this partnership is to conduct comprehensive tsunami hazard assessments for Pacific communities within the United States and her territories in support of hazard mitigation efforts that leverage multi-level agency collaboration for the benefit of the Pacific community ‘Ohana (or family). Of the specific communities identified for tsunami hazard assessment, the Island of Guam was chosen as the pilot study with the goal of identifying earthquake sources with the greatest potential to impact Guam, its population, and economy. The scope of this study includes five tsunami-vulnerable sites along the coastline of Guam for which 725 probable earthquake scenarios are considered.

Tsunami hazard assessments for each of five coastal communities on the Island of Guam—Tumon Bay, Agana Bay, Pago Bay, Apra Harbor, and Inarajan Bay—are conducted with both moderate (Mw 8.5) and Great Earthquake (Mw $\geq$ 9.0) scenarios. Wave amplitudes as high as 7.0 m at Tumon Bay are predicted, and at Pago and Inarajan bays the leading wave is predicted to arrive within 20 min with amplitudes as high as 15 m and 9 m, respectively, following a Great or worst-case earthquake. The Great Earthquake scenario is particularly important when considering far-field sources. Model results indicate that sources along the western Aleutians and Cascadia pose a significant risk to Guam due to favorable tsunami directivity from these regions to Guam. Although Great Earthquakes represent worst-case scenarios, occurrence of a moderate Pacific Basin earthquake is the most likely scenario. Tumon Bay, Apra Harbor, and Agana Bay are at significant risk from tsunamis generated by moderate earthquakes occurring along Ryukyu-Nankai source segments, while Manus and West Aleutian source segments pose a significant risk to both Pago Bay and Inarajan Bay in the event of a moderate earthquake. The greatest risk for all five communities, however, is posed by tsunamis generated along Mariana Trench and east Philippines sources, as identified from results of the 3625 optimized model runs. Overall, results show that Guam is at risk from tsunamis generated by earthquakes occurring in both near and far field due to Guam’s location relative to Pacific Basin subduction zones. Near-field earthquakes pose a time dependent problem for emergency managers due to Guam’s proximity to the seismic sources. The potential for local hazard from these sources with associated impact to population and marine structures is predicted to be significant.

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1. Introduction

A partnership between the Pacific Risk Management 'Ohana (PRiMO) and the National Oceanic and Atmospheric Administration (NOAA) Center for Tsunami Research was formed in 2006 with the goal of conducting comprehensive tsunami hazard assessments for Pacific communities within the United States and its territories. Formation of the partnership was initiated with the establishment of PRiMO in 2003 as a coalition of organizations focused on hazard risk management in the Pacific region. Federal risk management stakeholders met to explore opportunities to enhance partnerships and accelerated plans in the wake of the December 2004 Indian Ocean Sumatra tsunami and Hurricane Katrina in 2005. Both events caused unparalleled fatalities and destruction in the respective areas of impact and reinforced the need for a formal partnership to set future priorities.

'Ohana, Hawaiian for family, underscores the acceptance of Pacific communities and people working on natural disasters around the Pacific Ocean Basin as part of an extended family. A partnership goal is to aid PRiMO in its mandate to improve collective action and, as a group, its commitment to enhancing cooperation and collaboration to strengthen and sustain hazard-resilient communities among its agencies and institutions (PRIMO, 2009). The specific organizational goal is to increase collaboration among local, national, and regional agencies, institutions, and organizations involved in risk management in the Pacific for the benefit of the Pacific community family. To meet these goals, the PRiMO/NOAA partnership is centered on development of new, high-resolution digital elevation models, or numerical grids, to be used for investigation of earthquake sources around the Pacific Ocean Basin and assessing tsunami hazard for the vulnerable locations. The results will be available to local authorities and emergency managers for tsunami evacuation and inundation mapping.

The goal of this study is to provide a tsunami hazard assessment for the island of Guam that includes identification of earthquake sources from which tsunamis generated will have the greatest impact on the Island of Guam, its population, and economy.

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2. Background

Through PRIMO, specific communities were prioritized and, in 2008, the NOAA Center for Tsunami Research began collaborative work with the Island of Guam, selected for the pilot study. Coincidental to this work, NOAA's Pacific Marine Environmental Laboratory, in collaboration with NOAA's two tsunami warning centers, worked to develop a tsunami forecast capability for warnings, research, and hazard assessments (Titov *et al.*, 2005a). This capability resides in a system that integrates several key components: deep-ocean observations of tsunamis in real time, a basin-wide pre-computed propagation database of water level and flow velocities based on potential seismic unit sources, an inversion algorithm to refine the tsunami source based on deep-ocean observations during an event, and high-resolution tsunami forecast models. The Guam hazard assessment pilot study leverages the NOAA Center for Tsunami Research tsunami models to investigate regional vulnerability based on the tsunami history of the Island of Guam. Extension of this work for the Commonwealth of the Northern Mariana Islands (CNMI) and American Samoa is underway with a goal to conduct hazard assessment for the entire West and South Pacific United States territories.

2.1 Tsunami history in the West Pacific

Earthquakes capable of generating tsunamis occur in all parts of the world oceans in regions of known seismicity, typically subduction zones. Notable tsunamis in the Atlantic, such as that following the 1755 Lisbon, Portugal, earthquake as well as the landslide-generated Grand Banks tsunami of 1929 have occurred, but tsunami generation most commonly occurs in the Pacific Ocean

Table 2.1: Earthquake with Mw ≥ 8.0 in the Western Pacific.

Year	Longitude	Latitude	Depth	Mw	Location
1902	146	18	60	8.1	Agana, Guam
1906	138	34	340	8.4	Honshu, Japan
1909	142.5	31.5	80	8.3	Honshu, Japan
1909	145	12.5	100	8	Guam
1910	122.5	25.5	200	8.3	Taiwan
1911	131	28	160	8.7	Ryukyu Islands, Japan
1916	131.5	29.5	60	8	Duda, Japan
1918	125.2	5.4	33	8.3	Mindanao Island, Philippines
1920	122	23.5	10	8.3	Taiwan
1924	126.5	6.5	60	8.3	Mindanao Island, Philippines
1944	136	33.7	25	8.1	Kii, Japan
1946	135.6	33	30	8.1	Japan
1948	122	10.5	25	8.3	Panay, Philippines
1976	124.023	6.262	33	8.1	Mindanao Island, Philippines

Basin along the vast "Ring of Fire" subduction zones. Significant to this study, tsunami catalogues identify 14 historical earthquakes of Mw ≥ 8.0 from which tsunami were generated locally or from far-field Western Pacific sources, listed in **Table 2.1** (U.S. Geological Survey and National Geophysical Data Center earthquake database). A catalogue of what is believed to be all earthquakes to have occurred in the local vicinity of Guam is provided by Soloviev and Go (1974), Lander *et al.* (2002; 1993), and Iida (1984) (Catalogue of tsunamis in Japan and its neighboring countries).

2.2 Tsunami history of Guam

Guam is the largest and southernmost island in the volcanically formed Mariana Islands Archipelago and lies in close proximity to the seismically active region of the Mariana Trench. For this reason, there are multiple historical accounts of large, notable earthquakes, including those reported in 1809, 1822, 1825, 1834, 1837, 1849, 1892, 1902, 1909, 1990, and 1993. Four of these events, 1849, 1892, 1990, and 1993, triggered tsunamis that caused damage to the Island of Guam (Lander *et al.*, 2002). The 1993 tsunami, in particular, was observed along the southern and eastern coasts with a maximum amplitude of up to 2 m. Inside Apra Harbor, a tsunami amplitude of 15 cm was recorded. Despite this damage, the earthquake and tsunami were followed by a more devastating event, typhoon Steve, that caused extensive damage to the region. As a result, no detailed tsunami survey was conducted, so the extent of tsunami inundation remains unknown (Lander *et al.*, 2002; Hattori, 1993).

Figure 2.1 shows the location of Guam relative to the geological setting of the Western Pacific region and surrounding active subduction zones. To the east of Guam, the Mariana trench is formed by the Pacific plate moving toward and colliding with the Philippines Sea Plate at a rate of approximately 22 mm/yr. The Mariana trench extends northward to a triple junction with Nankai and Japan/Kuril trench, one of the highest stress-accumulating areas, with 83 mm/yr at Northeast Japan (Stein and Okal, 2007). Nankai trench extends further south, accommodating 57 mm/yr movement; it is followed by the Manila trench between Taiwan and Philippines. The Philippines Trench on the east and New Guinea and Manus Trenches on the south complete the circle of subduction zones around the Island of Guam.

2.3 Study areas

Geographically, Guam is located along the volcanically active Mariana Trench region of the southern Pacific Ocean where the Pacific and Philippines Sea tectonic plates converge. Guam, as shown in **Figure 2.2**, is approximately 50 km long from north to south and approximately 20 km wide in the east–west plane. Located at 13.45°N latitude and 144.79°E longitude, Guam is within 350 km of the 10,924 m Challenger Deep, the deepest known part of the Pacific Ocean. The island is 2500 km south of Tokyo, Japan, 6148 km west of the Hawaiian Islands, and 3380 km north of the Australian continent. The elongated island is 541 square km in surface area and inhabited by a population of 175,877 (CIA,

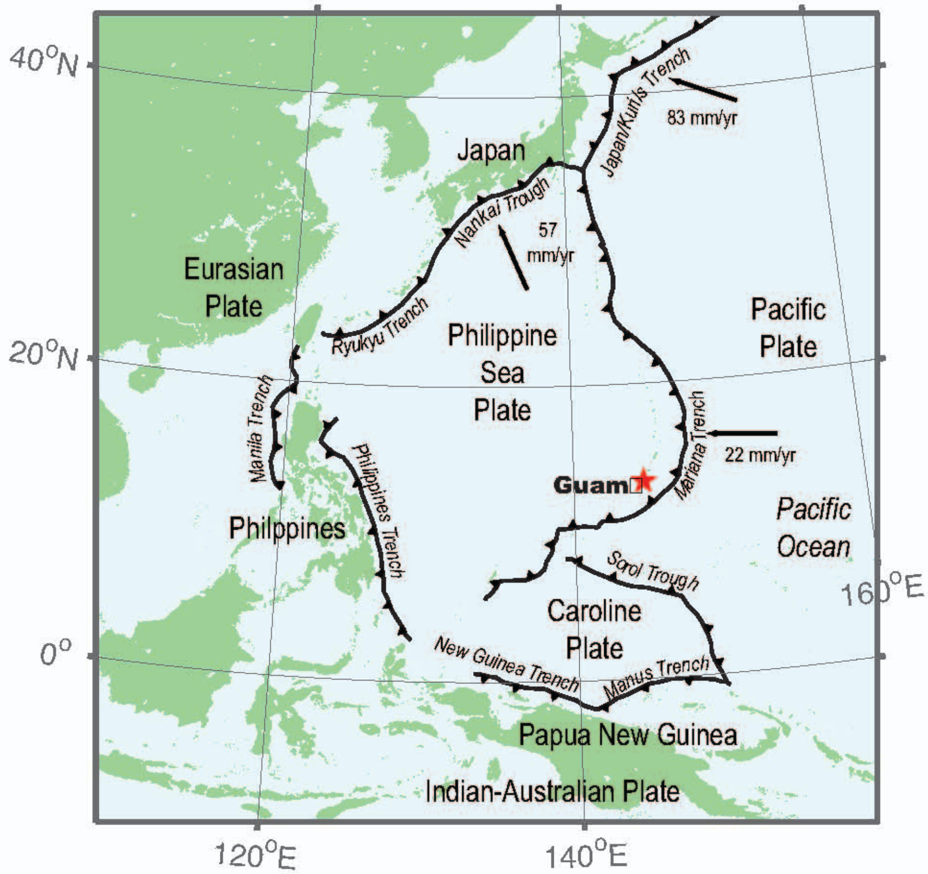

Figure 2.1: Regional setting showing the Island of Guam in relation to the Mariana Trench and surrounding tectonic plates and major specific subduction zones (Stein and Okal, 2007; Hall, 2002; 1997).

2007). Physically, the island has two distinct regions; a southern volcanic highland and a northern coralline limestone plateau. Buffeted by a fringing reef, Guam has virtually no continental shelf consistent with its very steep seafloor to surface relief. The location and geomorphology of Guam provides for a challenging environment in which to conduct tsunami research, modeling, and hazard assessment.

Guam was ceded to the United States by the Spanish in 1898 under terms of the Treaty of Paris. It has remained a United States Territory ever since, except for a few years during World War II when it was held under Japanese occupation. The island economy relies on the tourist trade and on the United States military due to its strategic importance as a supply and mobilization base. Nearly one third of the population is affiliated with Anderson Air Force Base or with the Apra Harbor Naval Reservation.

As a result, tsunami hazard assessment was conducted for the five specific sites on Guam shown in **Figure 2.2**: Tumon Bay on the Northwest side of the island, Agana Bay and Apra Harbor on the West central coast south of Tumon, Pago Bay on the East island coast, and Inarajan on the Southern part of the island. The capital Hagåtña (Agana) is located along the northwest coast

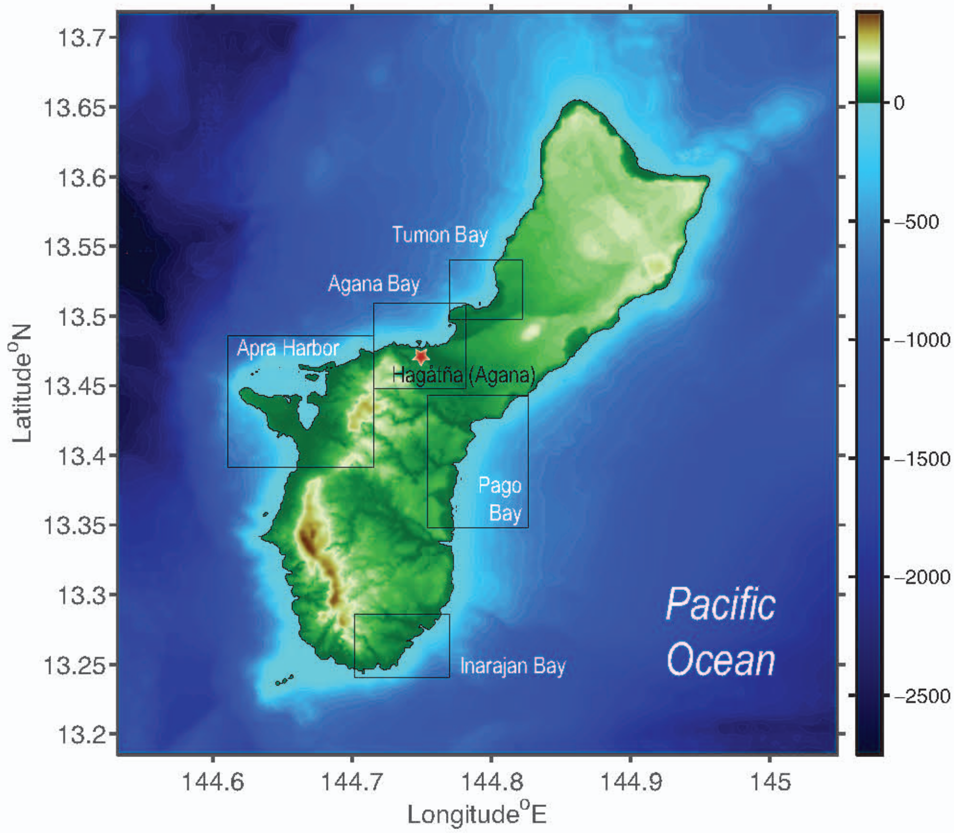

Figure 2.2: The five grids developed for tsunami hazard assessment at Apra Harbor, Agana, Tumon, Pago, and Inarajan bays.

of the island between Apra Harbor and Tumon Bay. Both Tumon and Agana Bay are densely populated, low-elevation communities popular with tourists. Apra Harbor holds particular importance as a deep-water port suitable for large Naval vessels. The maximum depth inside Apra Harbor is approximately 68 m, but the topography drops off steeply to a depth of 1440 m just 4 km offshore of the harbor entrance, making it ideal for naval vessel maneuverability. The harbor is home to the Guam shipyard, responsible for naval fleet repair and maintenance, and home to the only deep-water ammunition port in the western Pacific Ocean. In addition, Apra Harbor is considered to be the commercial and tourism hub for the island of Guam. The Harbor area is a densely populated tourist destination with a large infrastructure in place to support commerce. The additional sites of Pago and Inarajan Bay on the east coast of the island include two popular beaches, both of which are vulnerable to tsunami impact.

3. Methodology

A high-resolution inundation model is used as the basis for this study to provide an estimate of wave arrival time, wave height, and inundation following tsunami generation. Central to this work is construction of a high-resolution digital elevation model (DEM) to ensure an accurate representation of bathymetric and topographic regional features that affect tsunami impact. A DEM for Guam was constructed by combining several data sources into 1/3-arc-sec resolution grid with vertical datum set to local mean high water and the horizontal datum to WGS84. Bathymetric and topographic data from U.S. Army Corps of Engineers Joint Airborne LIDAR (Light Detection and Ranging) Bathymetry Technical Center of Expertise (USACE), and multibeam data from NOAA's National Geophysical Data Center (NGDC) and Scripps were used for grid development. Data were additionally provided by the National Ocean Services RNC #81048 and #81054, Pacific Islands Benthic Habitat Mapping Center (PIBHMC) and SRTM30-PLUS (**Figure 3.1**). For this study, three nested grids for each of five study sites, Tumon Bay, Apra Harbor, Pago Bay, Agana Bay, and Inarajan Bay, were prepared.

The scope of this study includes five tsunami-vulnerable sites along Guam's coastlines for which 725 probable earthquake scenarios are considered. The resultant 3625 high-resolution runs are computationally prohibitive as well as expensive, so modeling of all site cases at the highest 1/3-arc-sec resolution would not be feasible. As a result, the high-resolution model was optimized to ensure all cases were considered and to further the investigation with sensitivity studies. The resolution of the high-resolution numerical grid developed for Guam for accurate computation of wave response and inundation calculations is 1/3 arc sec. From this high-resolution grid, 3-arc-sec numerical grids were developed to perform within computational time constraints but still predicting time histories at selected numerical locations with high accuracy (Tang *et al.*, 2006).

The initial water surface elevation, evolution of wave propagation, and tsunami inundation for this study is computed by the MOST (Method of Splitting Tsunamis) model (Titov and Synolakis, 1997; 1998) by solving nonlinear shallow water equations with a finite difference algorithm. The Method of Splitting Tsunami (MOST) is a suite of numerical simulation codes capable of simulating three processes of tsunami evolution: generation, transoceanic propagation, and inundation of dry land. The MOST model has been extensively tested against a number of laboratory experiments and benchmarks (Synolakis *et al.*, 2008) and was successfully used for simulations of many historical tsunami events.

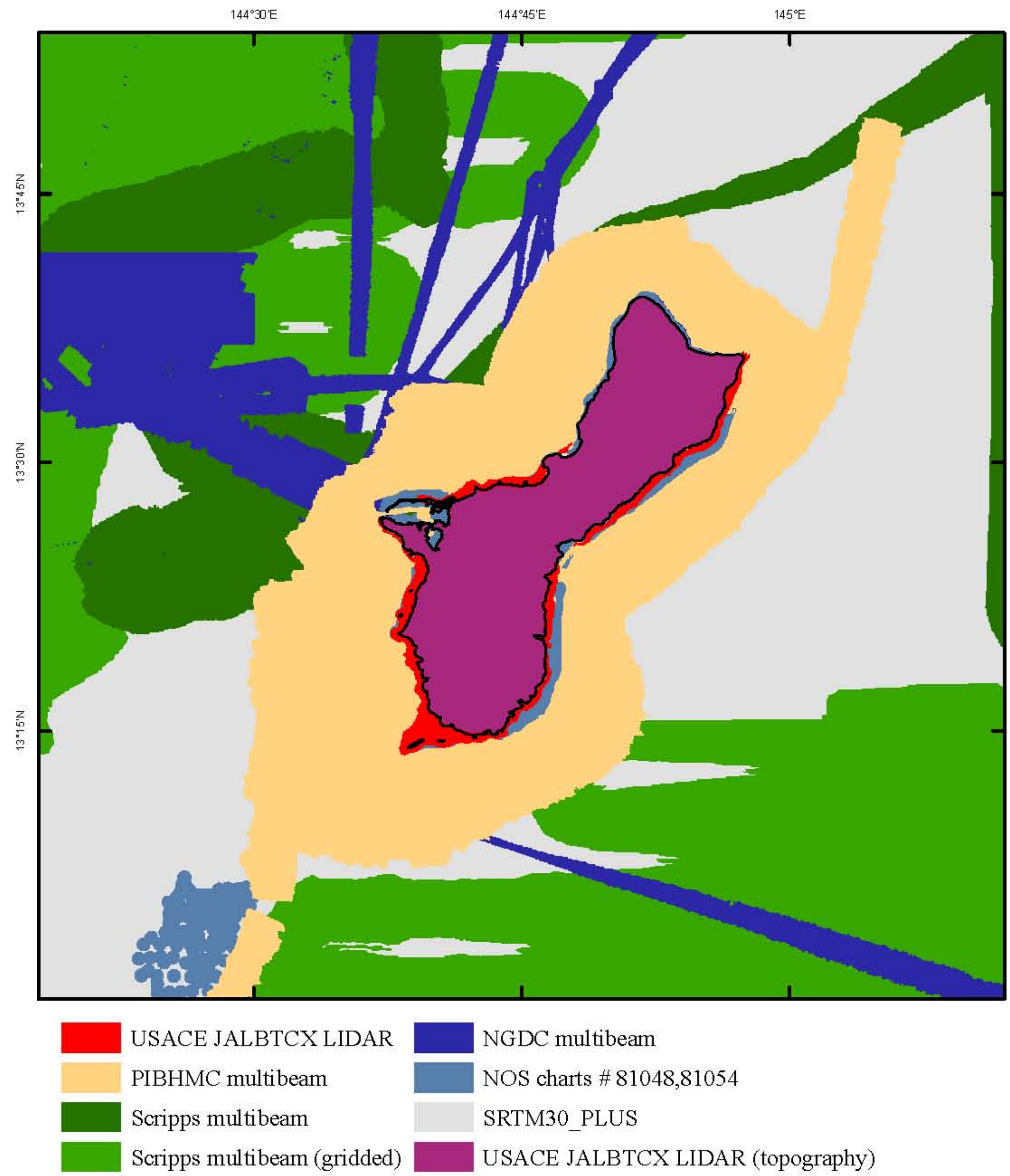

Figure 3.1: Data sources used for development of the Guam digital elevation model.

Table 3.1: List of multibeam survey data for Guam archived by NGDC.

Survey Identifier	Source	Ship	Chief Scientist	Date
AII8L12	University of Rhode Island	Atlantis II	Ken Smith and Christian de Moustier	1987-03-30
AII8L18	University of Rhode Island	Atlantis II	Brian Taylor	1987-03-30
MGLN02MV	NOAA NMFS	Melville	Robert Embley	2006-04-20
Marianas	Korean Ocean Research and Development Institute	Onnuri	Robert Dziak	1997-09-23
OES-03-07_AHI-03-07b	NOAA NMFS	Ahi		2003-09-21
PPTU08WT	Scripps	Thomas Washington	A. Yayanos	1986-04-22
PPTU09WT	Scripps	Thomas Washington	H. Craig	1986-04-30
RC2610	Lamont-Doherty	Conrad	Alexander Shor	1985-09-26
RC2611	Lamont-Doherty	Conrad	Alexander Shor	1985-09-28
TN153	University of Washington	Thomas G. Thompson	Robert Embley	2003-02-11
TN167	University of Washington	Thomas G. Thompson	Robert Embley	2004-03-27

3.1 Numerical grids

Data used for development of the high-resolution Guam grid are shown in **Figure 3.1**. Two U.S. Army Corps of Engineers (USACE), Joint Airborne LIDAR Bathymetry Technical Center of Expertise (JALBTCX) LIDAR surveys were incorporated into the grid. LIDAR is an aircraft-based laser survey system capable of collecting very high-resolution elevation data; the specific SHOALS LIDAR system is capable of penetrating water up to about 40 m, and is used by the USACE to survey bathymetry in shallow waters. The first USACE survey was performed in January 2001 to collect nearshore bathymetry from roughly Agana Bay in the northwest portion of Guam, proceeding counterclockwise around the south end of the island to Pago Bay. The second USACE survey, performed in February 2007, collected complete topographic data for all areas of the island as well as nearshore bathymetry from Pago Bay in the southeast of Guam north to Pati Point. The horizontal positional accuracy of the LIDAR data is ±3 m, and the vertical accuracy is ±15 cm. For the 2001 survey, NOAA Center for Tsunami Research used the raw SHOALS soundings in x, y, z text format as input to the gridding process. The 2007 survey was delivered as very high-resolution (1 m) gridded datasets; point data was extracted from these for input to the gridding process. For the topography, bare-earth processing was performed by using the topographic last return gridded data devoid of human structures and vegetation. These grids were clipped using polygons provided by USACE that indicated areas where a clear ground return was detected.

The National Geophysical Data Center (NGDC) provided data from several bathymetric surveys in the region, listed in **Table 3.1**. Limited processing was performed by NOAA Center for Tsunami Research to clean the multibeam data. On multibeam survey PPTU08WT, all data shallower than 2400 m were filtered out because they were substantially different from the more recent multibeam TUNE07WT survey, and were evaluated to be of lower quality. On the TUNE08WT survey, several bad beams, especially at the beginning of some data files, were removed.

The Scripps Institution of Oceanography at the University of California San Diego released data from a Guam survey undertaken by the R/V *Melville* in March–April 2001 (survey identifier COOK07MV; chief scientist Sherman Bloomer, Oregon State University). Raw multibeam data were downloaded from the Scripps SIO Explorer site (SIOExplorer, 2008); plotted in dark green in **Figure 3.1**. This archive did not contain bathymetric files for several regions that were surveyed, according to the cruise report. However, these missing data are available in gridded form from the Marine Geoscience Data System (MGDS, 2008) and were included in grid development. These processed datasets, distributed in GMT grid format with a resolution of approximately 3.5 arc sec, were used where original multibeam data were not available. These regions are plotted in light green in **Figure 3.1**.

The Pacific Islands Benthic Habitat Center (PIBHMC, 2008) is affiliated with the School of Ocean and Earth Science Technology at the University of Hawaii and funded in part by the NOAA Coral Reef Conservation Program. The Pacific Islands Benthic Habitat Center released gridded bathymetric data encircling the entire island of Guam (tan color in **Figure 3.1**), derived from surveys completed between 2003 and 2007. Some nearshore regions, with depths up to 400 m, were gridded with 5-m grid cells. However, the majority of survey extents were gridded with 60-m grid cells.

In nearshore and shoal area regions of insufficient high-resolution survey data, sounding points and contour lines were manually digitized from two NOAA Office of Coast Survey Raster Nautical Charts (RNC, 2008), #81048 and #81054. In total, 1637 sounding points and 76 contour segments were digitized. The nautical charts were derived from a variety of survey sources, many of them not available in digital form. Charting in offshore areas was primarily derived from pre-1900 surveys; parts of the west-central coast were surveyed from 1970 to 1989. The Apra Harbor area was surveyed by the Naval Oceanographic Office in 2001 (NGDC survey identifiers W00005 and W00006), resulting in updates of the NOS charts using these data.

The SRTM30-PLUS dataset by Joseph J. Becker and David T. Sandwell (TOPEX, 2007) is a medium-resolution global bathymetric/topographic dataset derived from satellite altimetry, ship track soundings, and other data sources. The dataset is provided at a resolution of 30 arc sec, though much of the dataset is derived from lower resolution sources, especially the 2-arc-min Smith and Sandwell dataset. SRTM30-PLUS data were used in deep-water regions of the grid where no other digital survey data were available (light gray in **Figure 3.1**).

The combined 1/3-arc-sec digital elevation model for each of the five high-resolution grids developed for this tsunami hazard assessment study are shown in **Figure 2.2**. Tumon, Agana, Pago, and Inarajan bays are selected as important population centers and Apra Harbor is included in the study because of the harbor's military importance and infrastructure as well as tide gauge observations located in the harbor for comparison and validation.

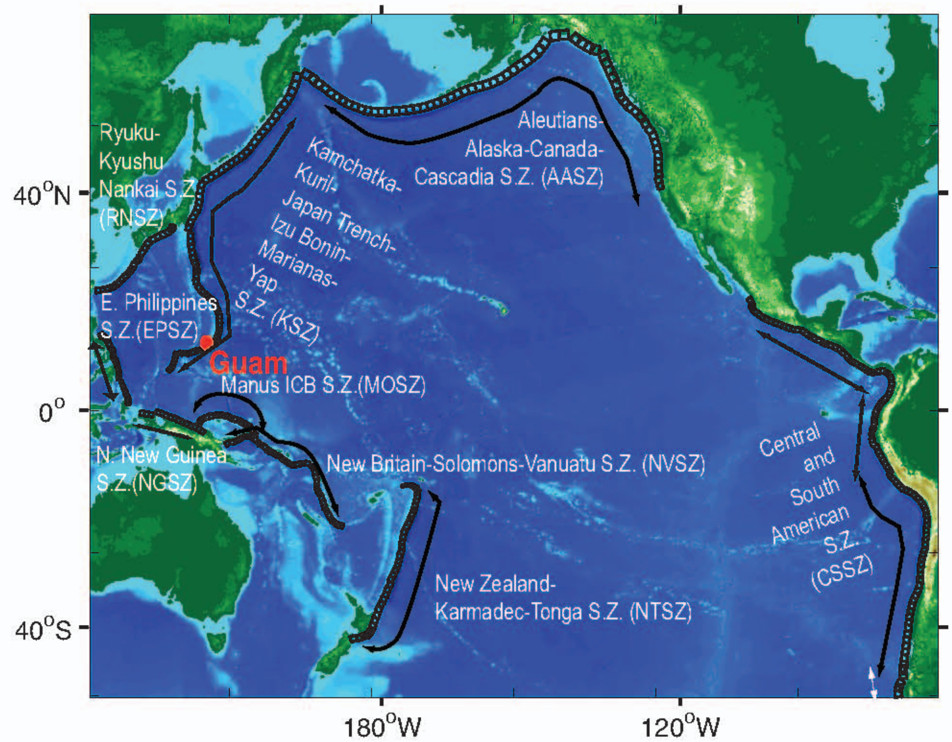

Figure 3.2: NOAA propagation database unit sources in the Pacific Ocean with respect to Guam.

3.2 Propagation database

Pacific Rim subduction zones are discretized into fault segments 100 km in length by 50 km in width, creating a NOAA tsunami propagation database (Gica *et al.*, 2008). The database contains pre-computed tsunami propagation results of wave heights and velocities across the Pacific Basin over all grid points for tsunamis generated by earthquakes with a fault rupture at each discrete segment. **Figure 3.2** shows the Pacific propagation databases unit sources with respect to Guam. Detailed source information for each specific subduction zone appears in Appendix G.

In this study, tsunamis from the Aleutians/Alaska and Cascadia (AASZ), Central and South America (CSSZ), eastern Philippines (EPSZ), Kuril Islands/Japan, and Mariana (KSZ), Manus (MSZ), New Guinea (NGSZ), Ryukyu-Nankai (RNSZ), New Zealand and Tonga (NTSZ), and New Britains and Vanuatu (NVSZ) subduction zones are considered. Four hundred three earthquake sources of combined propagation were used for the model study. Each model source simulates a large fault rupture of 100 km × 50 km unit sources linearly combined to create larger fault rupture zones capable of producing damaging transpacific tsunamis. Source slip value can be scaled to react to the actual slip of the earthquake of a certain magnitude. The underlying assumption is that the deep-sea evolution is linear, even though the equations used for propagation are nonlinear. Given the typical size of tsunamis in the deep ocean, this is a reasonable

Table 3.2: The earthquake parameters of 1952, 1960, and 1964 events used in modeling.

Date	Source	L (km)	W (km)	disp (m)	Mw	Information
4/10/1952	Kamchatka	800	100	13	9	10 cm at the tide gauge
22/5/1960	Chile	1000	100	20	9.2	20 cm at the tide guage
28/3/1964	Alaska	400	290/175	10	9.2	5 cm at the tide gauge

assumption, as in deep water the contributions of the nonlinear terms in the wave evolution are negligible. Once in shallow water, the tsunami dynamics become nonlinear so the linear superposition method is no longer applicable, hence a site-specific inundation model is created to study the coastal tsunami impact (Uslu, 2008).

3.3 Model validation and historical assessment

Three mega-earthquakes, the 1952 Kamchatka, the 1964 Alaska, and the 1960 Chile have been used in the model validation for various sites in several publications by Uslu (2008) and Borrero *et al.* (2006). The earthquakes caused tsunamis that were recorded in Apra Harbor at NOS tide gauge 1630000 (**Figure 3.3**). The historical records are instrumental in validating the numerical model developed for Guam and used in this study. These events are modeled with the parameters listed in **Table 3.3**. The computed time series at Apra Harbor have been compared with the historical records in **Figure 3.4**. Results show the models used in this study are sufficient to provide accurate tsunami modeling of the five selected sites in Guam.

Figure 3.5 shows the comparison between the high-resolution 1/3-arc-sec model runs and the optimized 3-arc-sec runs at Tumon Bay, Apra Harbor, Pago, Agana, and Inarajan bays for the 1952 Kamchatka tsunami. At Tumon, Pago, and Inarajan Bays, agreement between model runs is good in both amplitude and phase, showing that the optimized model accurately captures the tsunami at these locations. At Apra Harbor, agreement between the high-resolution and optimized runs is again good in amplitude and phase, particularly for the first wave. Comparison at this location between model runs and tide gauge data show good comparison in amplitude and phase for the first of two recorded tsunami waves followed by poorer agreement reflecting the more complicated non-linear nature of later waves at this site. At Agana Bay, agreement in phase is good. Amplitudes, although underestimated in optimized runs at Agana Bay, indicate tsunami hazard at this location.

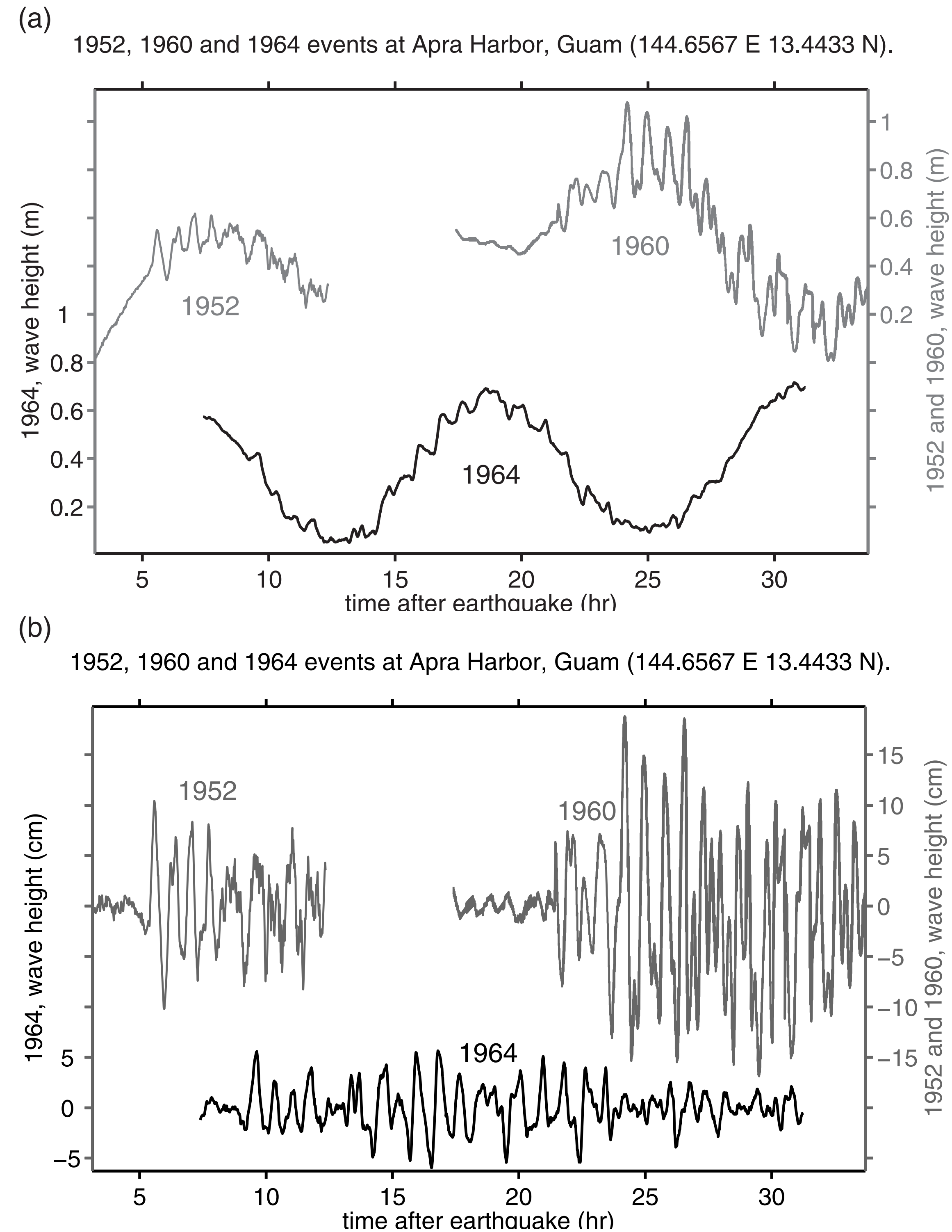

Figure 3.3: (a) Apra Harbor tide gauge observations of 1952, 1960, and 1964 tsunamis and (b) residual signal after detiding.

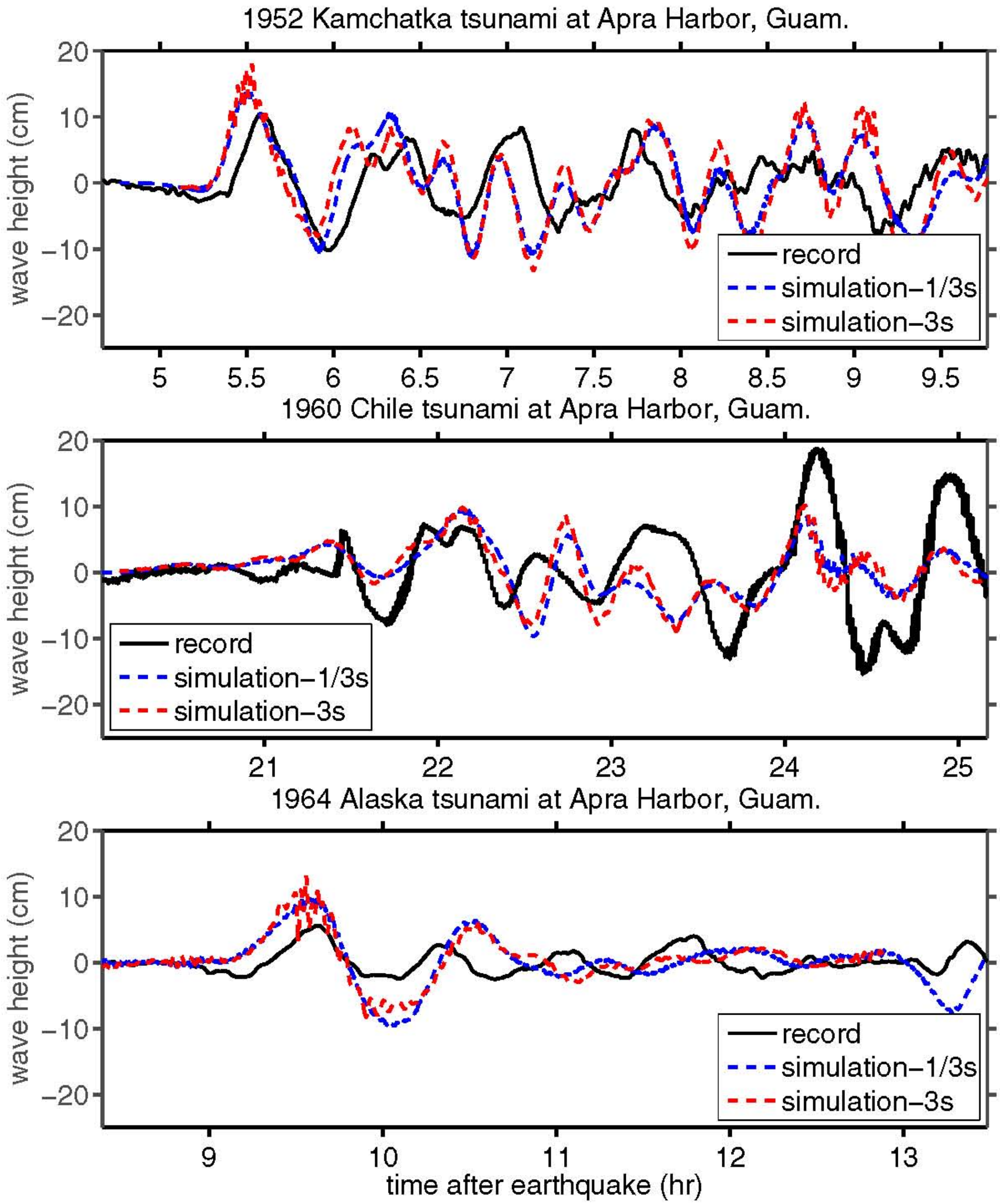

Figure 3.4: Comparison of numerical results with tide gauge records of 1952, 1960, and 1964 tsunamis at Apra Harbor.

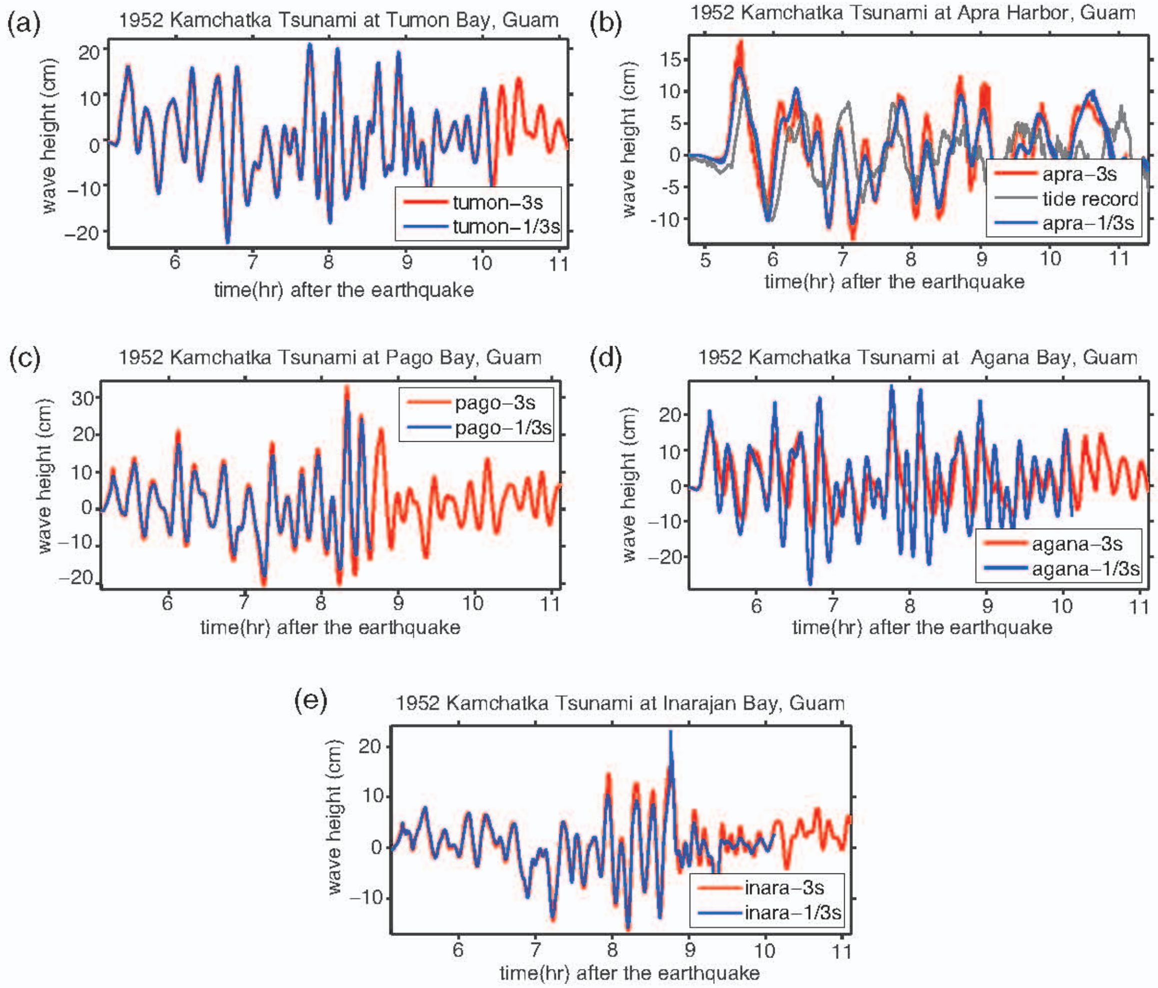

Figure 3.5: Comparison of computed 1952 tsunami with 1/3 arc sec to 3 arc sec at (a) Tumon Bay, (b) Apra Harbor, (c) Pago Bay, (d) Agana Bay, and (e) Inarajan Bay.

4. Results

Tsunamis evolve in a complex pattern during propagation and the tsunami energy distribution is found to be highly directional from the source area. Previous studies have shown that tsunamis triggered by similar magnitude earthquakes but from different subduction zones may result in substantially different impact at the same harbor, as has been discussed by Uslu (2008) and Dengler *et al.* (2008). The Kuril Islands earthquakes of 1933, 1994, 2006, and 2007 had similar magnitudes to one another as well as similar source locations, but produced different far-field results due to fault orientation differences. The events of 1933 and 2006 were thrust fault earthquakes and the 2007 earthquake had a normal fault mechanism. The 1994 earthquake was described as a vertical tear in the slab near the Hokkaido corner (Tanioka *et al.*, 1995); it has been successfully modeled as a thrust fault in Uslu (2008) and Dengler *et al.* (2008).

The assessment of tsunami hazard at the five Guam communities modeled provides determination of possible worst-case scenarios from the potential source regions investigated, the details of which are provided in Appendix G. These sources and the sensitivity of the island communities are discussed in the remainder of this section.

4.1 Tsunami sources

The seismic activity around the Western Pacific suggests that a Mw 8.5 earthquake is a feasible scenario for the region (Lander *et al.*, 2002; Hattori, 1993). Tsunamis from the Aleutians/Alaska and Cascadia (AASZ), Central and South America (CSSZ), eastern Philippines (EPSZ), Kuril Islands/Japan, and Mariana (KSZ), Manus (MSZ), New Guinea (NGSZ), Ryukyu-Nankai (RNSZ), New Zealand and Tonga (NTSZ), and New Britain and Vanuatu (NVSZ) are identified as particularly important for hazard assessment of Guam. The distribution of a total of 1128 scenario runs for three distinct earthquake magnitudes of 7.6, 8.5, and 9.0 are shown in **Table 4.1**. Preliminary results showed a signal-to-noise ratio for Mw 7.6 earthquakes too high for significant interpretation, so 725 scenarios for the two larger magnitudes of earthquakes are considered here. For nine subduction zones, 376 scenarios are considered for Mw 8.5 earthquakes and 349 scenarios for Mw 9.0 earthquakes. First, a Mw 8.5 earthquake is modeled as a combination of four Mw = 7.6 unit faults 100 km × 100 km resulting from a 6-m rupture. The area 400 km × 100 km in size releases a seismic moment of $m_o = 3 \cdot 10^{11} \frac{\text{dyne}}{\text{cm}^2} \cdot 400\ \text{km} \times 100\ \text{km} \cdot 6\ \text{m}$. For this case, the moment magnitude is calculated as in Hanks and Kanamori (1979):

$$\text{Mw} = \frac{2}{3}\left(\log m_o - 16\right) = \frac{2}{3}(\log 7.2 \cdot 10^{28} \text{dyne} \cdot \text{cm} - 16) = 8.5. \qquad (1)$$

This scenario represents that which is most likely to occur in the western Pacific. Moderate-sized earthquakes of Mw 8.5 have been historically more prevalent than their counterpart "Great" earthquakes that represent the worst-case scenario discussed below. Results obtained from the moderate scenario runs, tabulated in **Table 4.2**, show clearly that Apra Harbor and Agana Bay can expect the greatest impact from tsunamis generated by earthquake sources along the eastern Philippines subduction zone segments numbered 8–11. At both locations, an amplitude less than 1 m is output with significant amplitudes also seen from tsunamis generated by earthquakes occurring along the Kuril Islands/Japan and Marianna subduction zone segments 57–60. At Tumon, Pago, and Inarajan bays, the greatest modeled amplitudes resulted from tsunamis generated within Kuril Islands/Japan and Mariana subduction zone segments 57–60. These segments lie along the Mariana Trench northeast of Guam in close proximity to the island.

Results of the moderate scenario runs indicate that Pago Bay should expect to see the greatest amplitudes from tsunamis generated in all subduction zones with the exception of those generated in the Ryukyu-Nankai segments modeled where amplitudes at Tumon Bay were greatest. For all other subduction zone model runs, Pago Bay amplitude results are greater than those at all other locations with the exception, again, of Tumon Bay, at which a greater amplitude was noted from a tsunami generated in the eastern Philippines subduction zone sources segments modeled.

The second scenario considered is consistent with the rupture mechanism of the 1964 Great Alaska Earthquake in Prince William Sound. This scenario considers Mw 9.0 earthquakes occurring along segments of Pacific Rim subduction zones with ruptures of 700 km × 100 km each having a 20-m uniform slip. Results show that the greatest model amplitudes in Tumon Bay, Apra Harbor, and Agana Bay occur from tsunamis generated by eastern Philippines subduction zone earthquakes with an amplitude of 7 m seen at Tumon Bay. Maximum modeled amplitudes at Pago Bay and Inarajan are the result of tsunamis generated by earthquakes along the Kuril/Japan and Mariana subduction zone segments. A maximum amplitude of 14.5 m for all scenario runs occurs at Pago Bay.

Table 4.1: Number of modeled runs at each of the nine identified subduction zones for which Mw 7.6, Mw 8.5, and Mw 9.0 earthquake scenarios were considered.

Subduction Zones		**Mw = 7.6**	**Mw = 8.5**	**Mw = 9.0**
AASZ	Alaska/Aleutians-Cascadia	65	62	59
CSSZ	Central and South America	115	112	109
EPSZ	Eastern Philippines	18	15	12
KSZ	Kuril Islands/Japan, and Mariana	75	72	69
MSZ	Manus	17	14	11
NGSZ	New Guinea	15	12	9
NTSZ	New Zealand-Tonga	39	36	33
NVSZ	New Britain-Vanuatu	37	34	31
RNSZ	Ryukyu-Nankai	22	19	16
cumulative		**403**	**376**	**349**

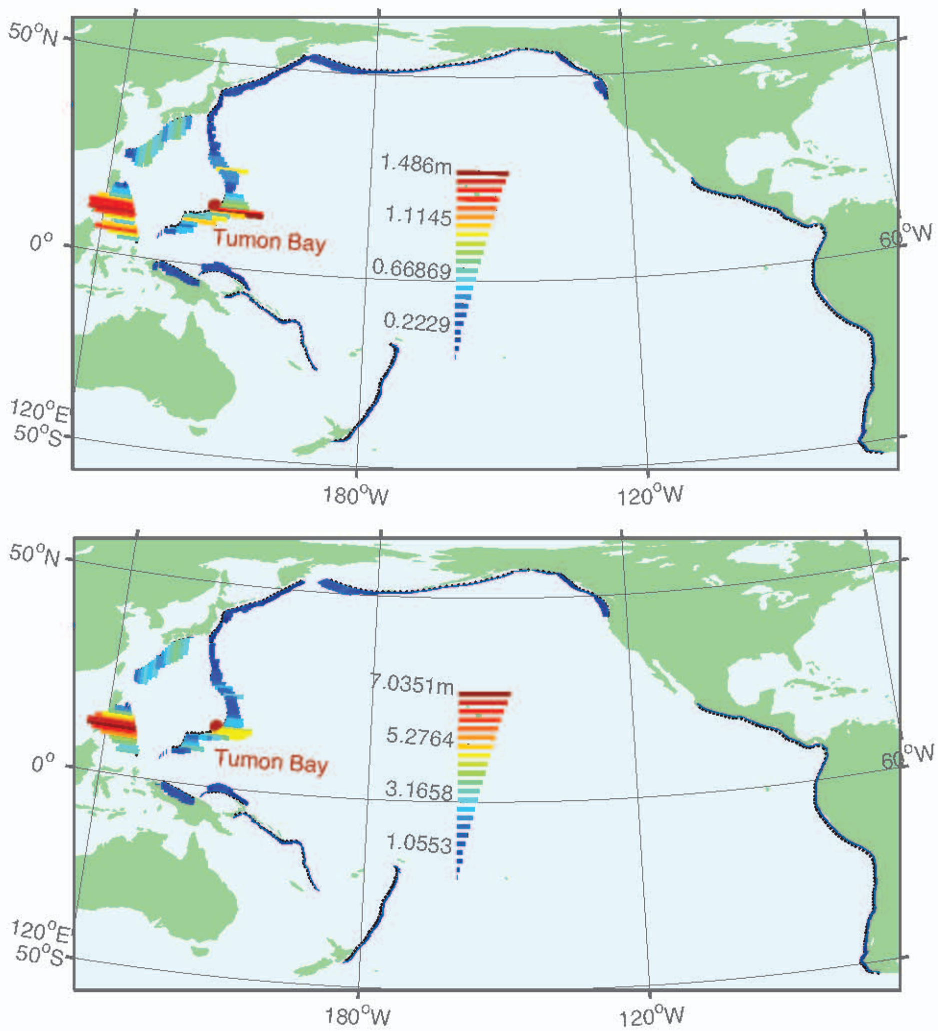

Figure 4.1: Tsunami wave height response at Tumon Bay from tsunamis triggered by (a) Mw = 8.5 and (b) Mw = 9.0 earthquakes.

4.2 Tsunami sensitivity study for Guam coastlines

A sensitivity study of the wave height response due to distinct tsunami sources is performed to identify regions of effective and efficient tsunami generation. Specific subduction zone segments are found to hold potentially more dangerous implications for the five modeled communities along Guam's coastline than other, sometimes adjacent segments. **Figure 4.1** shows the maximum computed wave height for the 376 Mw 8.5 and 349 Mw 9.0 scenarios at a selected simulation location (144.7986°E and 13.5115°N) in Tumon Bay. **Figure 4.1** also shows that the largest impact at Tumon Bay originates from two sources; the Mariana Trench and east Philippines sources. Results further show that an earthquake with magnitude larger than 8.0 from the Ryukyu-Nankai, Kuril Islands, New Guinea, and Manus Trench sources pose significant threat to Guam. Emergency managers should be aware of the potential for local haz-

Table 4.2: Results of synthetic moderate (Mw 8.5) earthquake scenarios for Guam from the nine subduction zones segments.

Sub.	**Tumon**		**Apra**		**Pago**		**Agana**		**Inarajan**	
Zones	**segs**	**(m)**	**segs**	**(m)**	**segs**	**(m)**	**segs**	**(m)**	**segs**	**(m)**
AASZ	06–09	0.3	06–09	0.31	03–06	0.59	05–08	0.26	03–06	0.41
AASZ	58–61	0.21	57–60	0.14	59–62	0.19	58–61	0.22	60–63	0.13
EPSZ	08–11	1.4	**08–11**	**0.87**	09–12	1.24	**08–11**	**0.91**	09–12	1.14
KSZ	20–23	0.27	20–23	0.26	20–23	0.35	20–23	0.25	20–23	0.27
KSZ	**57–60**	**1.49**	57–60	0.77	**57–60**	**4.42**	57–60	0.66	**57–60**	**2.8**
KSZ	66–70	1.02	66–69	0.59			66–69	0.79		
MSZ	10–13	0.25	10–13	0.25	10–13	0.84	10–13	0.25	10–13	0.47
NGSZ	09–12	0.28	03–06	0.24	02–05	0.33	09–12	0.25	04–07	0.32
RNSZ	07–10	0.78	17–20	0.65	08–11	0.5	18–21	0.54	05-08	0.36

Table 4.3: Results of synthetic worst-case (Mw 9.0) scenarios for Guam from the nine subduction zones segments.

Sub.	**Tumon**		**Apra**		**Pago**		**Agana**		**Inarajan**	
Zones	**segs**	**(m)**	**segs**	**(m)**	**segs**	**(m)**	**segs**	**(m)**	**segs**	**(m)**
AASZ	05–11	1.6	05–11	1.4	02–08	2.7	05–11	1.1	02–08	1.9
AASZ	57–63	0.7	59–65	0.5	59–65	0.8	55-61	0.5	59–65	0.5
AASZ							56–62	0.5		
EPSZ	**07–13**	**7.0**	**07-13**	**3.7**	07–13	5.4	**07–13**	**5.6**	07–13	3.8
KSZ	16–22	1.0	20–26	0.8	20–26	1.1	20–26	0.6	20–26	0.9
KSZ	57-63	4.6	55-61	2.2	53–59	14.4	57–63	2.9	53–60	9.4
KSZ			56-62	2.2	**57–63**	**14.5**			**57–63**	**9.4**
MSZ	09–15	1.1	10–16	0.9	10–16	2.6	09–15	0.8	09–15	1.6
							10–16	0.7		
NGSZ	04–10	1.3	06–12	1.0	03–09	1.4		0.9	02–08	1.1
RNSZ	14–20	3.4	14–20	2.2	14–20	2.6	14–20	2.7	14–20	1.4

ard from these sources with associated impact to population and marine structures. Great earthquakes (Mw ≥ 9.0) occurring in the far-field source regions of western Aleutians and Cascadia source zones could potentially generate tsunamis with directivity favorable for impact on Guam.

A summary of maximum computed heights at Tumon Bay, Apra Harbor, Pago, Agana, and Inarajan bays are provided in **Tables 4.2 and 4.3**. Predicted worst-case scenarios for each of the five communities are highlighted in the tables. The short written history of the Western Pacific does not have an account of a Mw ≥ 9.0 earthquake. While the potential for such an event exists, a Mw 8.5 is the most likely scenario. The occurrence of this more likely moderate earthquake within specific segments of the Mariana Trench could potentially generate a tsunami having the potential for an amplitude up to 1.50 m at Tumon, 4.4 m at Pago, and 2.8 m at Inarajan Bay. Amplitudes at Apra Harbor of 0.8 m and 0.9 m at Agana Bay are expected from this same tsunami. However, a tsunami triggered by a Mw 8.5 from an eastern Philippines source is predicted to generate the highest amplitudes of about 0.9 m at Apra Harbor and Agana Bay.

Results of this sensitivity study identify an east Philippines subduction zone earthquake as representing the worst case scenario for Tumon Bay, Apra Harbor, and Agana Bay. A 5.6-m wave at Agana Bay, 3.7 m at Apra Harbor, and a wave amplitude as high as 7.0 m at Tumon Bays are predicted by model results. Further, results show that along the east-facing beaches of Pago Bay and Inarajan, Mariana Trench sources are of greatest concern. At these locations, the leading elevation wave is predicted to arrive in less than 20 min, with amplitudes as high as 15 m at Pago Bay and 9 m at Inarajan Bay noted in worst-case scenario modeling of a Mw 9.0 earthquake.

5. Discussion and Conclusion

Prior to this study, the common belief has been that tsunamis pose no real hazard to Guam. The argument centers on the thought that because this steep volcanic island is devoid of any significant continental shelf, waves would be refracted around the island thereby "protecting" it from tsunamis emanating from around the Pacific Basin. However, the Maldives with its similar offshore geology to Guam was inundated following the Sumatra tsunami of 2004 (Titov *et al.*, 2005b; Fritz *et al.*, 2006), showing that the lack of a continental shelf does not necessarily prevent tsunami inundation. Another common belief is that the deep nearby trenches and offshore reef provide protection to Guam, but the 1993 Mariana tsunami is known to have impacted Guam, although the impact is not clear, as damage from a concurrent typhoon may have overshadowed any tsunami damage. The trench itself does not dissipate energy nor does it act to steer waves away from Guam. The tsunami energy directivity may cause a tsunami from some specific source regions to produce significant impact and pose significant hazard to Guam. Another common misconception is that the island of Guam is protected by the coral reefs that ring the island just offshore and act to dissipate tsunami energy. The effect of the reef presence on the tsunami dynamics is visible in the model, yet the reef is not sufficient to prevent tsunami impact at the coastline. Because of the steep bathymetry around the island, the reef extent is very short, and thus not enough to fully dissipate all tsunami energy. Results of this study suggest that "protection" of Guam by nearby trenches, offshore reef, and lack of a continental shelf is not supported. Only the location of Guam relative to historical tsunami sources appears to have protected it from impact during past events. However, impact from events prior to 1848 is unknown, since the island was not nearly as populous as it is now.

The deepest known region of the Pacific Ocean Basin, the Mariana Trench, is located in close proximity to the Island of Guam. The trench region, at the intersection of two geologically old continental plates, has a high seismic slip rate of 22 mm/yr. Rather than offering "protection" to the island, the trench is a potential source of tsunami generation. Although a Mw $\geq$ 9.0 earthquake in this region is not a probable scenario, model results from this study suggest that a more likely moderate earthquake could pose extreme hazard along localized stretches of the Guam coastline. The maximum wave height computed at Tumon Bay, Apra Harbor, and Agana Bay are relatively smaller than wave heights computed at Pago and Inarajan Bays. This result is due primarily to the Pago and Inarajan bays' location on the eastern coastline that fronts the near field Mariana Trench source region. Apra Harbor, Tumon Bay, and Agana Bay are all located on the side of Guam opposite the Mariana Trench source, so they are protected from direct wave impact. As a result, the computed wave heights at these communities are significantly smaller than those computed for the communities on the opposing side of the island. It is noted, however, that an extended duration of high-amplitude wave activity at these three communities on the western side of Guam has the potential to disrupt commerce and fishing. Model results further suggest that tsunamis generated in the Ryukyu-Nankai, Kuril Islands, Mariana Trench, and East Philippines subduction zones should be of concern to emergency managers. Moderate earthquakes originating along specific segments of the east Philippine and Kuril/Japan and Mariana subduction zones are of particular concern. In addition, tsunamis generated in the far-field along western Aleutian and Cascadia subduction zones should be evaluated for possible impact. Model results for realistic scenario mega events originating in the far-field west Aleutians, Cascadia and Kurils, produce significant wave heights along the coastlines of Guam. Maximum wave height results for a tsunami generated by a west Aleutians earthquake is 1.6 m at Tumon Bay, 1.4 m at Apra Harbor, 2.7 m at Agana Bay, and 1.9 m at Inarajan Bay synthetic warning point. The Cascadia tsunami is computed with 0.5-m maximum wave height at Apra Harbor, Agana Bay, and Inarajan Bay, a 0.7-m wave height at Tumon Bay, and a wave height of 0.8 m at Pago Bay, which, coincidentally, was the amplitude of the wave observed at the Crescent City tide gauge during the 2004 Kuril Islands tsunami (Dengler *et al.*, 2008; Kelley *et al.*, 2006; Uslu, 2008). A tsunami generated by a south Kurils or Northern Japan earthquake is also predicted to exceed 1 m at Pago Bay.

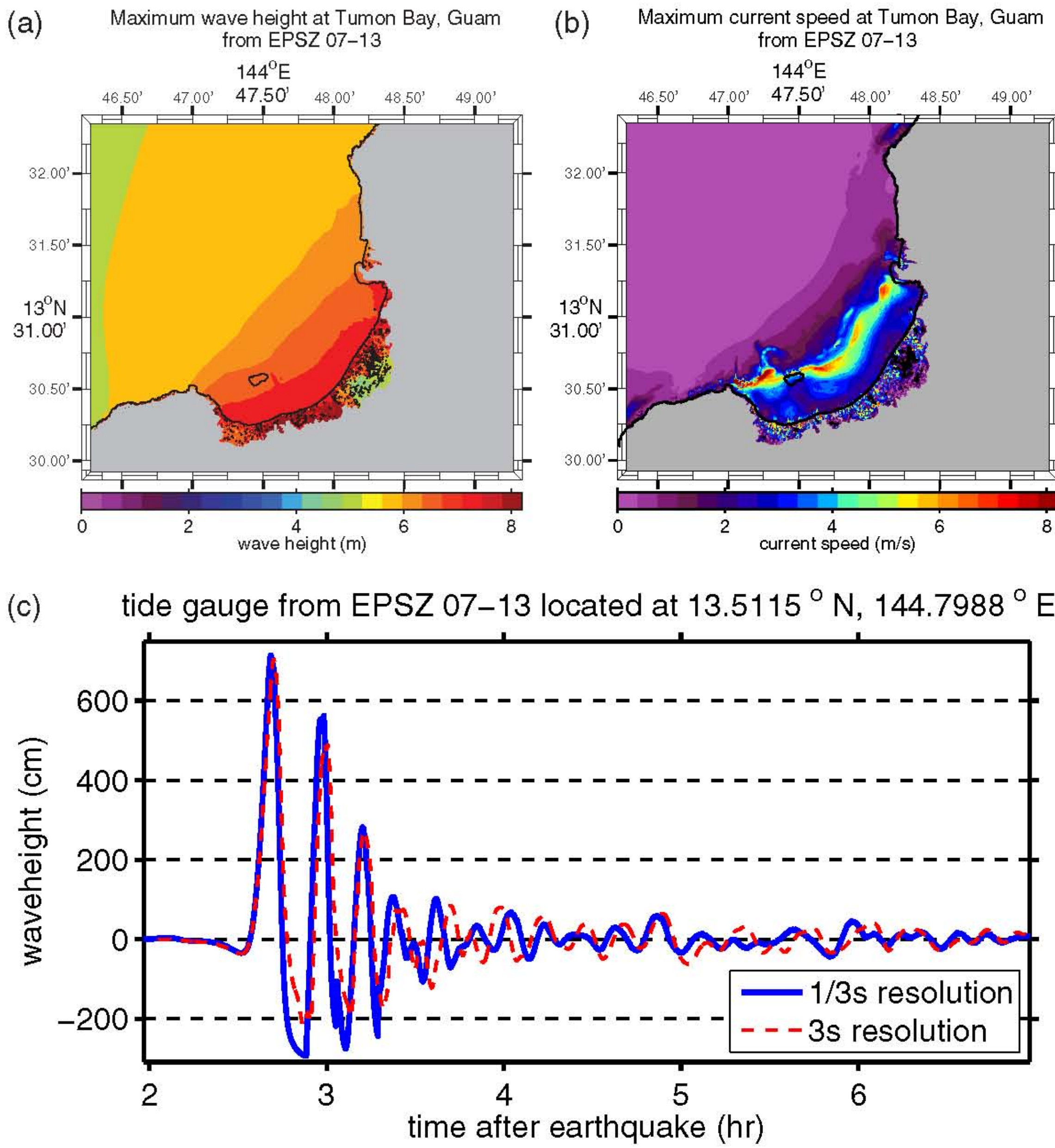

Figure 5.1: (a) Maximum computed wave heights, (b) maximum computed currents, and (c) tsunami time history at the numerical tide gauge at Tumon Bay from a tsunami triggered by a Mw = 9.0 earthquake on EPSZ segments 07–13 by a 20-m slip.

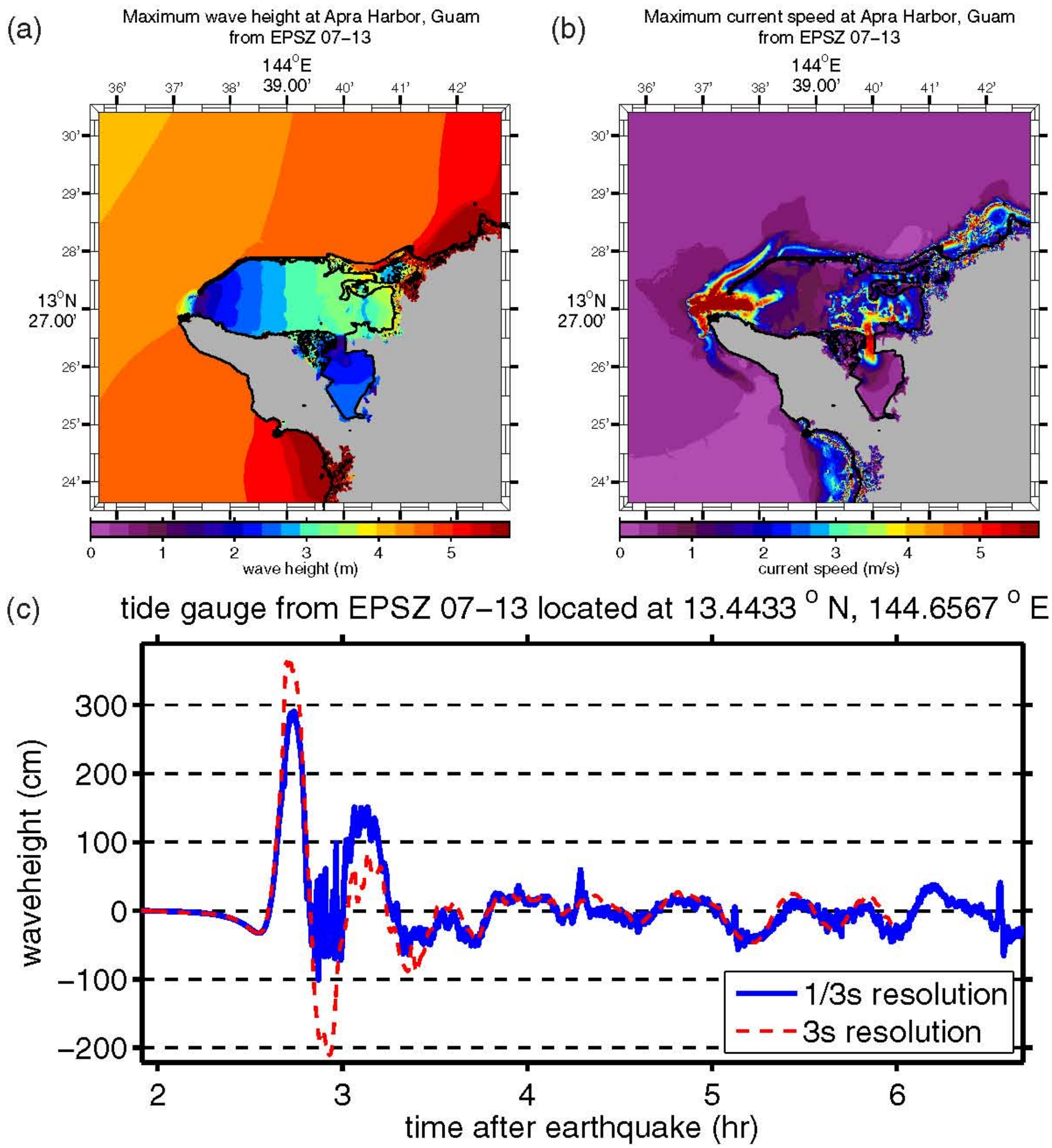

Figure 5.2: (a) Maximum computed wave heights, (b) maximum computed currents, and (c) tsunami time history at the numerical tide gauge at Apra Harbor from a tsunami triggered by a Mw = 9.0 earthquake on EPSZ segments 07–13 by a 20-m slip.

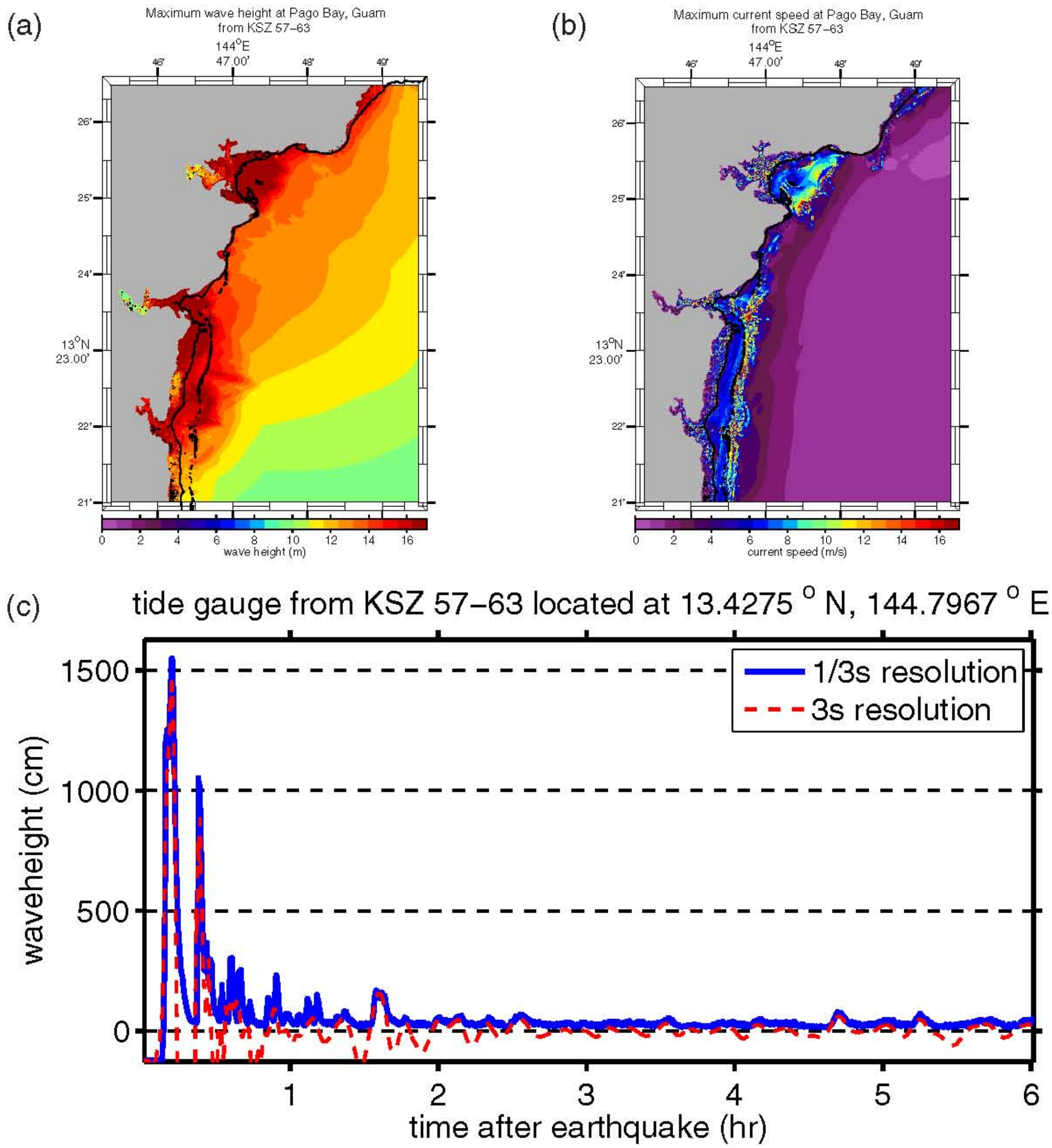

Figure 5.3: (a) Maximum computed wave heights, (b) maximum computed currents, and (c) tsunami time history at the numerical tide gauge at Pago Bay from a tsunami triggered by a Mw = 9.0 earthquake on KSZ segments 57–63 by a 20-m slip.

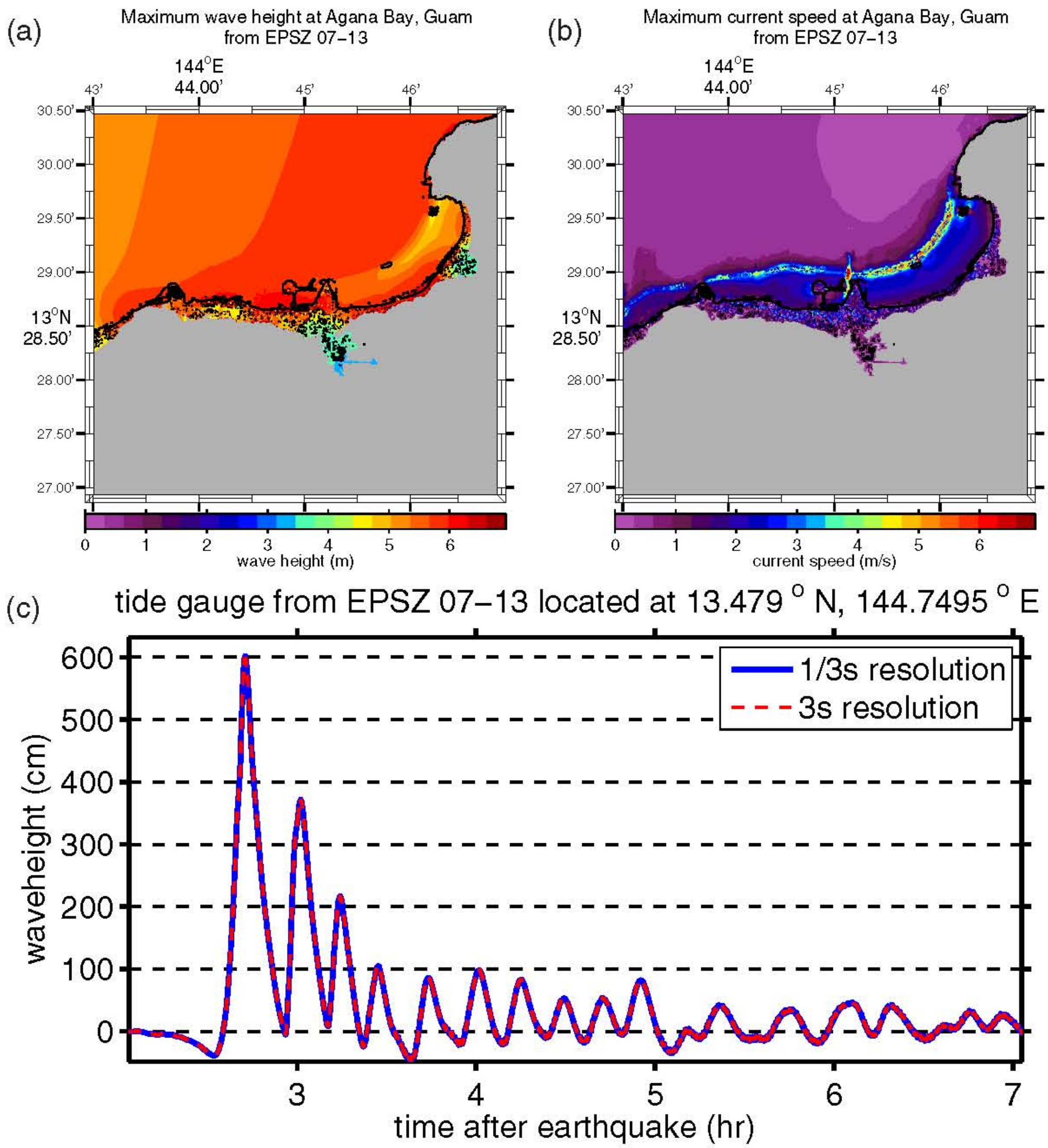

Figure 5.4: (a) Maximum computed wave heights, (b) maximum computed currents, and (c) tsunami time history at the numerical tide gauge at Agana Bay from a tsunami triggered by a Mw = 9.0 earthquake on EPSZ segments 07–13 by a 20-m slip.

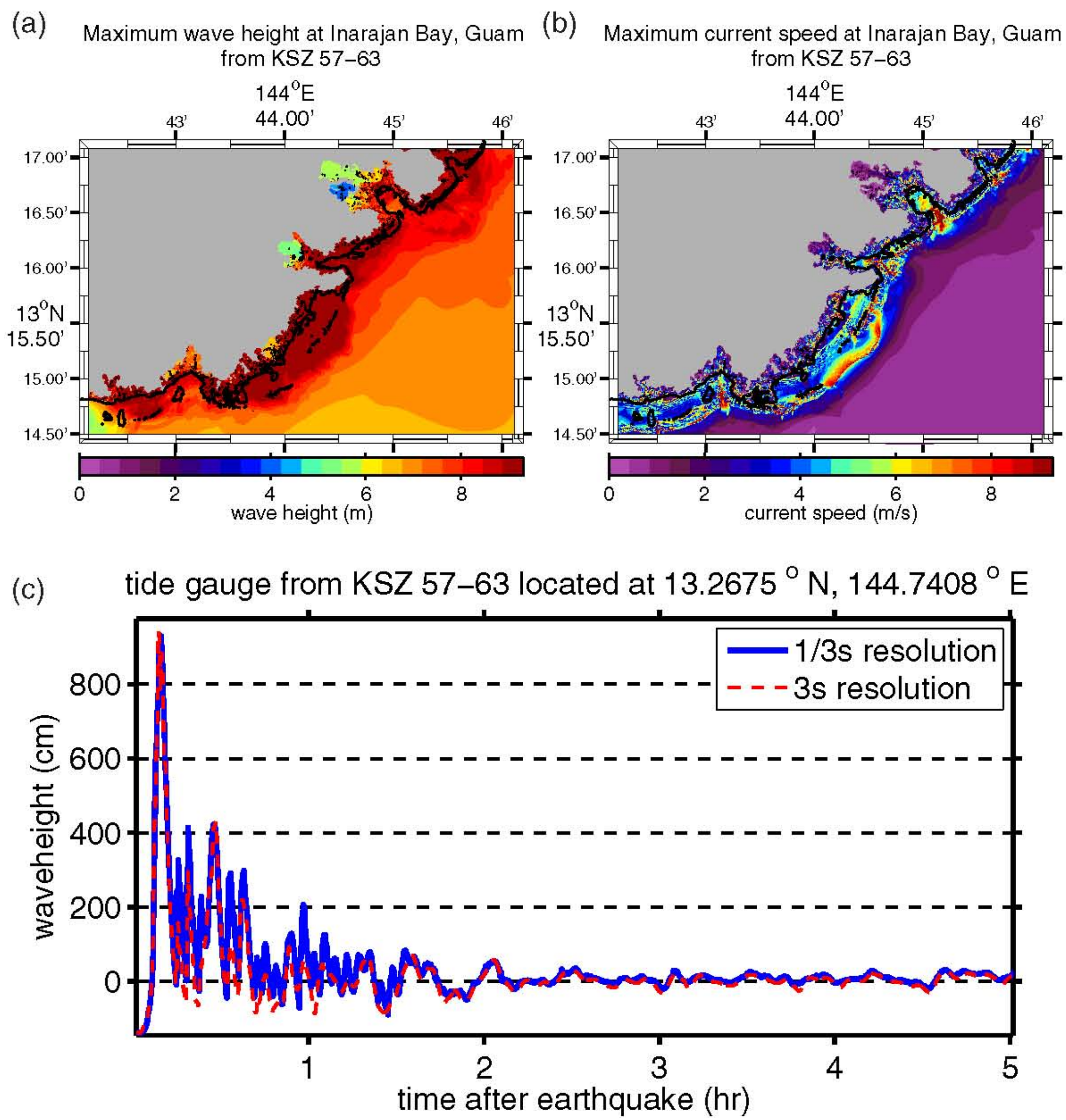

Figure 5.5: (a) Maximum computed wave heights, (b) maximum computed currents, and (c) tsunami time history at the numerical tide gauge at Inarajan Bay from a tsunami triggered by a Mw = 9.0 earthquake on KSZ segments 57–63 by a 20-m slip.

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Appendix A
Glossary

Arrival time The time when the first tsunami wave is observed at a particular location, typically given in local and/or universal time, but also commonly noted in minutes or hours relative to the time of the earthquake.

Bathymetry The measurement of water depth of an undisturbed body of water.

Cascadia Subduction Zone Fault that extends from Cape Mendocino in Northern California northward to mid-Vancouver Island Canada. The fault marks the convergence boundary where the Juan de Fuca tectonic plate is being subducted under the margin of the North America plate.

Current speed The scalar rate of water motion measured as distance/time.

Current velocity Movement of water expressed as a vector quantity. Velocity is the distance of movement per time coupled with direction of motion.

Digital Elevation Model (DEM) A digital representation of bathymetry or topography based on regional survey data or satellite imagery. Data are arrays of regularly spaced elevations referenced to a map projection of the geographic coordinate system.

Epicenter The point on the surface of the earth that is directly above the focus of an earthquake.

Focus The point beneath the surface of the earth where a rupture or energy release occurs due to a buildup of stress or the movement of Earth's tectonic plates relative to one another.

Inundation The horizontal inland extent of land that a tsunami penetrates, generally measured perpendicularly to a shoreline.

Marigram Tide gauge recording of wave level as a function of time at a particular location. The instrument used for recording is termed a marigraph.

Moment Magnitude (Mw) The magnitude of an earthquake on a logarithmic scale in terms of the energy released. Moment magnitude is based on the size and characteristics of a fault rupture as determined from long-period seismic waves.

Method of Splitting Tsunamis (MOST) A suite of numerical simulation codes used to provide estimates of the three processes of tsunami evolution: tsunami generation, propagation, and inundation.

Near-field A particular location at which the Earth's deformation due to energy release affects the modeling solution.

Propagation database A basin-wide database of pre-computed water elevations and flow velocities at uniformly spaced grid points throughout the world oceans. Values are computed from tsunamis generated by earthquakes with a fault rupture at any one of discrete 100 × 50 km unit sources along worldwide subduction zones.

Runup Vertical difference between the elevation of tsunami inundation and the sea level at the time of a tsunami. Runup is the elevation of the highest point of land inundated by a tsunami as measured relative to a stated datum, such as mean sea level.

Short-term Inundation Forecasting for Tsunamis (SIFT) A tsunami forecast system that integrates tsunami observations in the deep-ocean with numerical models to provide an estimate of tsunami wave arrival and amplitude at specific coastal locations while a tsunami propagates across an ocean basin.

Subduction zone A submarine region of the earth's crust at which two or more tectonic plates converge to cause one plate to sink under another, overriding plate. Subduction zones are regions of high seismic activity.

Synthetic event Hypothetical events based on computer simulations or theory of possible or even likely future scenarios.

Tele-tsunami or distant tsunami or far-field tsunami Most commonly, a tsunami originating from a source greater than 1000 km away from a particular location. In some contexts, a tele-tsunami is one that propagates through the deep ocean before reaching a particular location without regard to distance separation.

Tidal wave Term frequently used incorrectly as a synonym for tsunami. A tsunami is unrelated to the predictable periodic rise and fall of sea level due to the gravitational attractions of the moon and sun: the tide.

Tide The predictable rise and fall of a body of water (ocean, sea, bay, etc.) due to the gravitational attractions of the moon and sun.

Tide gauge An instrument for measuring the rise and fall of a column of water over time at a particular location.

Travel time The time it takes for a tsunami to travel from the generating source to a particular location.

tsunami A Japanese term that literally translates to "harbor wave." Tsunamis are a series of long-period shallow water waves that are generated by the sudden displacement of water due to subsea disturbances such as earthquakes, submarine landslides, or volcanic eruptions. Less commonly, meteoric impact to the ocean or meteorological forcing can generate a tsunami.

Tsunami Hazard Assessment A systematic investigation of seismically active regions of the world oceans to determine their potential tsunami impact at a particular location. Numerical models are typically used to characterize tsunami generation, propagation, and inundation, and to quantify the risk posed to a particular community from tsunamis generated in each source region investigated.

Tsunami propagation The directional movement of a tsunami wave outward from the source of generation. The speed at which a tsunami propagates depends on the depth of the water column in which the wave is traveling. Tsunamis travel at a speed of 700 km/hr (450 mi/hr) over the average depth of 4000 m in the open deep Pacific Ocean.

Tsunami source Location of tsunami origin, most typically an underwater earthquake epicenter. Tsunamis are also generated by submarine landslides, underwater volcanic eruptions, or, less commonly, by meteoric impact of the ocean.

Wave amplitude The maximum vertical rise or drop of a column of water as measured from wave crest (peak) or trough to a defined mean water level state.

Wave crest or peak The highest part of a wave or maximum rise above a defined mean water level state, such as mean lower low water.

Wave height The vertical difference between the highest part of a specific wave (crest) and its corresponding lowest point (trough).

Wavelength The horizontal distance between two successive wave crests or troughs.

Wave period The length of time between the passage of two successive wave crests or troughs as measured at a fixed location.

Wave trough The lowest part of a wave or the maximum drop below a defined mean water level state, such as mean lower low water.

Appendix B
Time–series from 1952, 1960, and 1964 Tsunamis

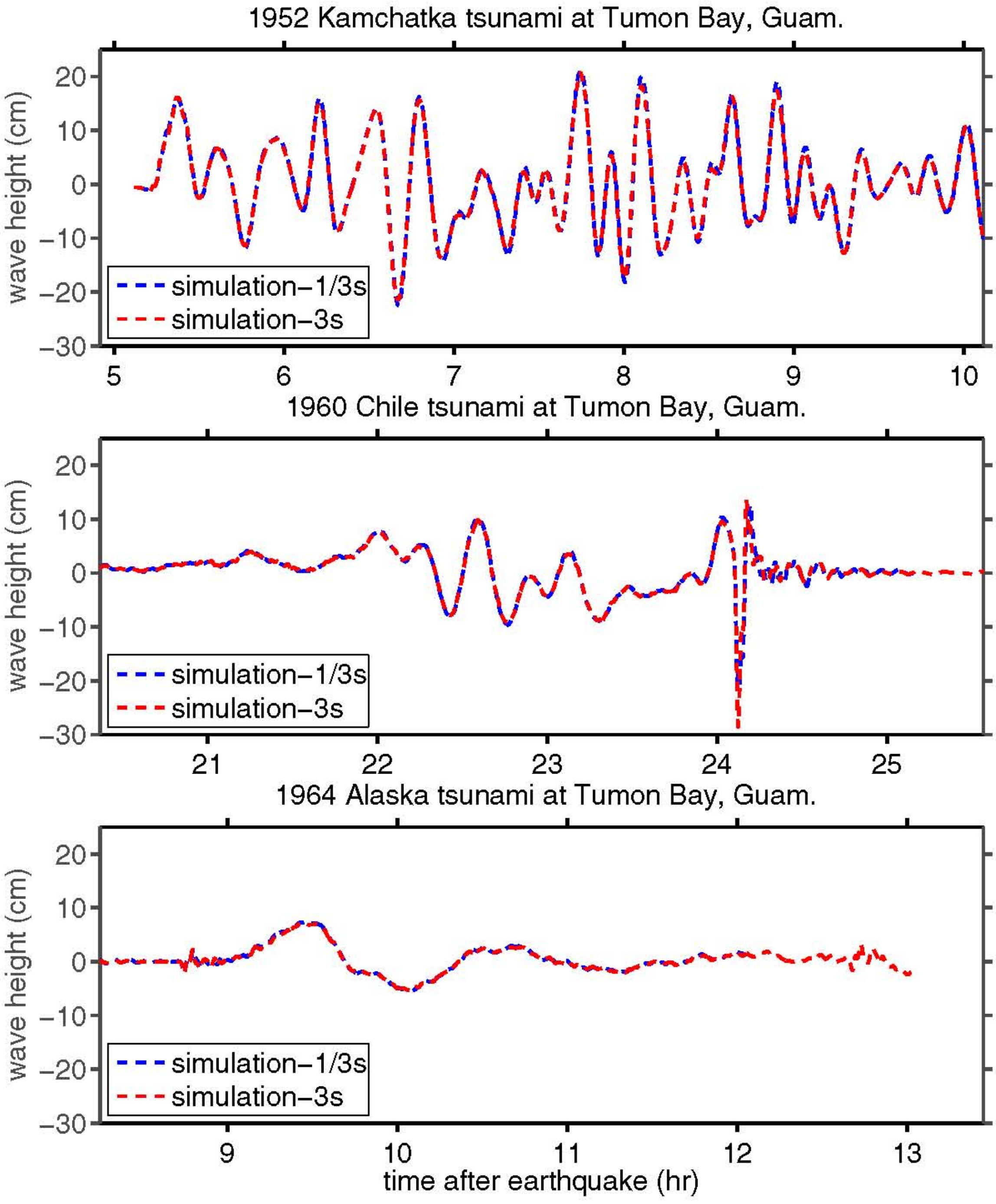

Figure B.1: The 1952 Kamchatka, the 1960 Chile and the 1964 Alaska Tsunamis at a numerical tide gauge in Tumon Bay.

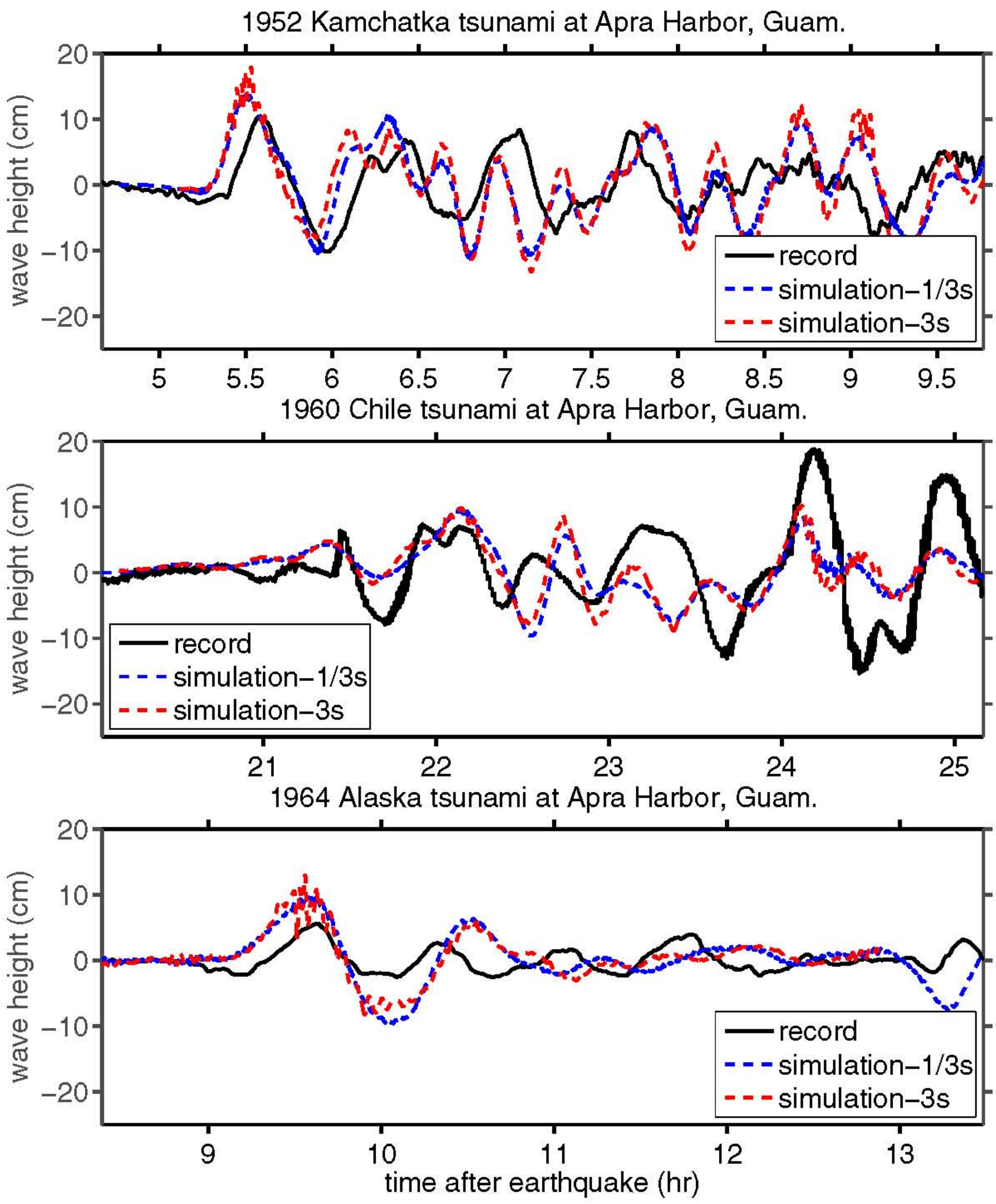

Figure B.2: The 1952 Kamchatka, the 1960 Chile and the 1964 Alaska Tsunamis at Apra Harbor tide gauge.

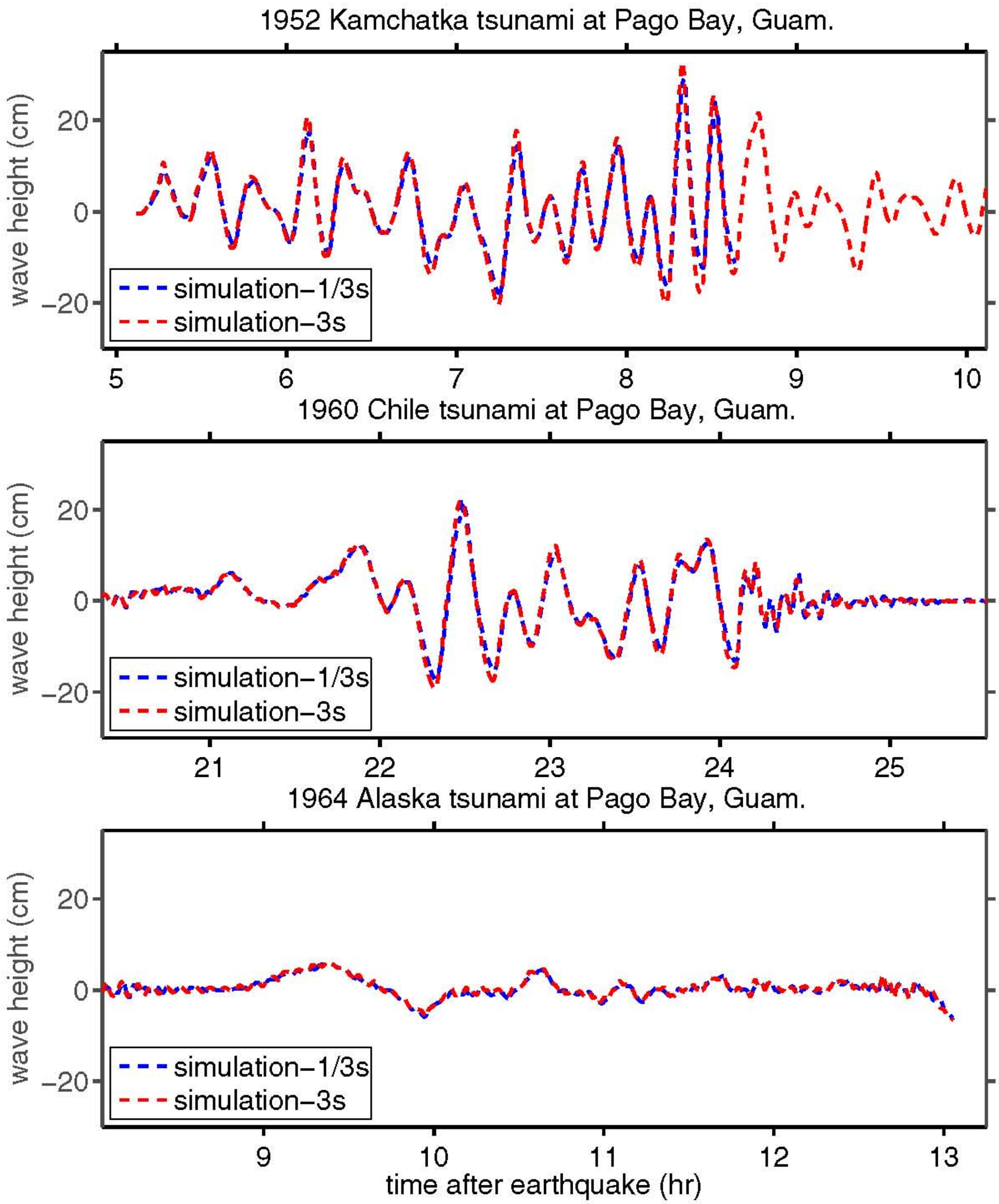

Figure B.3: The 1952 Kamchatka, the 1960 Chile and the 1964 Alaska Tsunamis at a numerical tide gauge in Pago Bay.

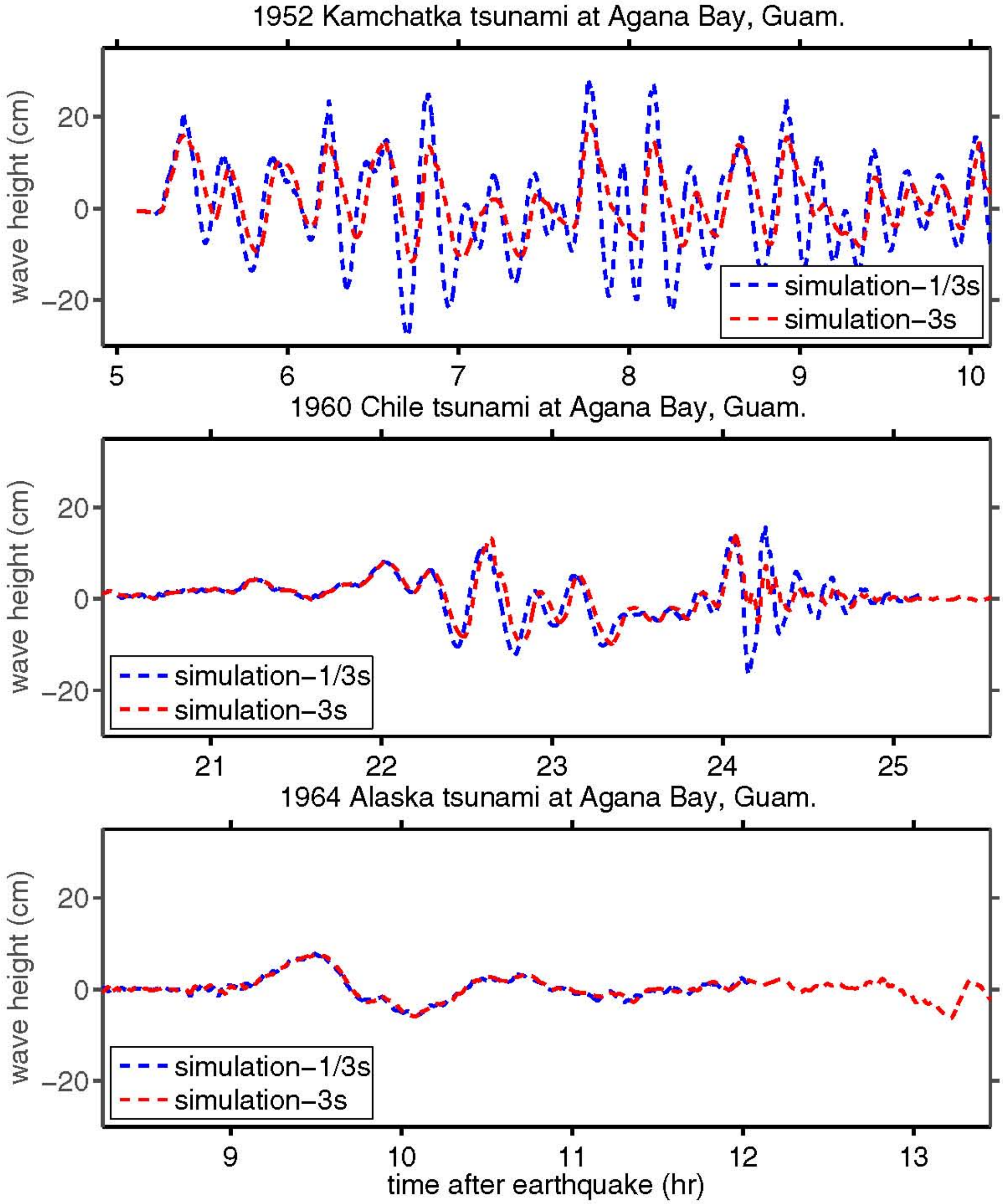

Figure B.4: The 1952 Kamchatka, the 1960 Chile and the 1964 Alaska Tsunamis at a numerical tide gauge in Agana Bay.

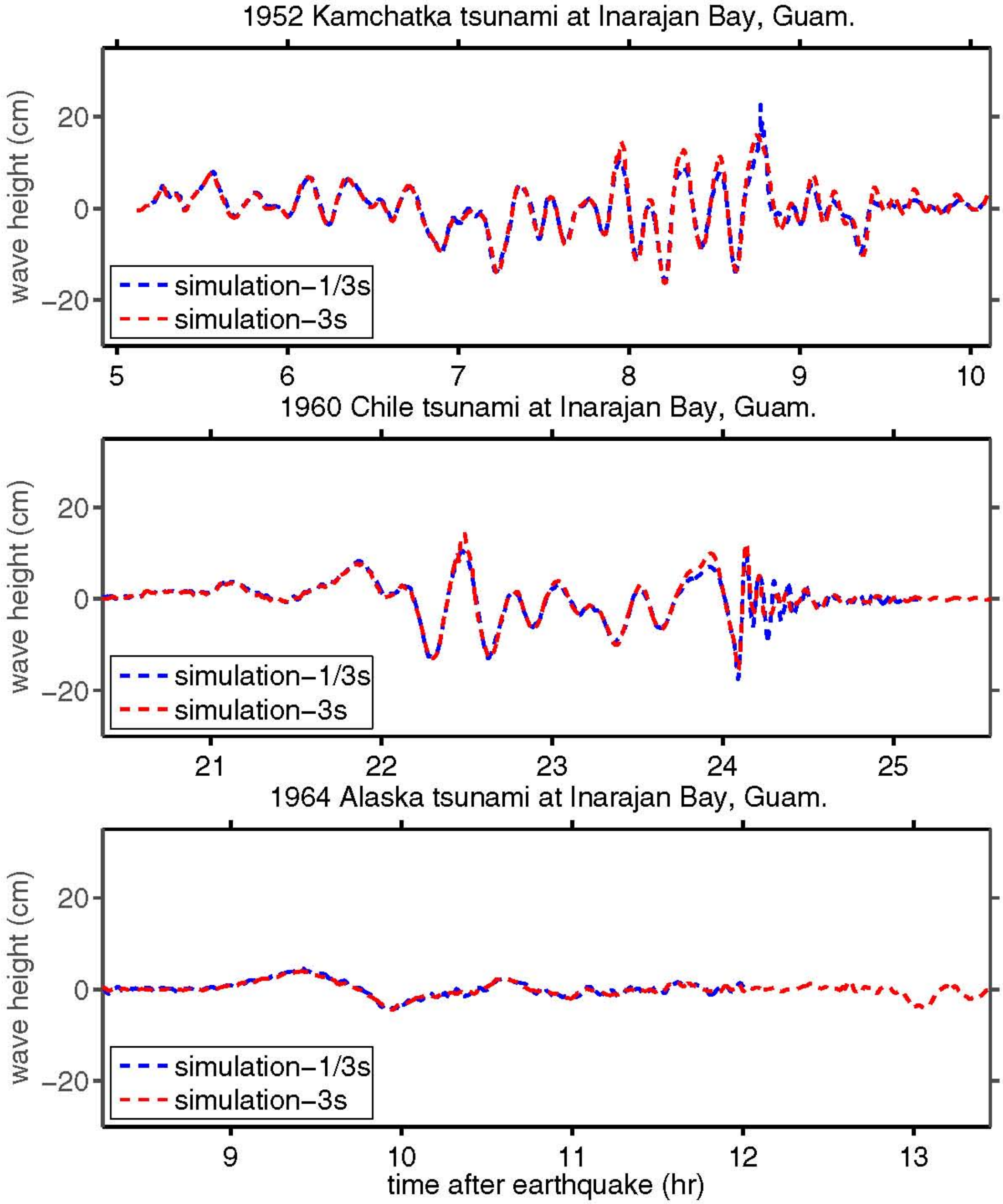

Figure B.5: The 1952 Kamchatka, the 1960 Chile and the 1964 Alaska Tsunamis at a numerical tide gauge in Inarajan Bay.

Appendix C
Tumon Bay

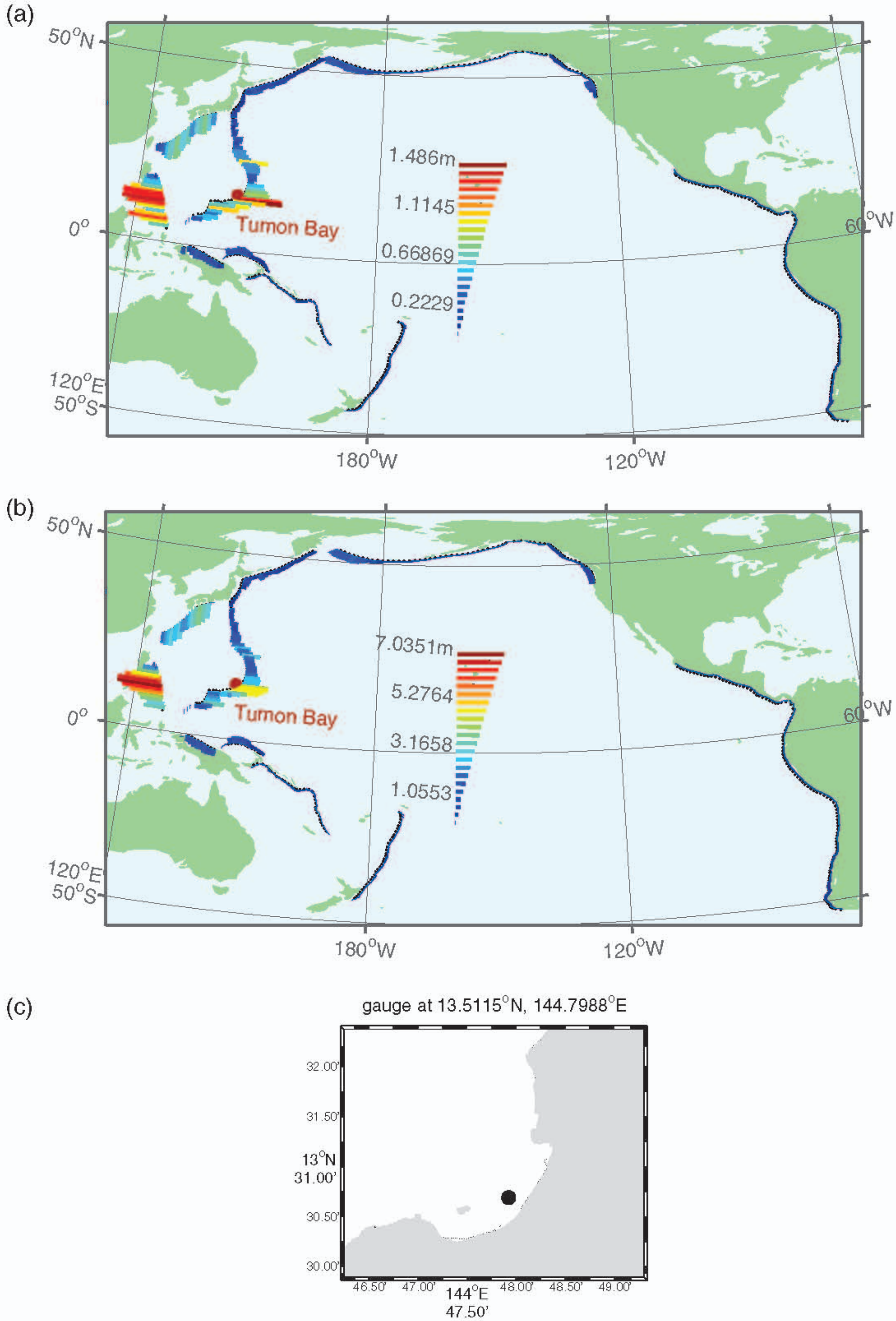

Figure C.1: Tsunami wave height response at Tumon Bay from tsunamis triggered by (a) Mw = 8.5 and (b) Mw = 9.0 earthquakes.

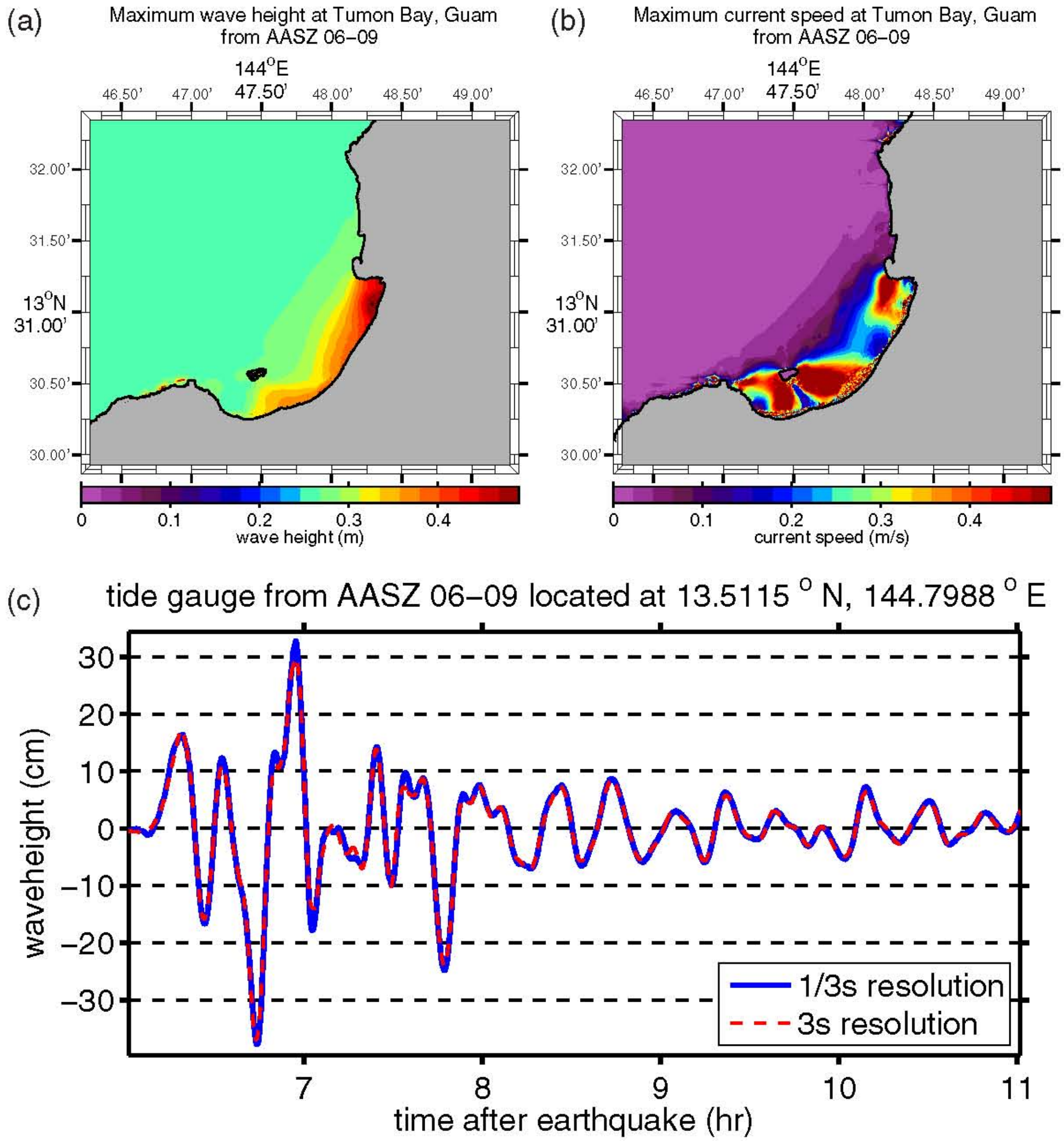

Figure C.2: (a) Maximum computed wave heights, (b) maximum computed currents, and (c) tsunami time history at the numerical tide gauge at Tumon Bay from a tsunami triggered by a Mw = 8.5 earthquake on AASZ segments 06–09 by a 6-m slip.

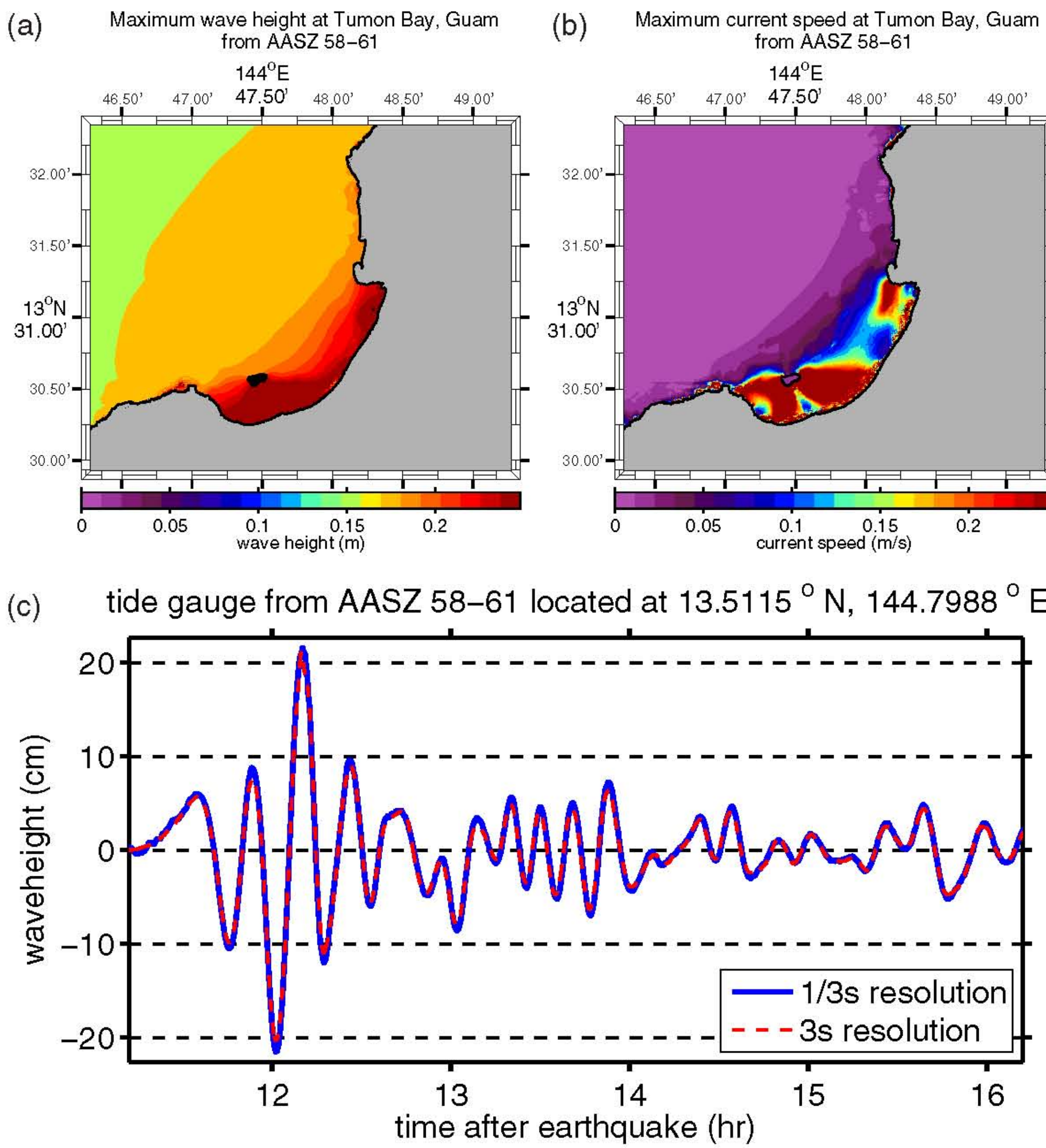

Figure C.3: (a) Maximum computed wave heights, (b) maximum computed currents, and (c) tsunami time history at the numerical tide gauge at Tumon Bay from a tsunami triggered by a Mw = 8.5 earthquake on AASZ segments 58–61 by a 6-m slip.

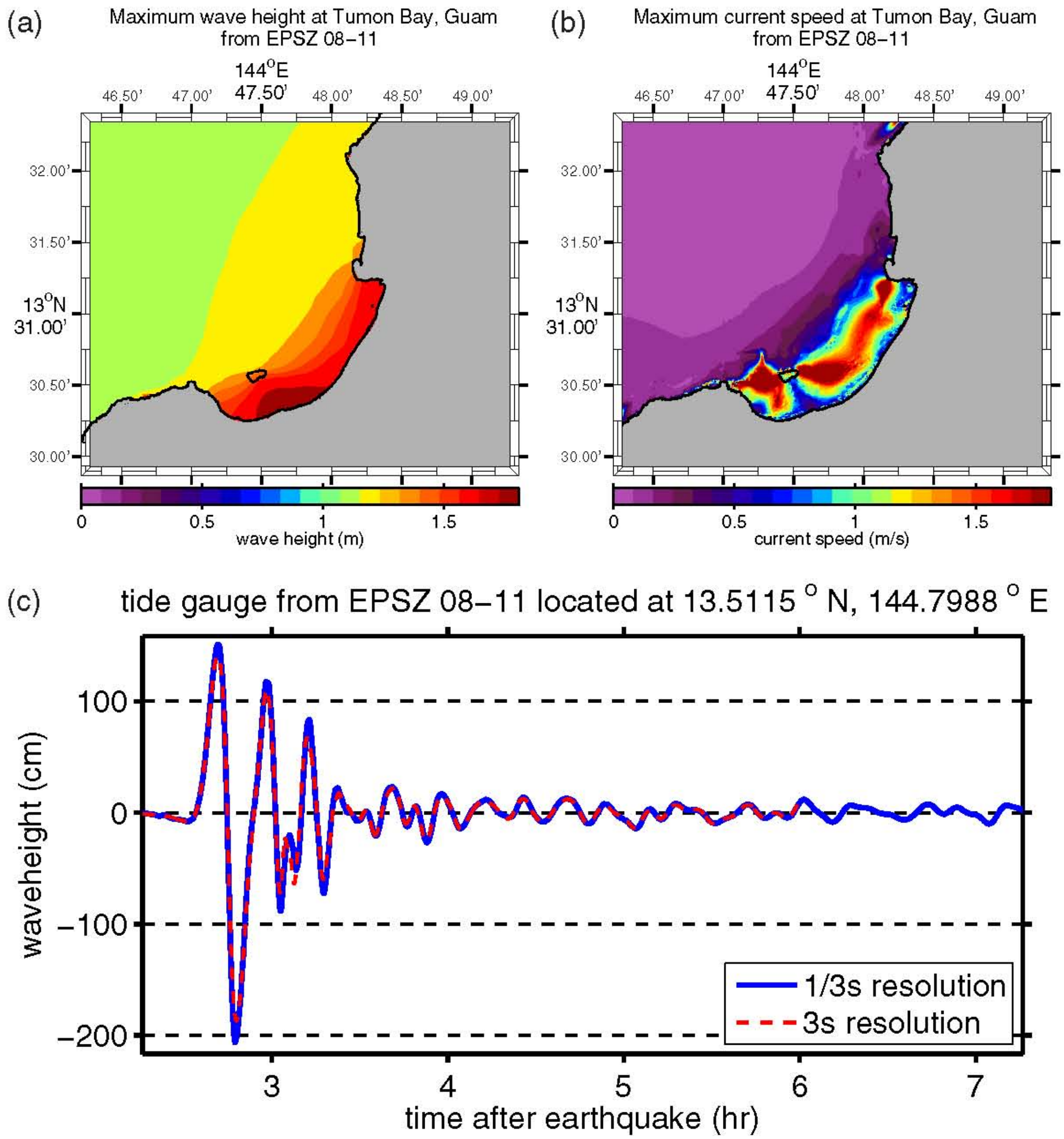

Figure C.4: (a) Maximum computed wave heights, (b) maximum computed currents, and (c) tsunami time history at the numerical tide gauge at Tumon Bay from a tsunami triggered by a Mw = 8.5 earthquake on EPSZ segments 08–11 by a 6-m slip.

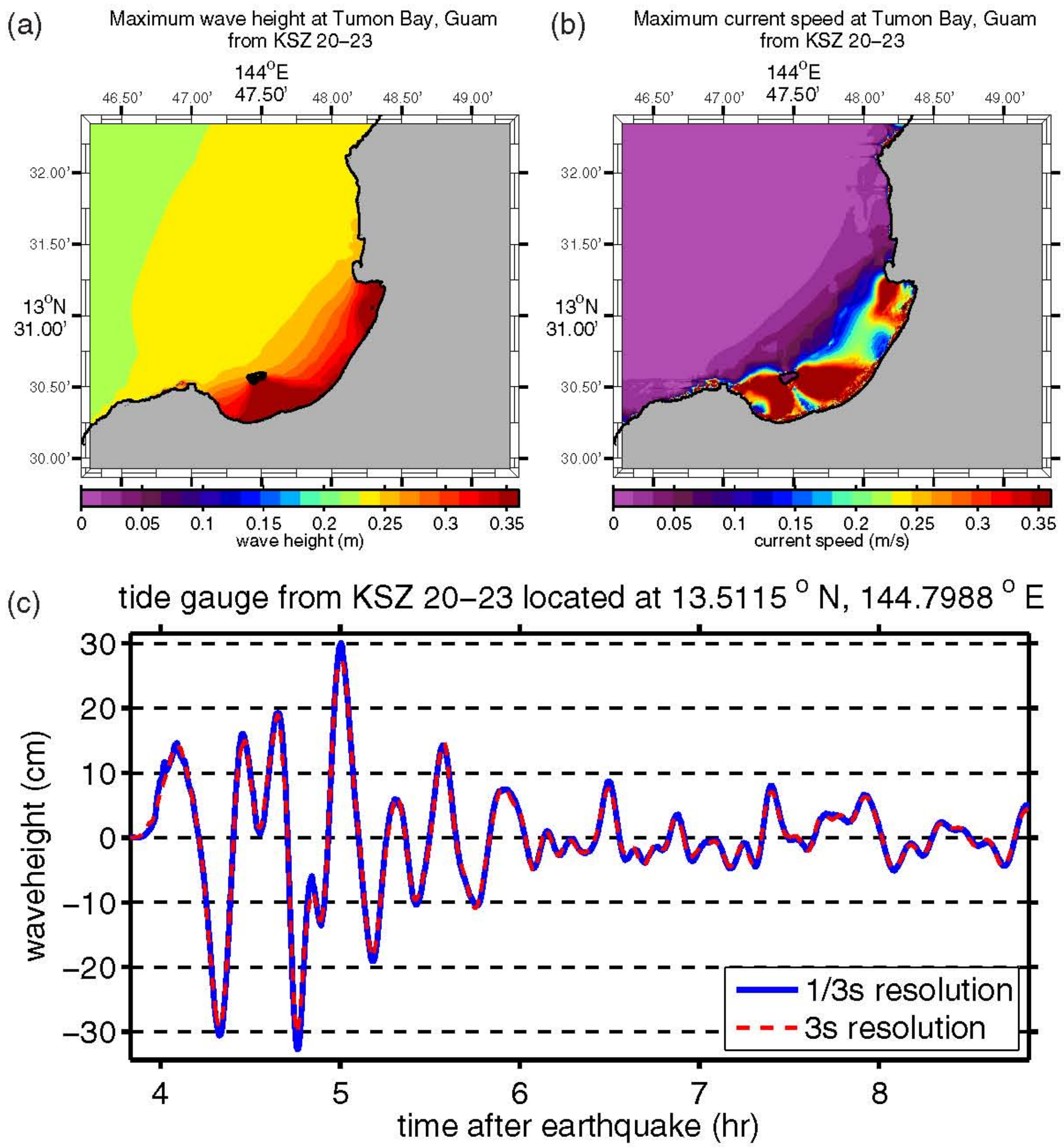

Figure C.5: (a) Maximum computed wave heights, (b) maximum computed currents, and (c) tsunami time history at the numerical tide gauge at Tumon Bay from a tsunami triggered by a Mw = 8.5 earthquake on KSZ segments 20–23 by a 6-m slip.

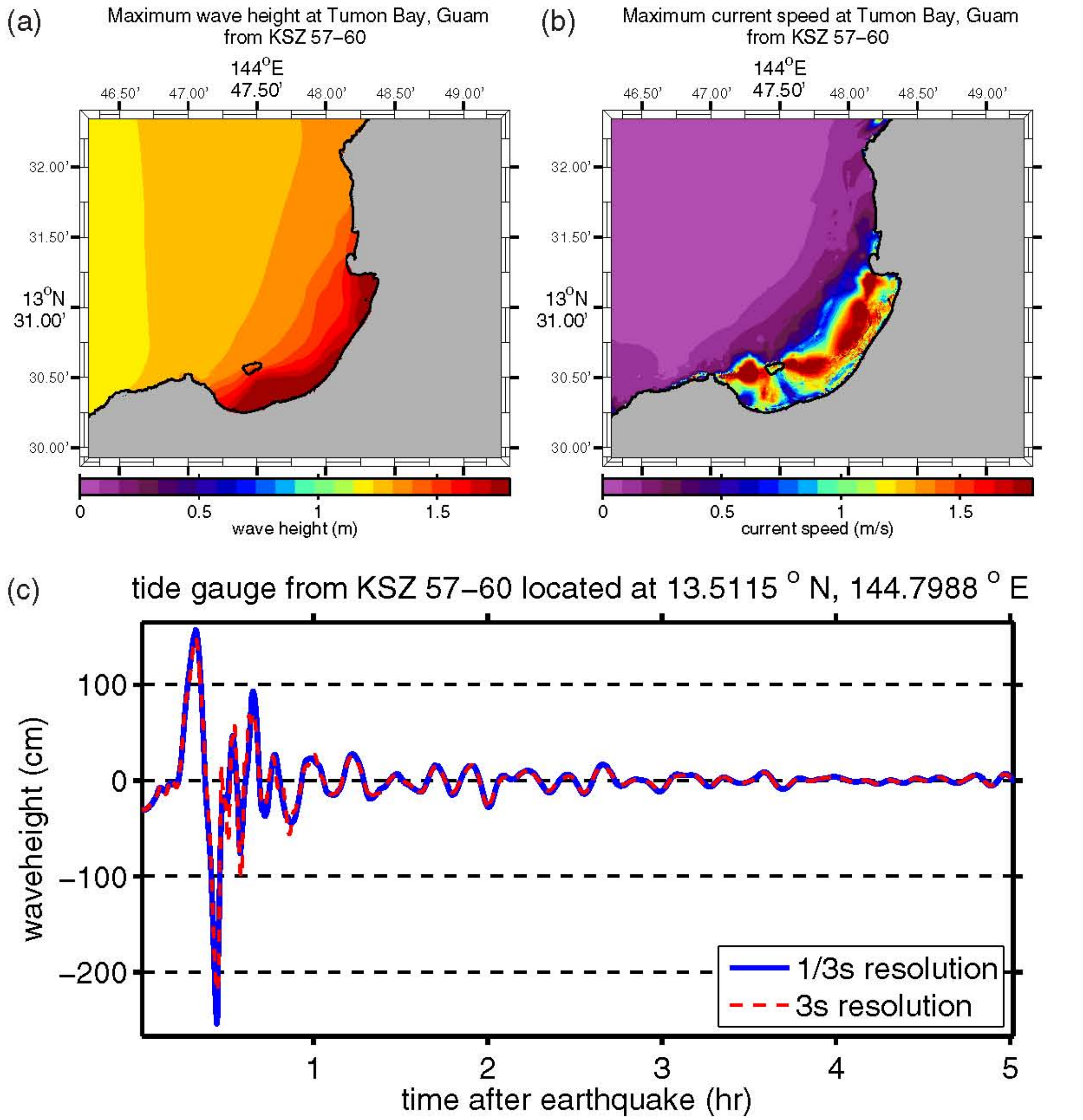

Figure C.6: (a) Maximum computed wave heights, (b) maximum computed currents, and (c) tsunami time history at the numerical tide gauge at Tumon Bay from a tsunami triggered by a Mw = 8.5 earthquake on KSZ segments 57–60 by a 6-m slip.

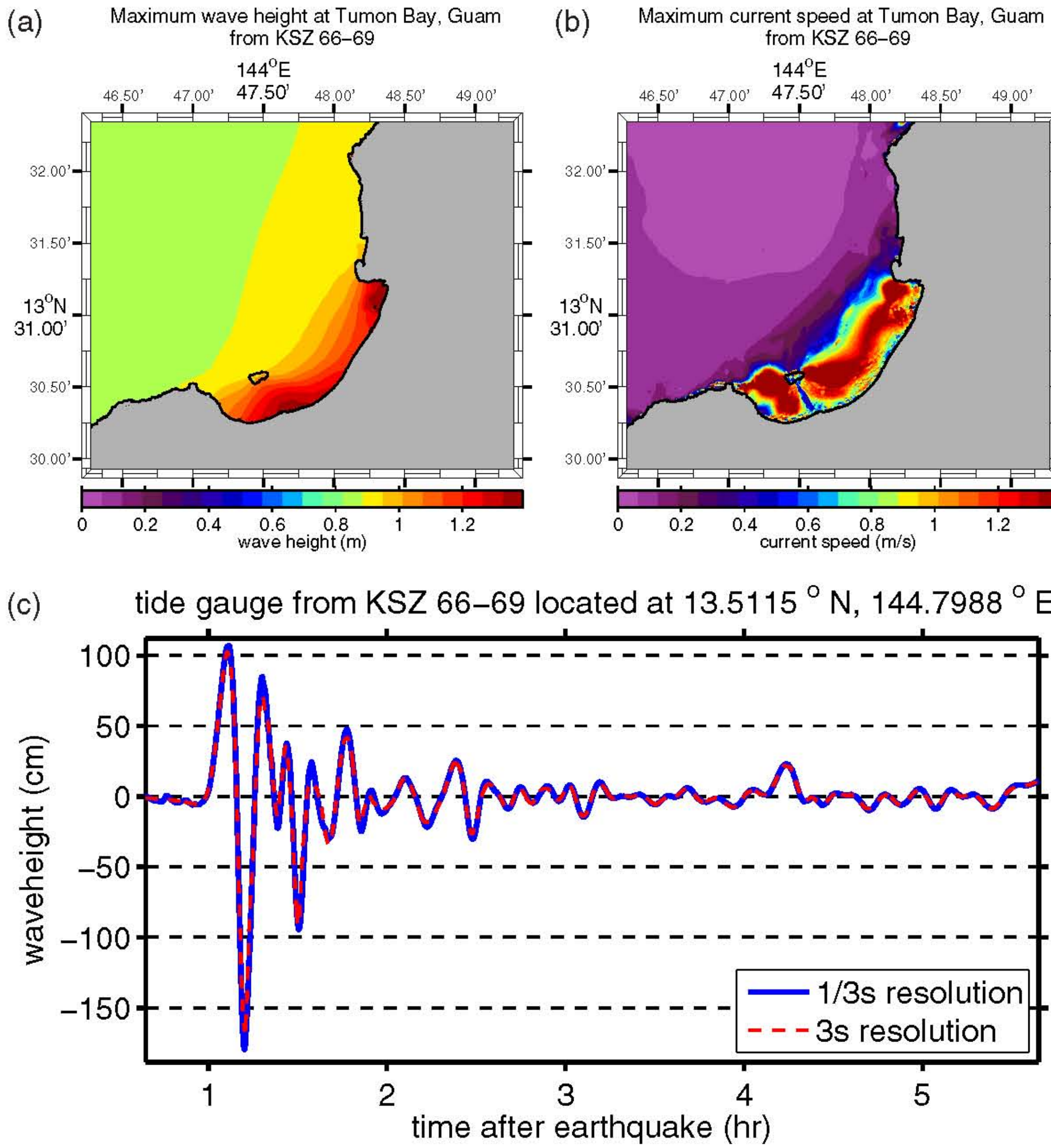

Figure C.7: (a) Maximum computed wave heights, (b) maximum computed currents, and (c) tsunami time history at the numerical tide gauge at Tumon Bay from a tsunami triggered by a Mw = 8.5 earthquake on KSZ segments 66–69 by a 6-m slip.

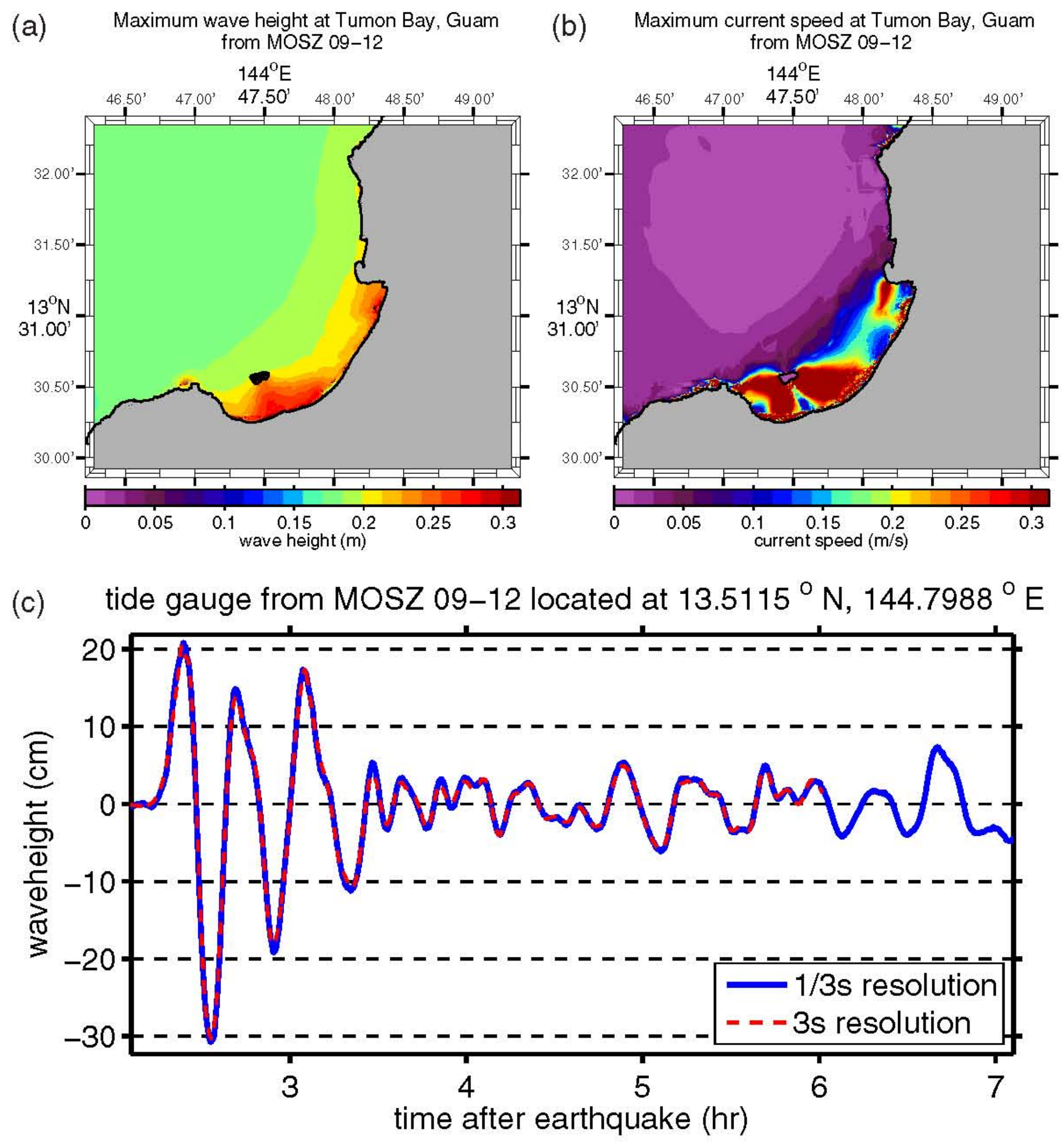

Figure C.8: (a) Maximum computed wave heights, (b) maximum computed currents, and (c) tsunami time history at the numerical tide gauge at Tumon Bay from a tsunami triggered by a Mw = 8.5 earthquake on MOSZ segments 09–12 by a 6-m slip.

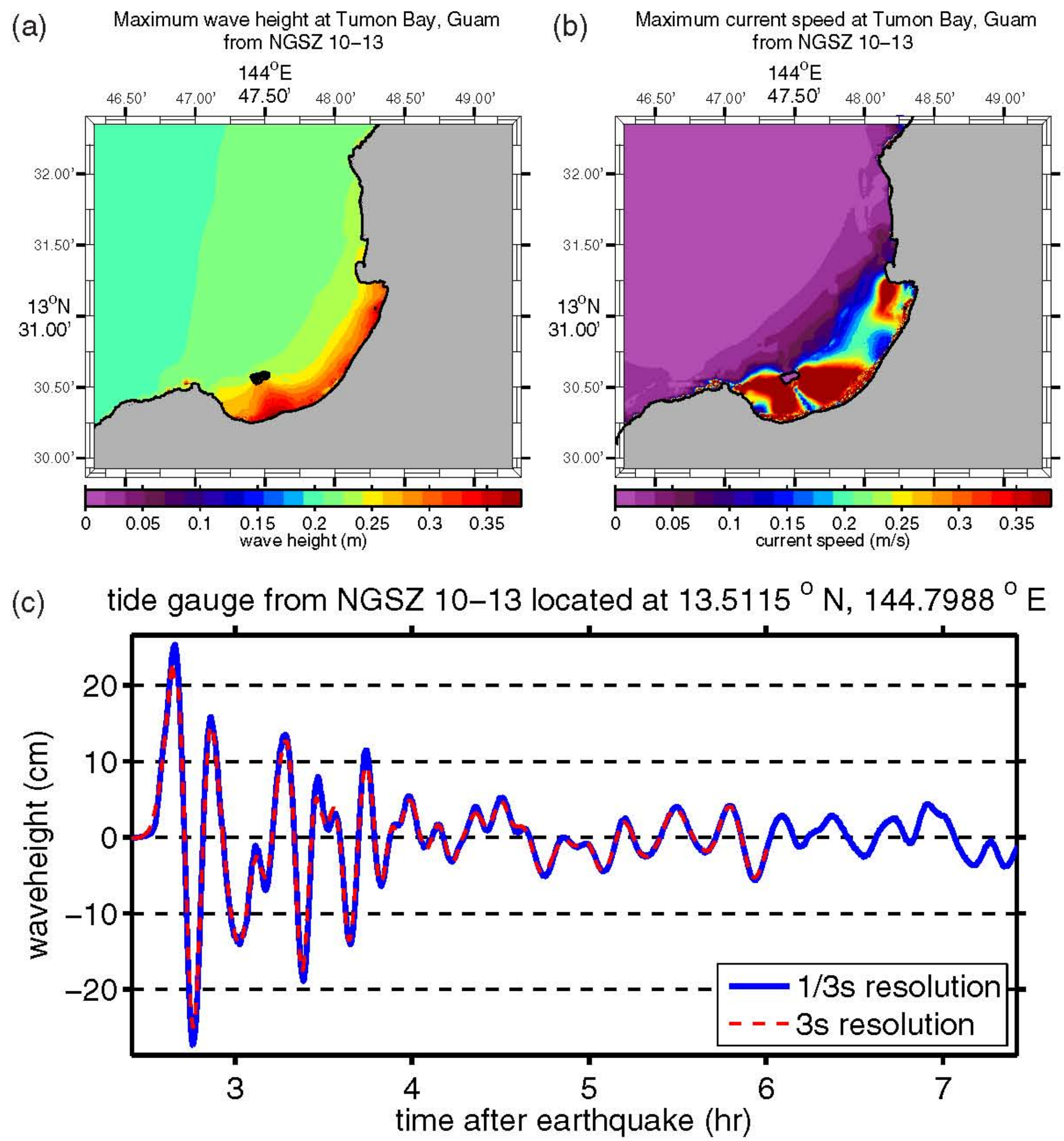

Figure C.9: (a) Maximum computed wave heights, (b) maximum computed currents, and (c) tsunami time history at the numerical tide gauge at Tumon Bay from a tsunami triggered by a Mw = 8.5 earthquake on NGSZ segments 10–13 by a 6-m slip.

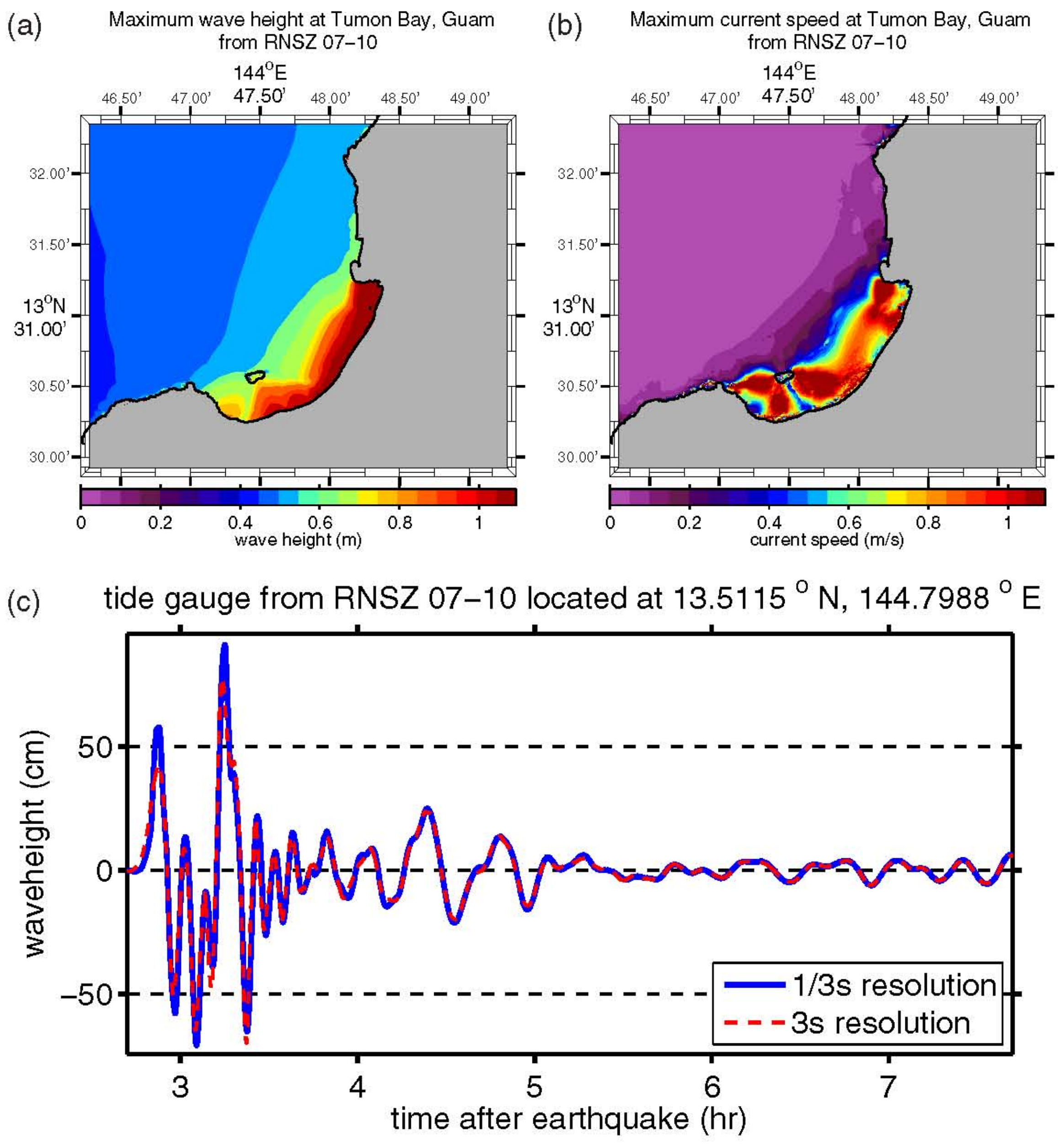

Figure C.10: (a) Maximum computed wave heights, (b) maximum computed currents, and (c) tsunami time history at the numerical tide gauge at Tumon Bay from a tsunami triggered by a Mw = 8.5 earthquake on RNSZ segments 07–10 by a 6-m slip.

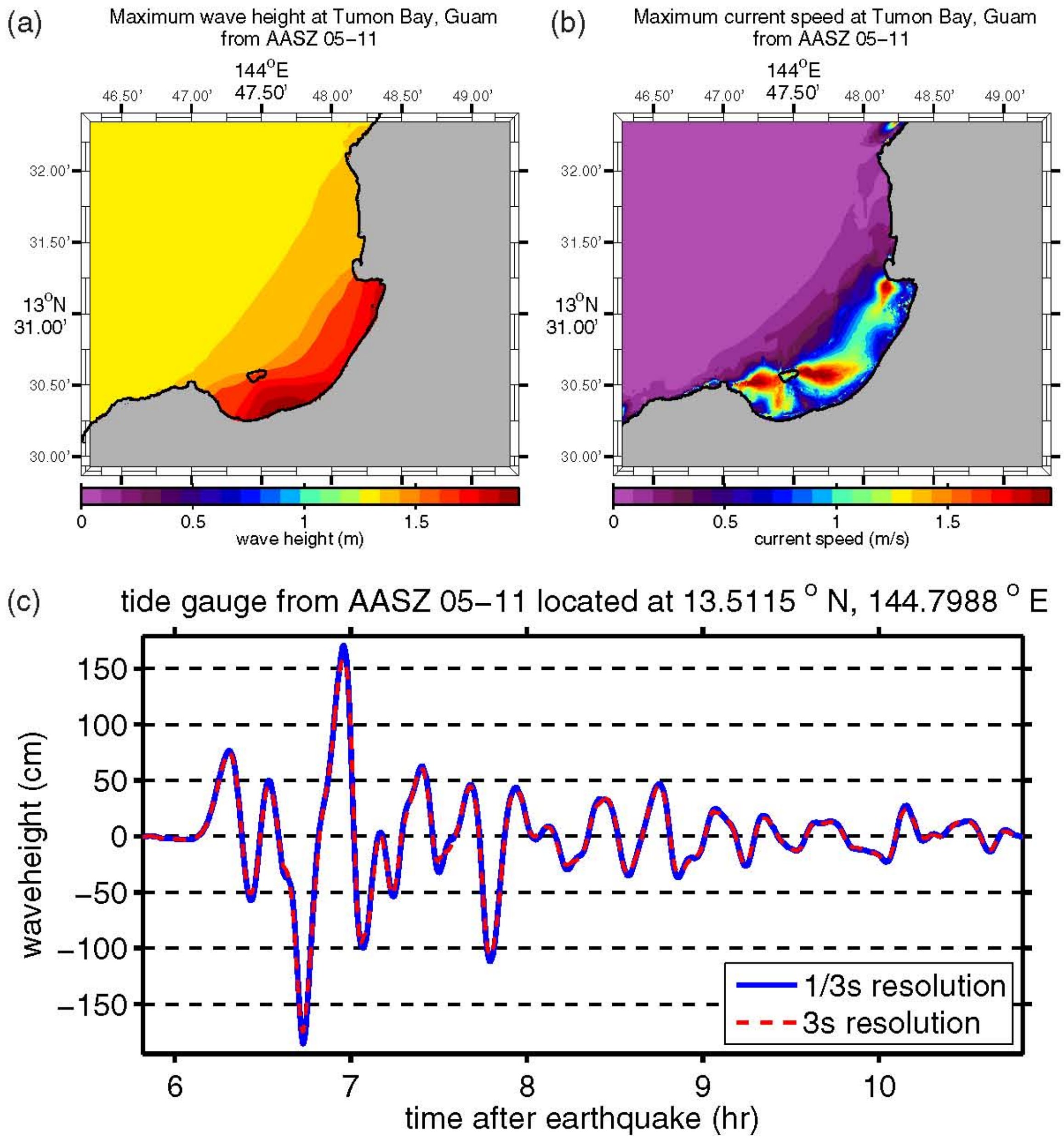

Figure C.11: (a) Maximum computed wave heights, (b) maximum computed currents, and (c) tsunami time history at the numerical tide gauge at Tumon Bay from a tsunami triggered by a Mw = 9.0 earthquake on AASZ segments 05–11 by a 20-m slip.

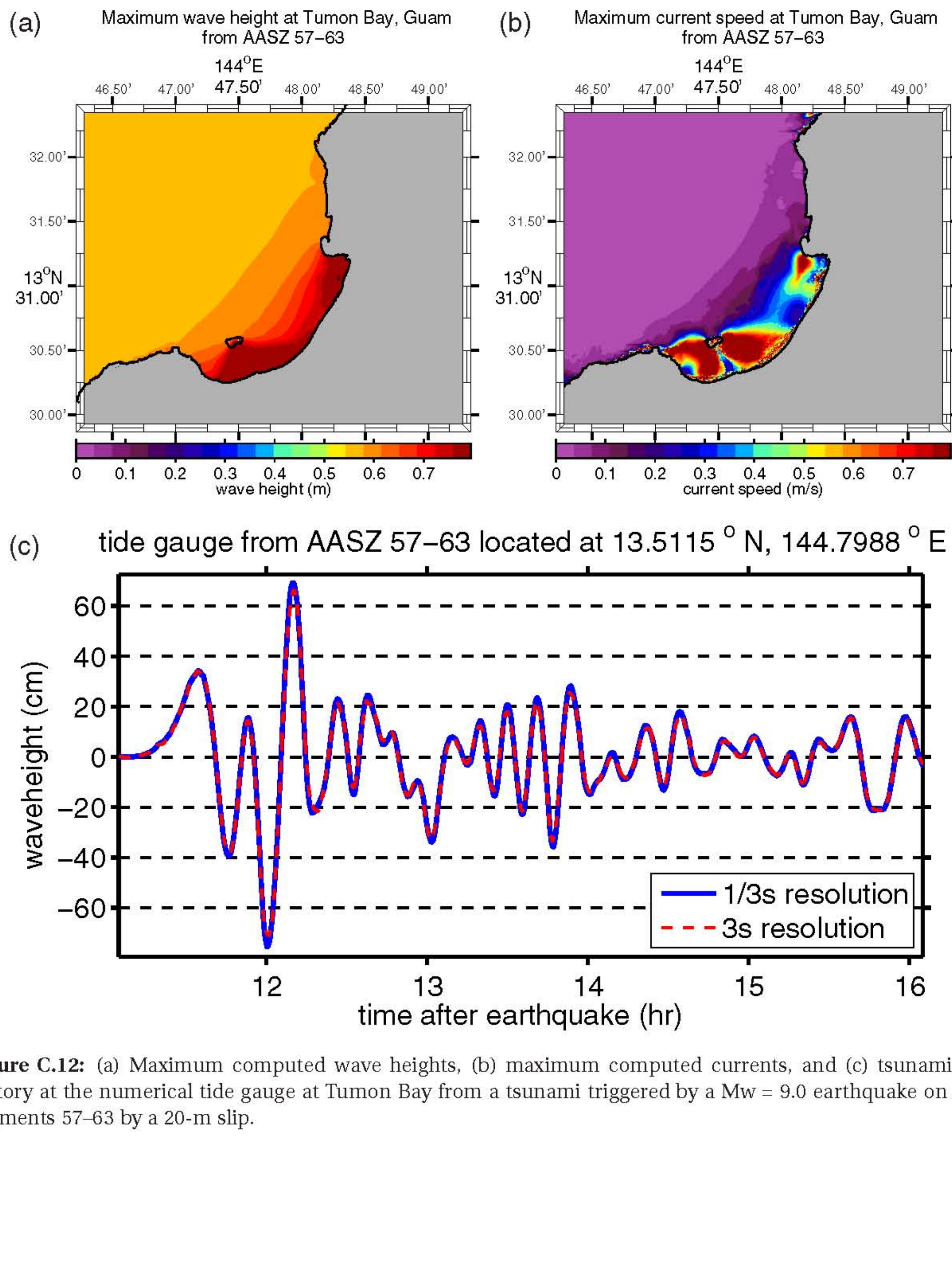

Figure C.12: (a) Maximum computed wave heights, (b) maximum computed currents, and (c) tsunami time history at the numerical tide gauge at Tumon Bay from a tsunami triggered by a Mw = 9.0 earthquake on AASZ segments 57–63 by a 20-m slip.

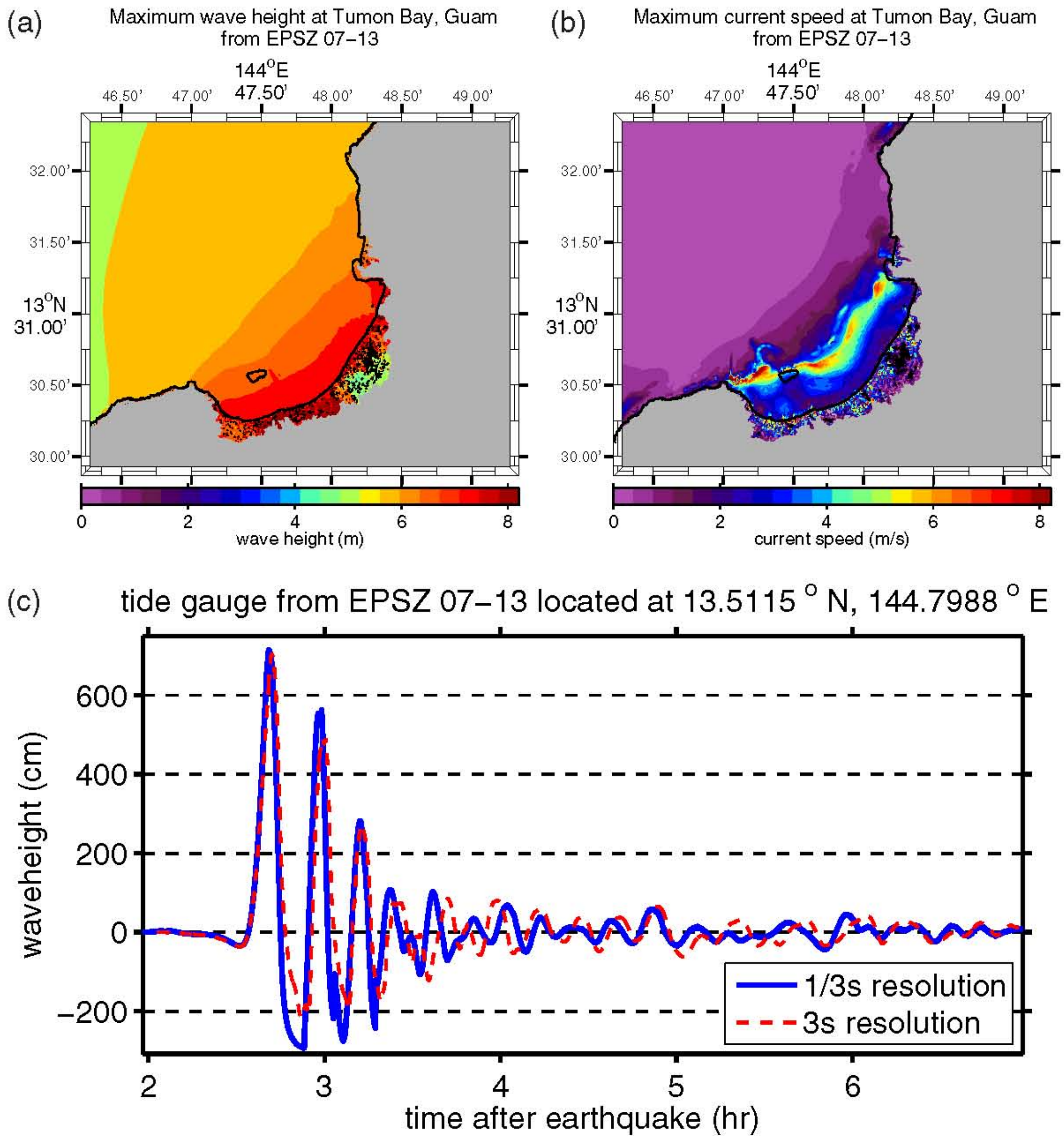

Figure C.13: (a) Maximum computed wave heights, (b) maximum computed currents, and (c) tsunami time history at the numerical tide gauge at Tumon Bay from a tsunami triggered by a Mw = 9.0 earthquake on EPSZ segments 07–13 by a 20-m slip.

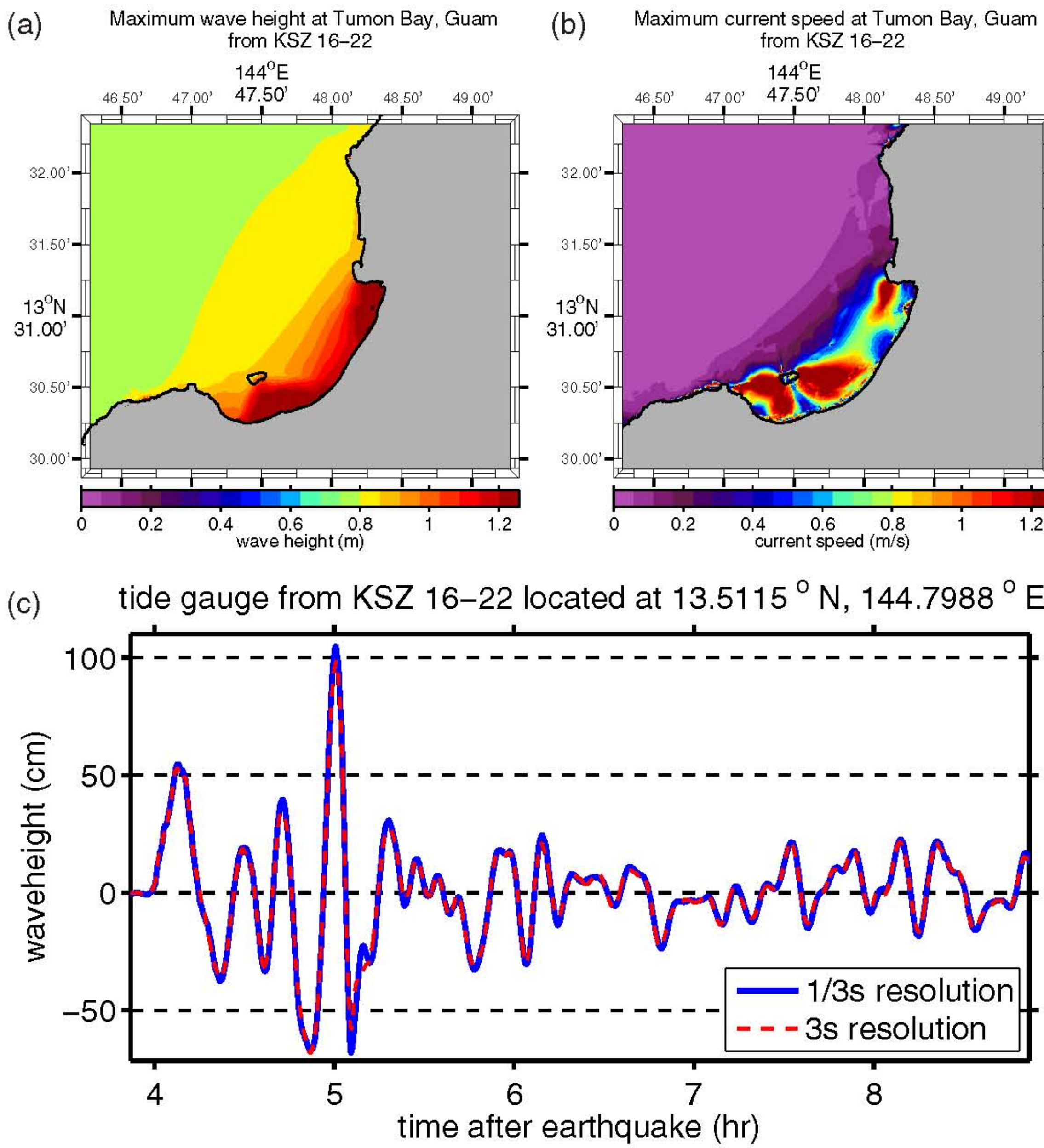

Figure C.14: (a) Maximum computed wave heights, (b) maximum computed currents, and (c) tsunami time history at the numerical tide gauge at Tumon Bay from a tsunami triggered by a Mw = 9.0 earthquake on KSZ segments 16–22 by a 20-m slip.

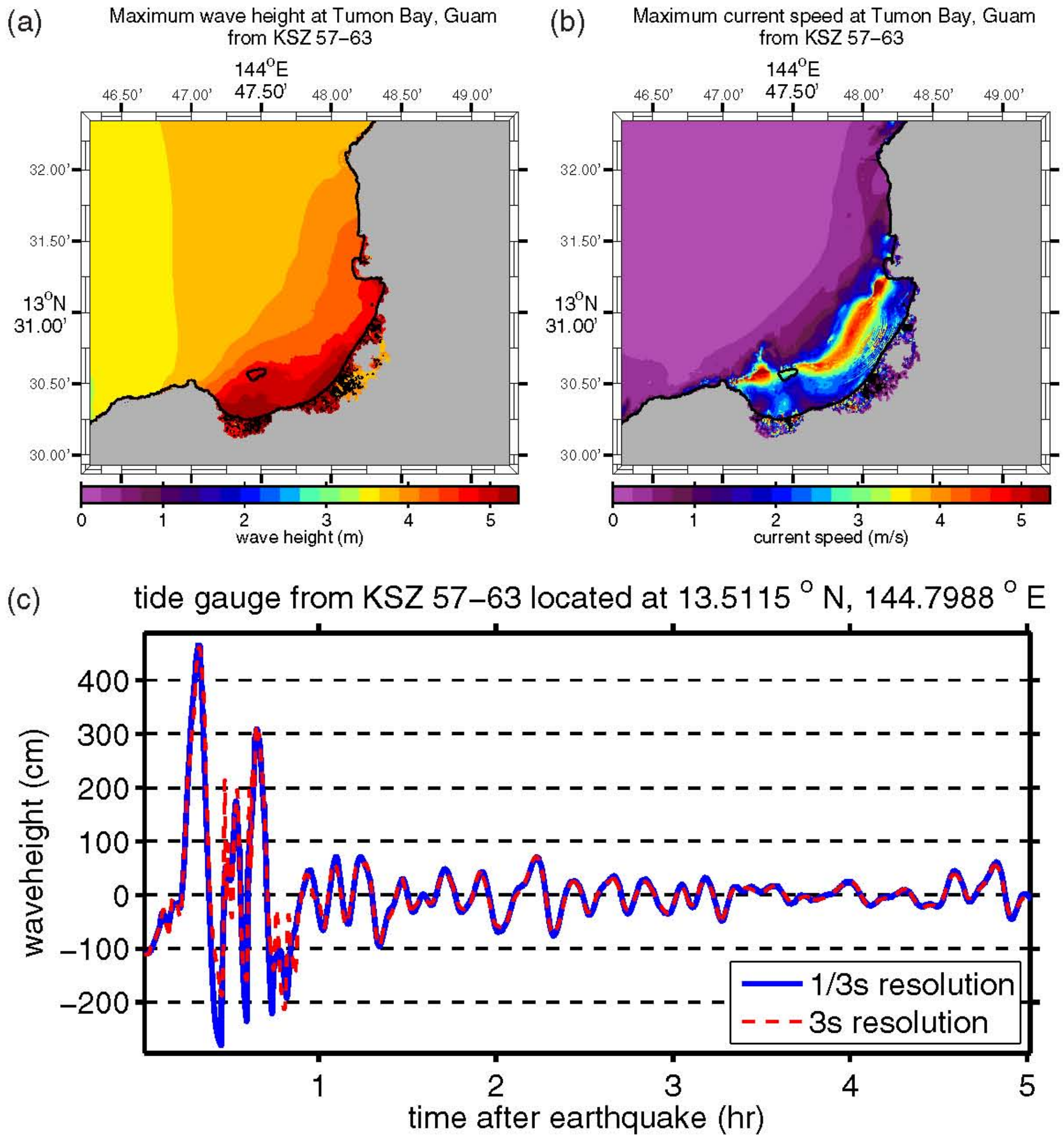

Figure C.15: (a) Maximum computed wave heights, (b) maximum computed currents, and (c) tsunami time history at the numerical tide gauge at Tumon Bay from a tsunami triggered by a Mw = 9.0 earthquake on KSZ segments 57–63 by a 20-m slip.

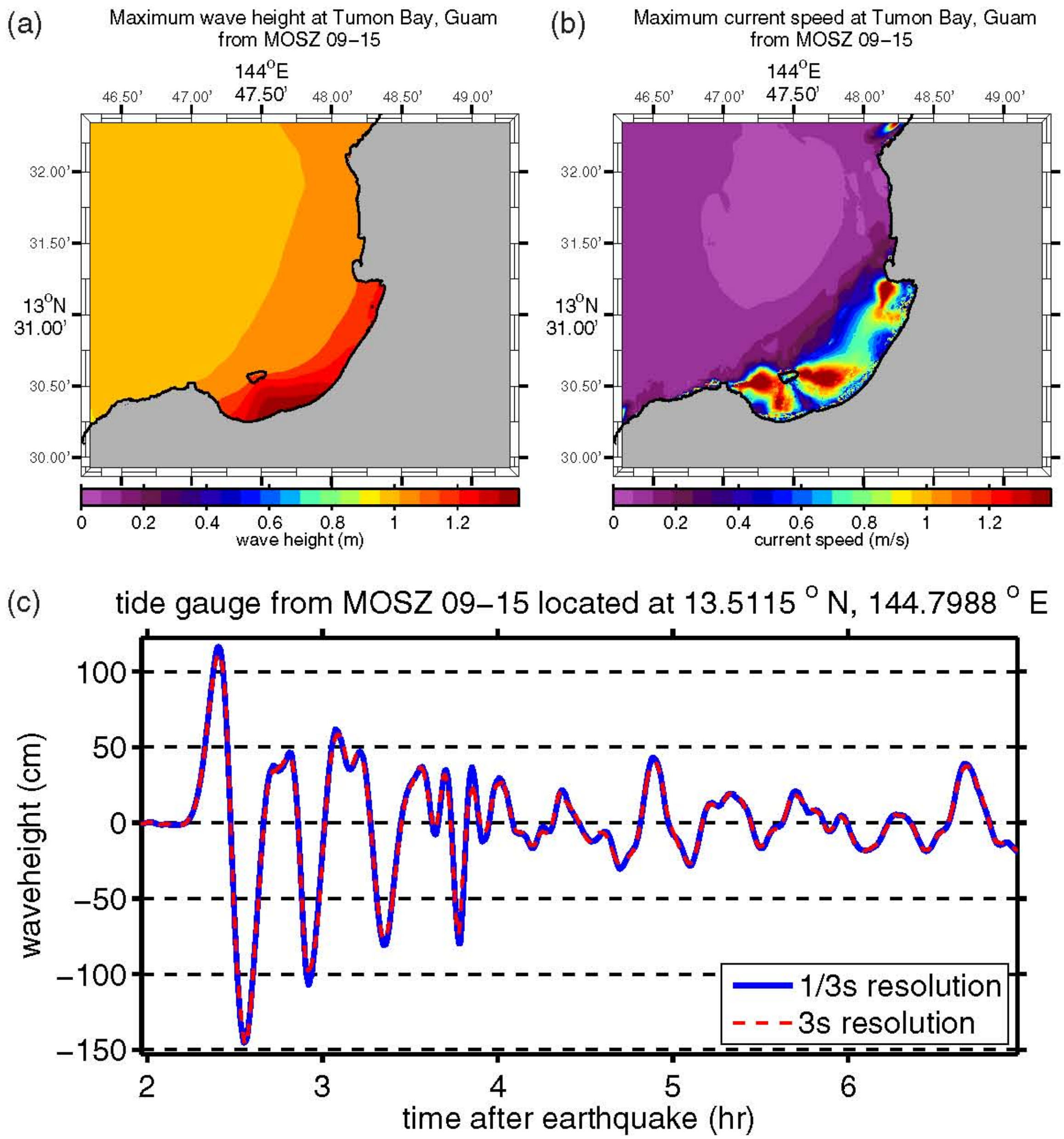

Figure C.16: (a) Maximum computed wave heights, (b) maximum computed currents, and (c) tsunami time history at the numerical tide gauge at Tumon Bay from a tsunami triggered by a Mw = 9.0 earthquake on MOSZ segments 09–15 by a 20-m slip.

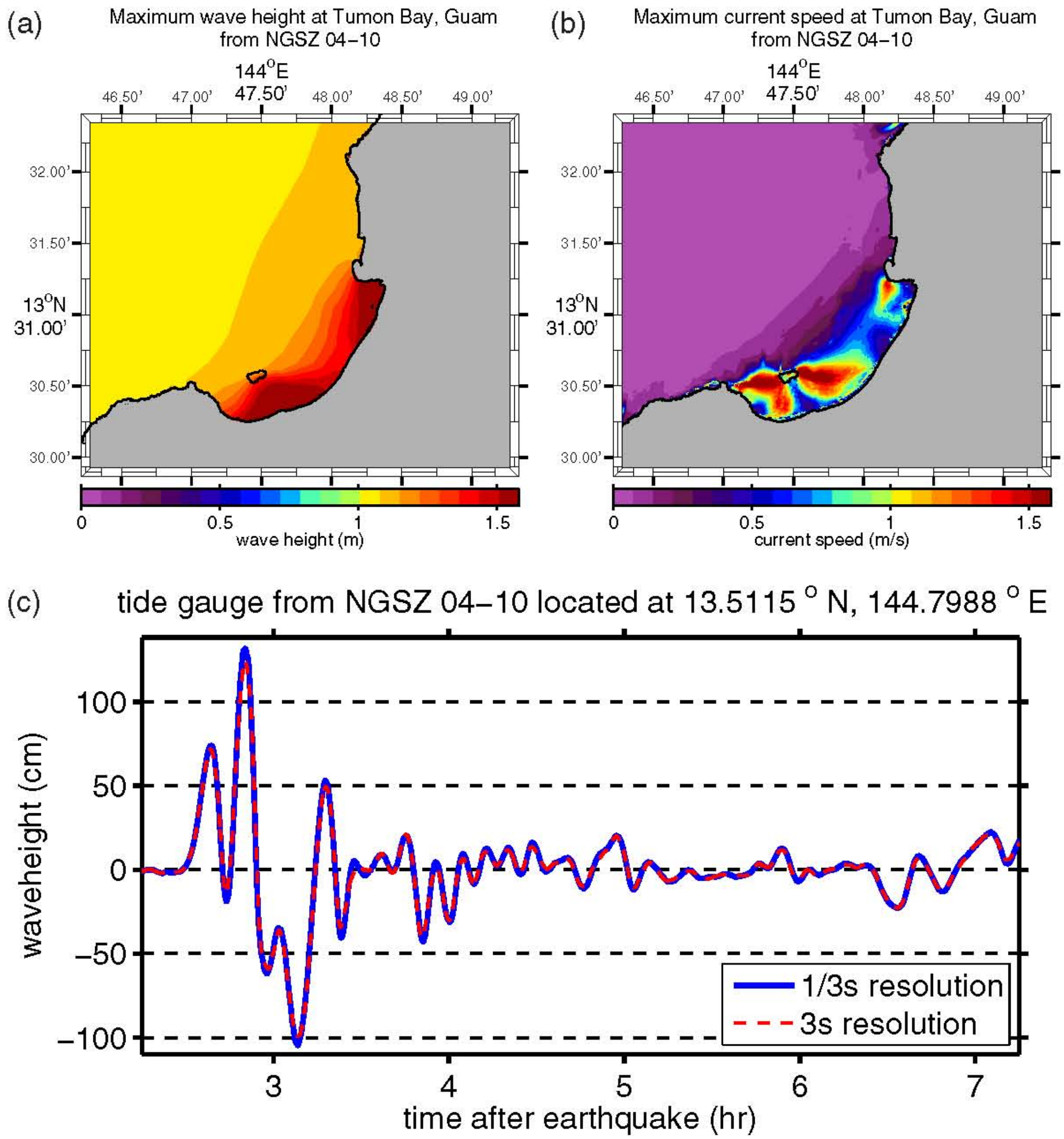

Figure C.17: (a) Maximum computed wave heights, (b) maximum computed currents, and (c) tsunami time history at the numerical tide gauge at Tumon Bay from a tsunami triggered by a Mw = 9.0 earthquake on NGSZ segments 04–10 by a 20-m slip.

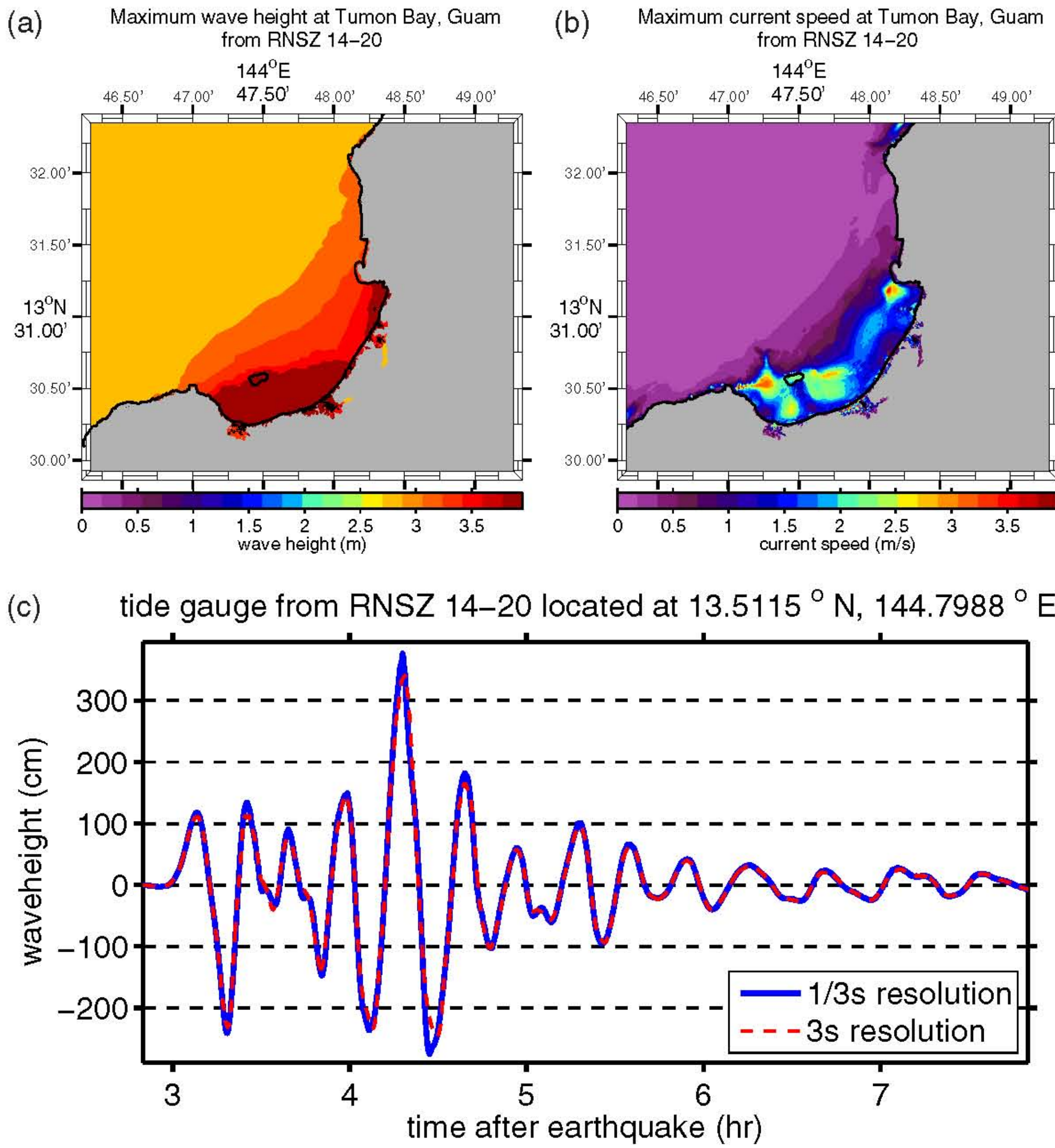

Figure C.18: (a) Maximum computed wave heights, (b) maximum computed currents, and (c) tsunami time history at the numerical tide gauge at Tumon Bay from a tsunami triggered by a Mw = 9.0 earthquake on RNSZ segments 14–20 by a 20-m slip.

Appendix D
Apra Harbor

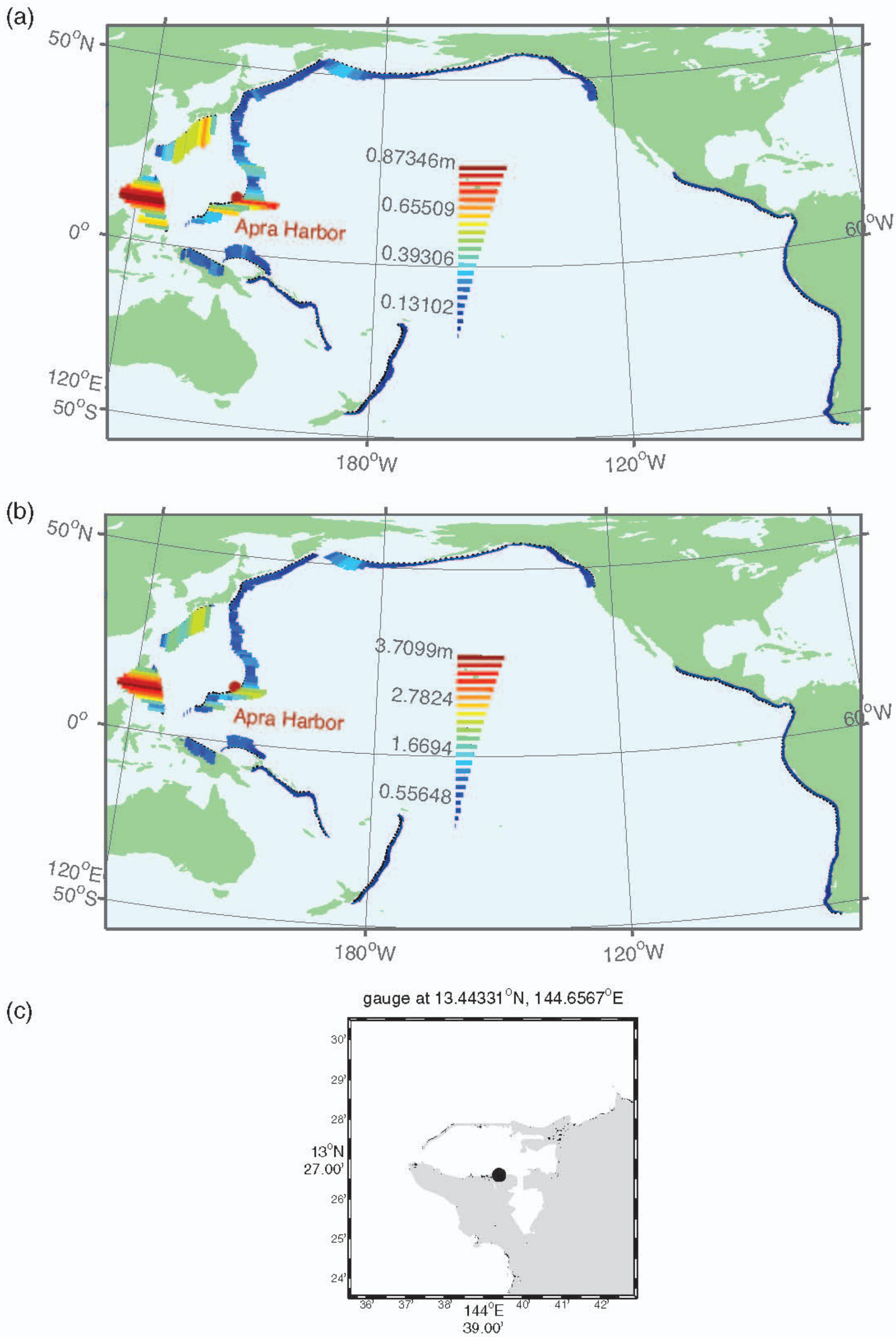

Figure D.1: Tsunami wave height response at Apra Harbor from tsunamis triggered by (a) Mw = 8.5 and (b) Mw = 9.0 earthquakes.

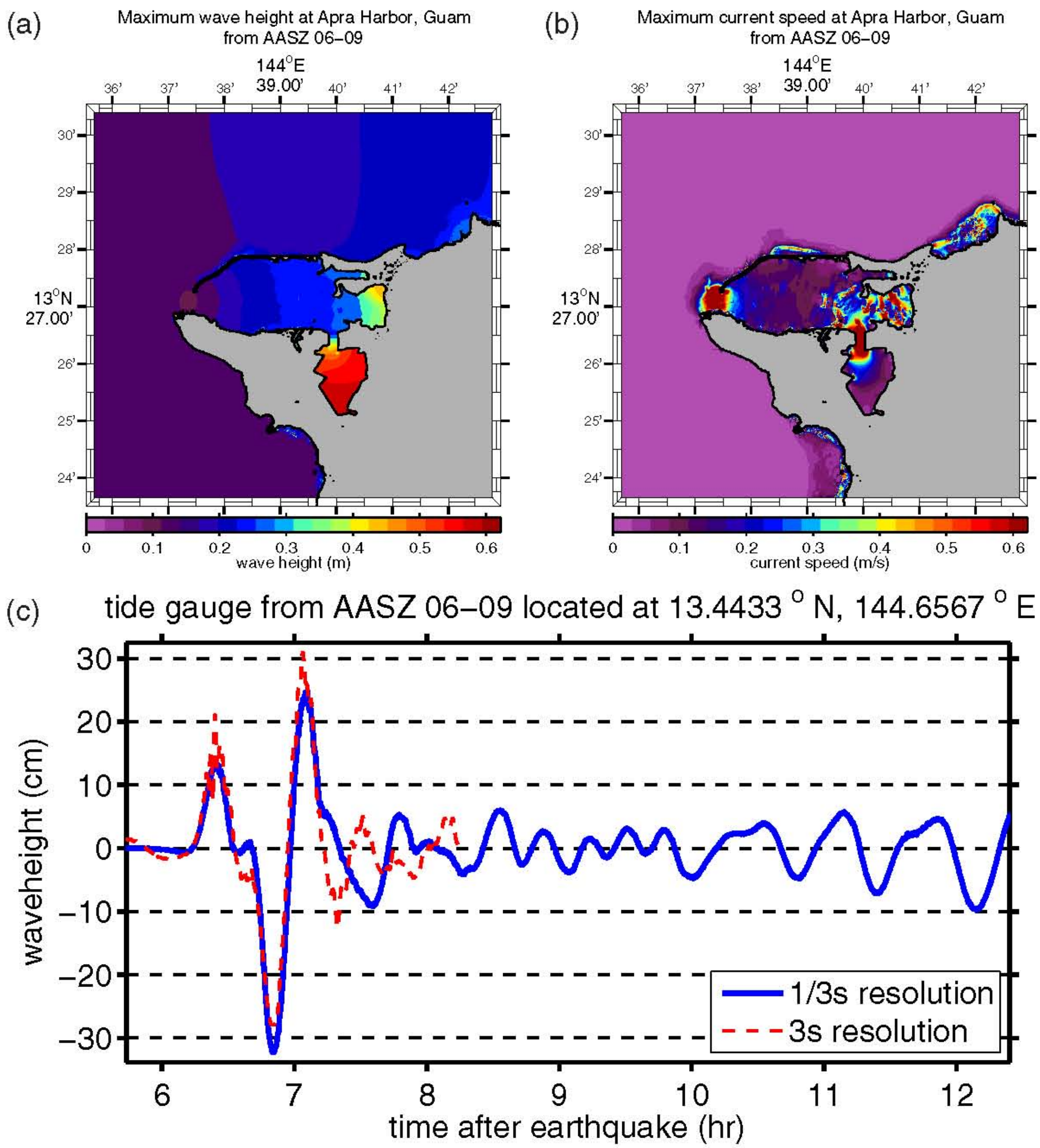

Figure D.2: (a) Maximum computed wave heights, (b) maximum computed currents, and (c) tsunami time history at the numerical tide gauge at Apra Harbor from a tsunami triggered by a Mw = 8.5 earthquake on AASZ segments 06–09 by a 6-m slip.

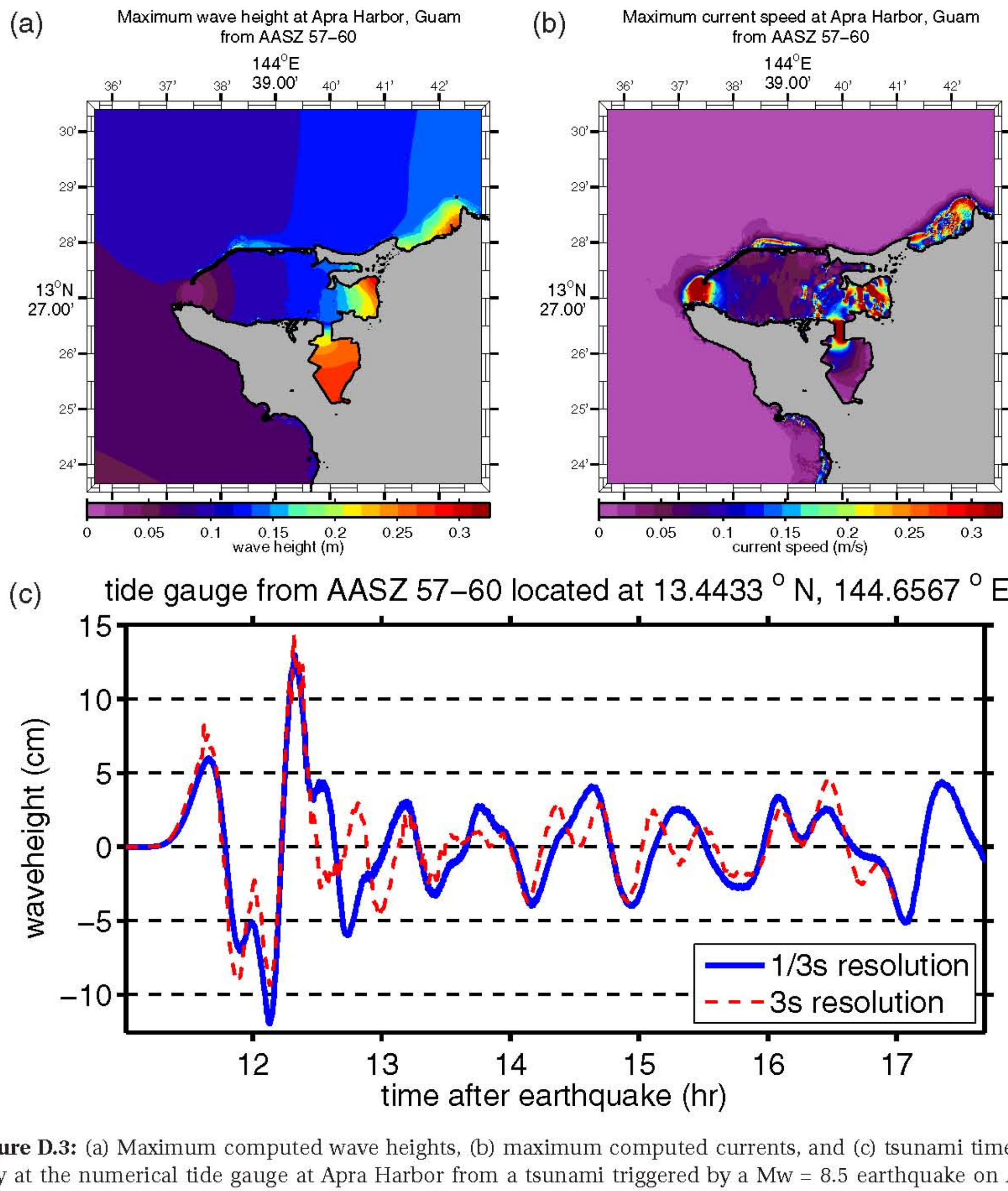

Figure D.3: (a) Maximum computed wave heights, (b) maximum computed currents, and (c) tsunami time history at the numerical tide gauge at Apra Harbor from a tsunami triggered by a Mw = 8.5 earthquake on AASZ segments 57–60 by a 6-m slip.

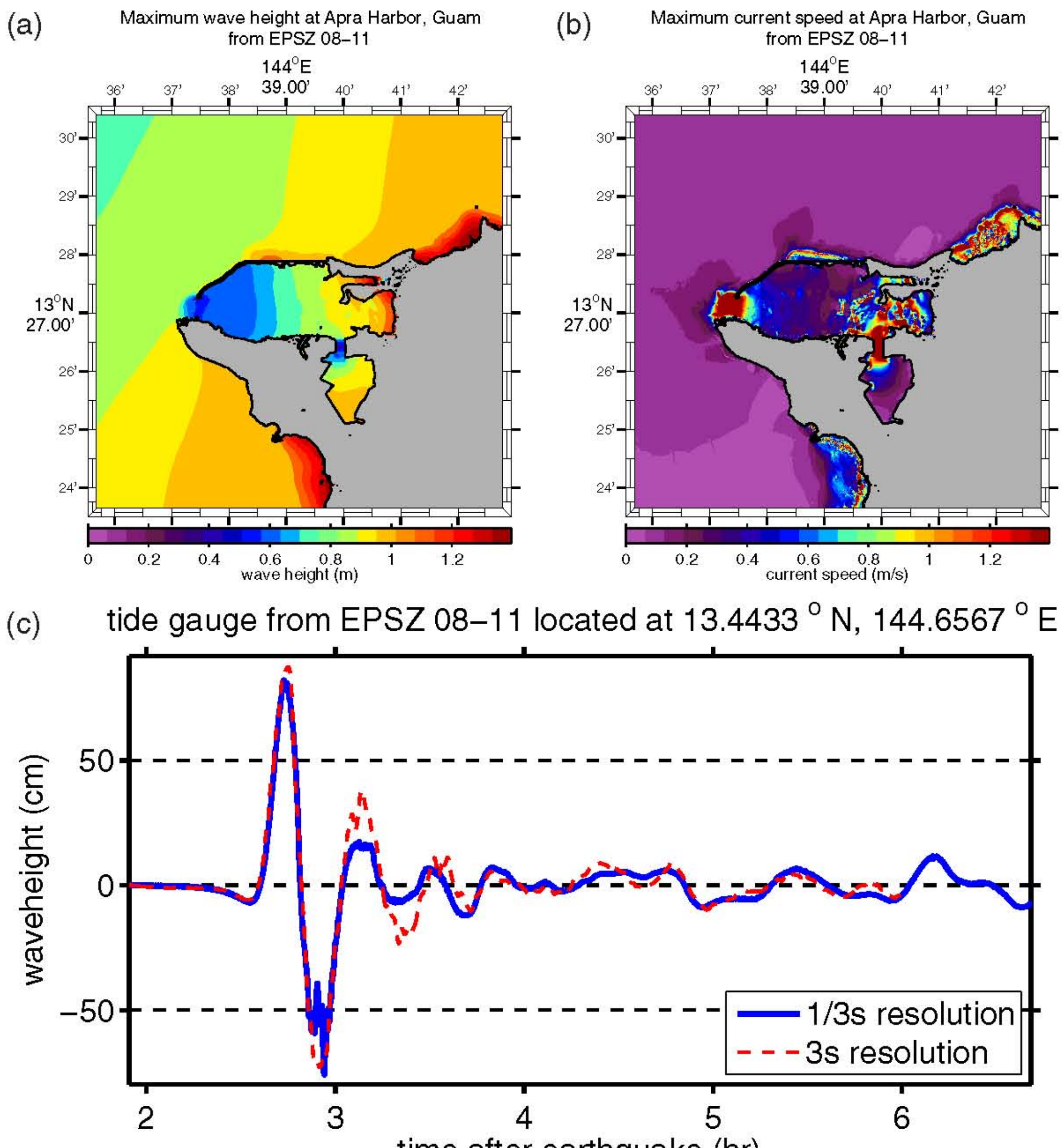

Figure D.4: (a) Maximum computed wave heights, (b) maximum computed currents, and (c) tsunami time history at the numerical tide gauge at Apra Harbor from a tsunami triggered by a Mw = 8.5 earthquake on EPSZ segments 08–11 by a 6-m slip.

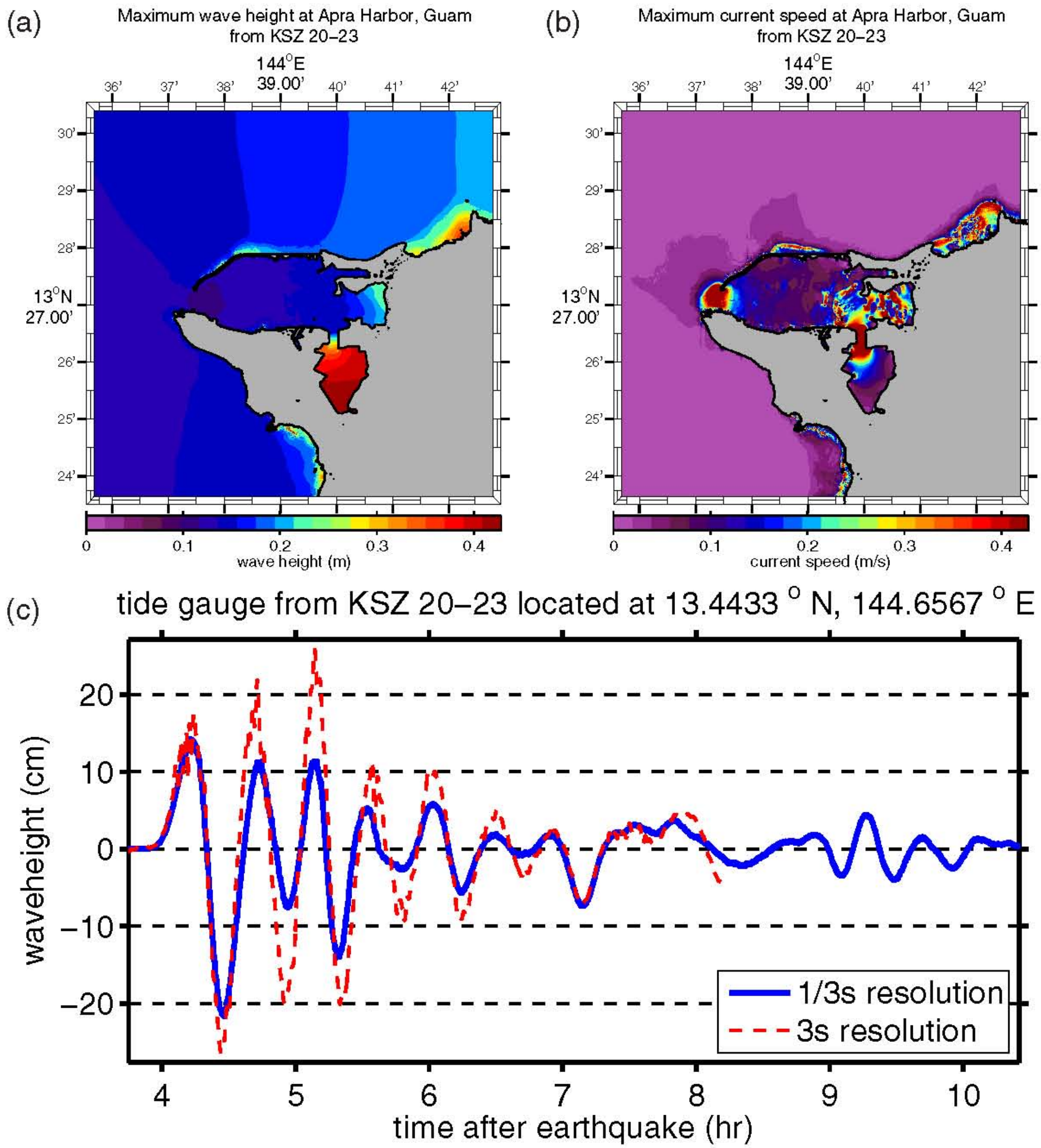

Figure D.5: (a) Maximum computed wave heights, (b) maximum computed currents, and (c) tsunami time history at the numerical tide gauge at Apra Harbor from a tsunami triggered by a Mw = 8.5 earthquake on KSZ segments 20–23 by a 6-m slip.

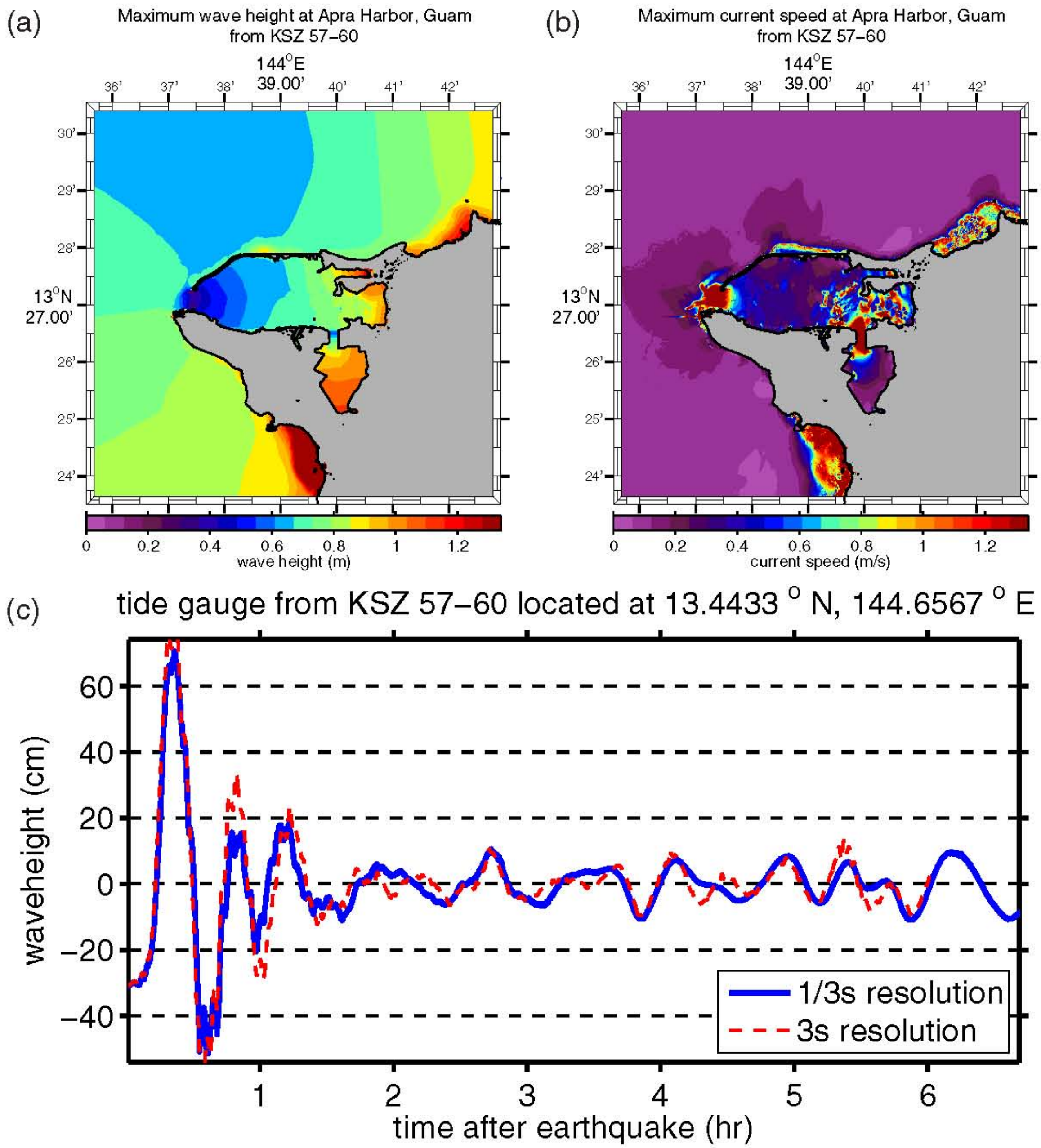

Figure D.6: (a) Maximum computed wave heights, (b) maximum computed currents, and (c) tsunami time history at the numerical tide gauge at Apra Harbor from a tsunami triggered by a Mw = 8.5 earthquake on KSZ segments 57–60 by a 6-m slip.

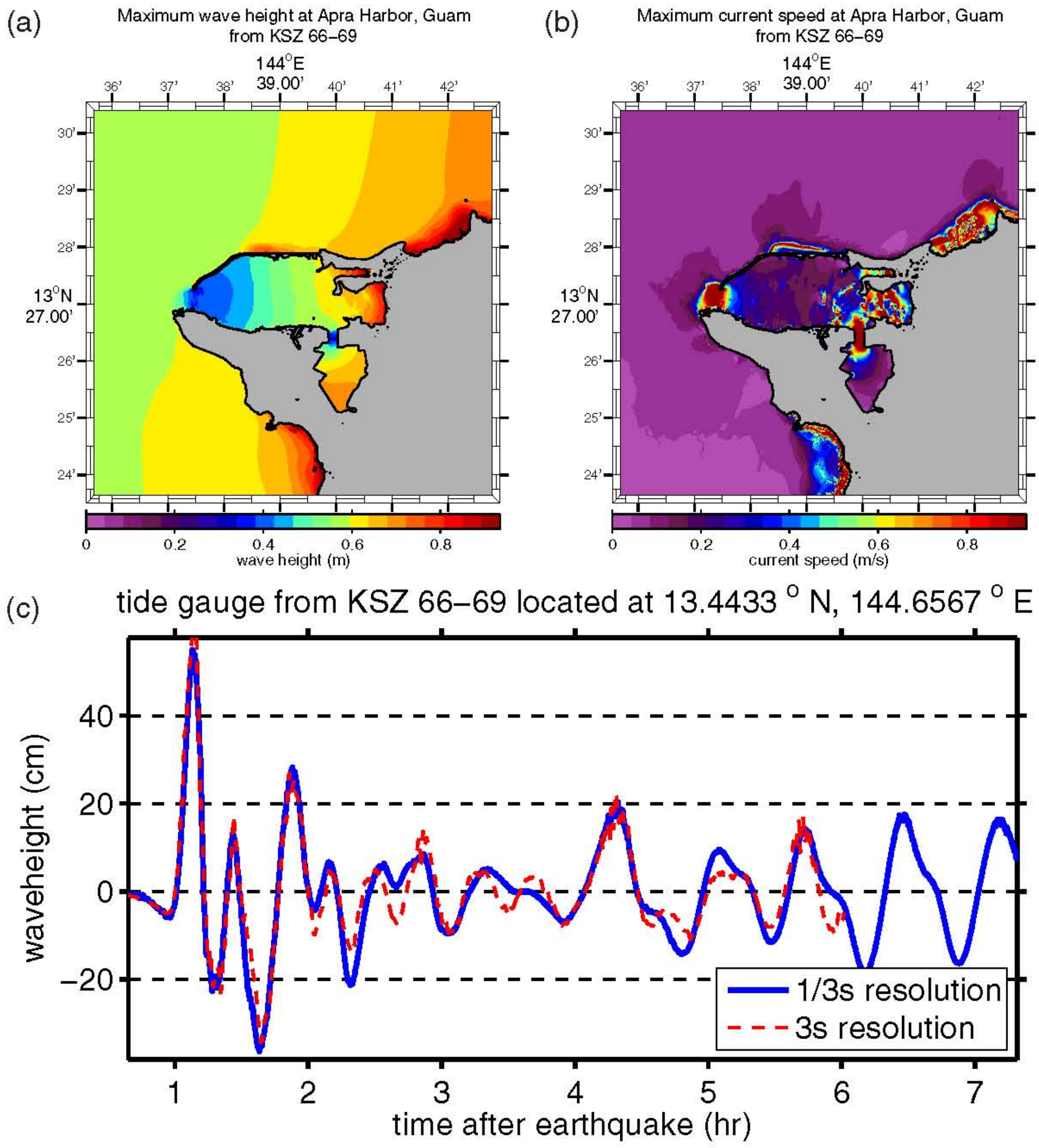

Figure D.7: (a) Maximum computed wave heights, (b) maximum computed currents, and (c) tsunami time history at the numerical tide gauge at Apra Harbor from a tsunami triggered by a Mw = 8.5 earthquake on KSZ segments 66–69 by a 6-m slip.

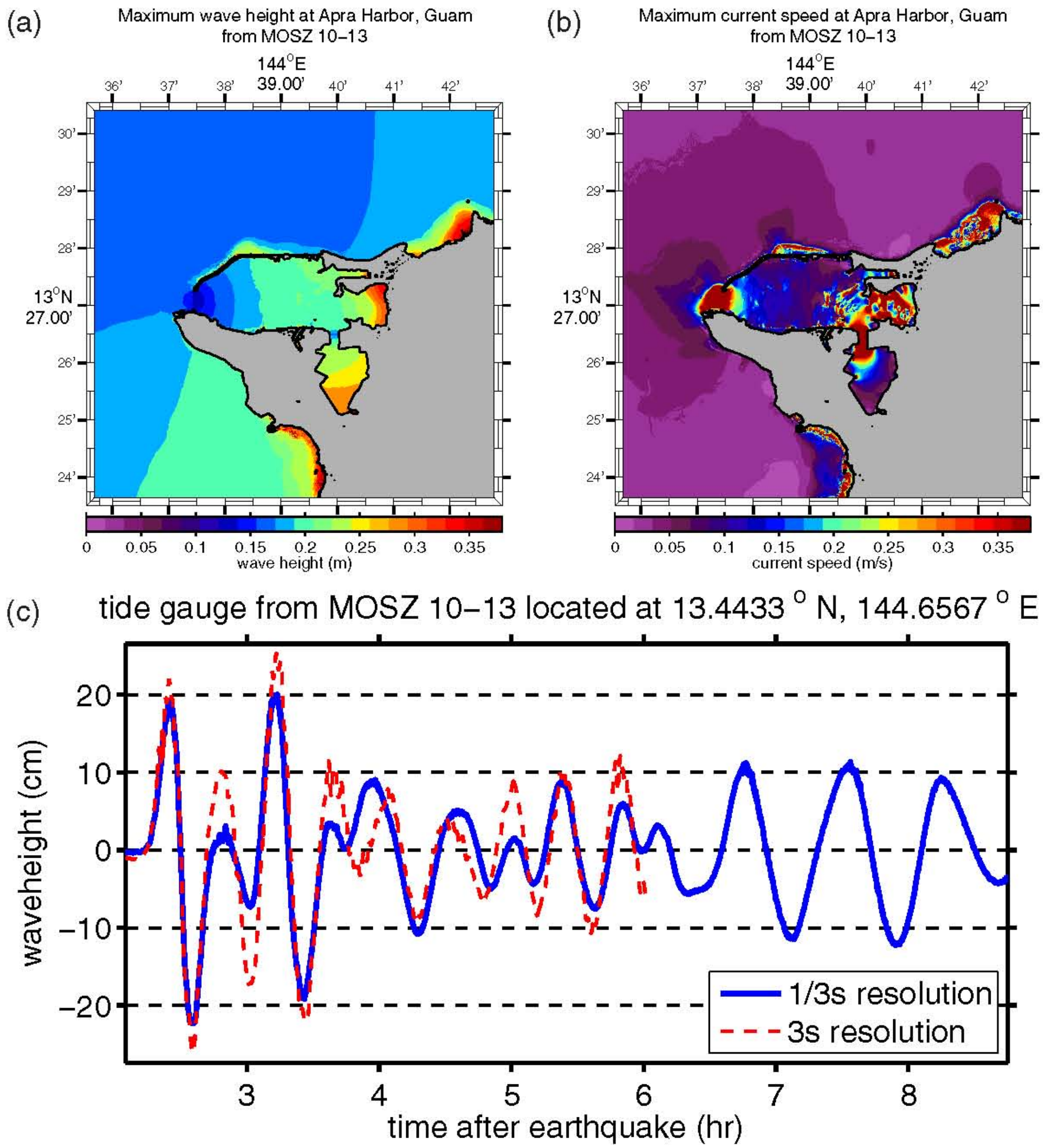

Figure D.8: (a) Maximum computed wave heights, (b) maximum computed currents, and (c) tsunami time history at the numerical tide gauge at Apra Harbor from a tsunami triggered by a Mw = 8.5 earthquake on MOSZ segments 10–13 by a 6-m slip.

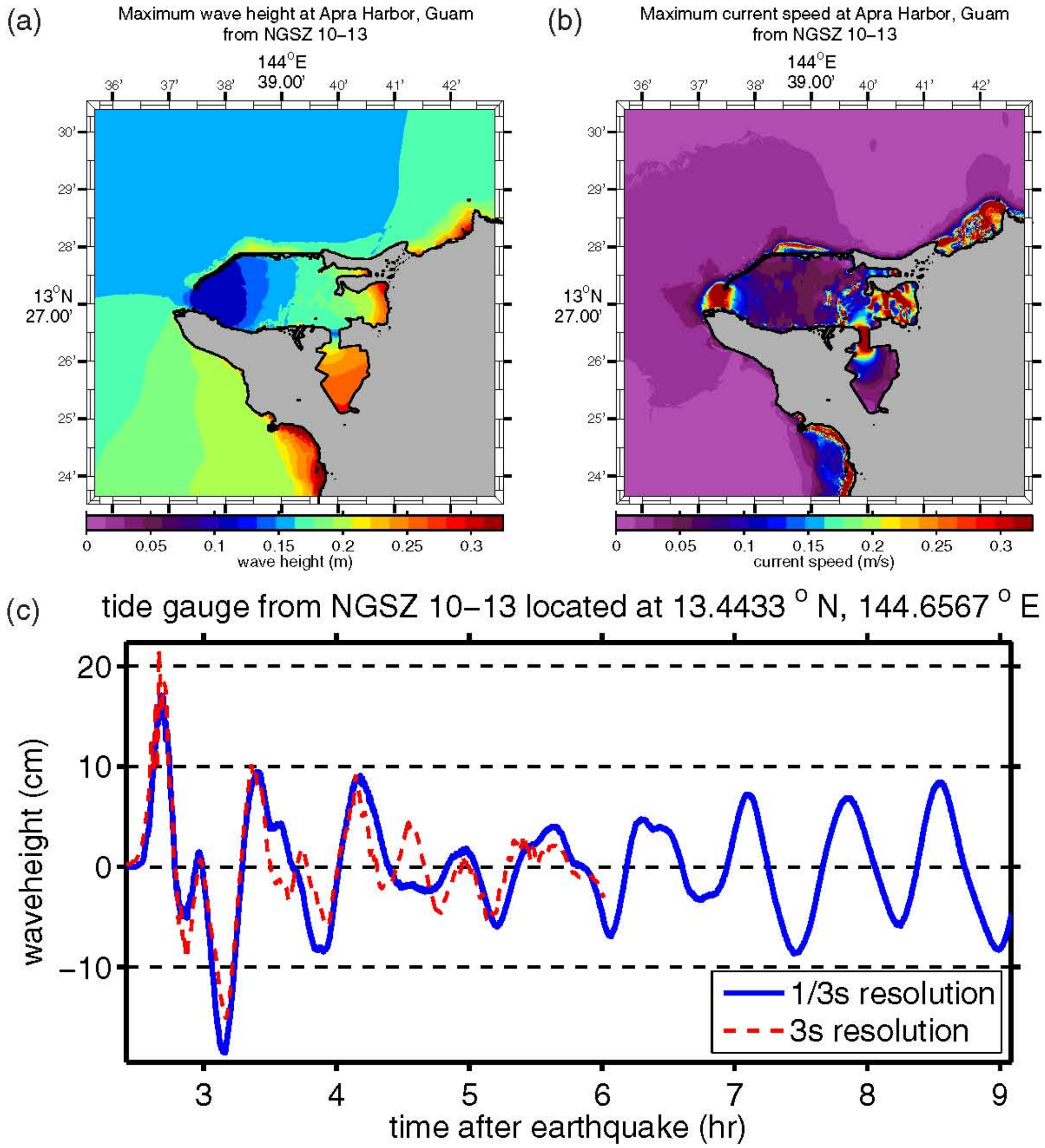

Figure D.9: (a) Maximum computed wave heights, (b) maximum computed currents, and (c) tsunami time history at the numerical tide gauge at Apra Harbor from a tsunami triggered by a Mw = 8.5 earthquake on NGSZ segments 10–13 by a 6-m slip.

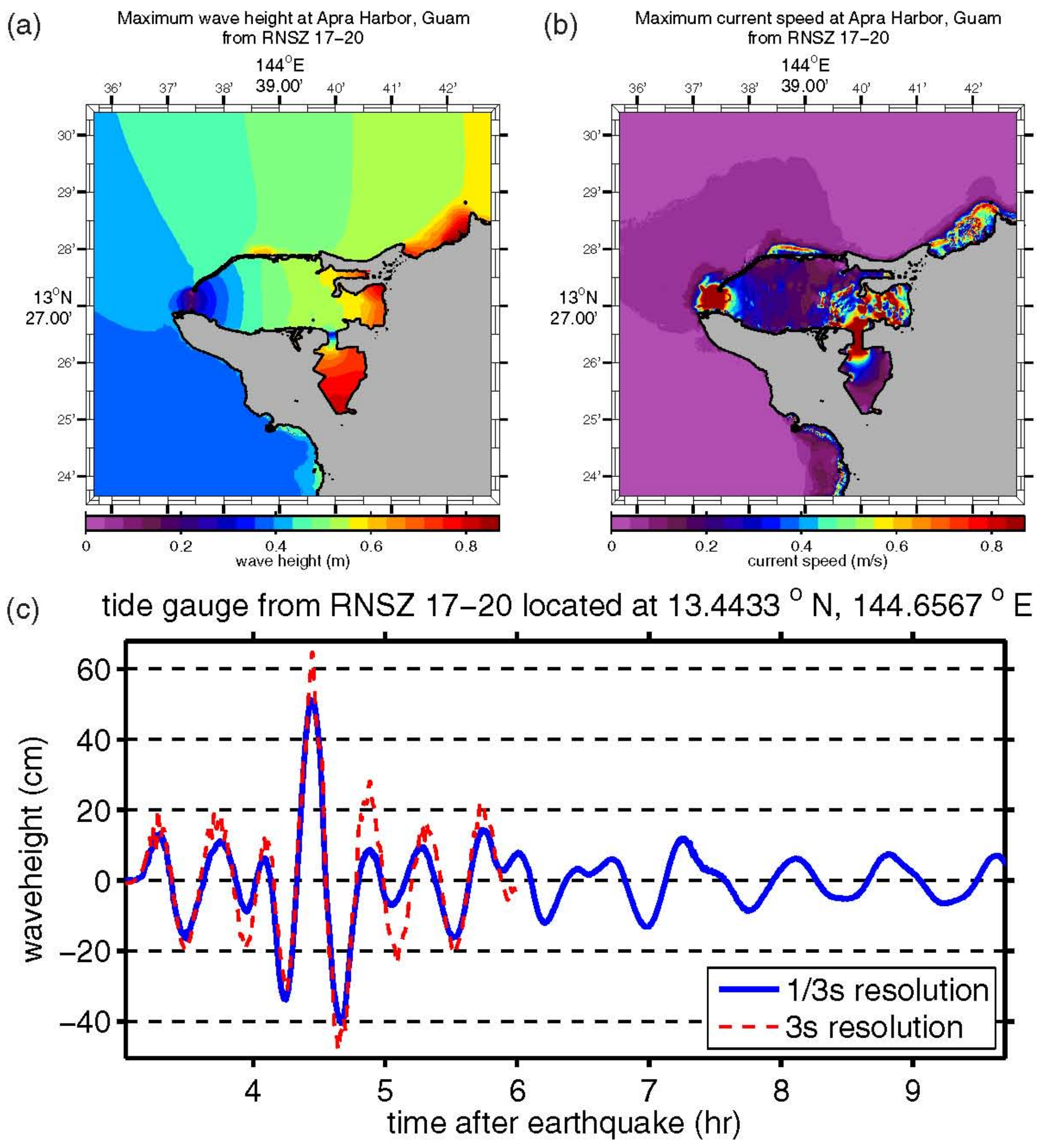

Figure D.10: (a) Maximum computed wave heights, (b) maximum computed currents, and (c) tsunami time history at the numerical tide gauge at Apra Harbor from a tsunami triggered by a Mw = 8.5 earthquake on RNSZ segments 17–20 by a 6-m slip.

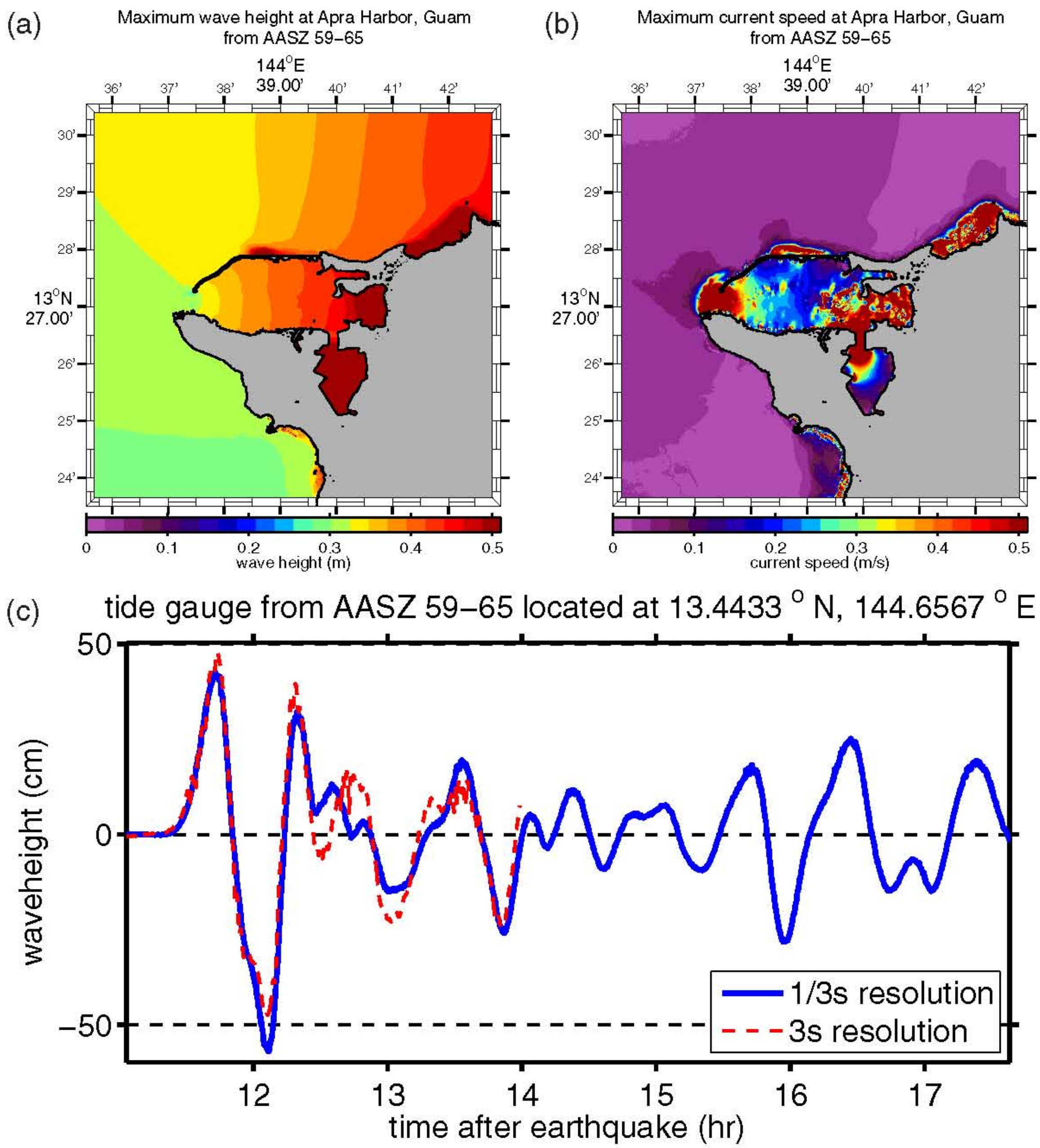

Figure D.11: (a) Maximum computed wave heights, (b) maximum computed currents, and (c) tsunami time history at the numerical tide gauge at Apra Harbor from a tsunami triggered by a Mw = 9.0 earthquake on AASZ segments 59–65 by a 20-m slip.

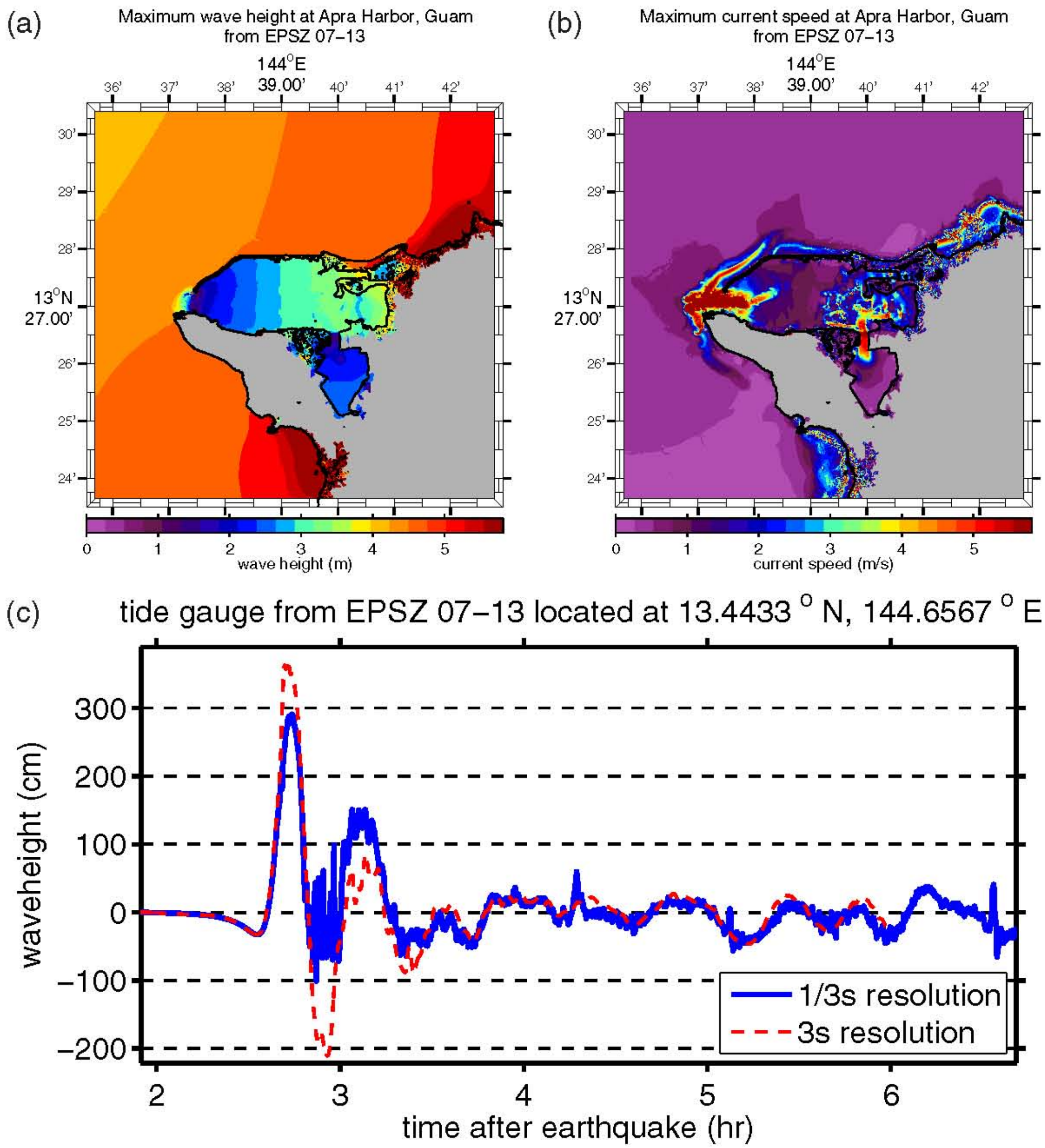

Figure D.12: (a) Maximum computed wave heights, (b) maximum computed currents, and (c) tsunami time history at the numerical tide gauge at Apra Harbor from a tsunami triggered by a Mw = 9.0 earthquake on EPSZ segments 07–13 by a 20-m slip.

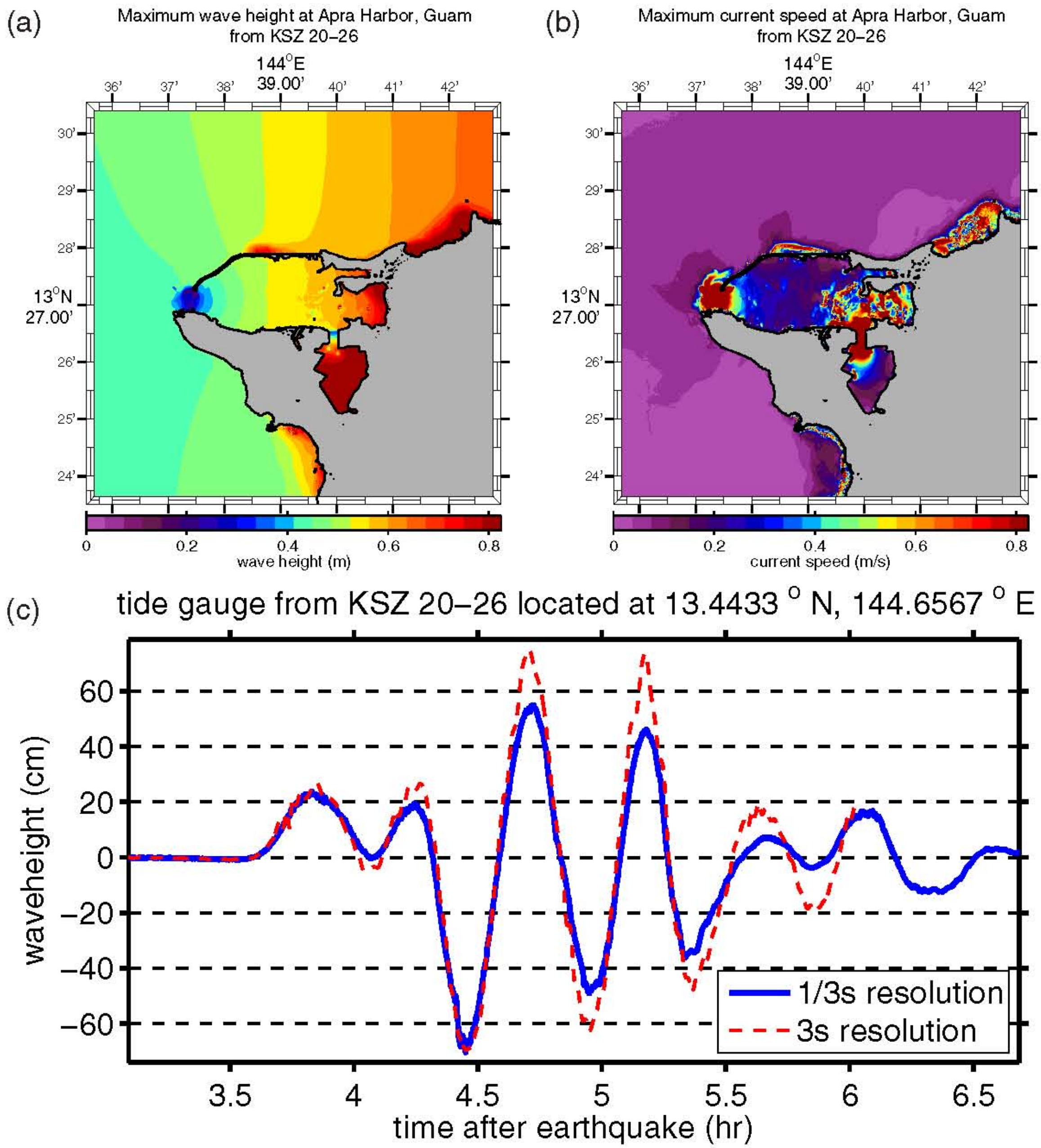

Figure D.13: (a) Maximum computed wave heights, (b) maximum computed currents, and (c) tsunami time history at the numerical tide gauge at Apra Harbor from a tsunami triggered by a Mw = 9.0 earthquake on KSZ segments 20–26 by a 20-m slip.

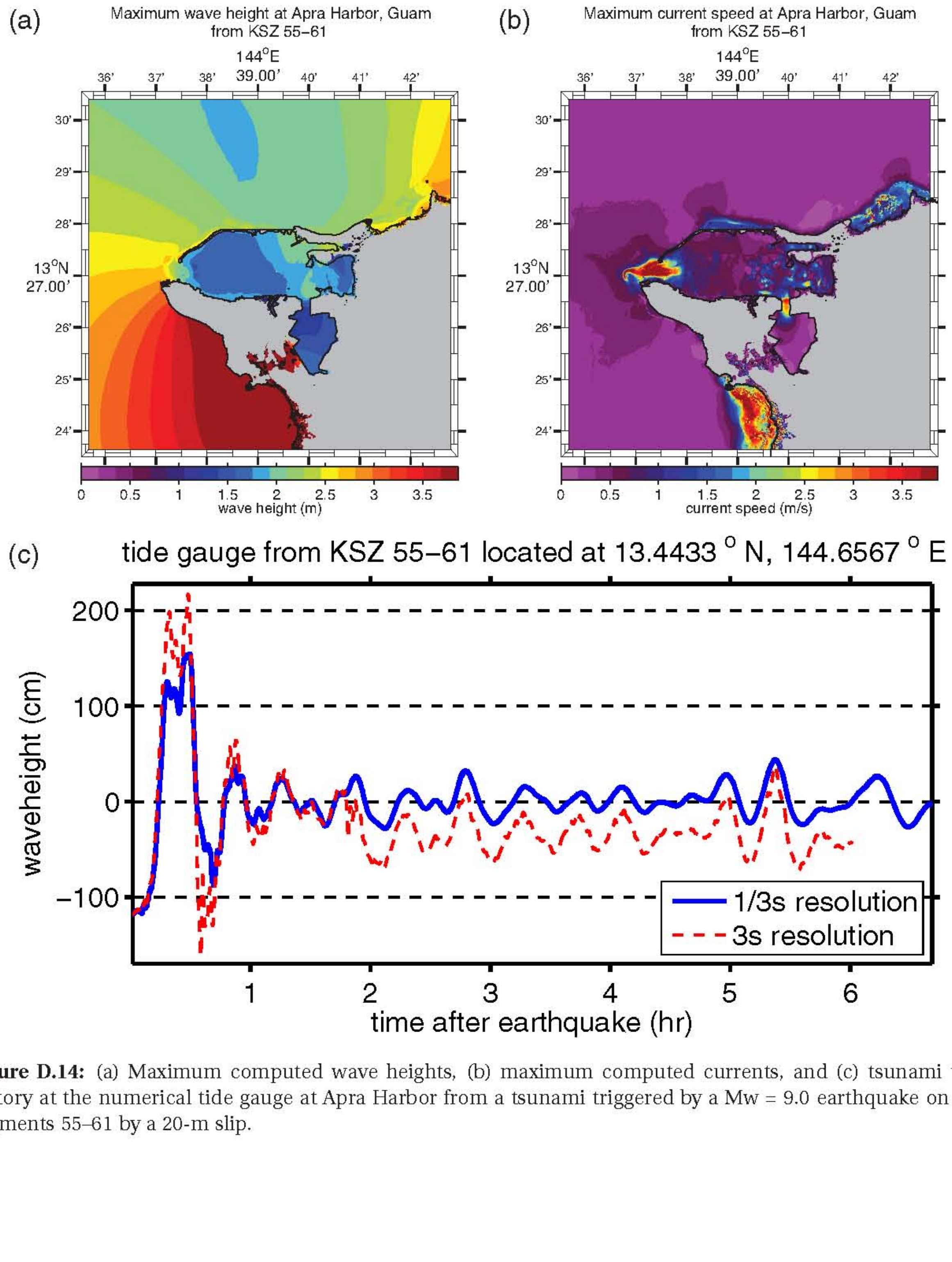

Figure D.14: (a) Maximum computed wave heights, (b) maximum computed currents, and (c) tsunami time history at the numerical tide gauge at Apra Harbor from a tsunami triggered by a Mw = 9.0 earthquake on KSZ segments 55–61 by a 20-m slip.

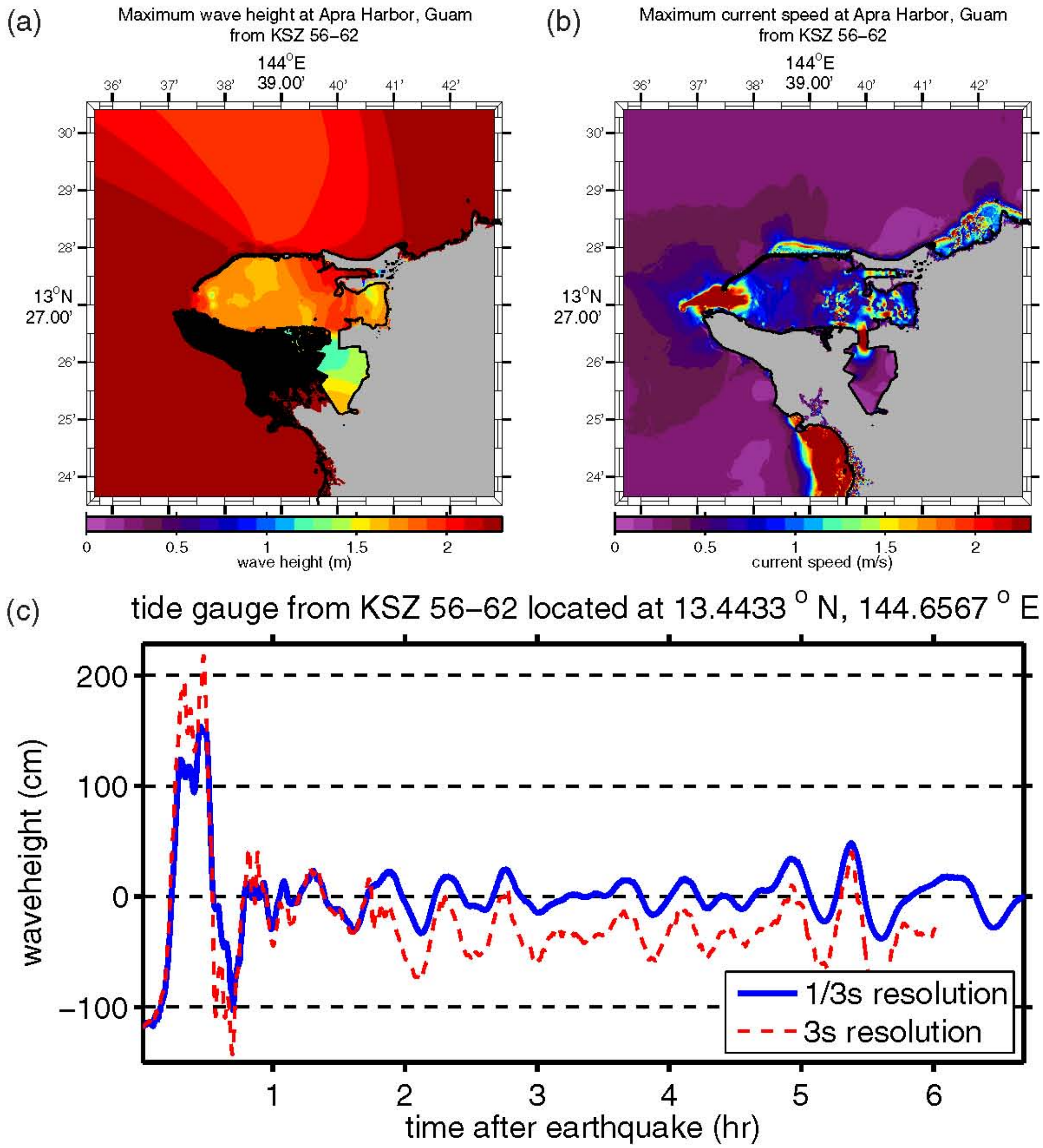

Figure D.15: (a) Maximum computed wave heights, (b) maximum computed currents, and (c) tsunami time history at the numerical tide gauge at Apra Harbor from a tsunami triggered by a Mw = 9.0 earthquake on KSZ segments 56–62 by a 20-m slip.

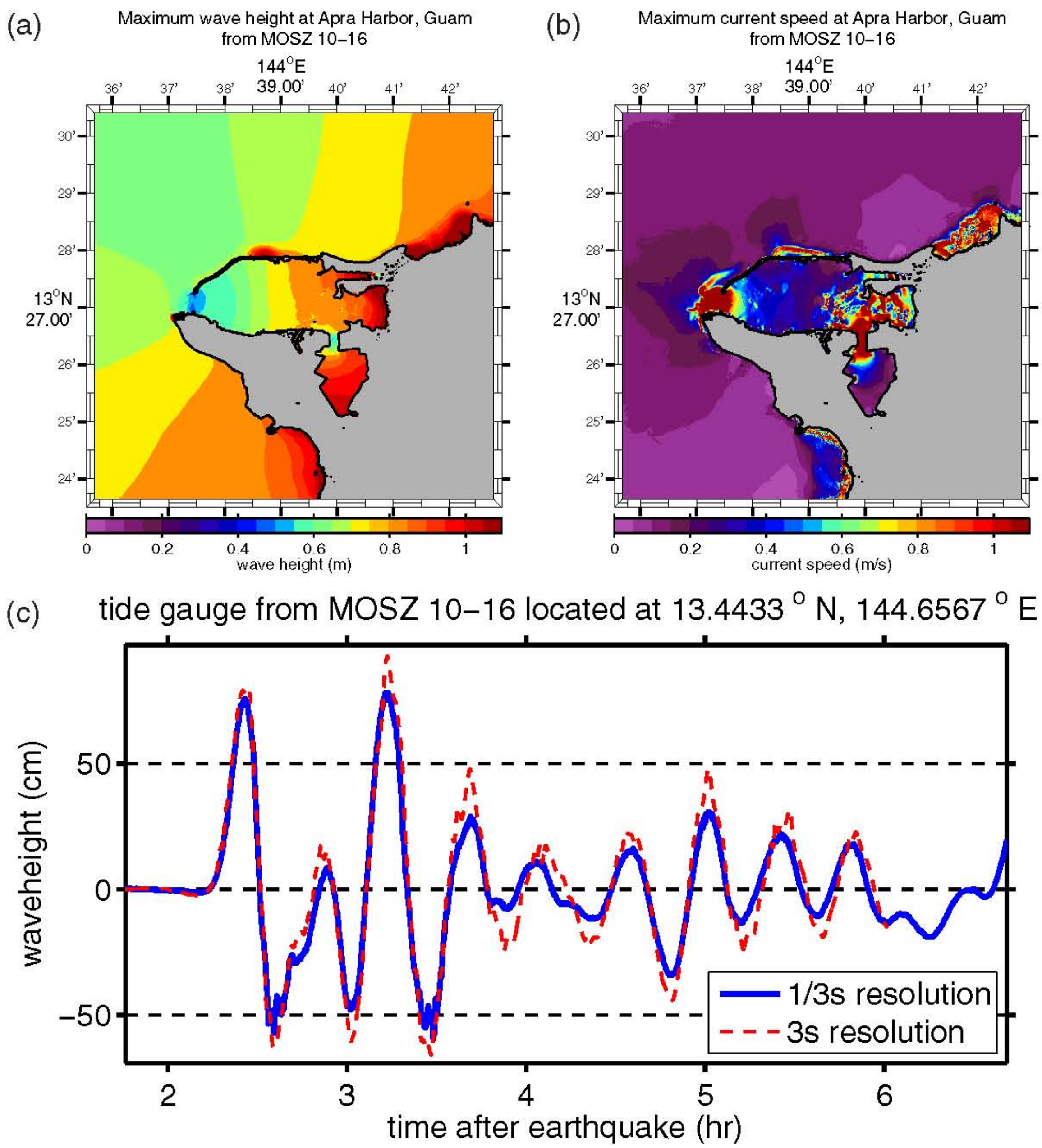

Figure D.16: (a) Maximum computed wave heights, (b) maximum computed currents, and (c) tsunami time history at the numerical tide gauge at Apra Harbor from a tsunami triggered by a Mw = 9.0 earthquake on MOSZ segments 10–16 by a 20-m slip.

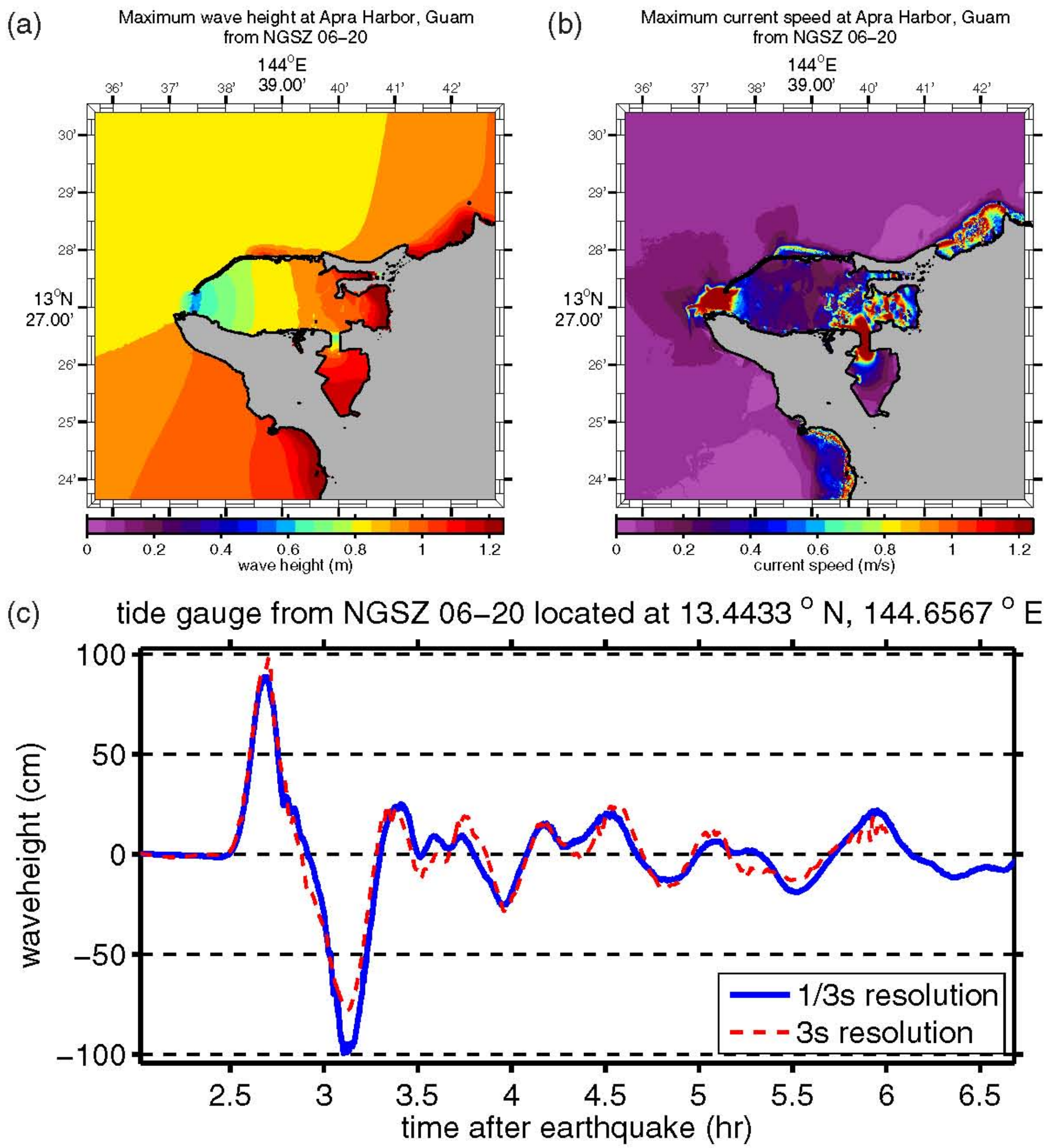

Figure D.17: (a) Maximum computed wave heights, (b) maximum computed currents, and (c) tsunami time history at the numerical tide gauge at Apra Harbor from a tsunami triggered by a Mw = 9.0 earthquake on NGSZ segments 06–20 by a 20-m slip.

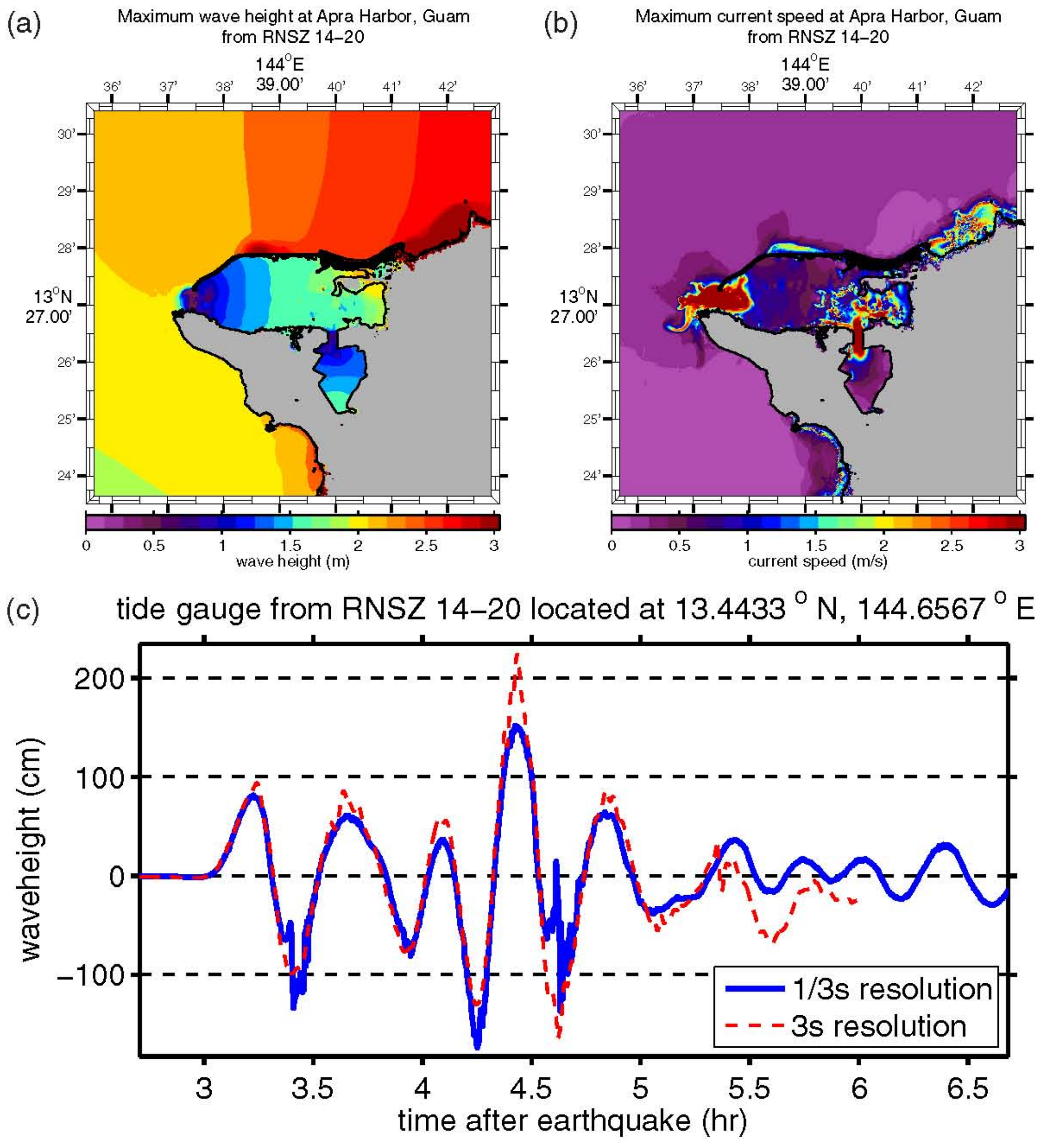

Figure D.18: (a) Maximum computed wave heights, (b) maximum computed currents, and (c) tsunami time history at the numerical tide gauge at Apra Harbor from a tsunami triggered by a Mw = 9.0 earthquake on RNSZ segments 14–20 by a 20-m slip.

Appendix E
Pago Bay

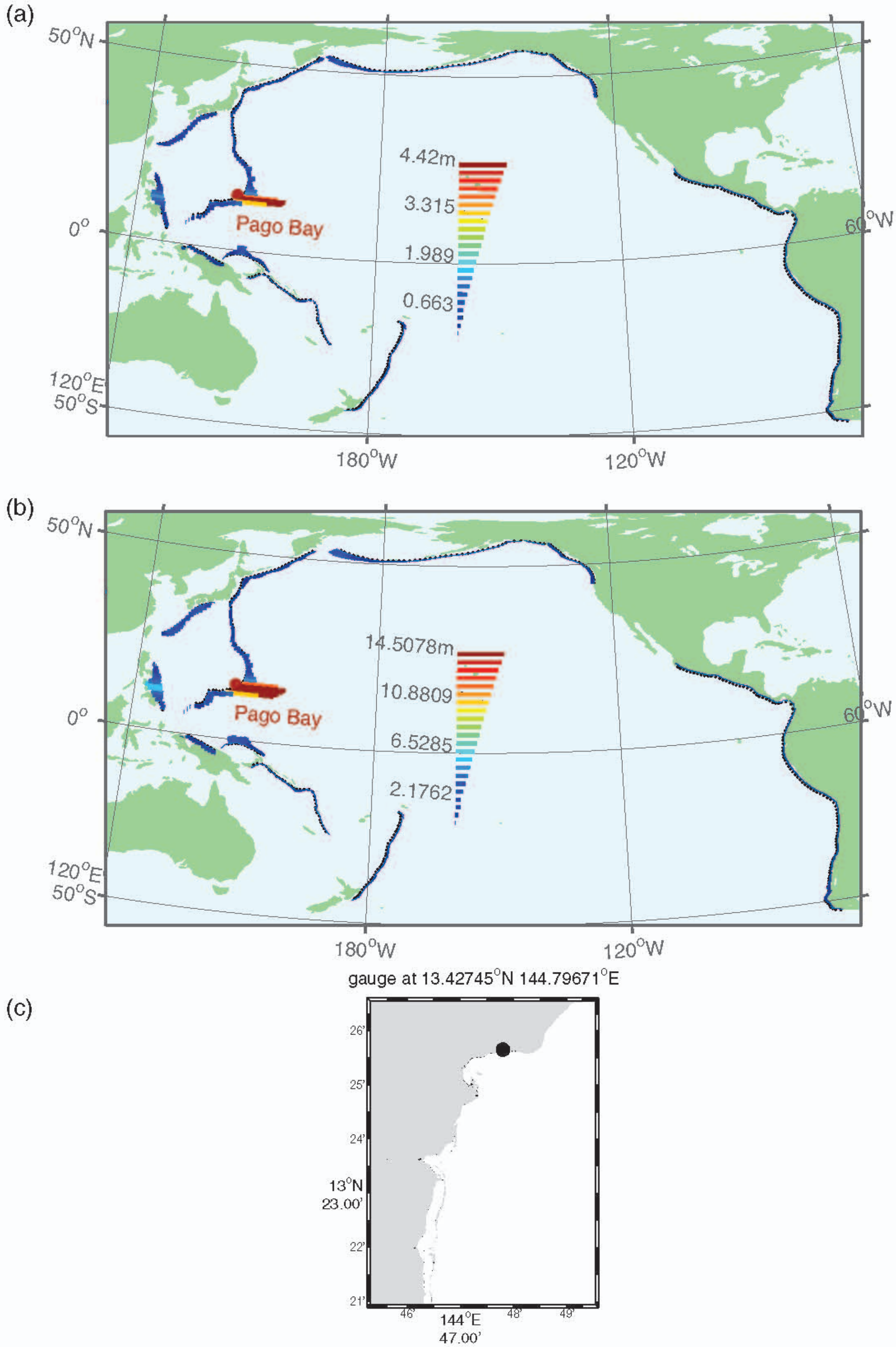

Figure E.1: Tsunami wave height response at Pago Bay from tsunamis triggered by (a) Mw = 8.5 and (b) Mw = 9.0 earthquakes.

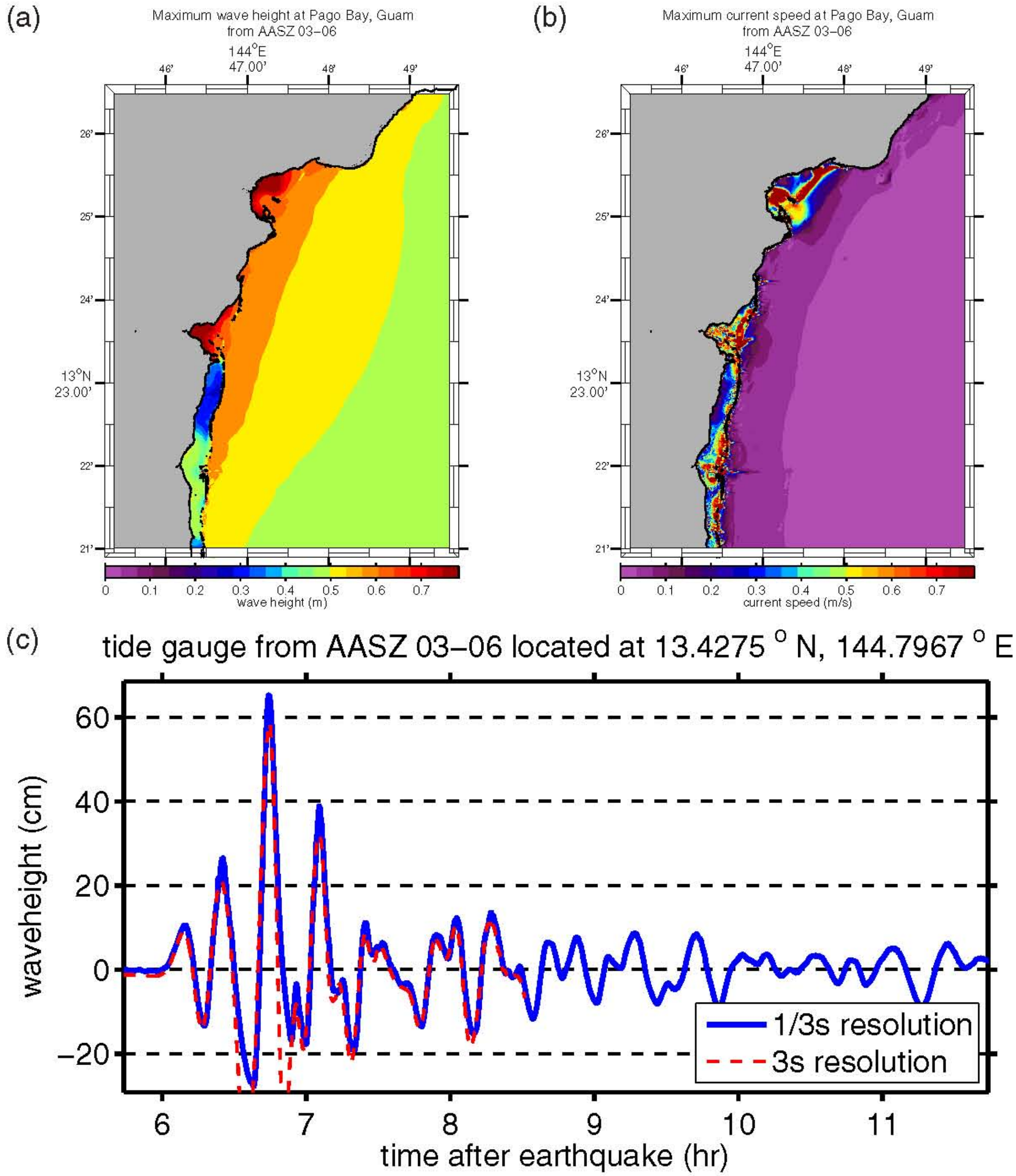

Figure E.2: (a) Maximum computed wave heights, (b) maximum computed currents, and (c) tsunami time history at the numerical tide gauge at Pago Bay from a tsunami triggered by a Mw = 8.5 earthquake on AASZ segments 03–06 by a 6-m slip.

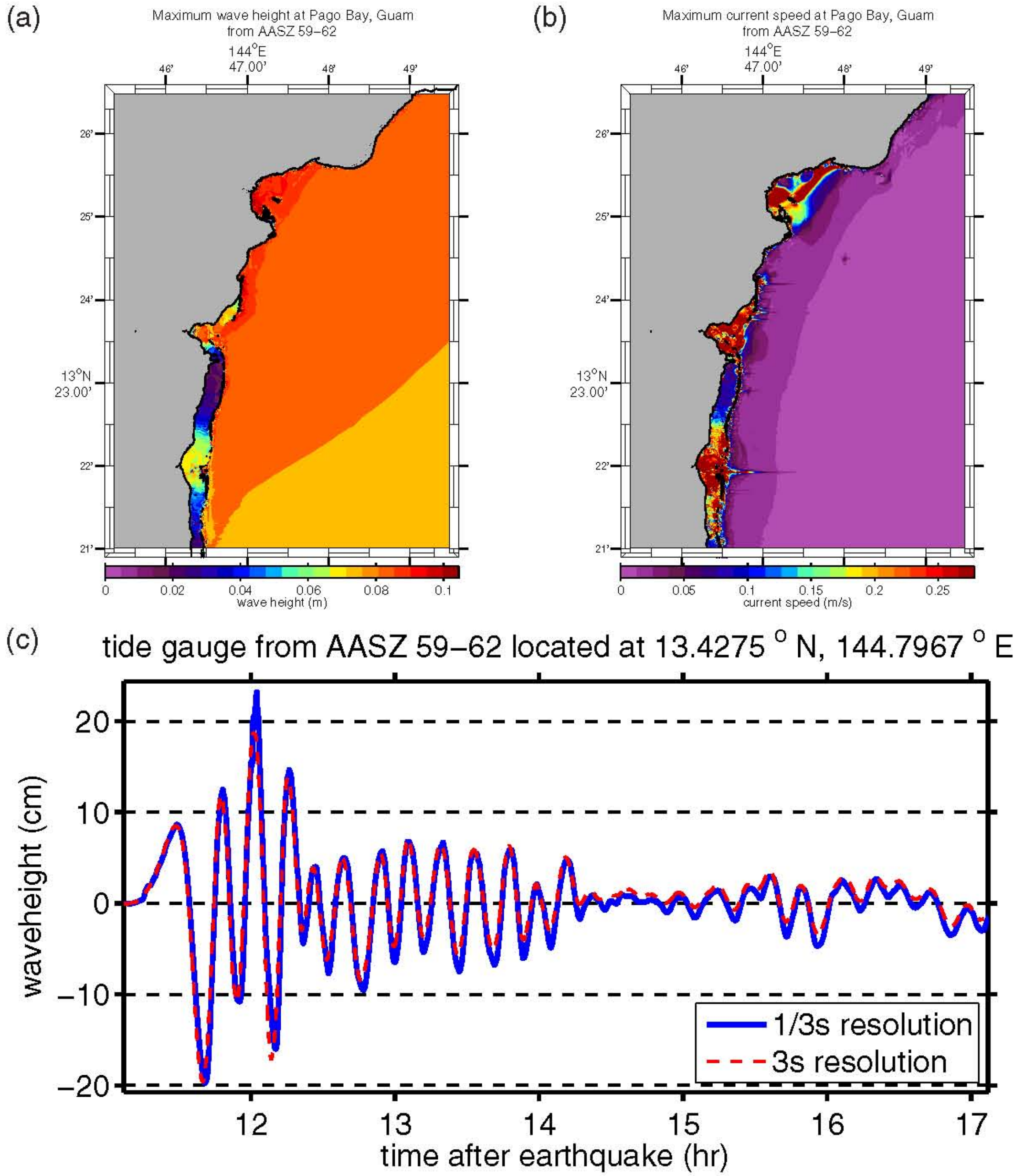

Figure E.3: (a) Maximum computed wave heights, (b) maximum computed currents, and (c) tsunami time history at the numerical tide gauge at Pago Bay from a tsunami triggered by a Mw = 8.5 earthquake on AASZ segments 59–62 by a 6-m slip.

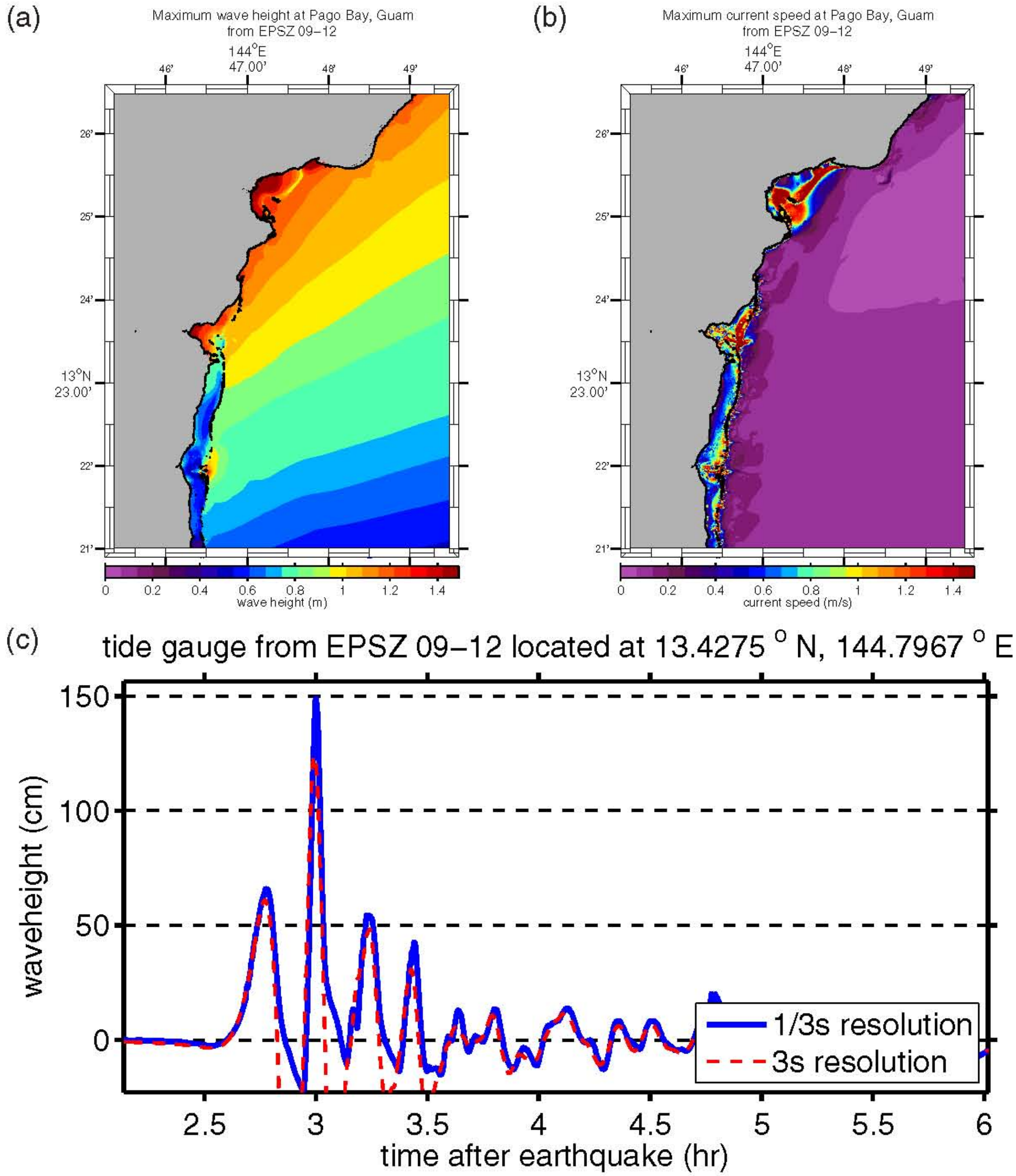

Figure E.4: (a) Maximum computed wave heights, (b) maximum computed currents, and (c) tsunami time history at the numerical tide gauge at Pago Bay from a tsunami triggered by a Mw = 8.5 earthquake on EPSZ segments 09–12 by a 6-m slip.

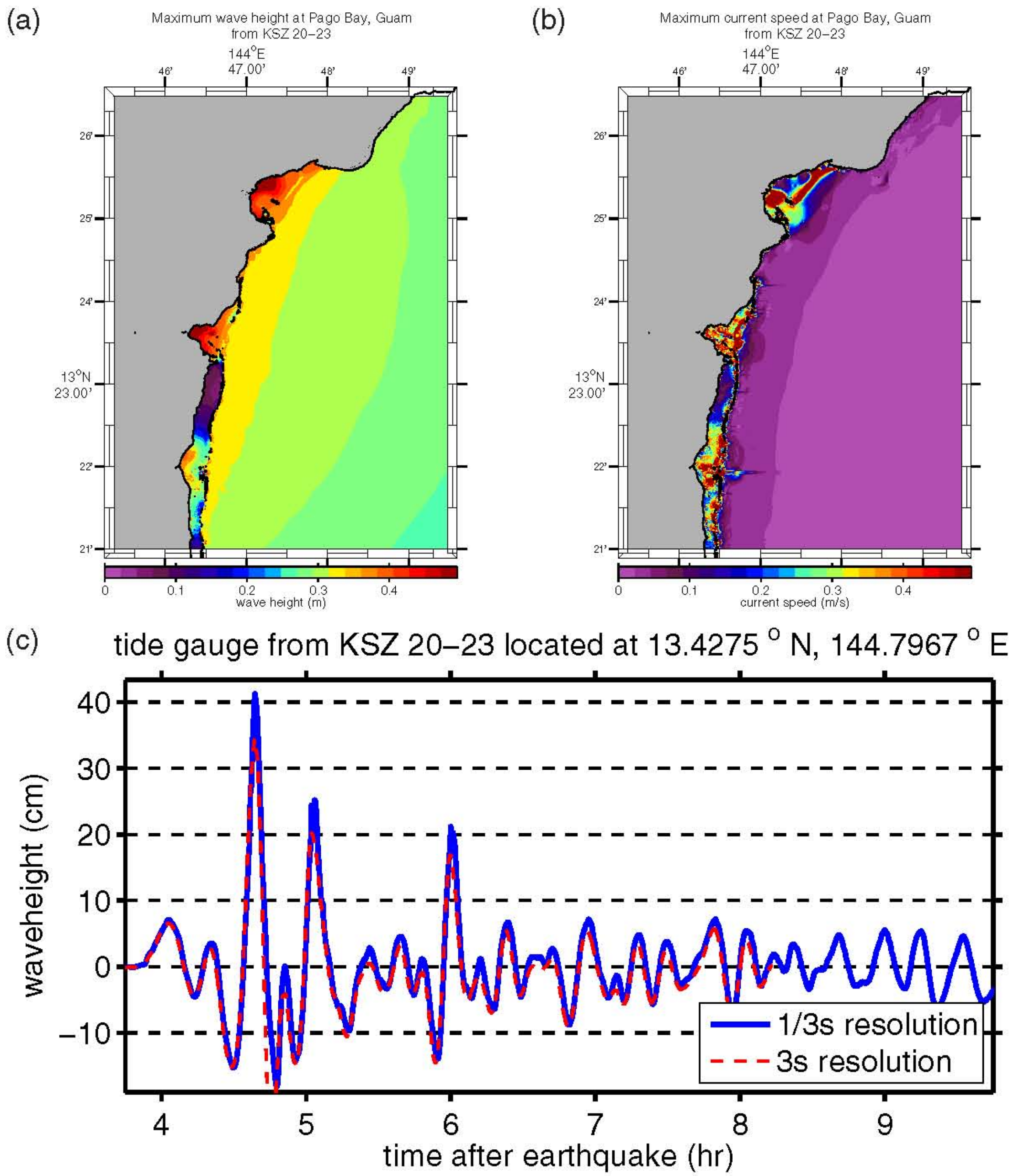

Figure E.5: (a) Maximum computed wave heights, (b) maximum computed currents, and (c) tsunami time history at the numerical tide gauge at Pago Bay from a tsunami triggered by a Mw = 8.5 earthquake on KSZ segments 20–23 by a 6-m slip.

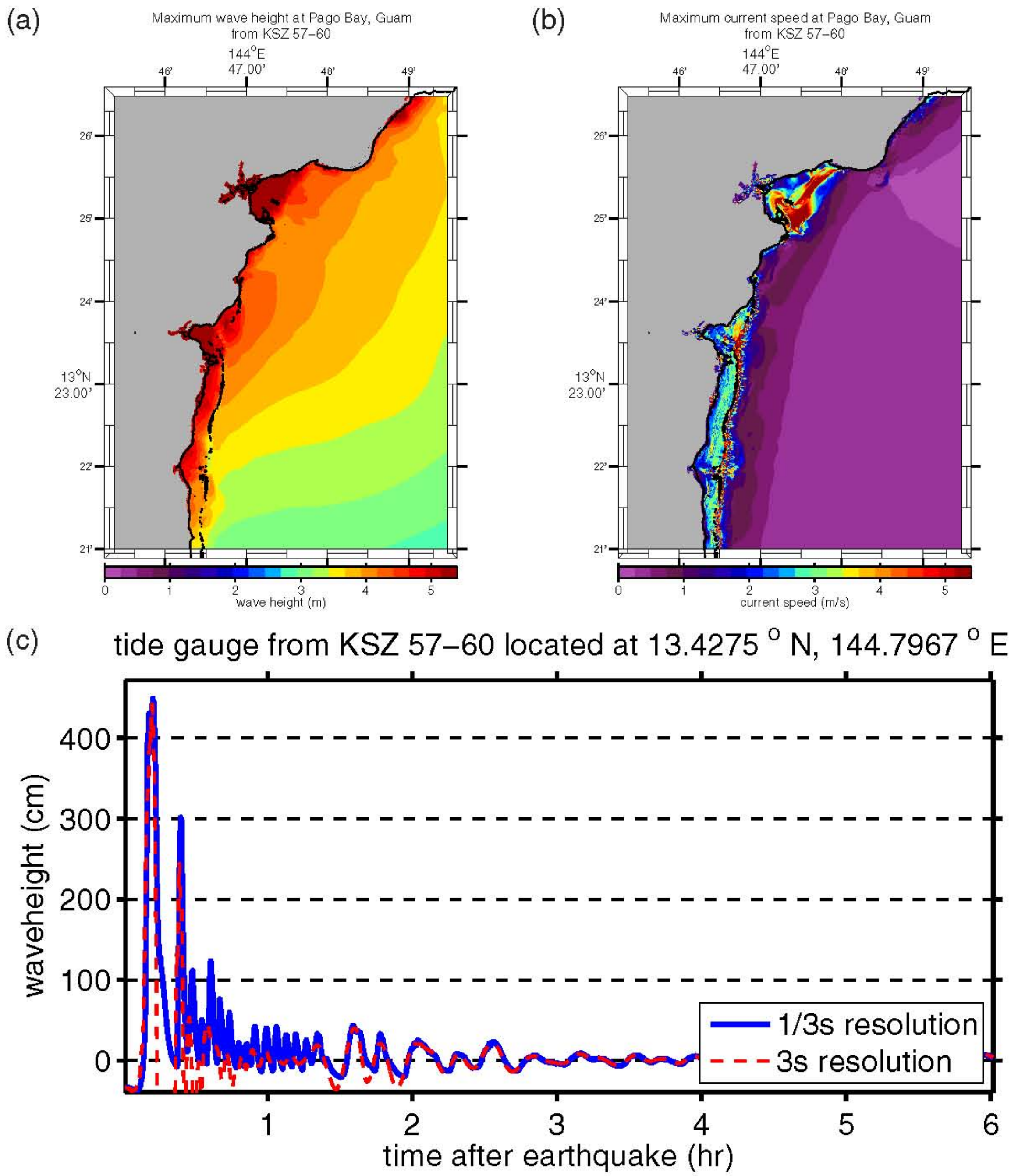

Figure E.6: (a) Maximum computed wave heights, (b) maximum computed currents, and (c) tsunami time history at the numerical tide gauge at Pago Bay from a tsunami triggered by a Mw = 8.5 earthquake on KSZ segments 57–60 by a 6-m slip.

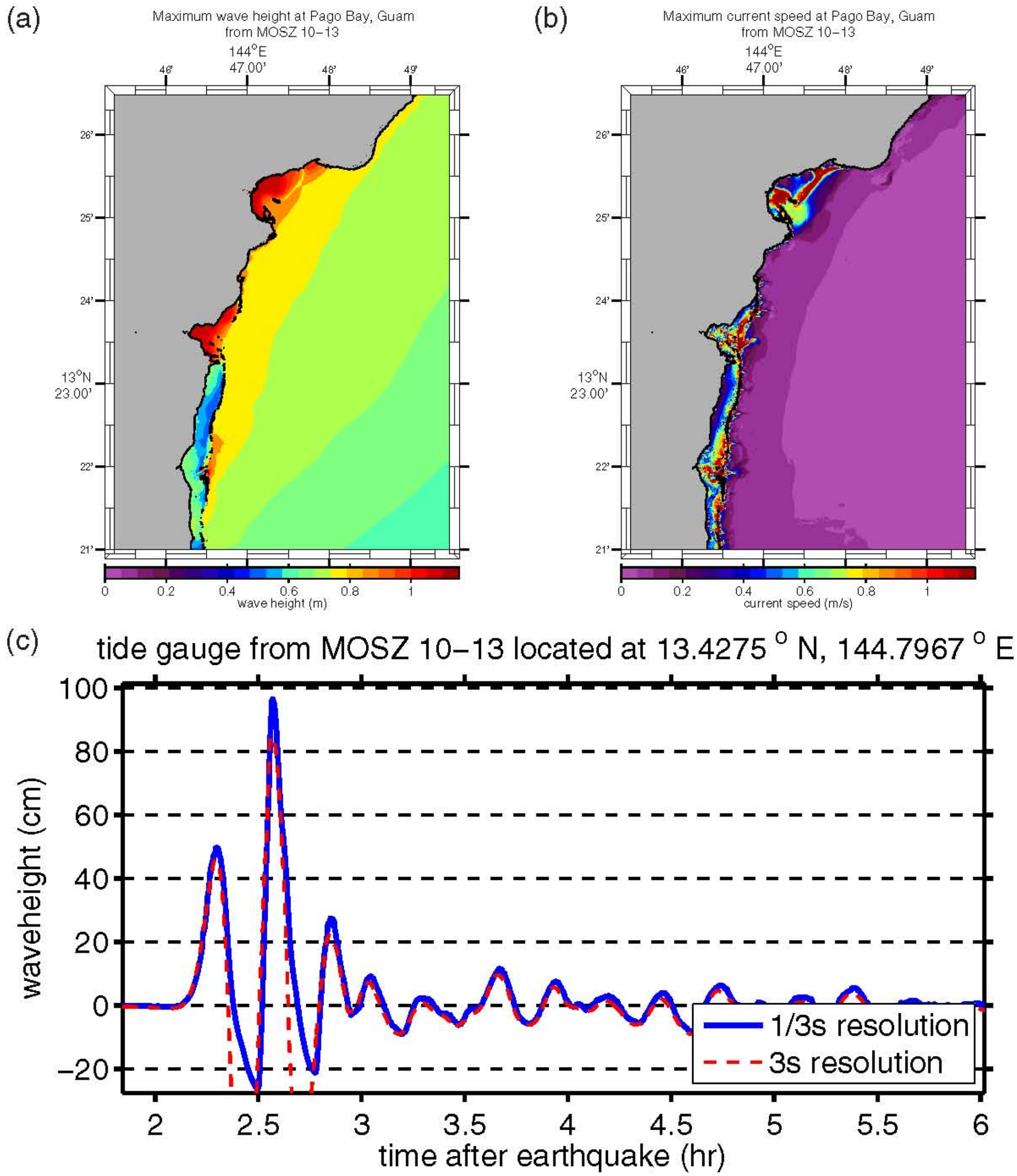

Figure E.7: (a) Maximum computed wave heights, (b) maximum computed currents, and (c) tsunami time history at the numerical tide gauge at Pago Bay from a tsunami triggered by a Mw = 8.5 earthquake on MOSZ segments 10–13 by a 6-m slip.

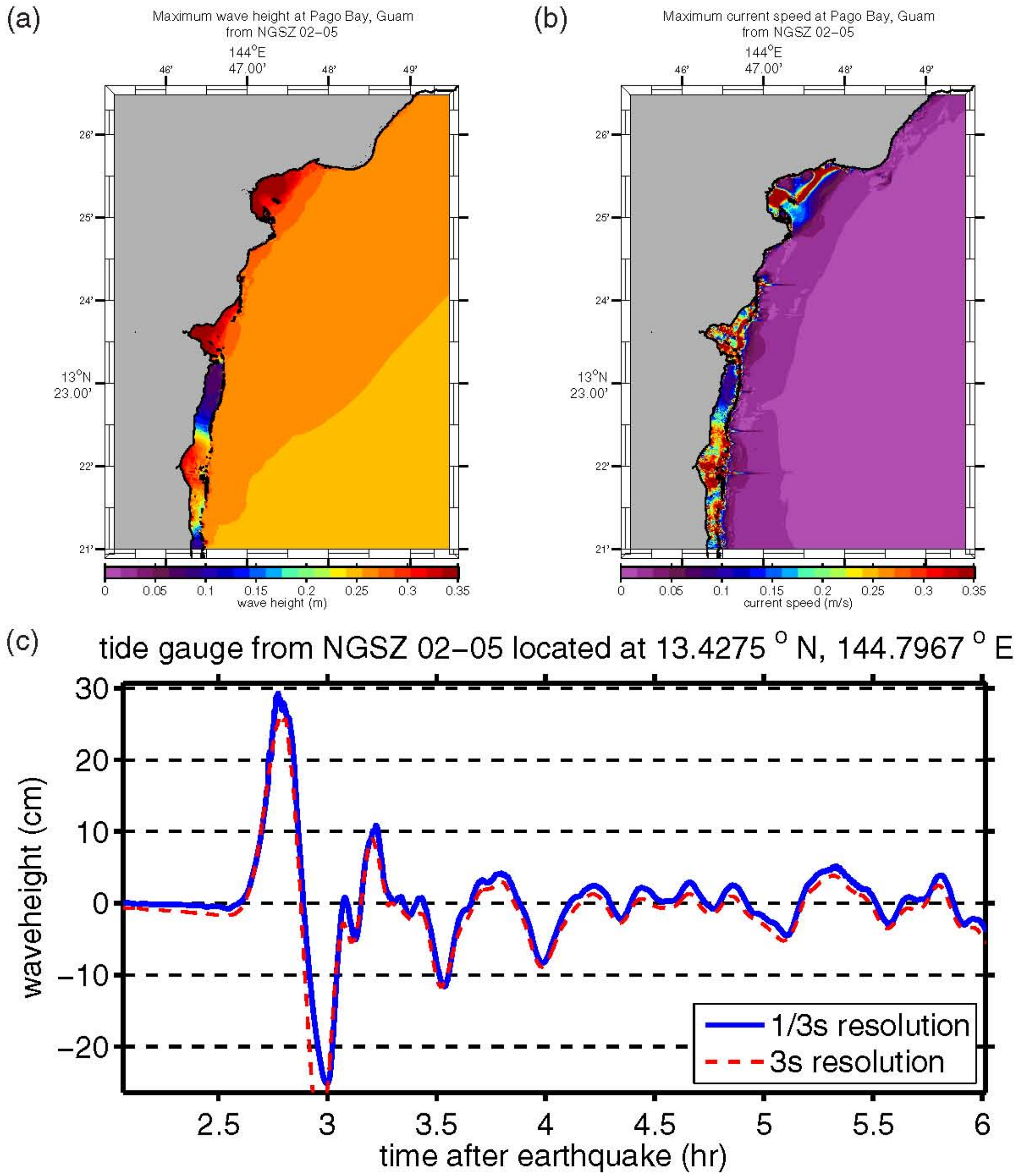

Figure E.8: (a) Maximum computed wave heights, (b) maximum computed currents, and (c) tsunami time history at the numerical tide gauge at Pago Bay from a tsunami triggered by a Mw = 8.5 earthquake on NGSZ segments 02–05 by a 6-m slip.

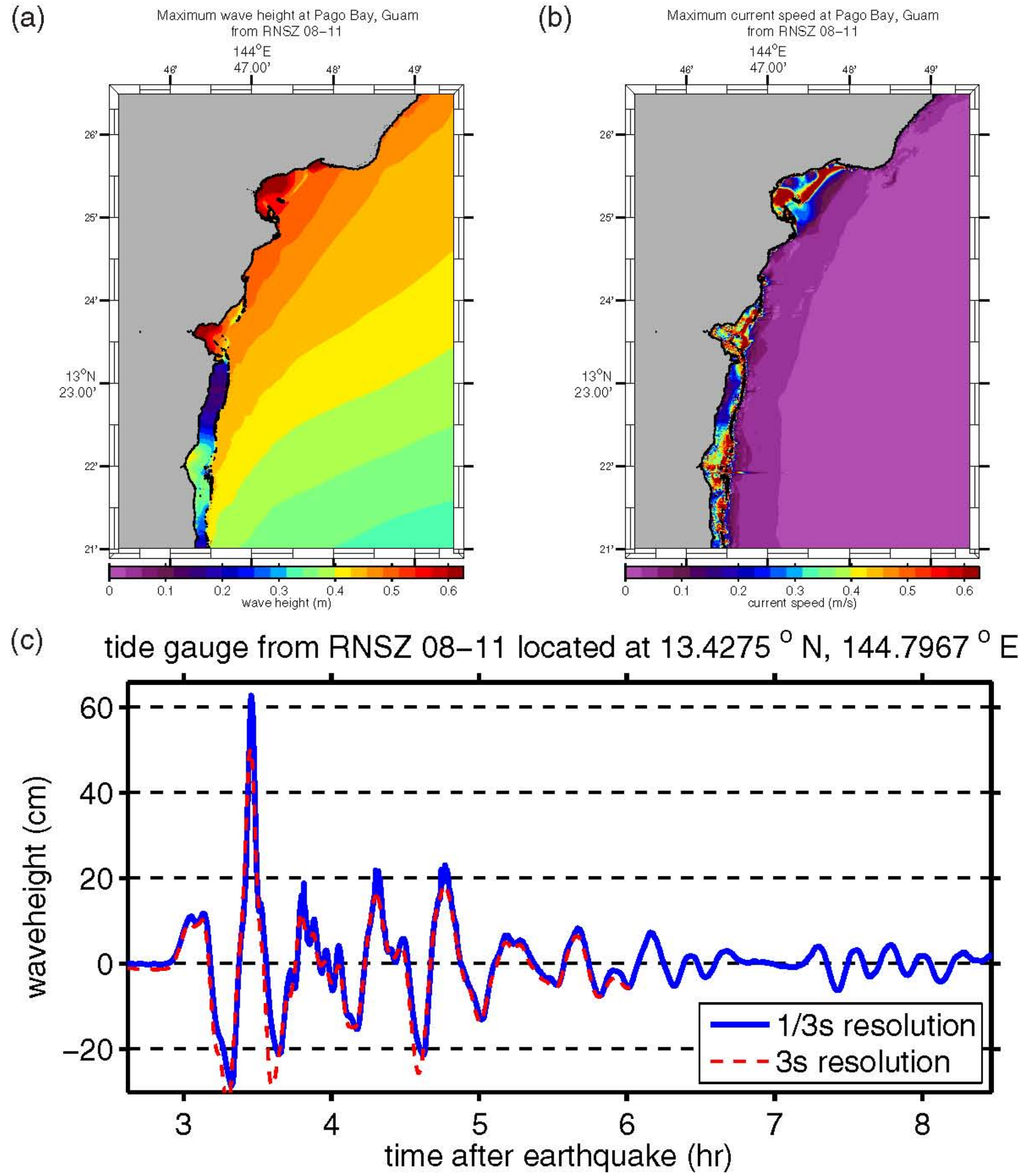

Figure E.9: (a) Maximum computed wave heights, (b) maximum computed currents, and (c) tsunami time history at the numerical tide gauge at Pago Bay from a tsunami triggered by a Mw = 8.5 earthquake on RNSZ segments 08–11 by a 6-m slip.

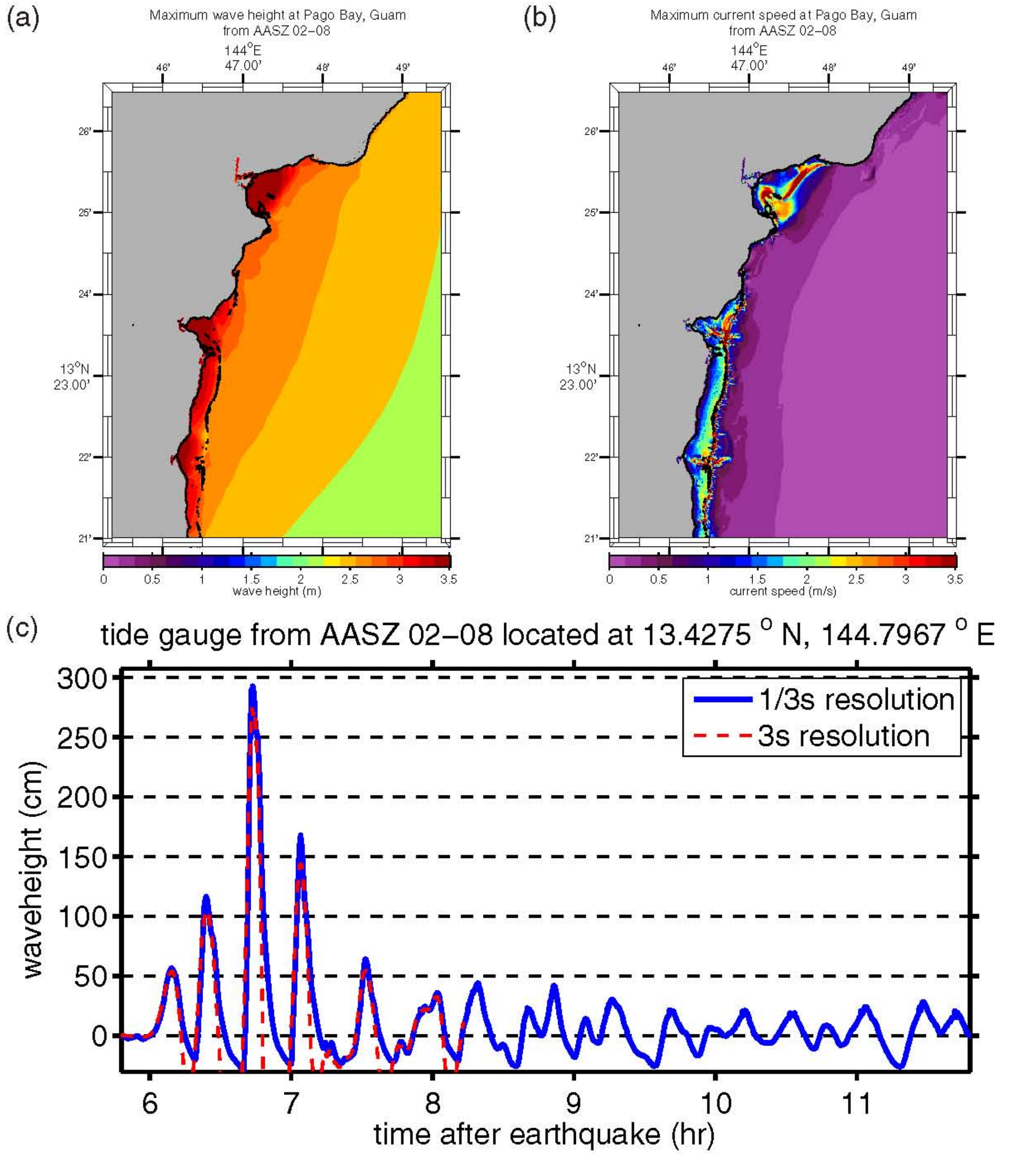

Figure E.10: (a) Maximum computed wave heights, (b) maximum computed currents, and (c) tsunami time history at the numerical tide gauge at Pago Bay from a tsunami triggered by a Mw = 9.0 earthquake on AASZ segments 02–08 by a 20-m slip.

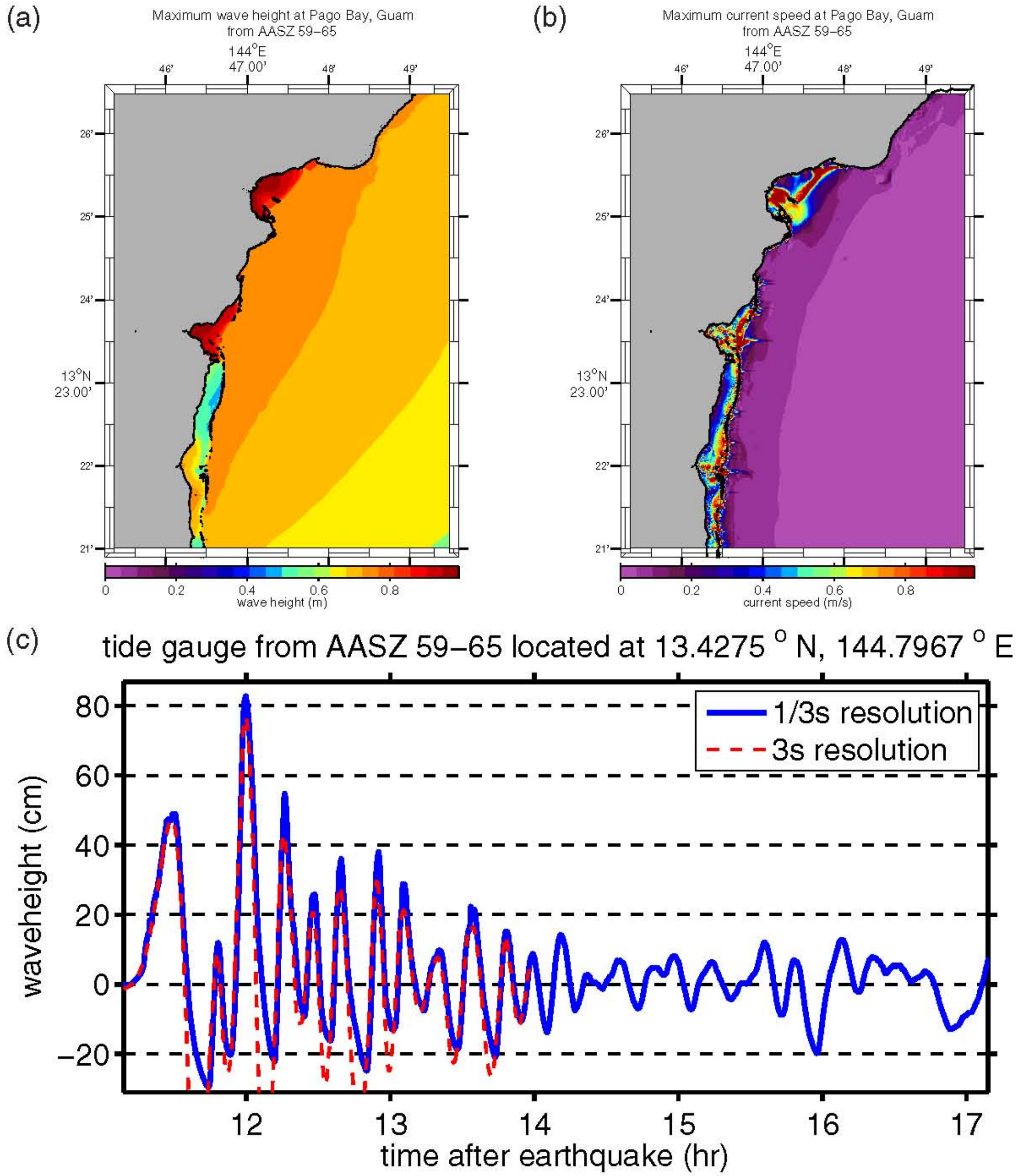

Figure E.11: (a) Maximum computed wave heights, (b) maximum computed currents, and (c) tsunami time history at the numerical tide gauge at Pago Bay from a tsunami triggered by a Mw = 9.0 earthquake on AASZ segments 59–65 by a 20-m slip.

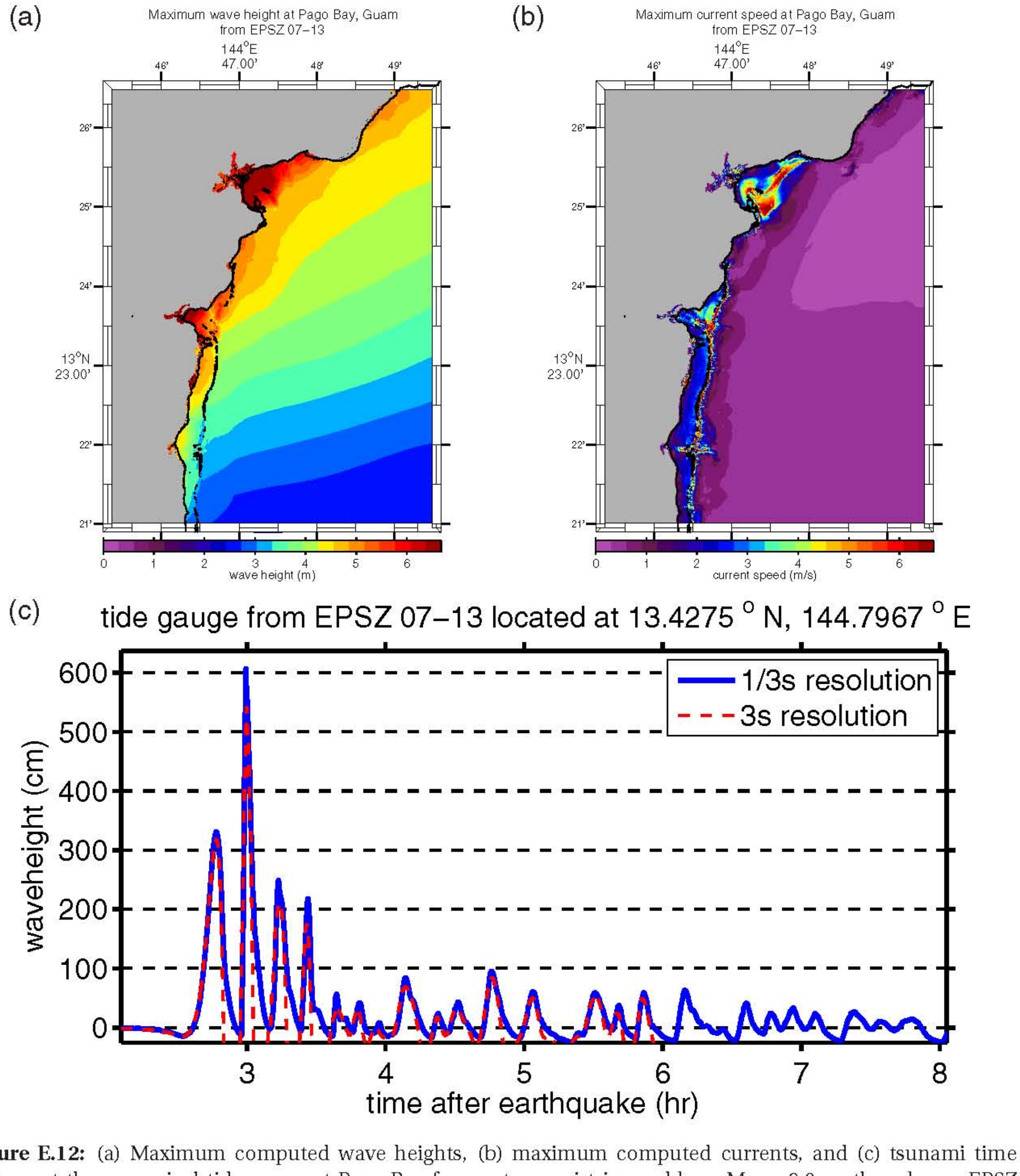

Figure E.12: (a) Maximum computed wave heights, (b) maximum computed currents, and (c) tsunami time history at the numerical tide gauge at Pago Bay from a tsunami triggered by a Mw = 9.0 earthquake on EPSZ segments 07–13 by a 20-m slip.

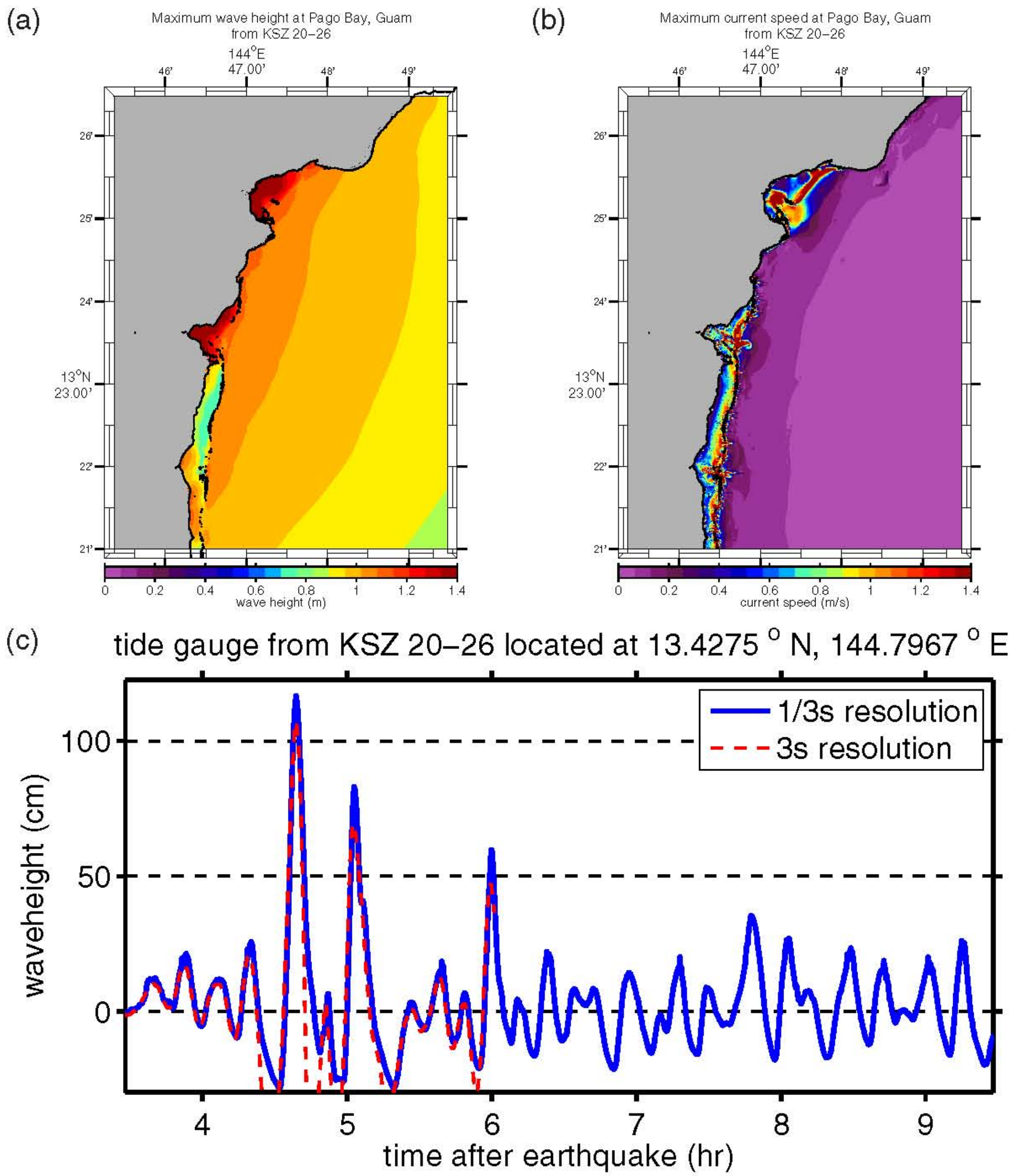

Figure E.13: (a) Maximum computed wave heights, (b) maximum computed currents, and (c) tsunami time history at the numerical tide gauge at Pago Bay from a tsunami triggered by a Mw = 9.0 earthquake on KSZ segments 20–26 by a 20-m slip.

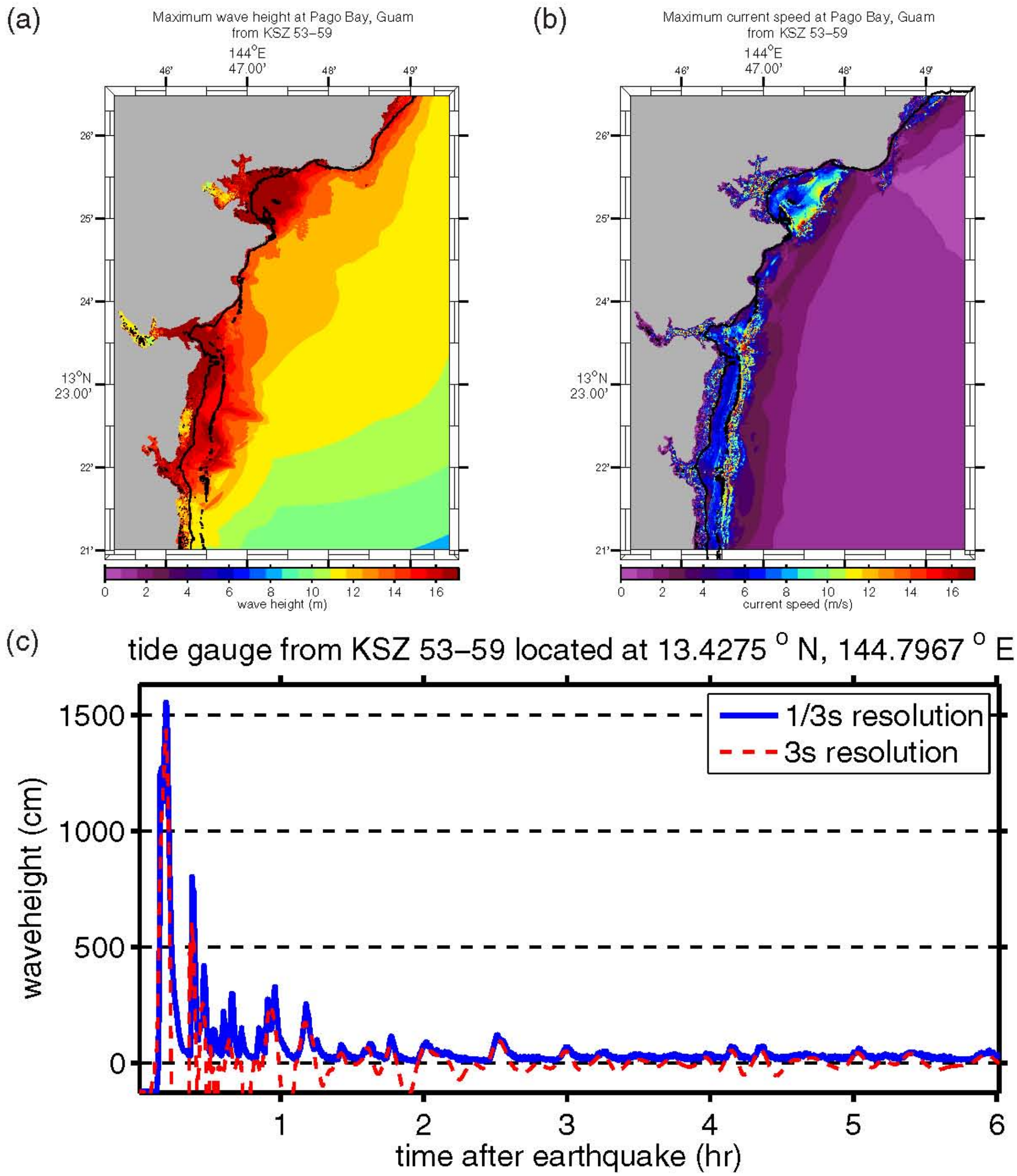

Figure E.14: (a) Maximum computed wave heights, (b) maximum computed currents, and (c) tsunami time history at the numerical tide gauge at Pago Bay from a tsunami triggered by a Mw = 9.0 earthquake on KSZ segments 53–60 by a 20-m slip.

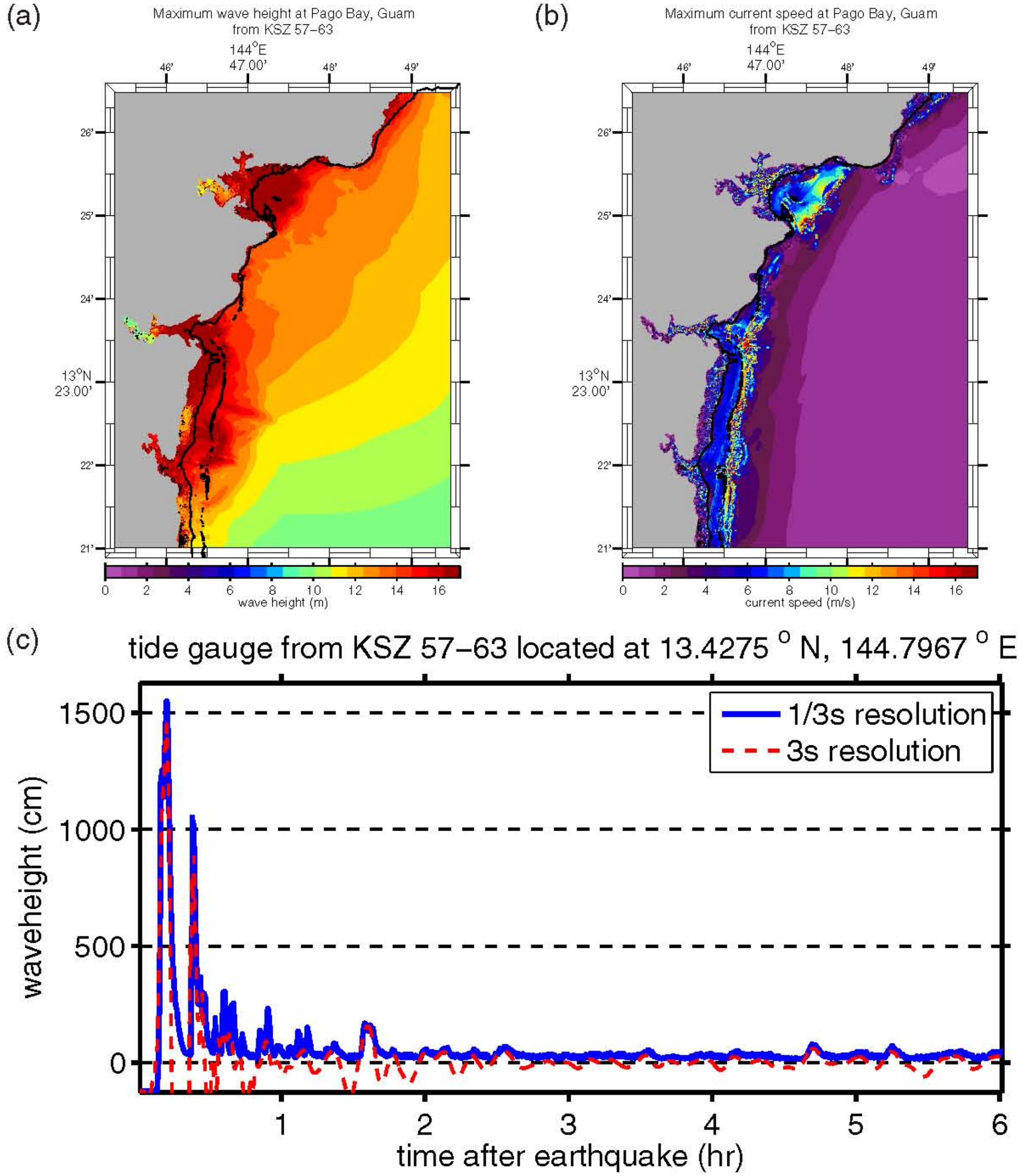

Figure E.15: (a) Maximum computed wave heights, (b) maximum computed currents, and (c) tsunami time history at the numerical tide gauge at Pago Bay from a tsunami triggered by a Mw = 9.0 earthquake on KSZ segments 57–63 by a 20-m slip.

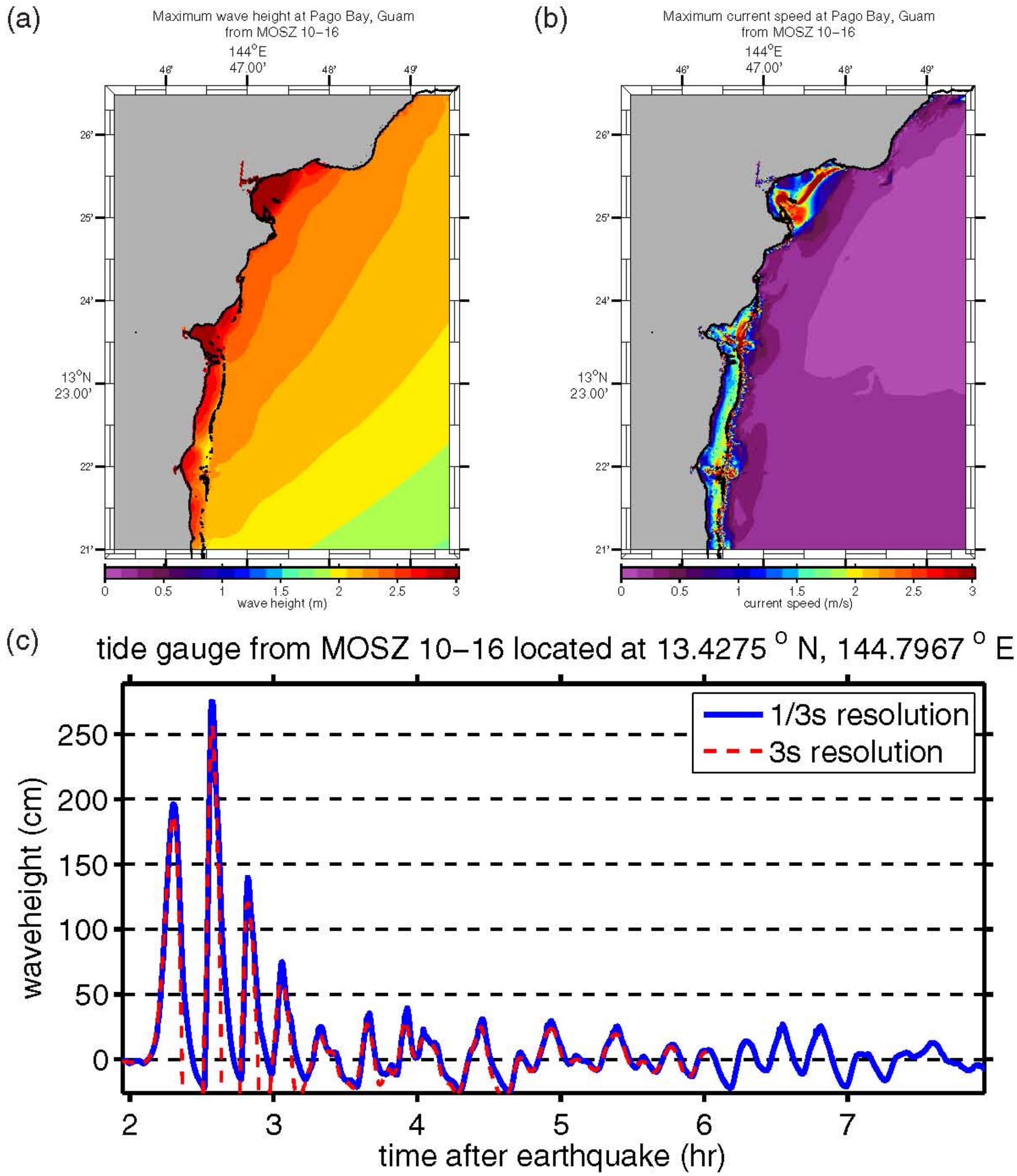

Figure E.16: (a) Maximum computed wave heights, (b) maximum computed currents, and (c) tsunami time history at the numerical tide gauge at Pago Bay from a tsunami triggered by a Mw = 9.0 earthquake on MOSZ segments 10–16 by a 20-m slip.

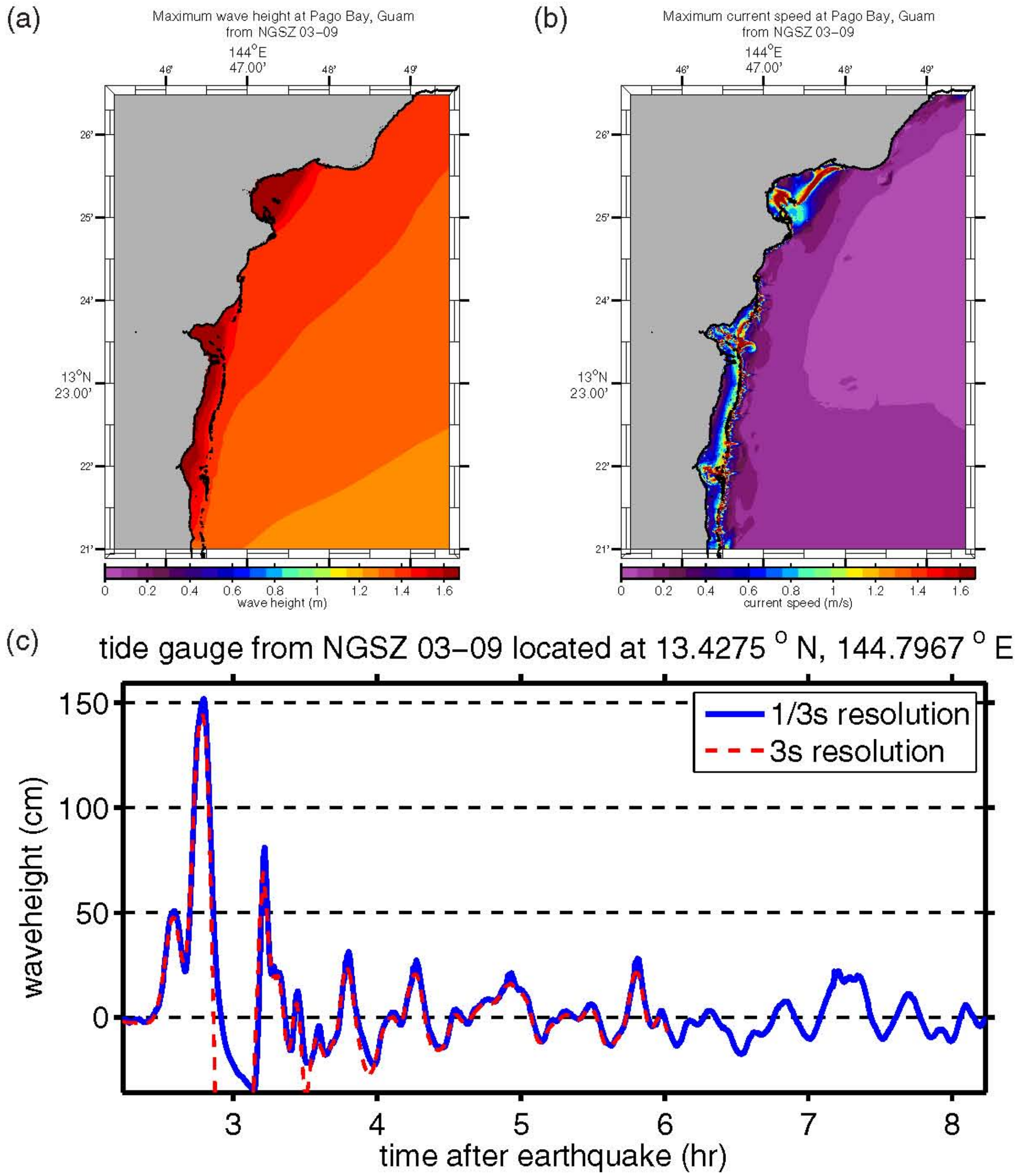

Figure E.17: (a) Maximum computed wave heights, (b) maximum computed currents, and (c) tsunami time history at the numerical tide gauge at Pago Bay from a tsunami triggered by a Mw = 9.0 earthquake on NGSZ segments 03–09 by a 20-m slip.

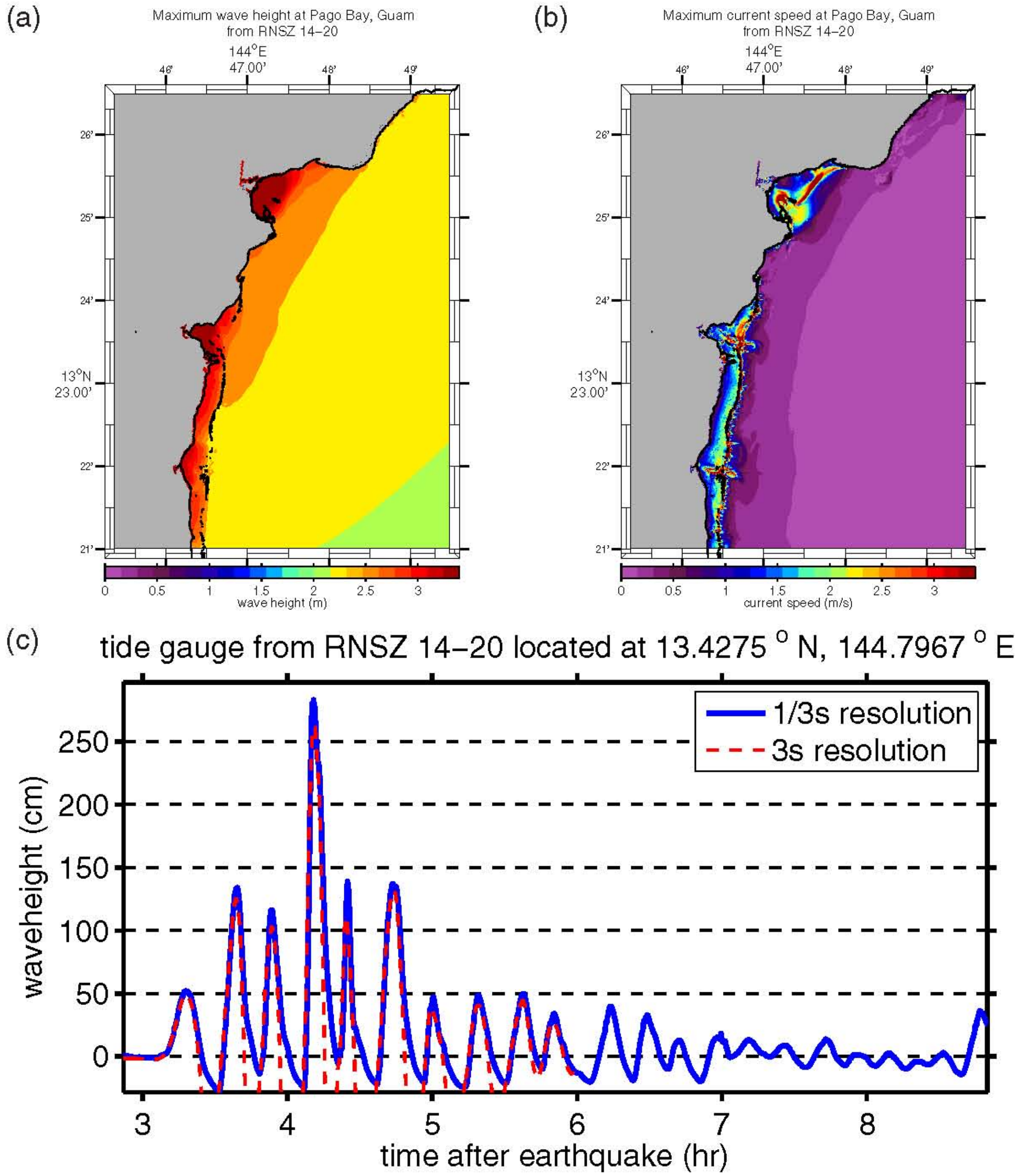

Figure E.18: (a) Maximum computed wave heights, (b) maximum computed currents, and (c) tsunami time history at the numerical tide gauge at Pago Bay from a tsunami triggered by a Mw = 9.0 earthquake on RNSZ segments 14–20 by a 20-m slip.

Appendix F
Agana Bay

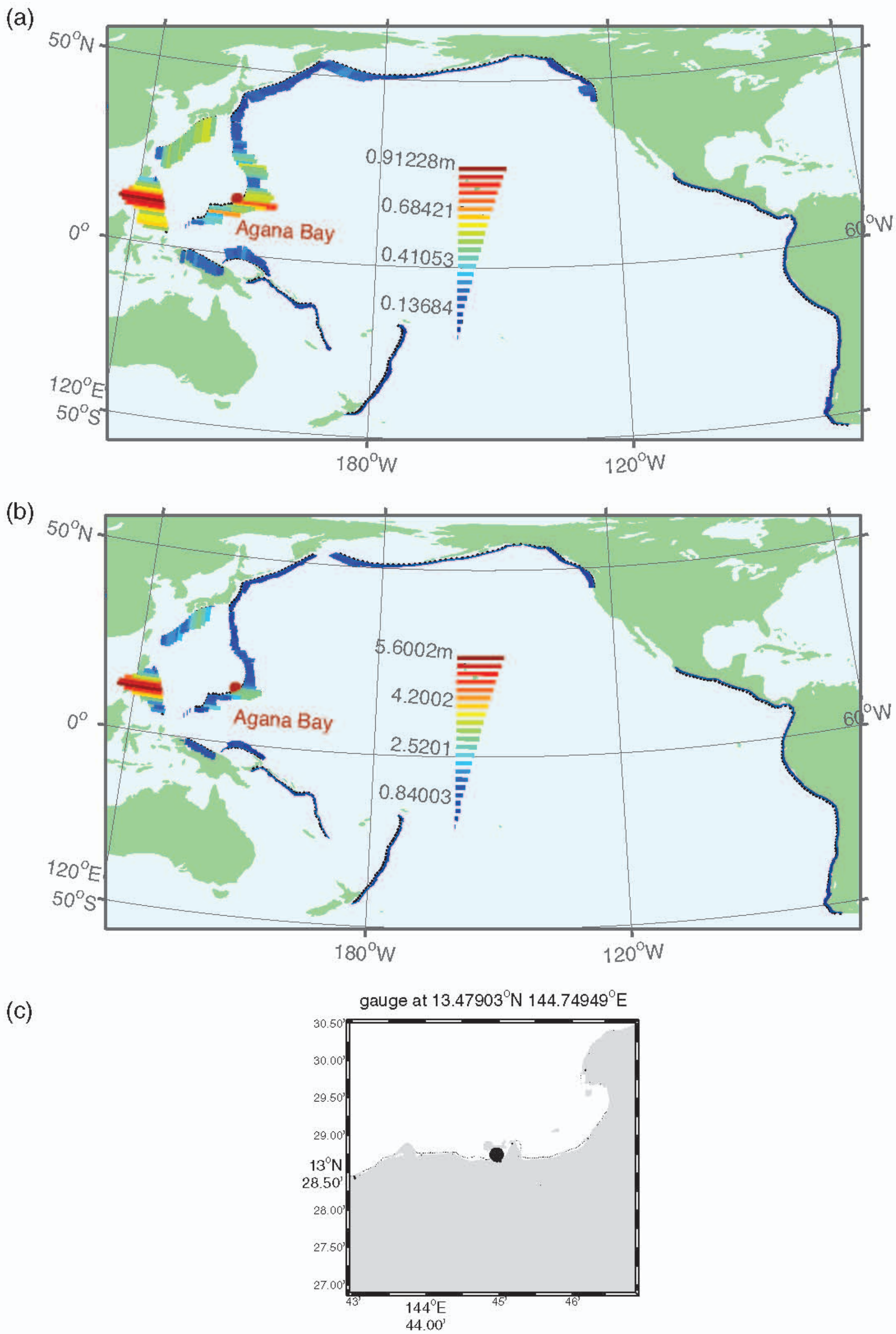

Figure F.1: Tsunami wave height response at Agana Bay from tsunamis triggered by (a) Mw = 8.5 and (b) Mw = 9.0 earthquakes.

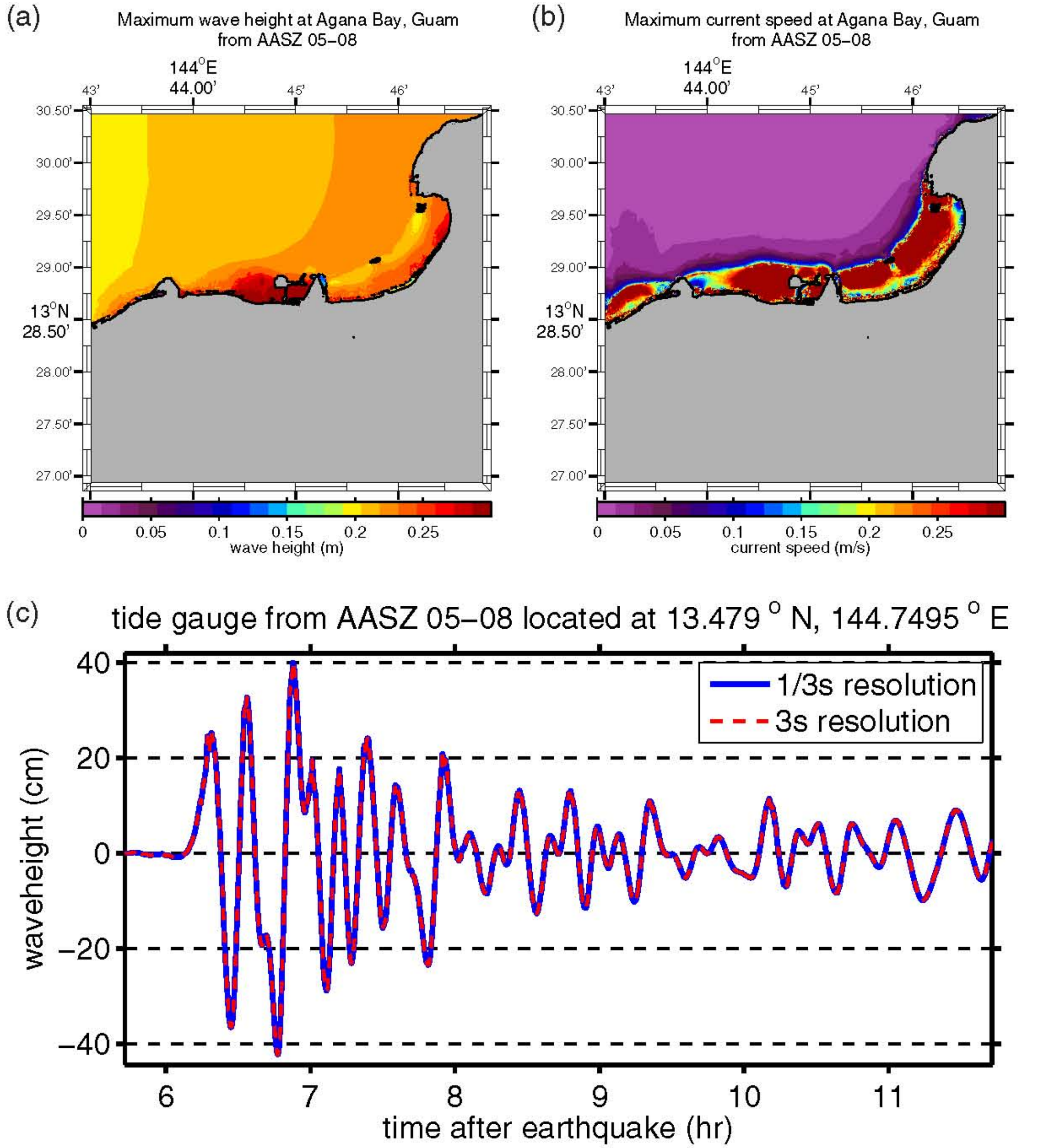

Figure F.2: (a) Maximum computed wave heights, (b) maximum computed currents, and (c) tsunami time history at the numerical tide gauge at Agana Bay from a tsunami triggered by a Mw = 8.5 earthquake on AASZ segments 05–08 by a 6-m slip.

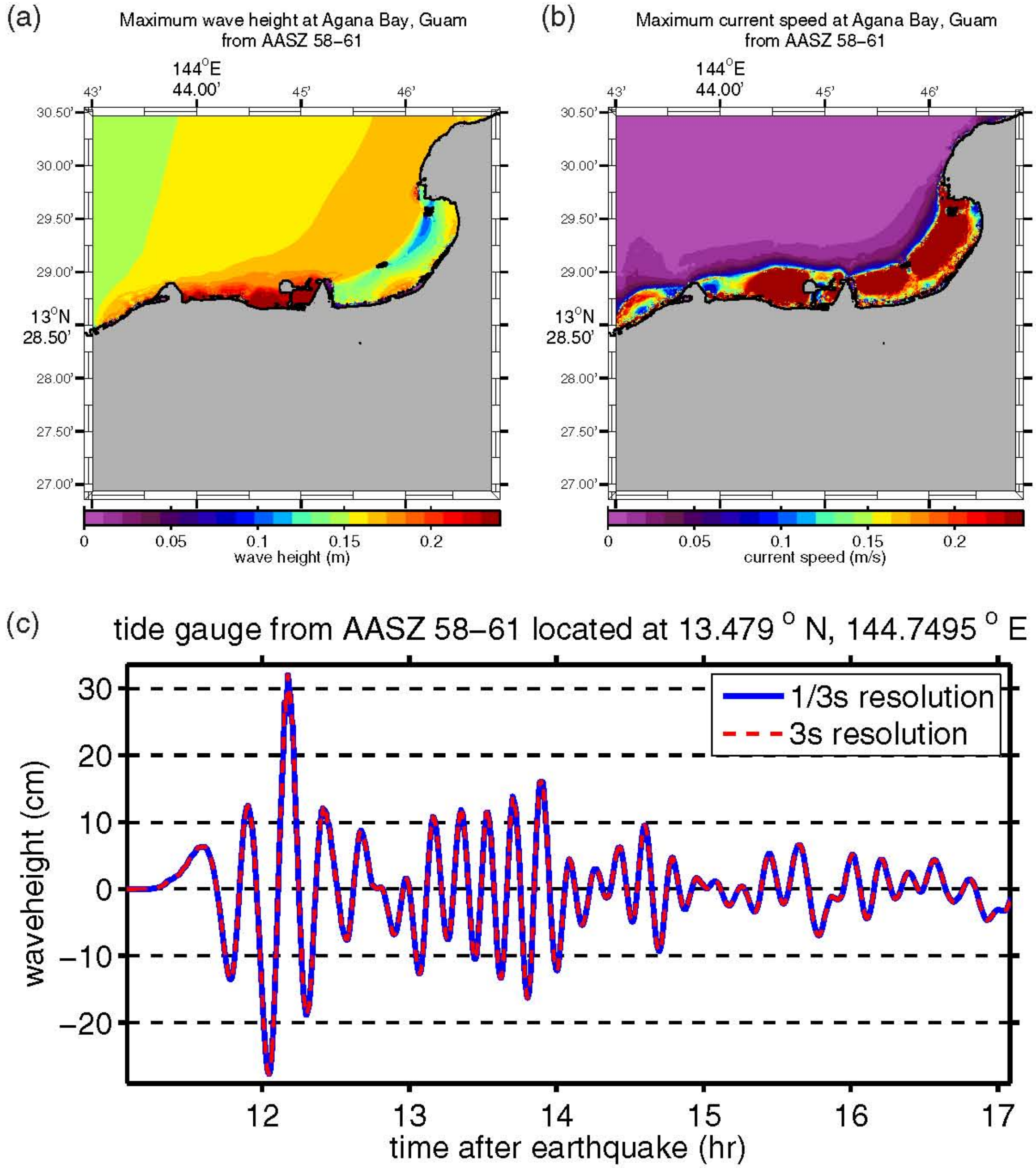

Figure F.3: (a) Maximum computed wave heights, (b) maximum computed currents, and (c) tsunami time history at the numerical tide gauge at Agana Bay from a tsunami triggered by a Mw = 8.5 earthquake on AASZ segments 58–61 by a 6-m slip.

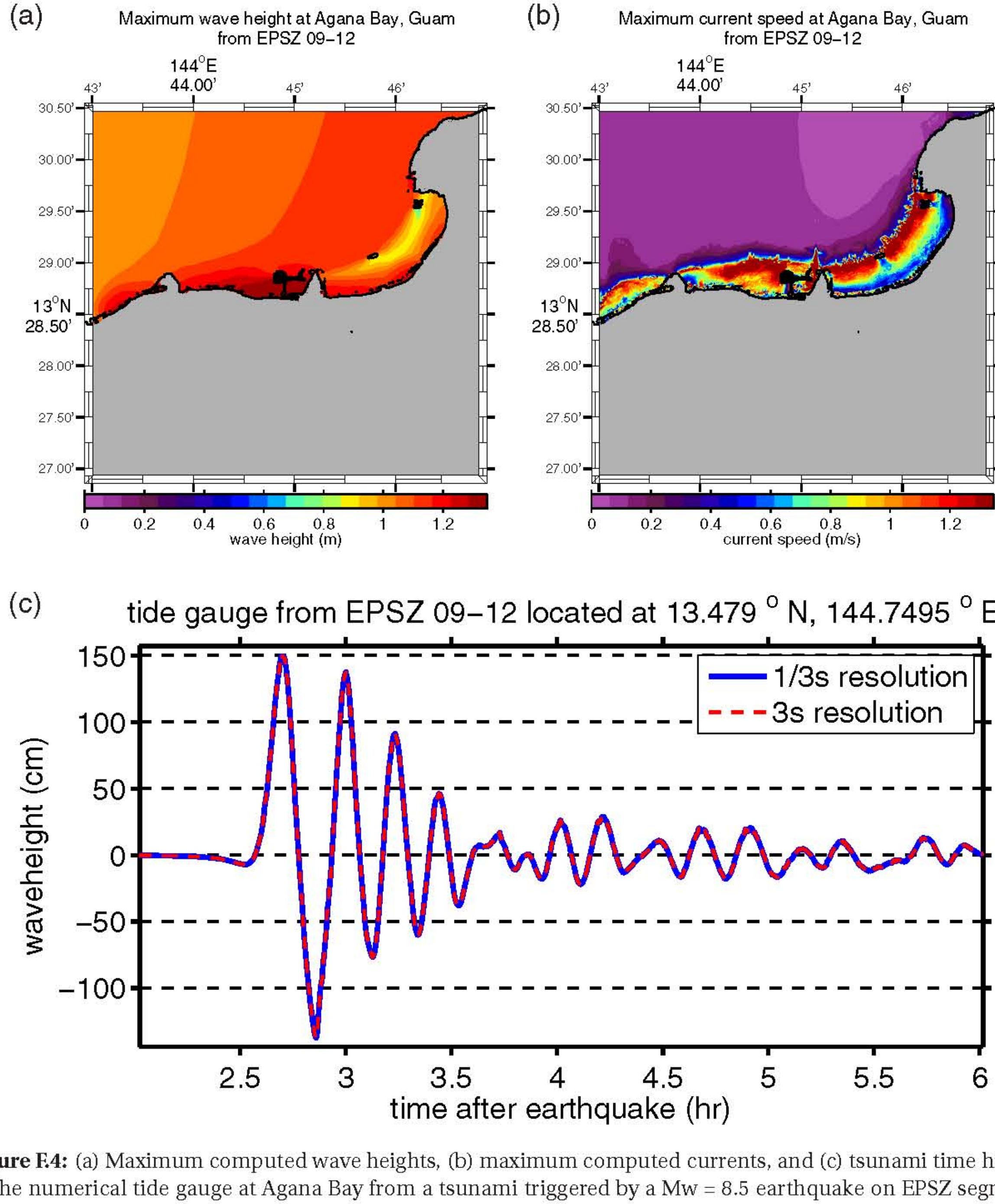

Figure F.4: (a) Maximum computed wave heights, (b) maximum computed currents, and (c) tsunami time history at the numerical tide gauge at Agana Bay from a tsunami triggered by a Mw = 8.5 earthquake on EPSZ segments 09–12 by a 6-m slip.

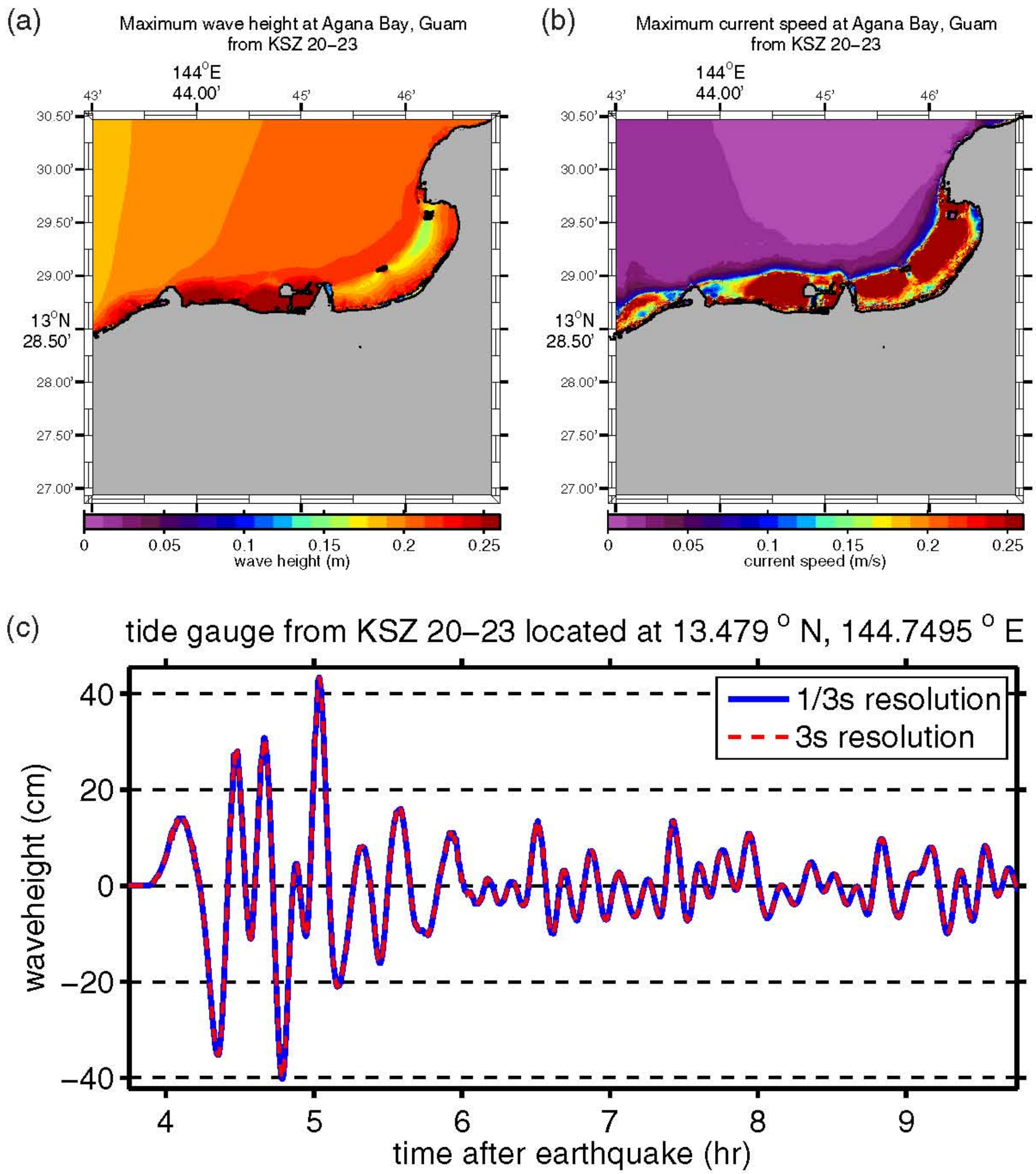

Figure F.5: (a) Maximum computed wave heights, (b) maximum computed currents, and (c) tsunami time history at the numerical tide gauge at Agana Bay from a tsunami triggered by a Mw = 8.5 earthquake on KSZ segments 20–23 by a 6-m slip.

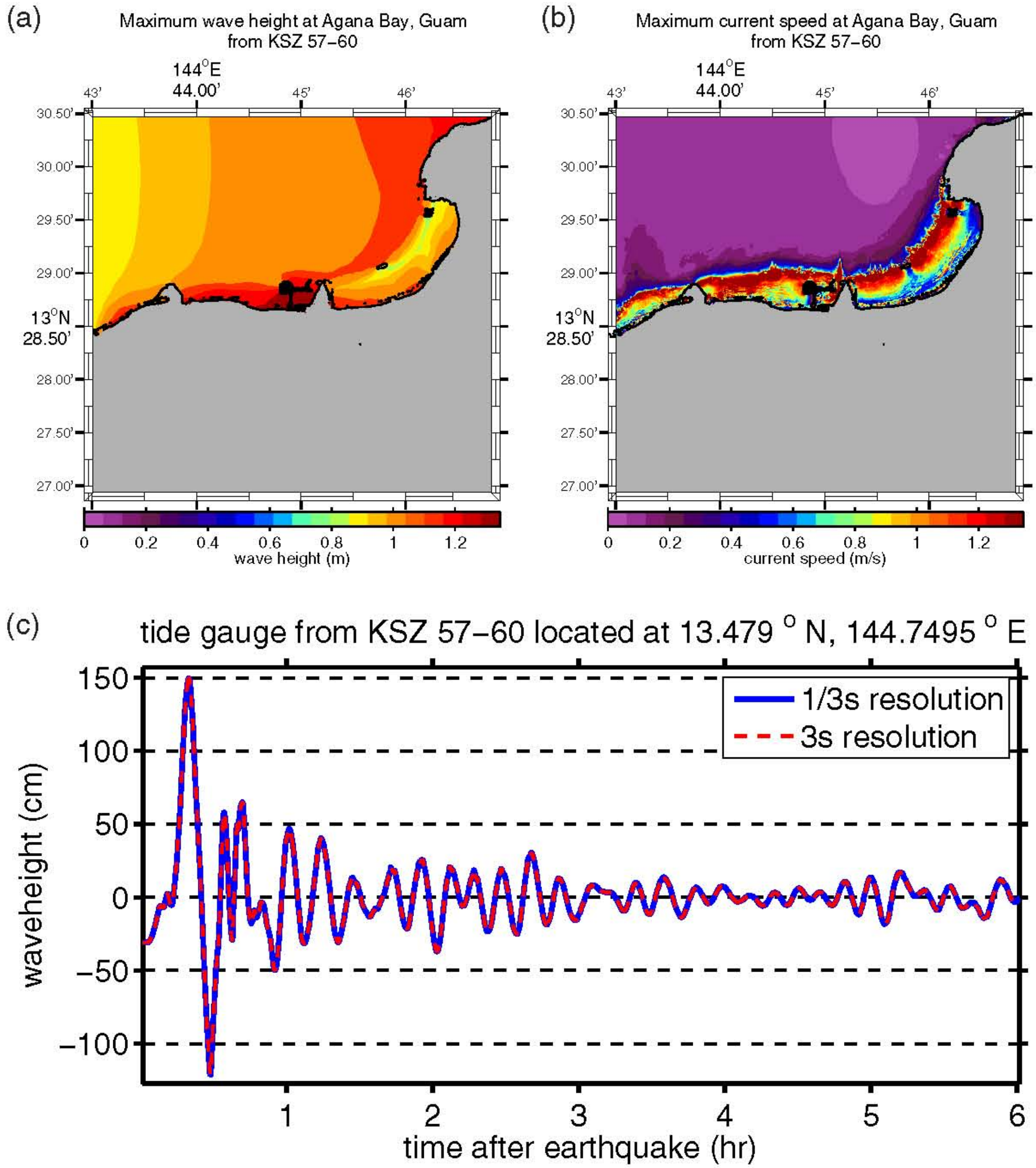

Figure F.6: (a) Maximum computed wave heights, (b) maximum computed currents, and (c) tsunami time history at the numerical tide gauge at Agana Bay from a tsunami triggered by a Mw = 8.5 earthquake on KSZ segments 57–60 by a 6-m slip.

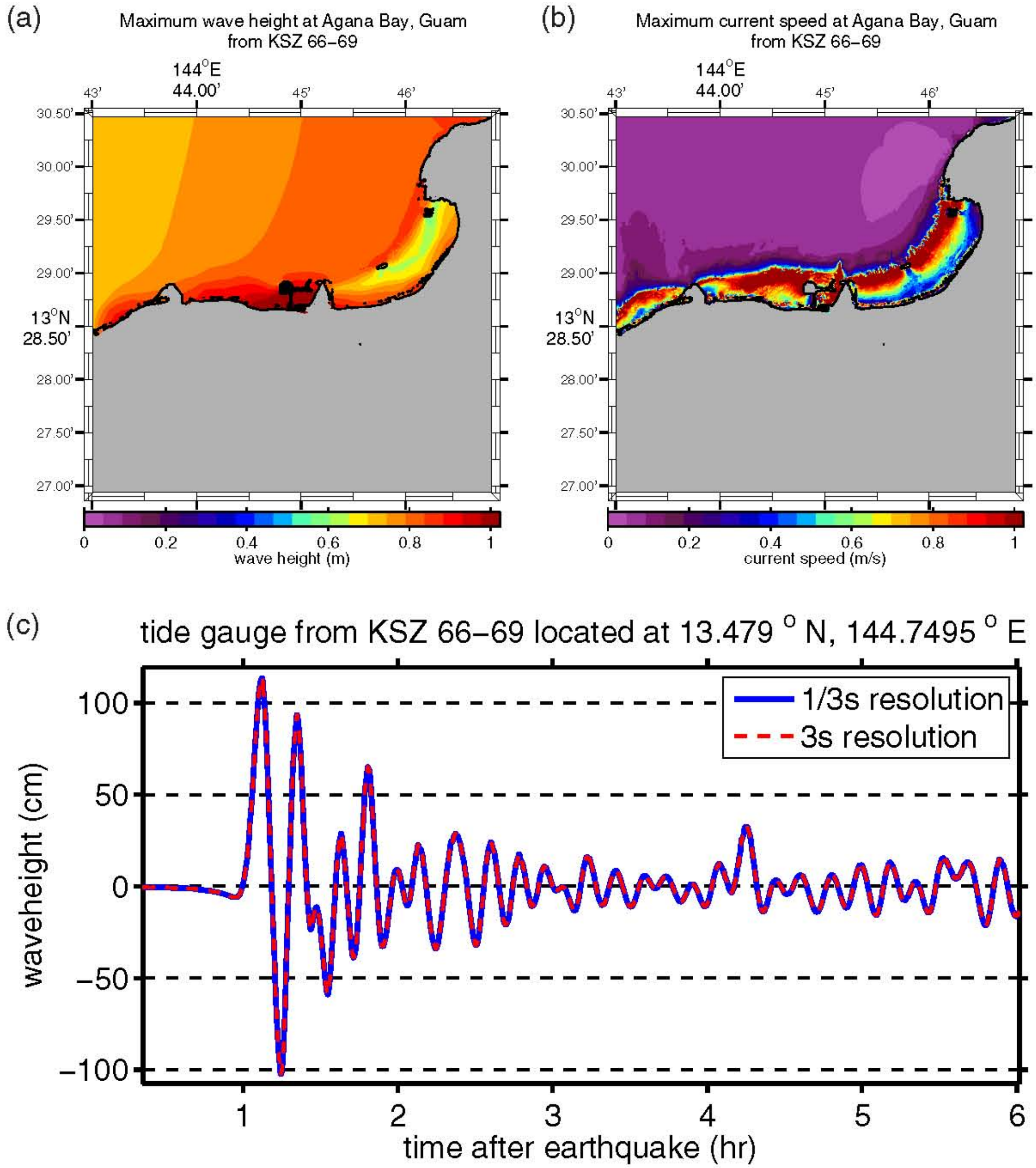

Figure F.7: (a) Maximum computed wave heights, (b) maximum computed currents, and (c) tsunami time history at the numerical tide gauge at Agana Bay from a tsunami triggered by a Mw = 8.5 earthquake on KSZ segments 66–69 by a 6-m slip.

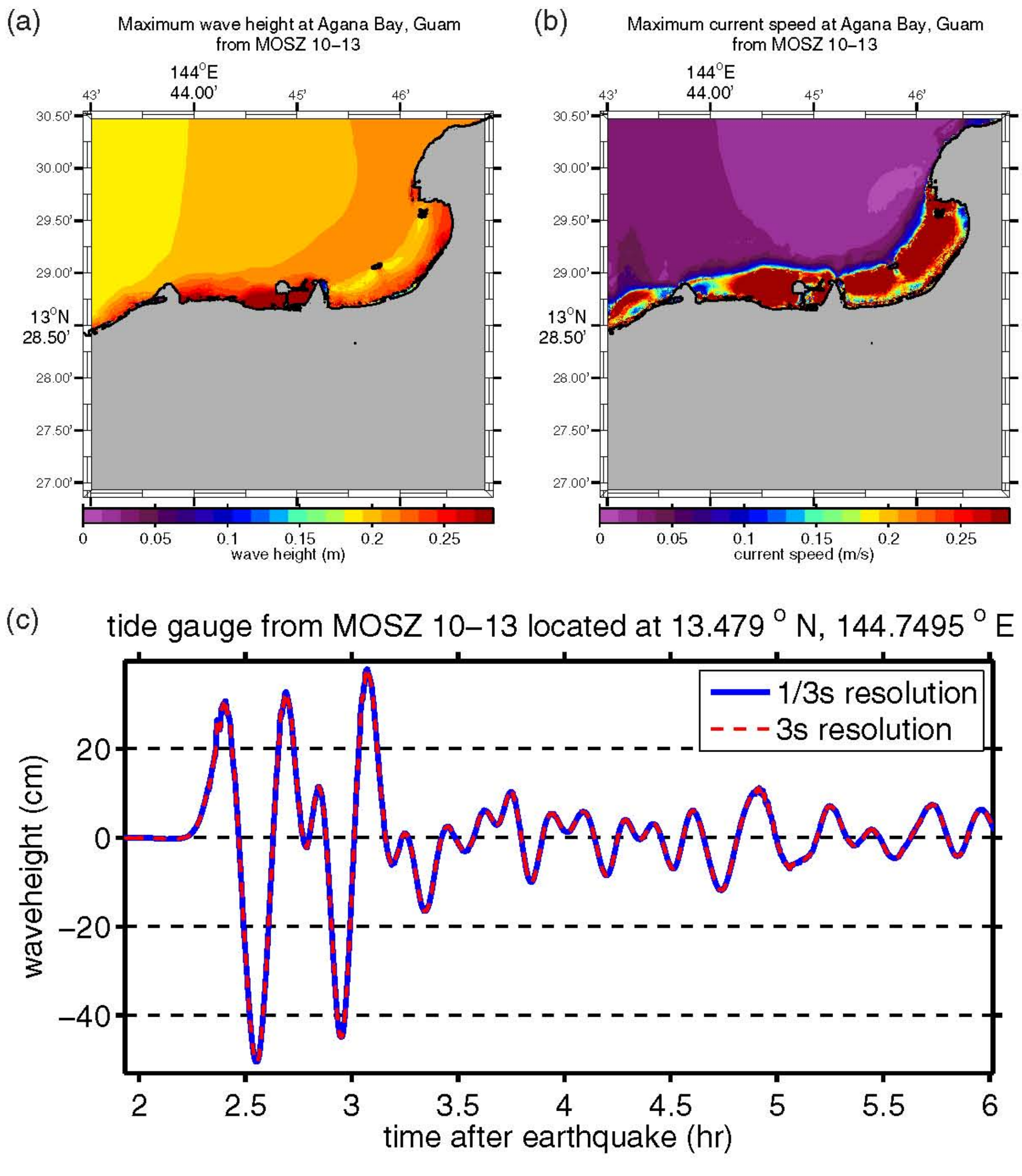

Figure F.8: (a) Maximum computed wave heights, (b) maximum computed currents, and (c) tsunami time history at the numerical tide gauge at Agana Bay from a tsunami triggered by a Mw = 8.5 earthquake on MOSZ segments 10–13 by a 6-m slip.

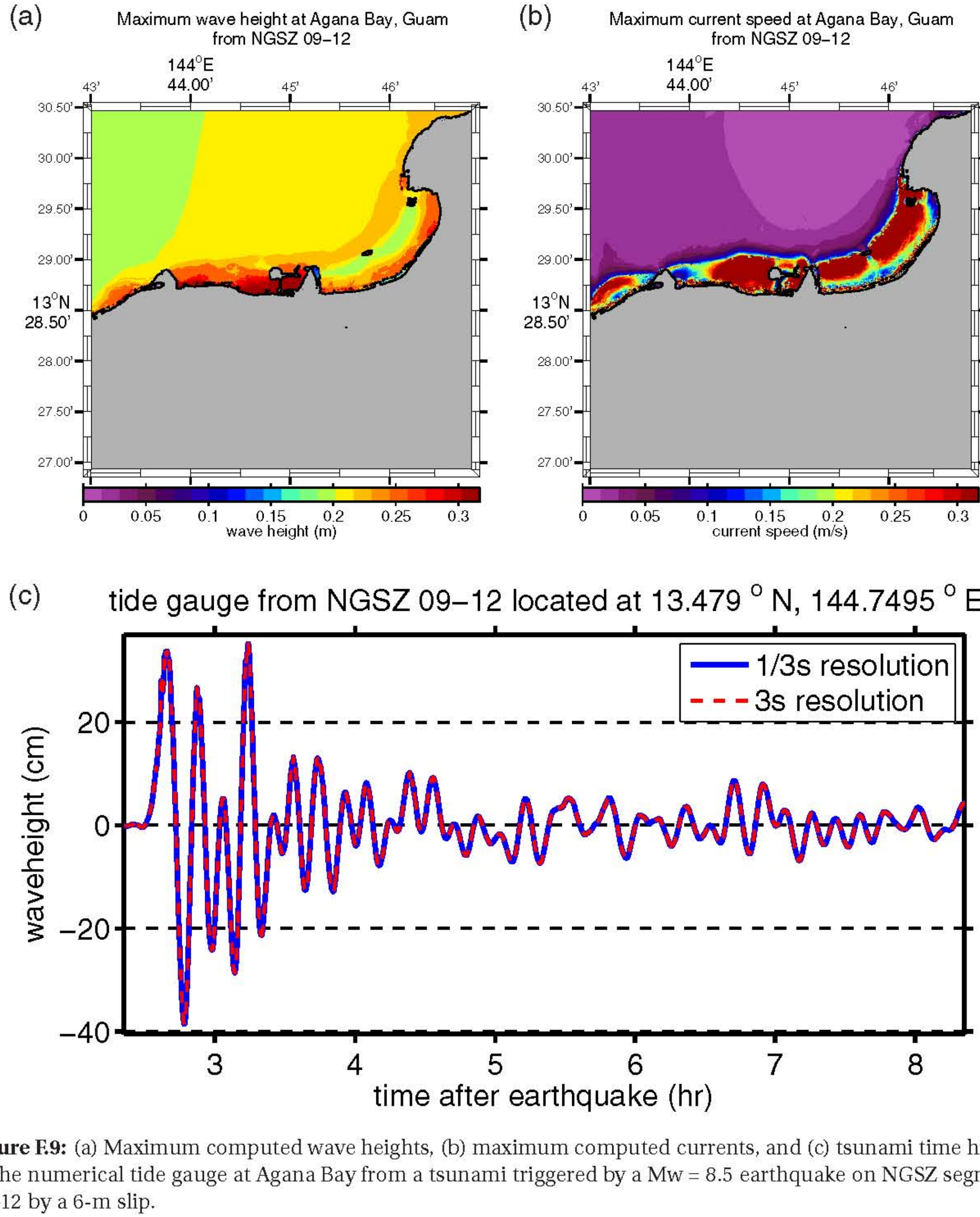

Figure F.9: (a) Maximum computed wave heights, (b) maximum computed currents, and (c) tsunami time history at the numerical tide gauge at Agana Bay from a tsunami triggered by a Mw = 8.5 earthquake on NGSZ segments 09–12 by a 6-m slip.

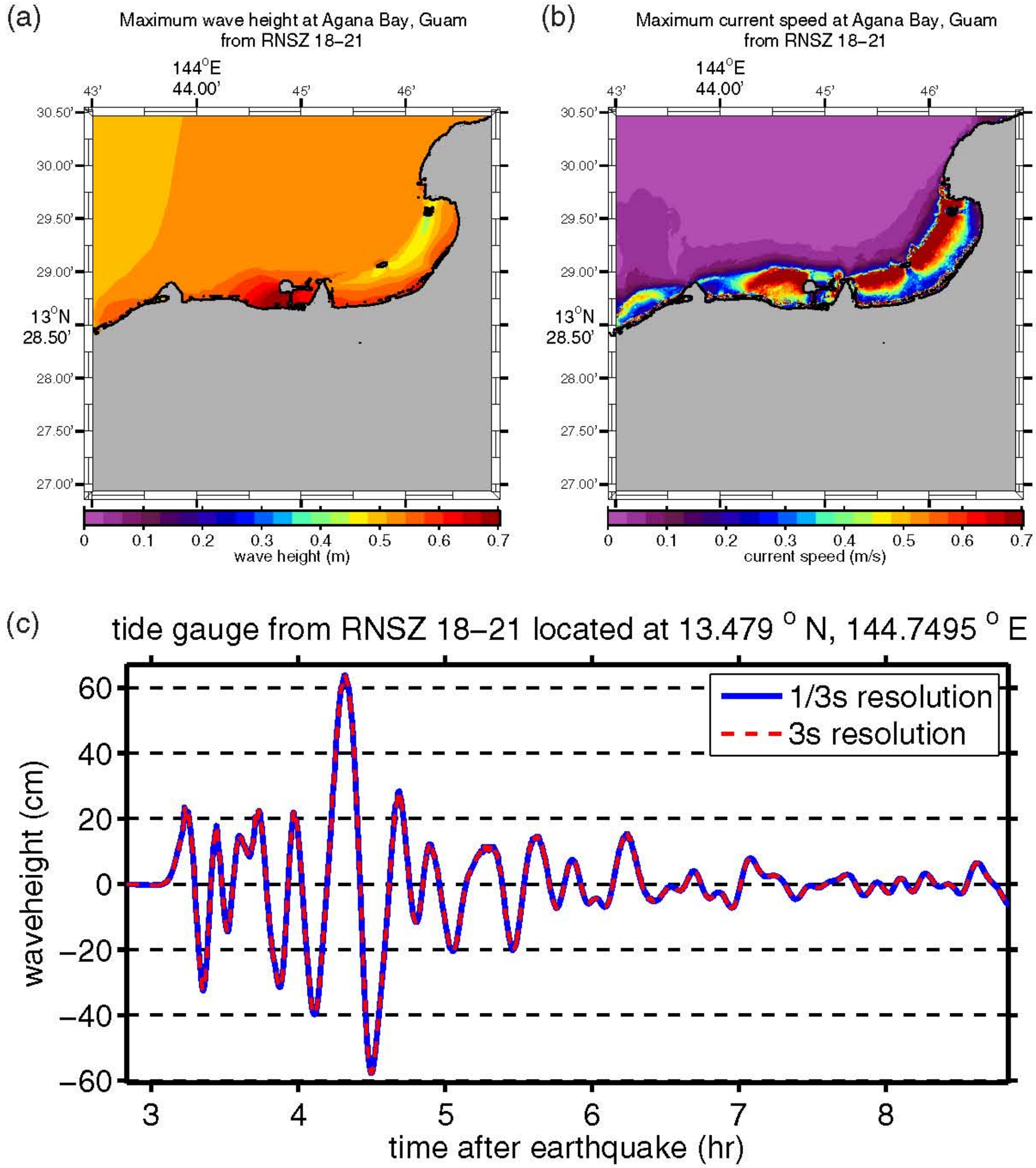

Figure F.10: (a) Maximum computed wave heights, (b) maximum computed currents, and (c) tsunami time history at the numerical tide gauge at Agana Bay from a tsunami triggered by a Mw = 8.5 earthquake on RNSZ segments 18–21 by a 6-m slip.

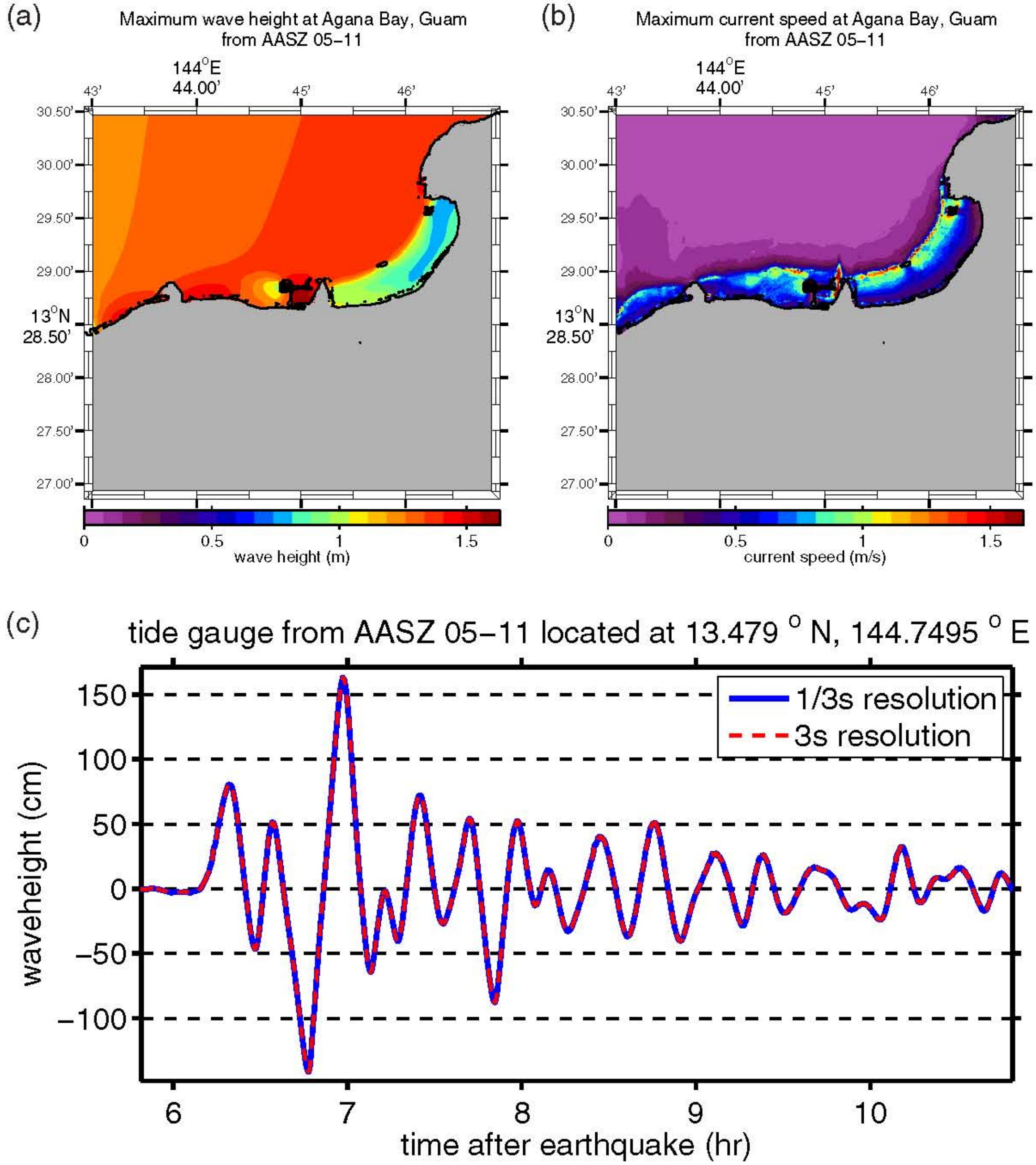

Figure F.11: (a) Maximum computed wave heights, (b) maximum computed currents, and (c) tsunami time history at the numerical tide gauge at Agana Bay from a tsunami triggered by a Mw = 9.0 earthquake on AASZ segments 05–11 by a 20-m slip.

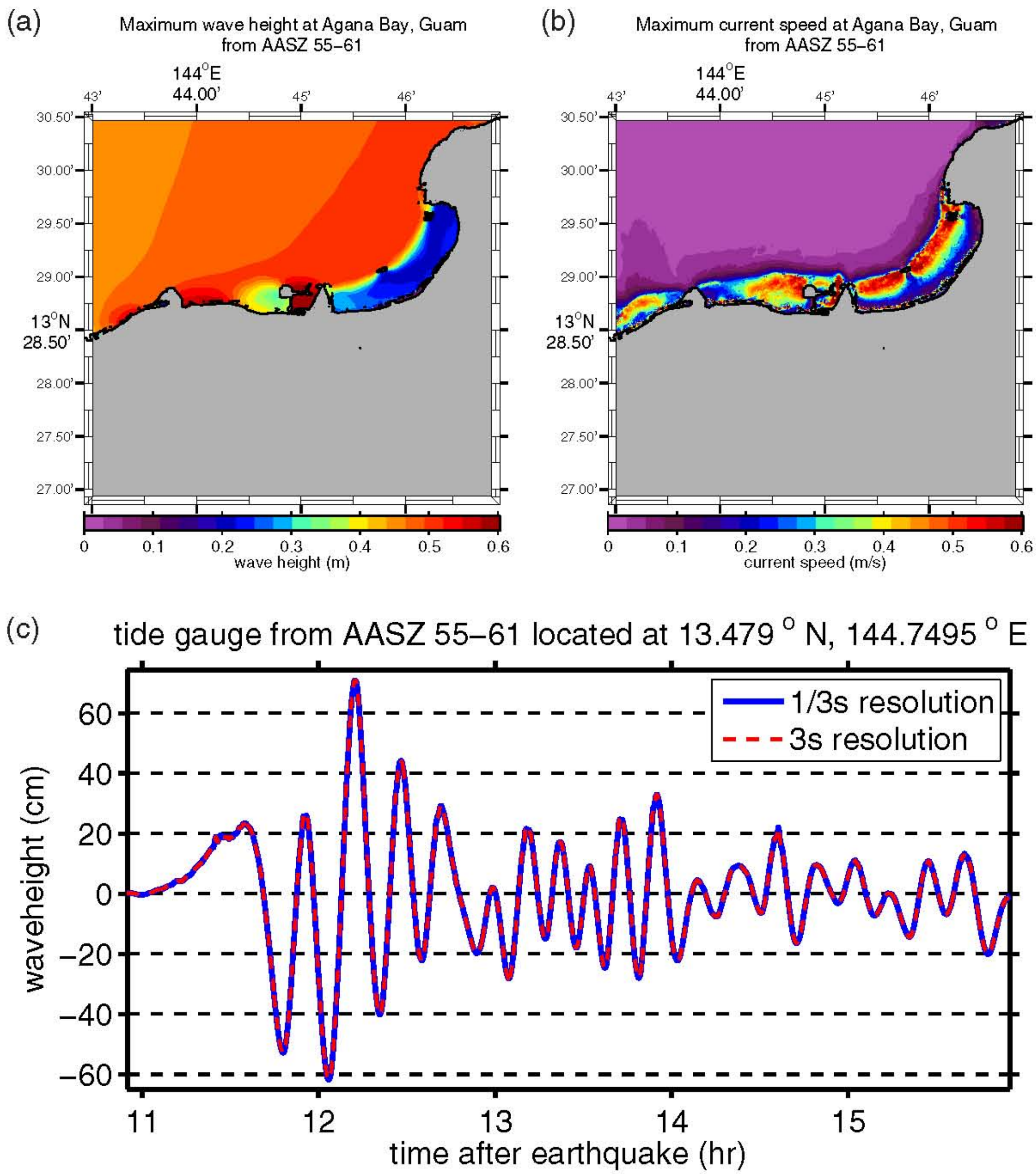

Figure F.12: (a) Maximum computed wave heights, (b) maximum computed currents, and (c) tsunami time history at the numerical tide gauge at Agana Bay from a tsunami triggered by a Mw = 9.0 earthquake on AASZ segments 55–61 by a 20-m slip.

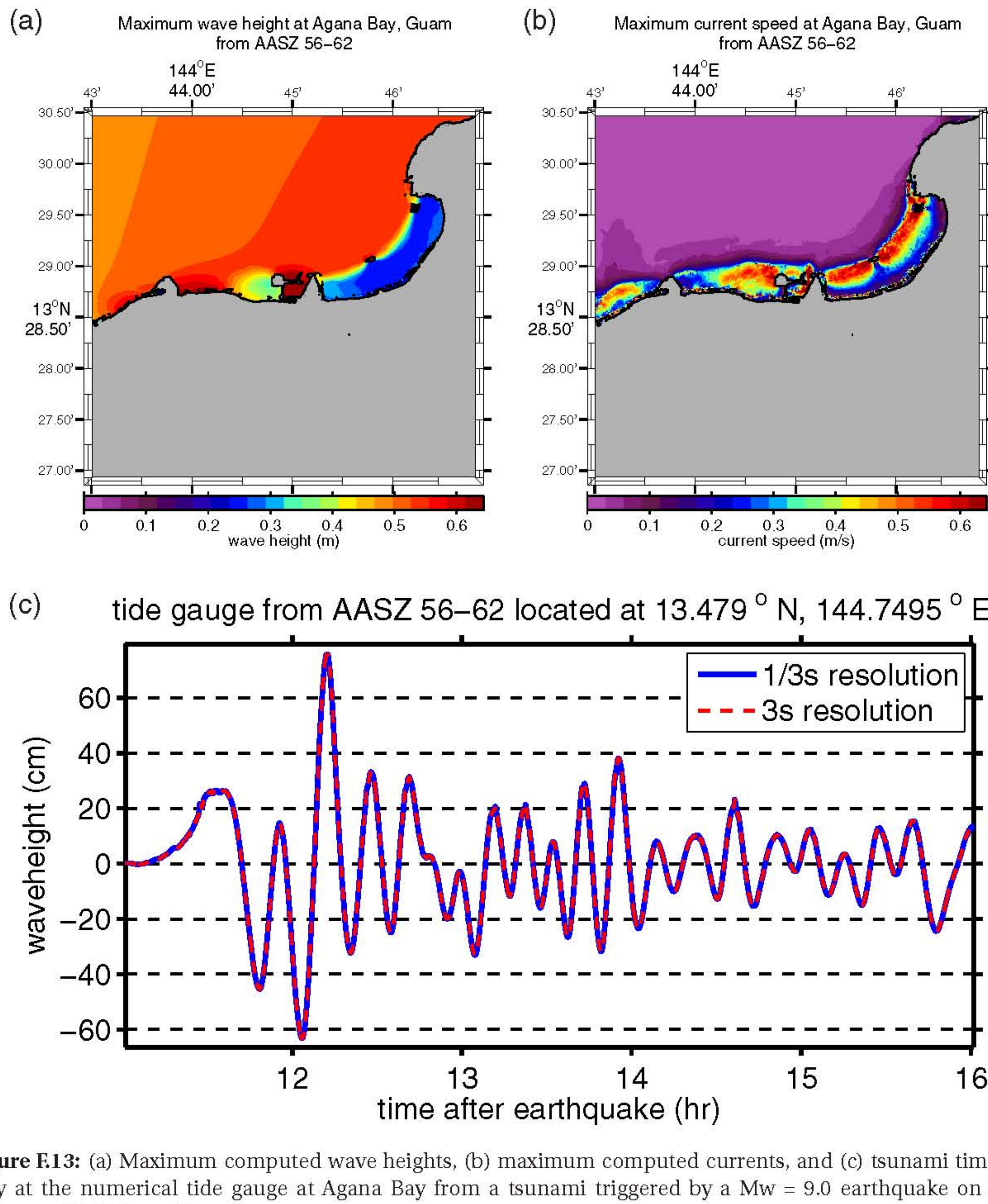

Figure F.13: (a) Maximum computed wave heights, (b) maximum computed currents, and (c) tsunami time history at the numerical tide gauge at Agana Bay from a tsunami triggered by a Mw = 9.0 earthquake on AASZ segments 56–62 by a 20-m slip.

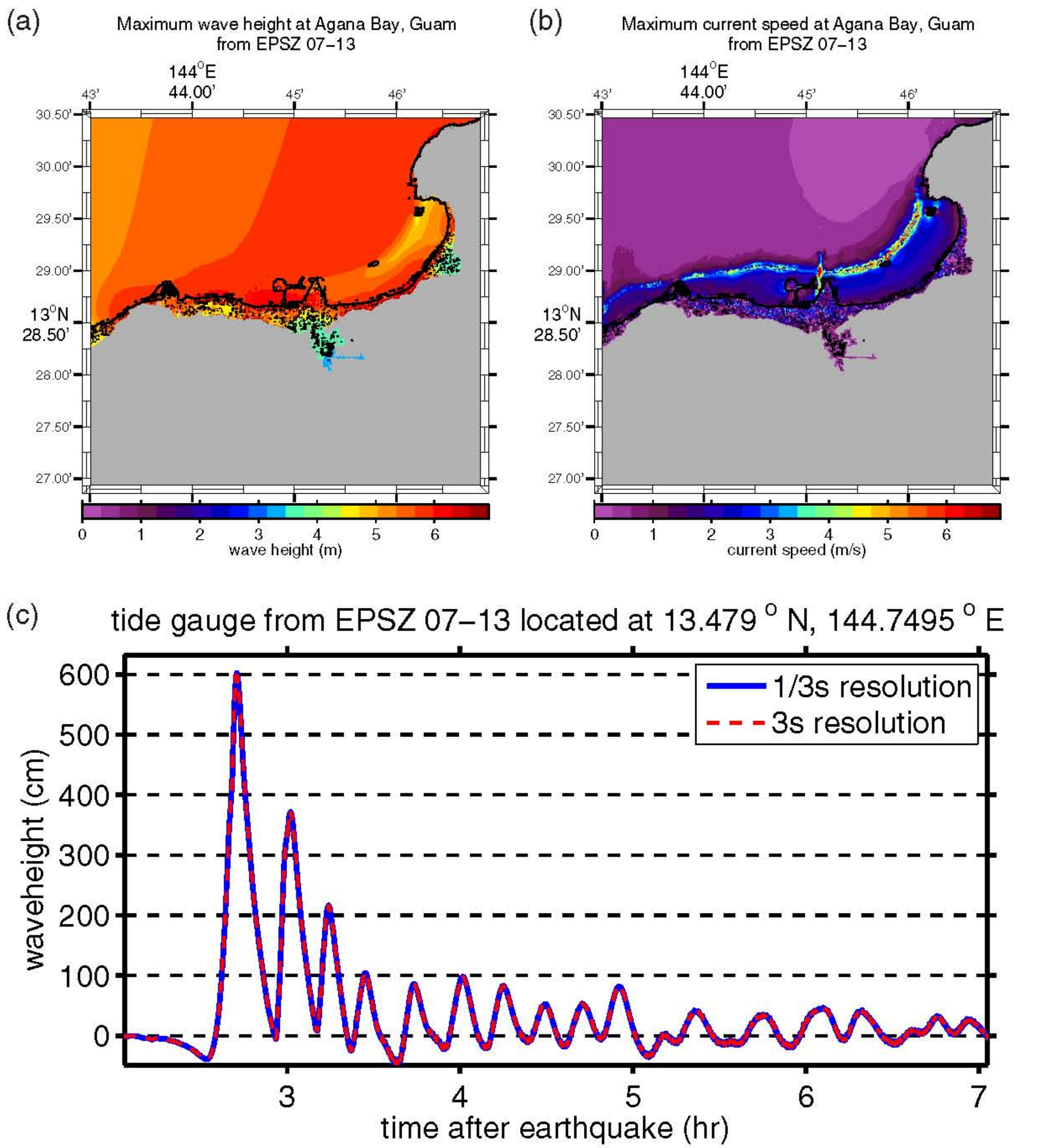

Figure F.14: (a) Maximum computed wave heights, (b) maximum computed currents, and (c) tsunami time history at the numerical tide gauge at Agana Bay from a tsunami triggered by a Mw = 9.0 earthquake on EPSZ segments 07–13 by a 20-m slip.

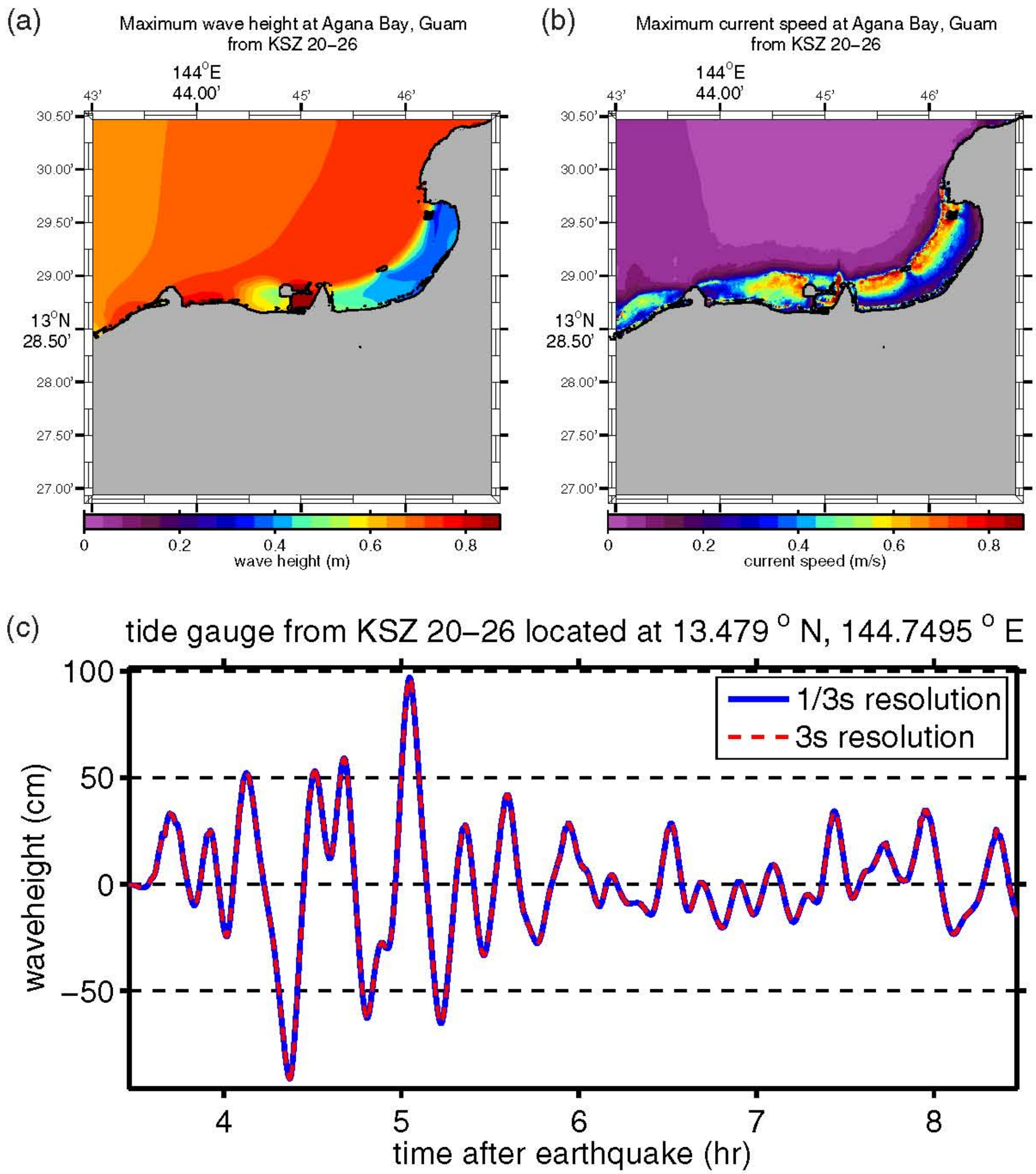

Figure F.15: (a) Maximum computed wave heights, (b) maximum computed currents, and (c) tsunami time history at the numerical tide gauge at Agana Bay from a tsunami triggered by a Mw =9.0 earthquake on KSZ segments 20–26 by a 20-m slip.

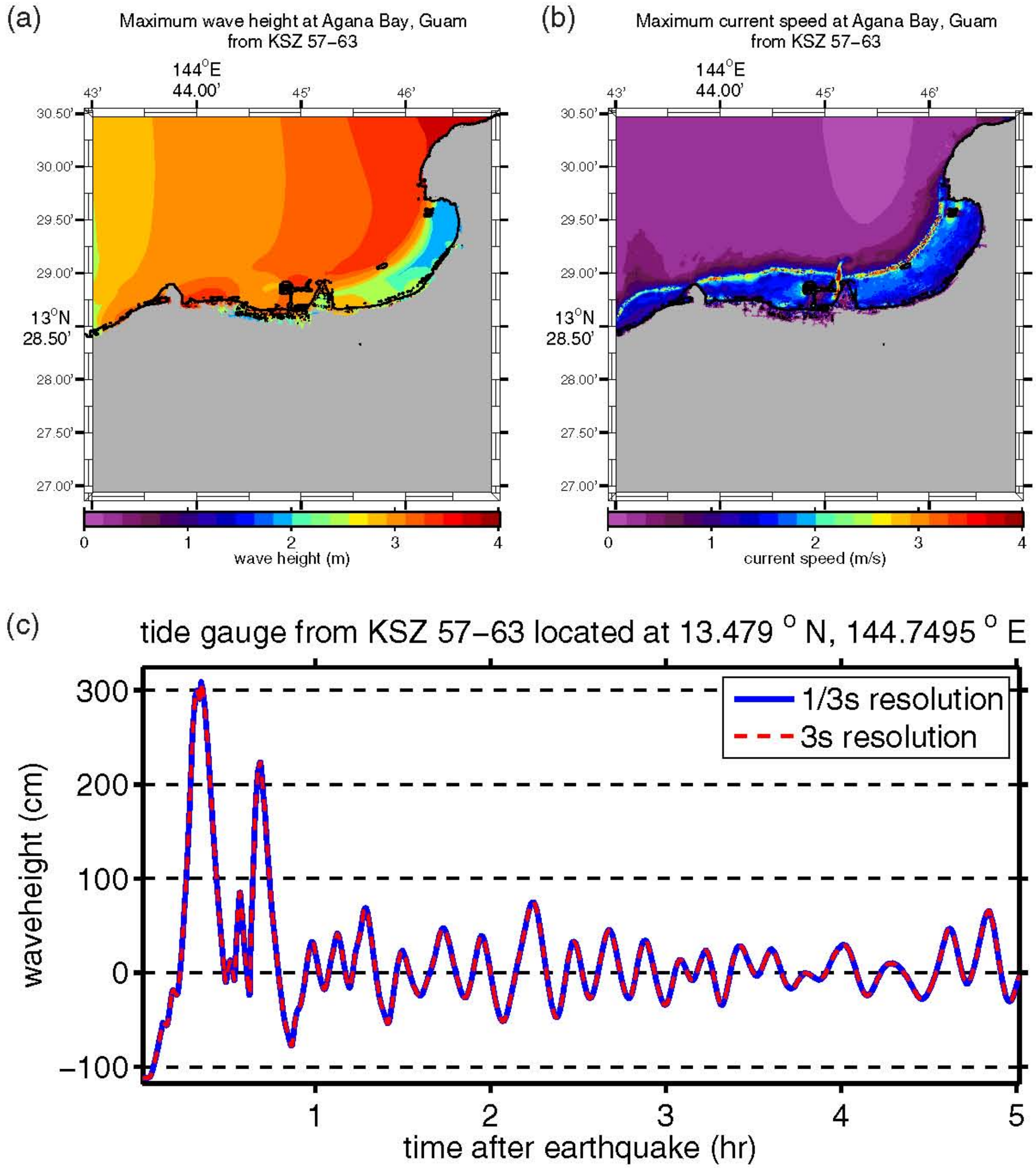

Figure F.16: (a) Maximum computed wave heights, (b) maximum computed currents, and (c) tsunami time history at the numerical tide gauge at Agana Bay from a tsunami triggered by a Mw = 9.0 earthquake on KSZ segments 57–63 by a 20-m slip.

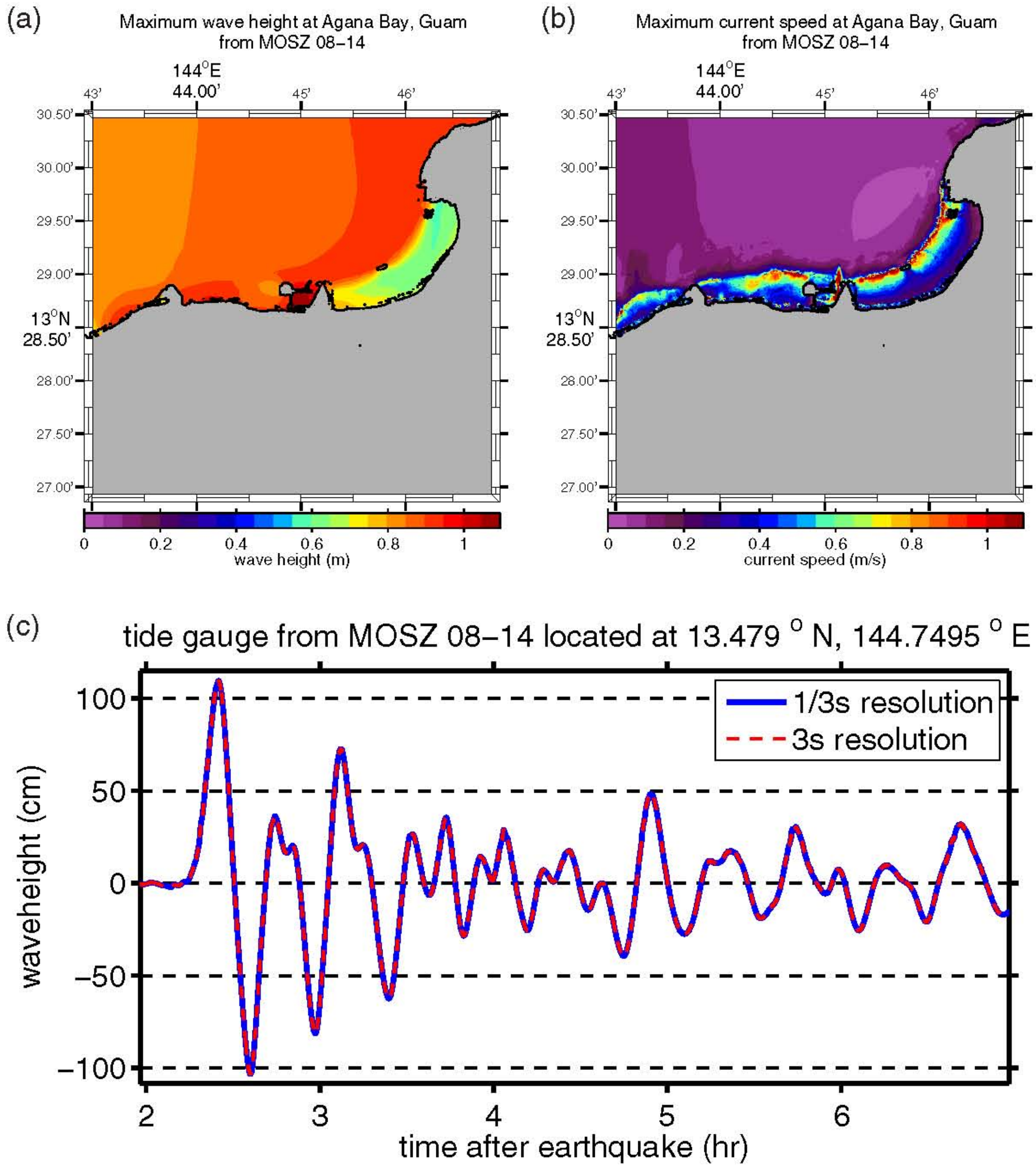

Figure F.17: (a) Maximum computed wave heights, (b) maximum computed currents, and (c) tsunami time history at the numerical tide gauge at Agana Bay from a tsunami triggered by a Mw = 9.0 earthquake on MOSZ segments 08–14 by a 20-m slip.

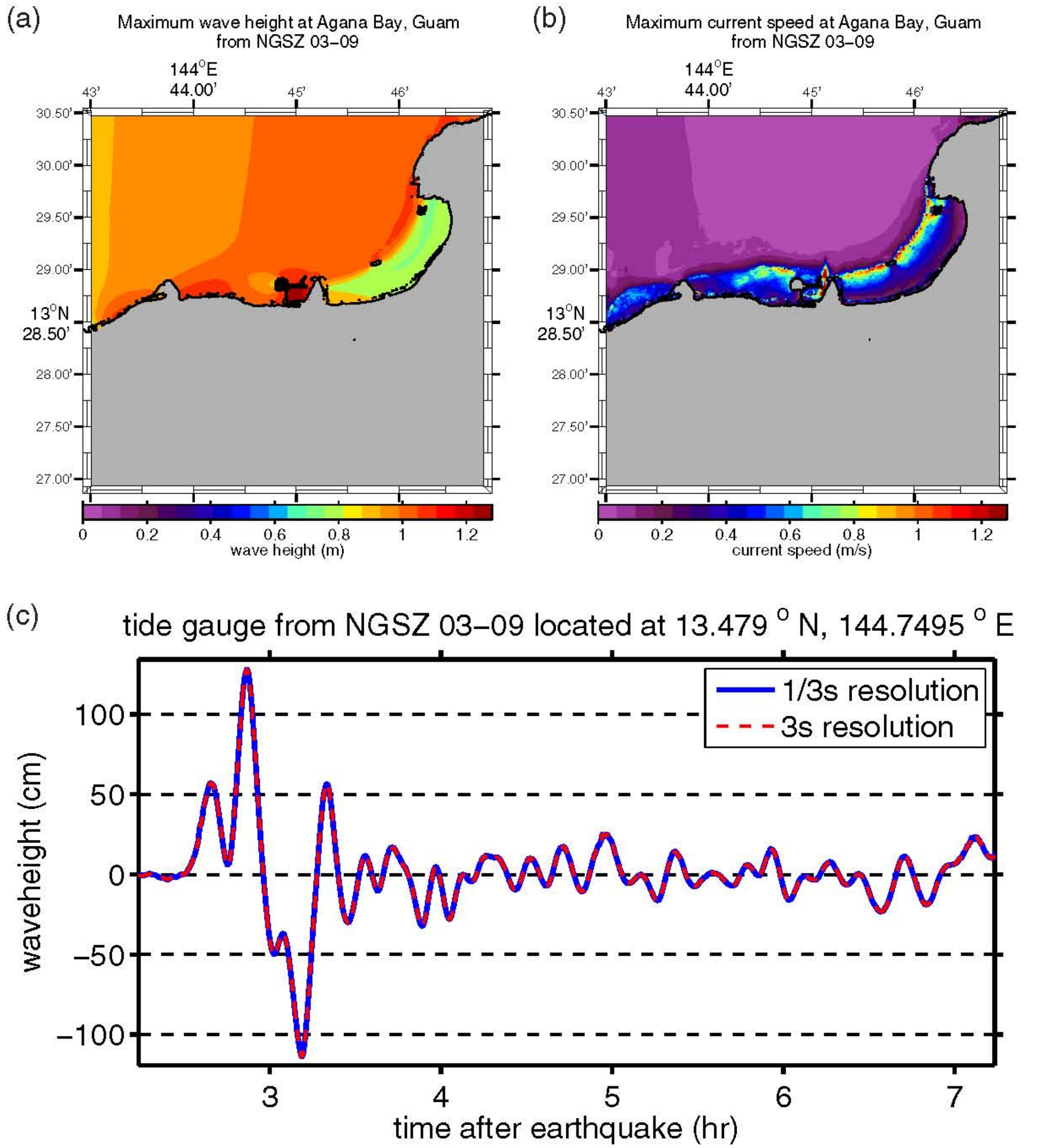

Figure F.18: (a) Maximum computed wave heights, (b) maximum computed currents, and (c) tsunami time history at the numerical tide gauge at Agana Bay from a tsunami triggered by a Mw = 9.0 earthquake on NGSZ segments 03–09 by a 20-m slip.

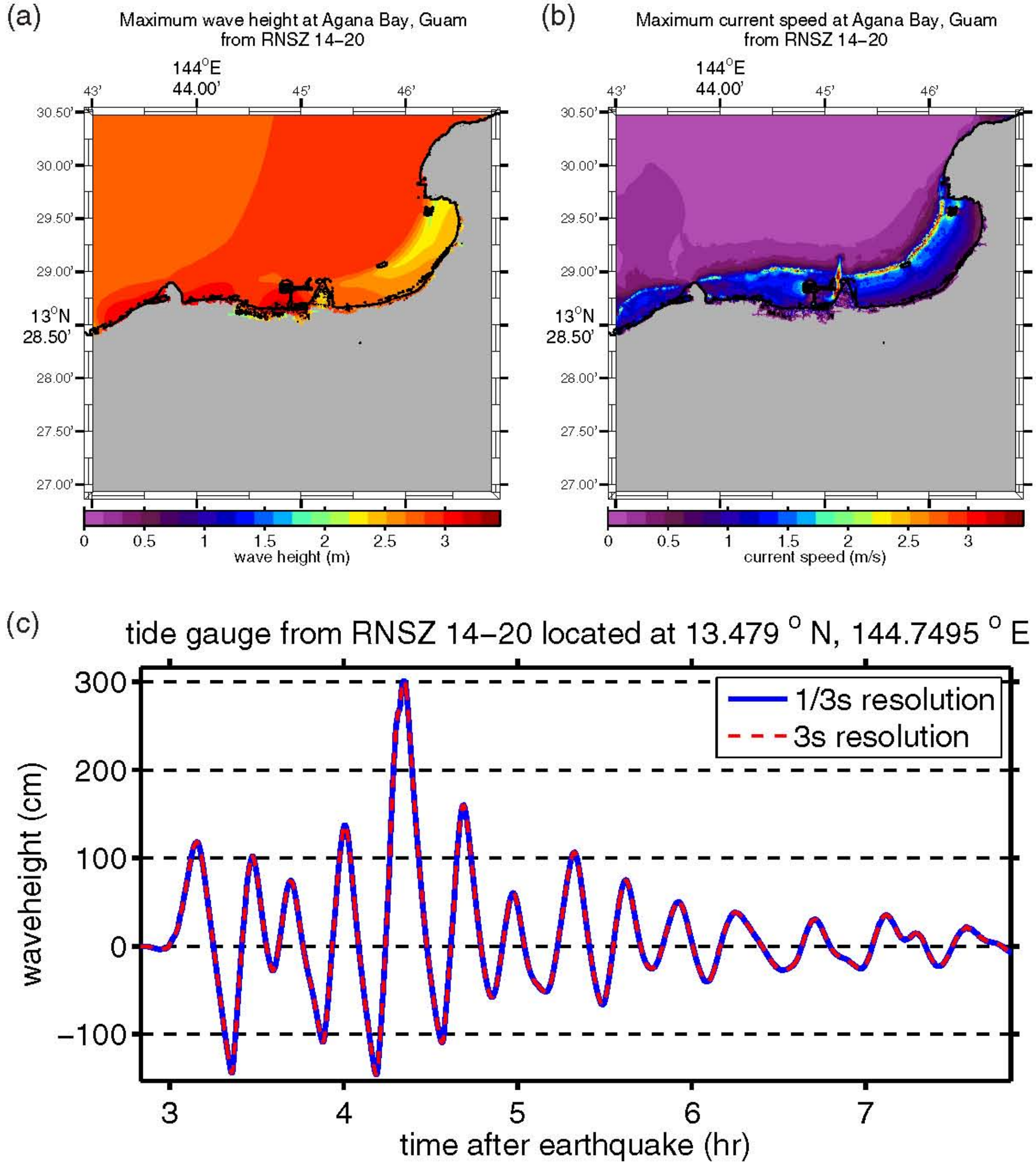

Figure F.19: (a) Maximum computed wave heights, (b) maximum computed currents, and (c) tsunami time history at the numerical tide gauge at Agana Bay from a tsunami triggered by a Mw = 9.0 earthquake on RNSZ segments 14–20 by a 20-m slip.

Appendix G
Inarajan Bay

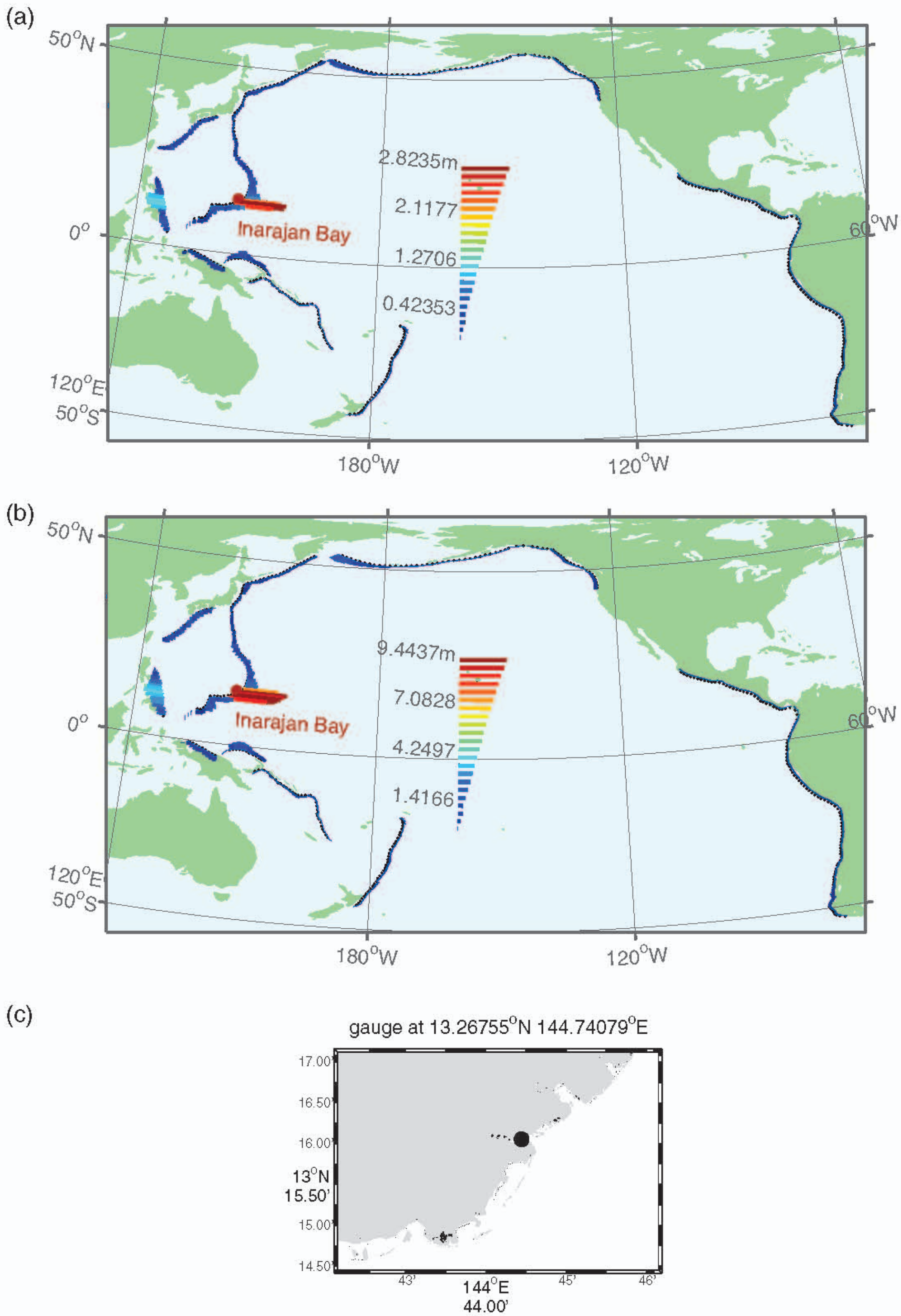

Figure G.1: Tsunami wave height response at Inarajan Bay from tsunamis triggered by (a) Mw = 8.5 and (b) Mw = 9.0 earthquakes.

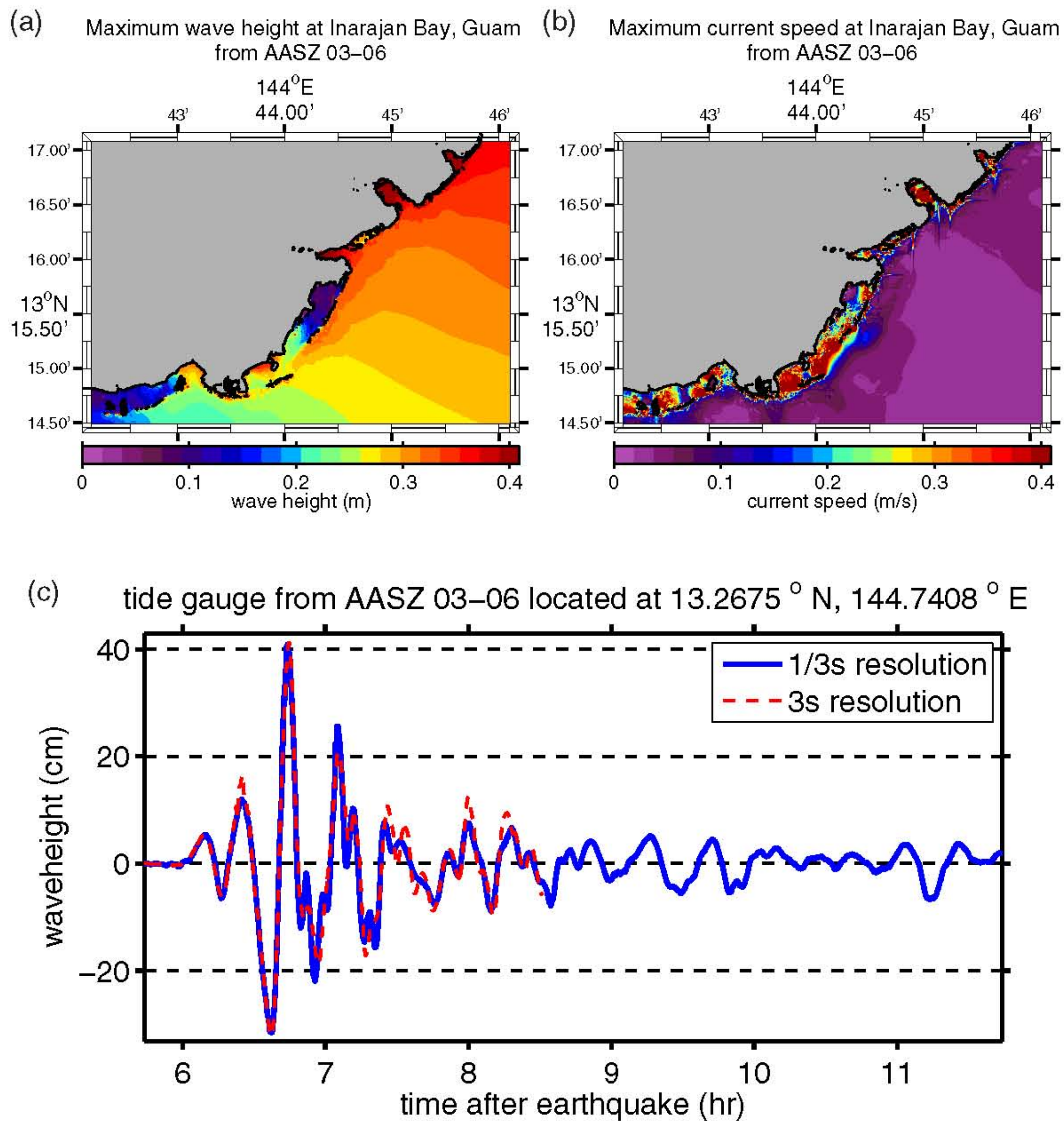

Figure G.2: (a) Maximum computed wave heights, (b) maximum computed currents, and (c) tsunami time history at the numerical tide gauge at Inarajan Bay from a tsunami triggered by a Mw = 8.5 earthquake on AASZ segments 03–06 by a 6-m slip.

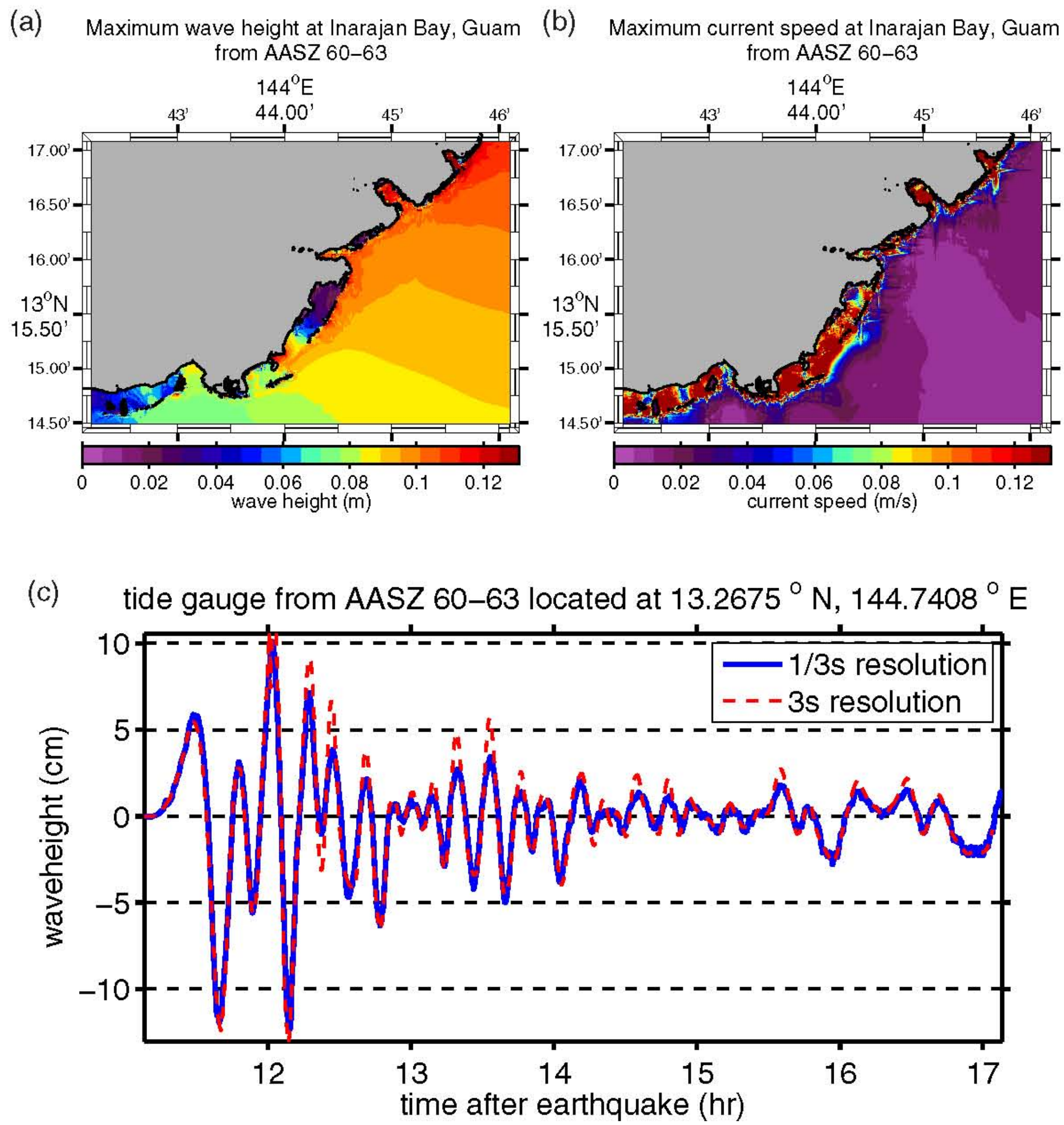

Figure G.3: (a) Maximum computed wave heights, (b) maximum computed currents, and (c) tsunami time history at the numerical tide gauge at Inarajan Bay from a tsunami triggered by a Mw = 8.5 earthquake on AASZ segments 60–63 by a 6-m slip.

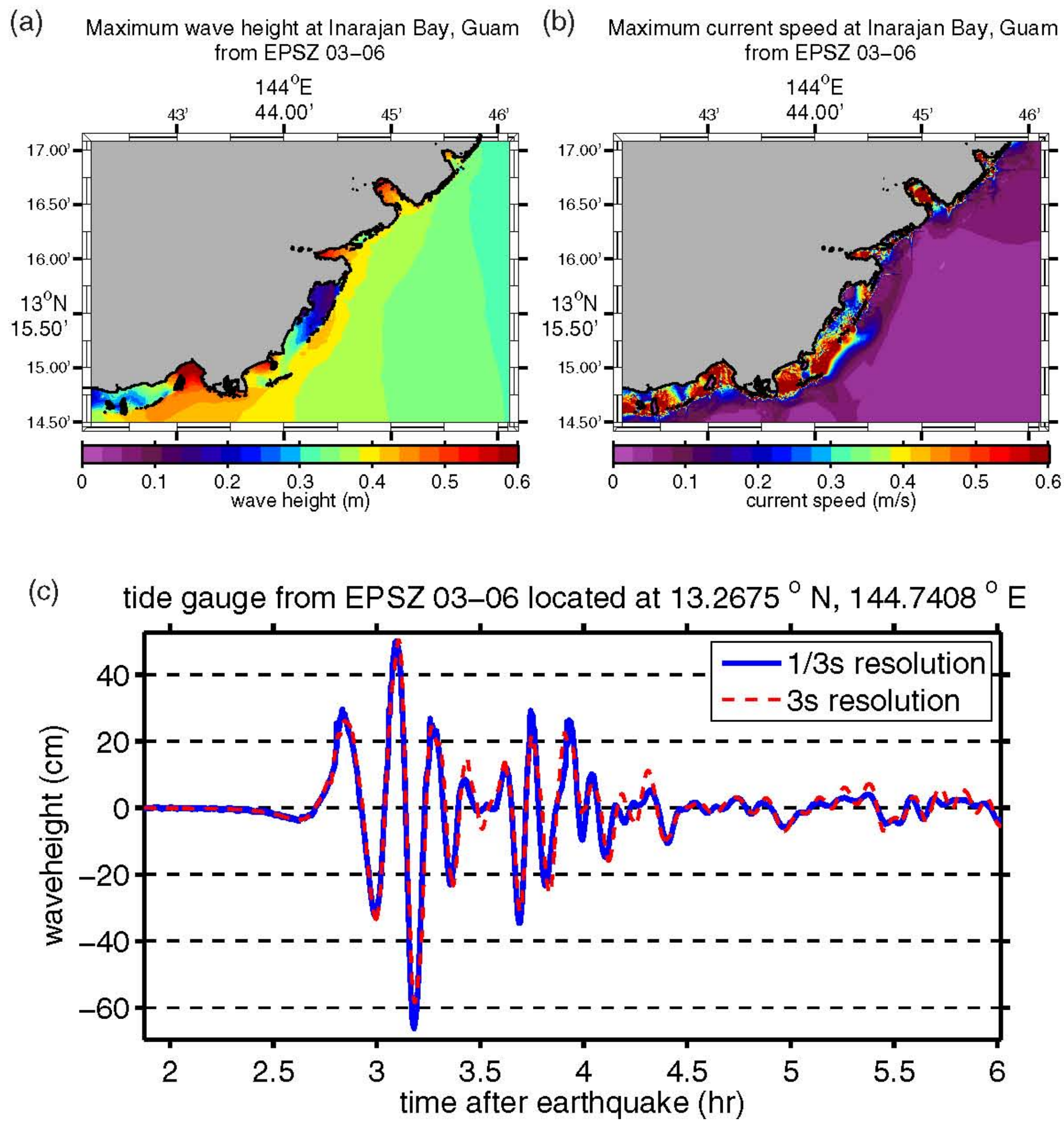

Figure G.4: (a) Maximum computed wave heights, (b) maximum computed currents, and (c) tsunami time history at the numerical tide gauge at Inarajan Bay from a tsunami triggered by a Mw = 8.5 earthquake on EPSZ segments 03–06 by a 6-m slip.

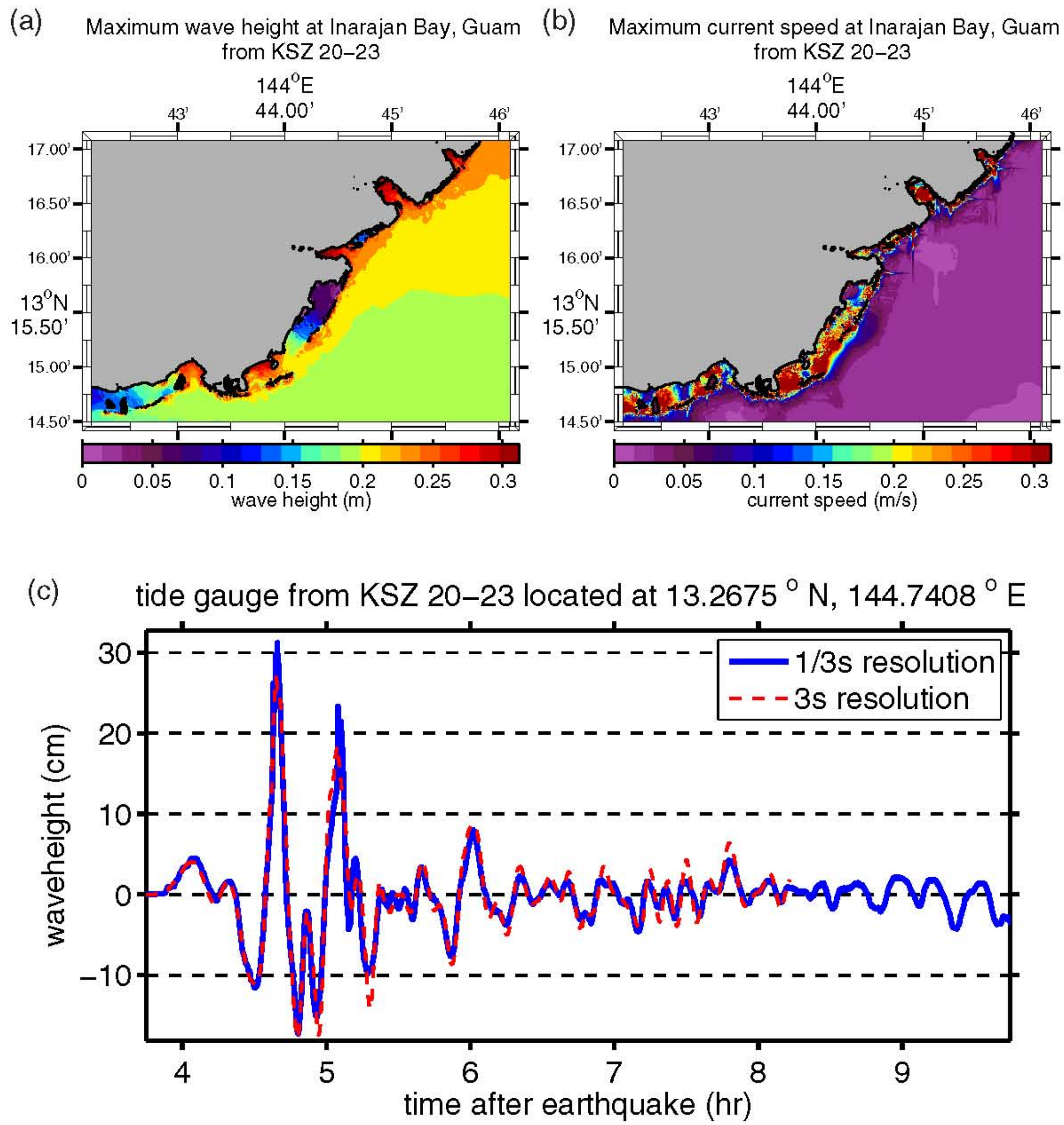

Figure G.5: (a) Maximum computed wave heights, (b) maximum computed currents, and (c) tsunami time history at the numerical tide gauge at Inarajan Bay from a tsunami triggered by a Mw = 8.5 earthquake on KSZ segments 20–23 by a 6-m slip.

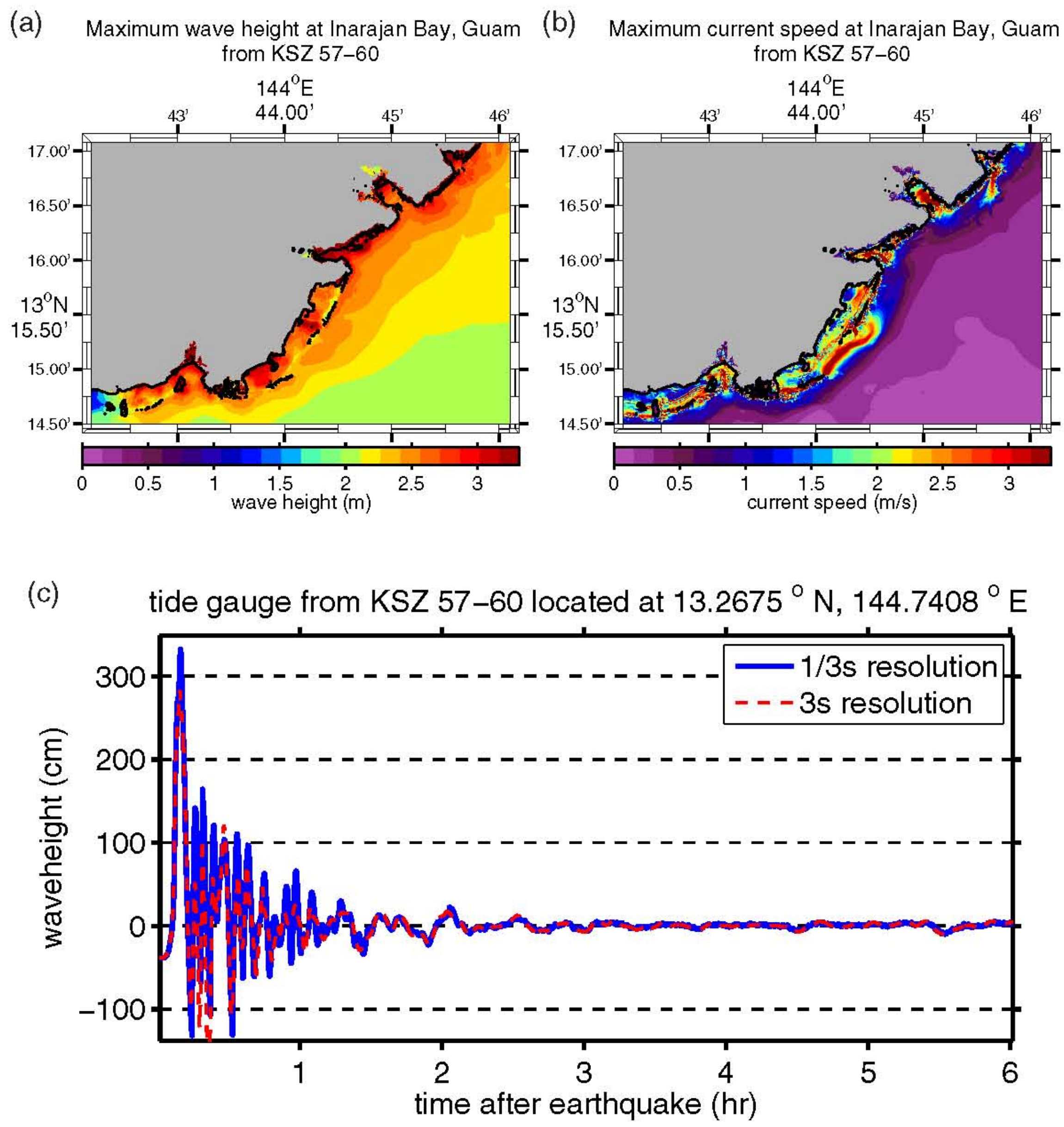

Figure G.6: (a) Maximum computed wave heights, (b) maximum computed currents, and (c) tsunami time history at the numerical tide gauge at Inarajan Bay from a tsunami triggered by a Mw = 8.5 earthquake on KSZ segments 57–60 by a 6-m slip.

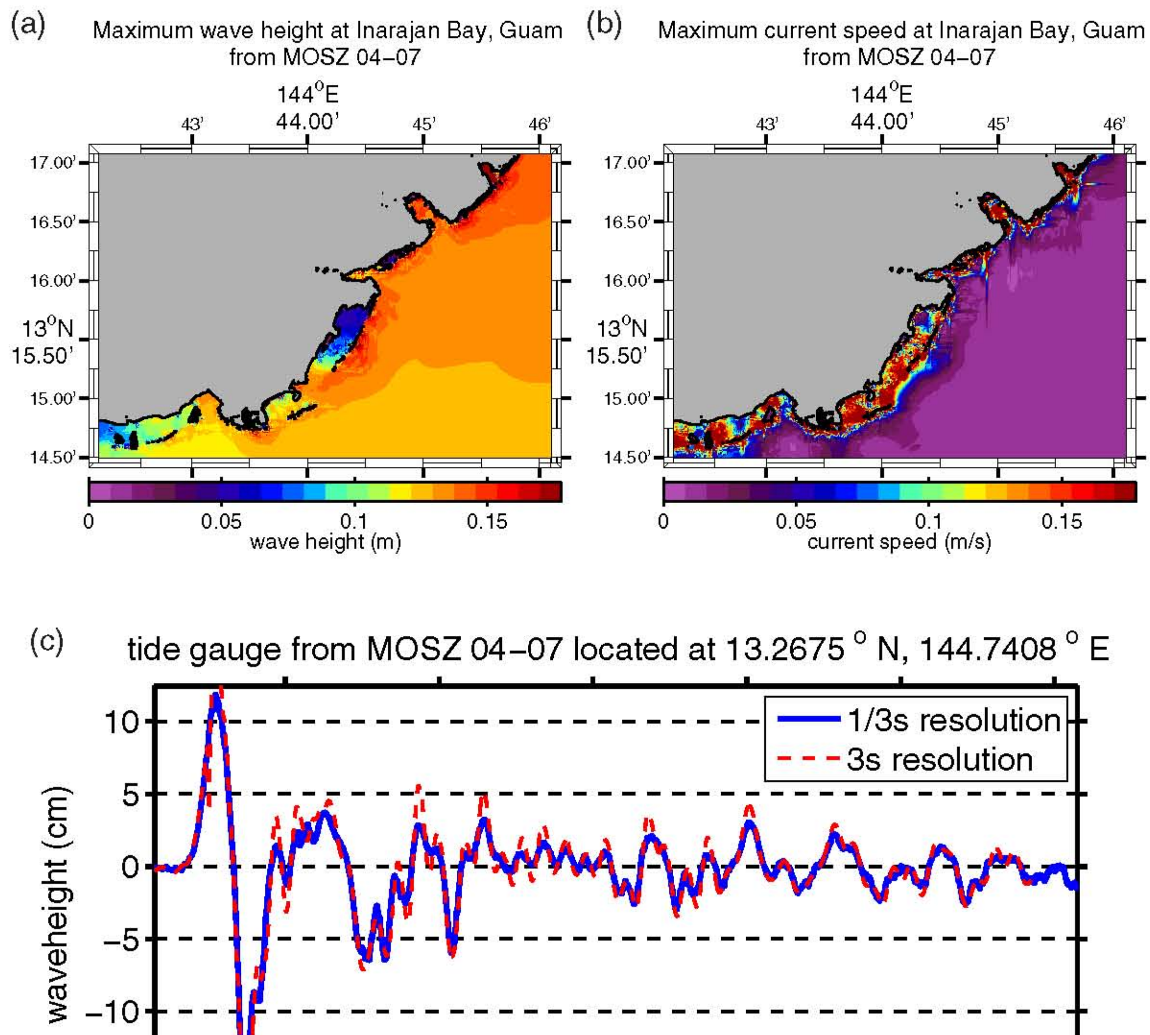

Figure G.7: (a) Maximum computed wave heights, (b) maximum computed currents, and (c) tsunami time history at the numerical tide gauge at Inarajan Bay from a tsunami triggered by a Mw = 8.5 earthquake on MOSZ segments 04–07 by a 6-m slip.

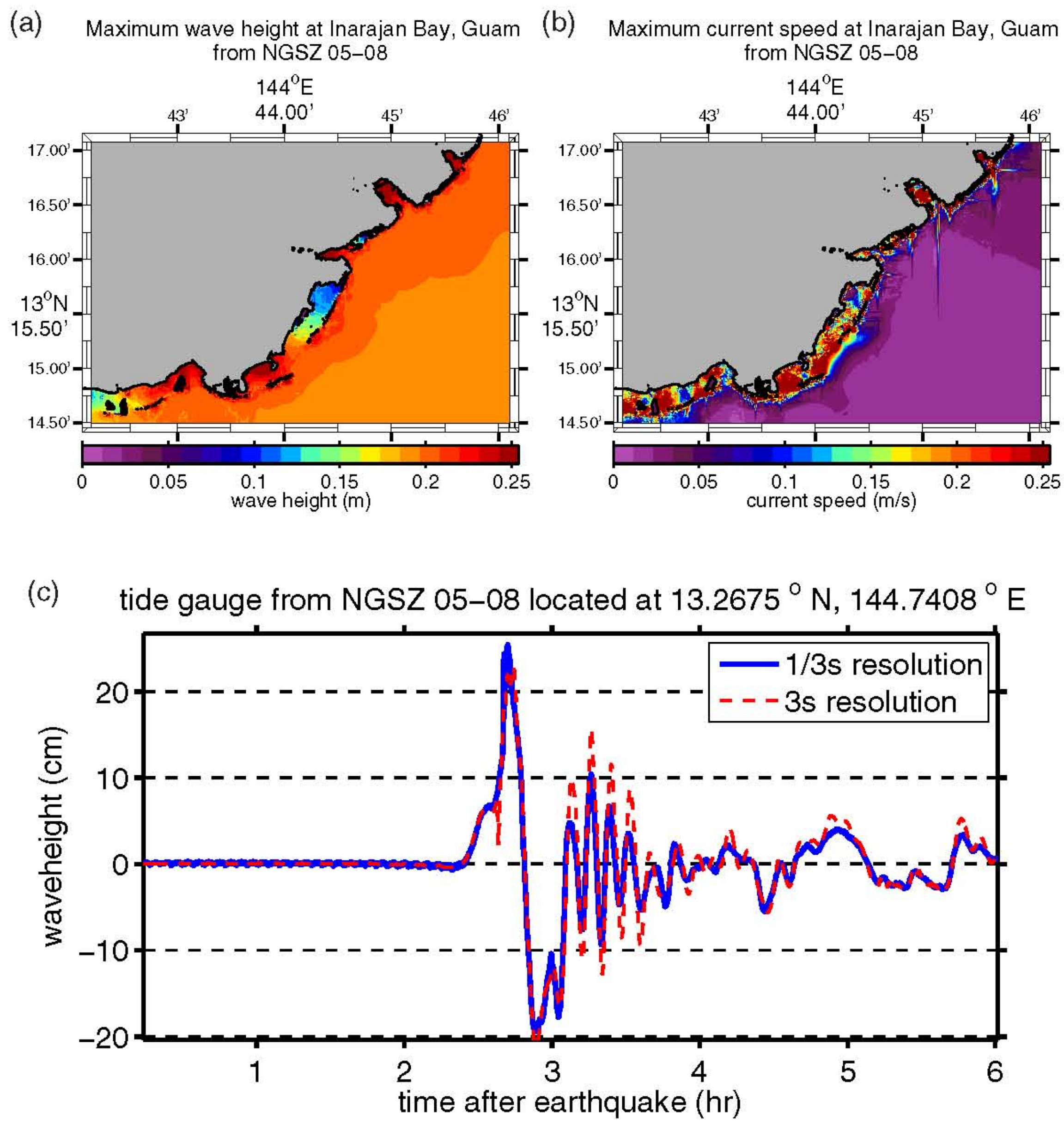

Figure G.8: (a) Maximum computed wave heights, (b) maximum computed currents, and (c) tsunami time history at the numerical tide gauge at Inarajan Bay from a tsunami triggered by a Mw = 8.5 earthquake on NGSZ segments 05–08 by a 6-m slip.

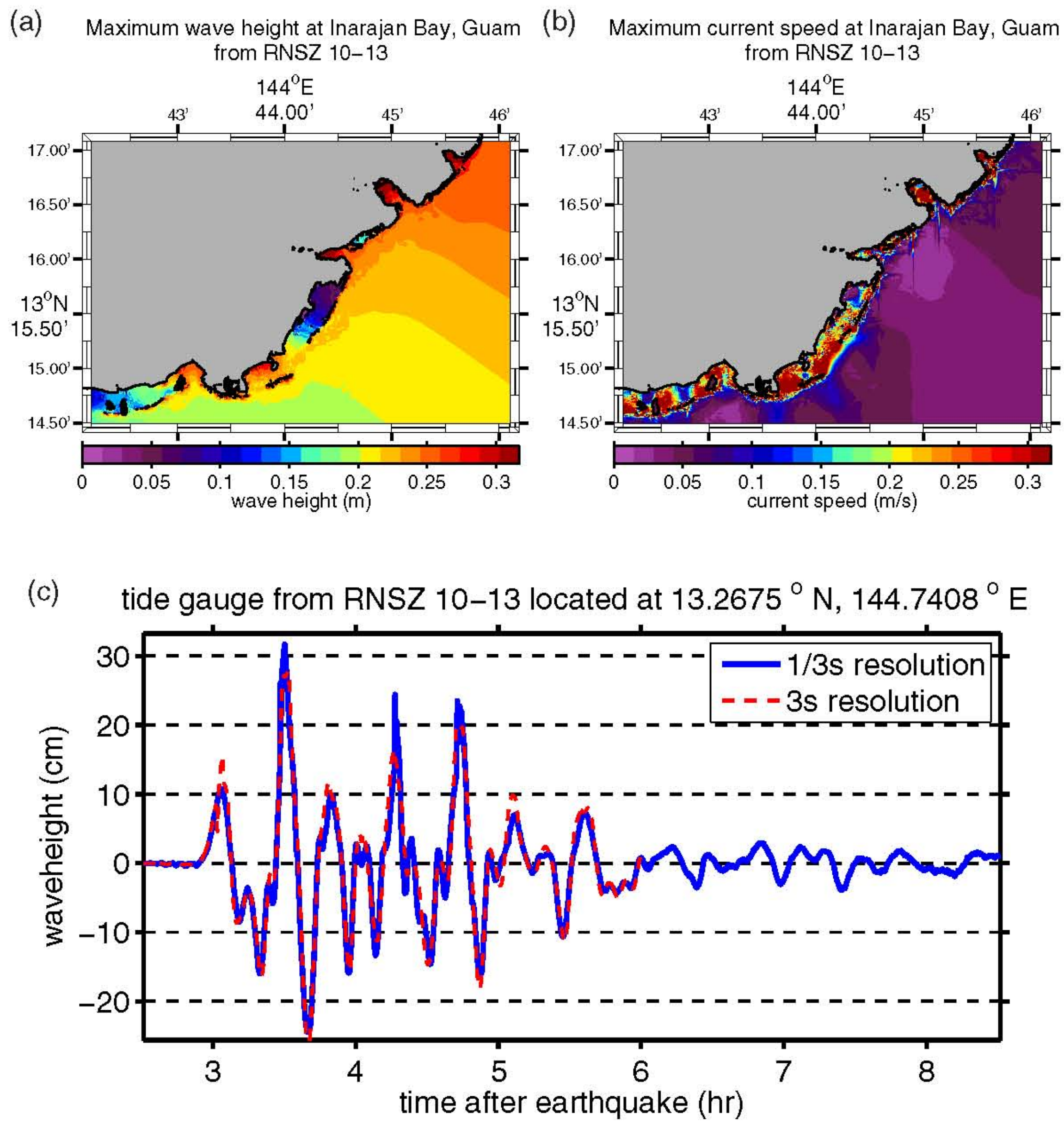

Figure G.9: (a) Maximum computed wave heights, (b) maximum computed currents, and (c) tsunami time history at the numerical tide gauge at Inarajan Bay from a tsunami triggered by a Mw = 8.5 earthquake on RNSZ segments 10–13 by a 6-m slip.

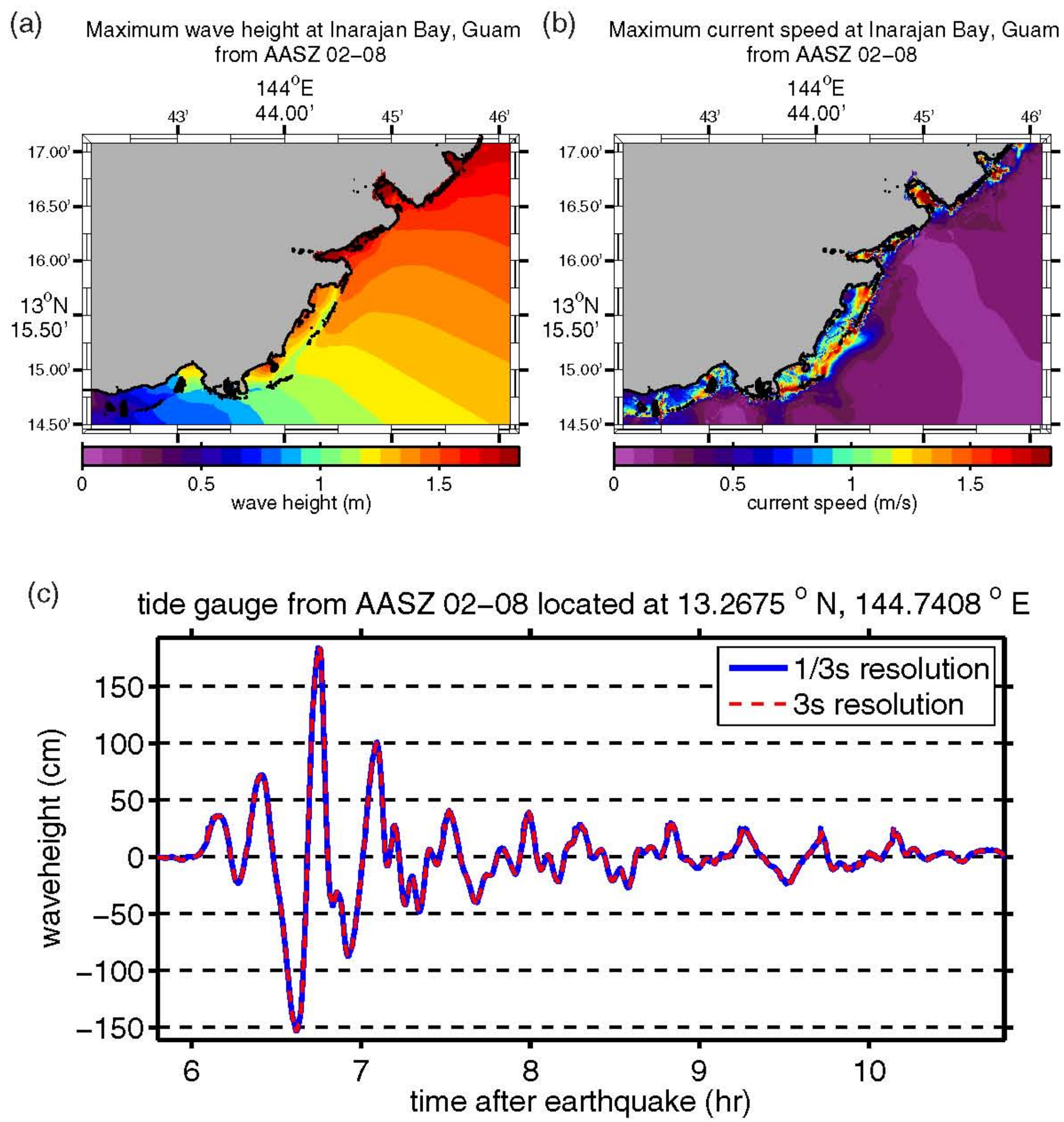

Figure G.10: (a) Maximum computed wave heights, (b) maximum computed currents, and (c) tsunami time history at the numerical tide gauge at Inarajan Bay from a tsunami triggered by a Mw = 9.0 earthquake on AASZ segments 02–08 by a 20-m slip.

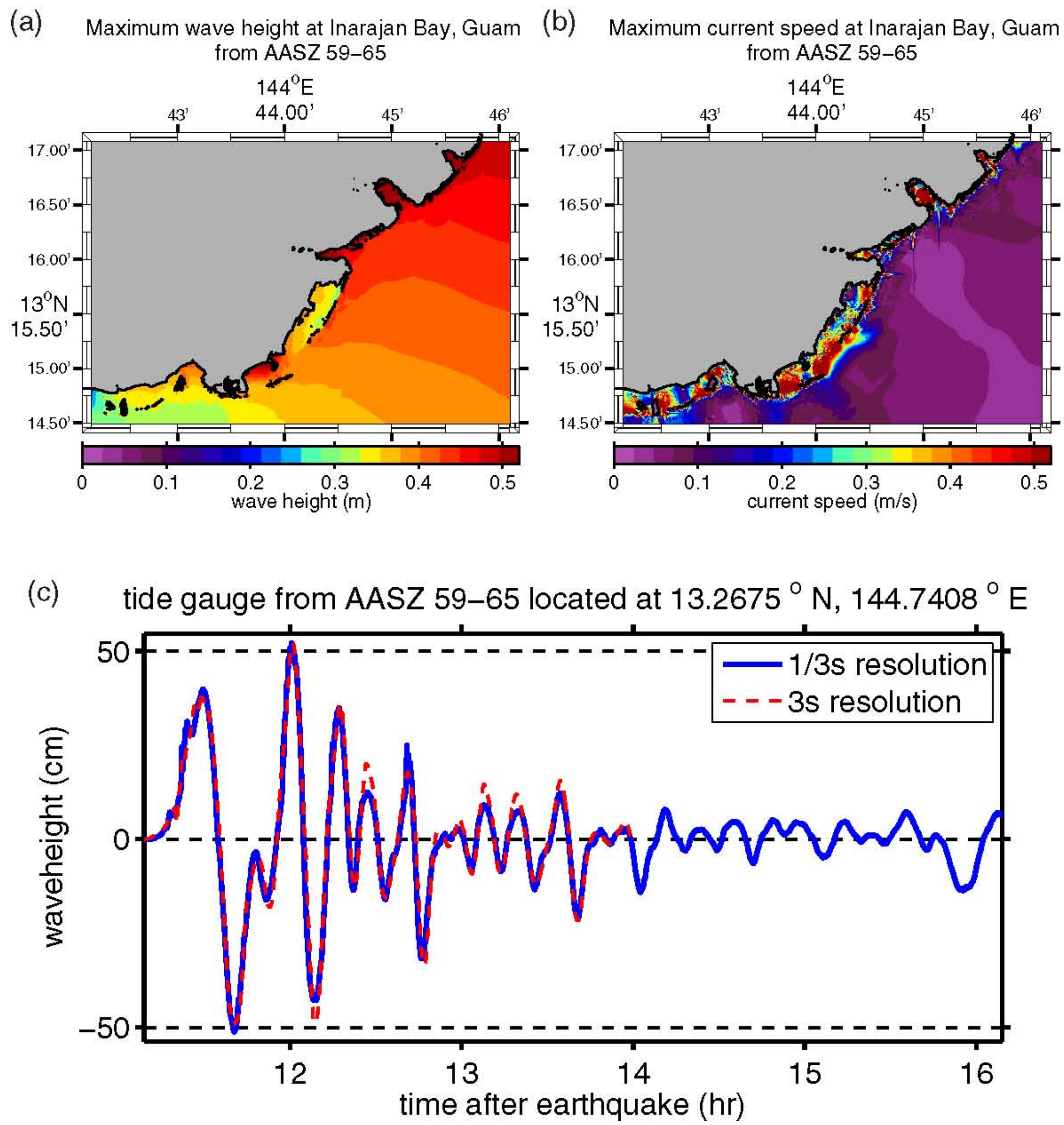

Figure G.11: (a) Maximum computed wave heights, (b) maximum computed currents, and (c) tsunami time history at the numerical tide gauge at Inarajan Bay from a tsunami triggered by a Mw = 9.0 earthquake on AASZ segments 59–65 by a 20-m slip.

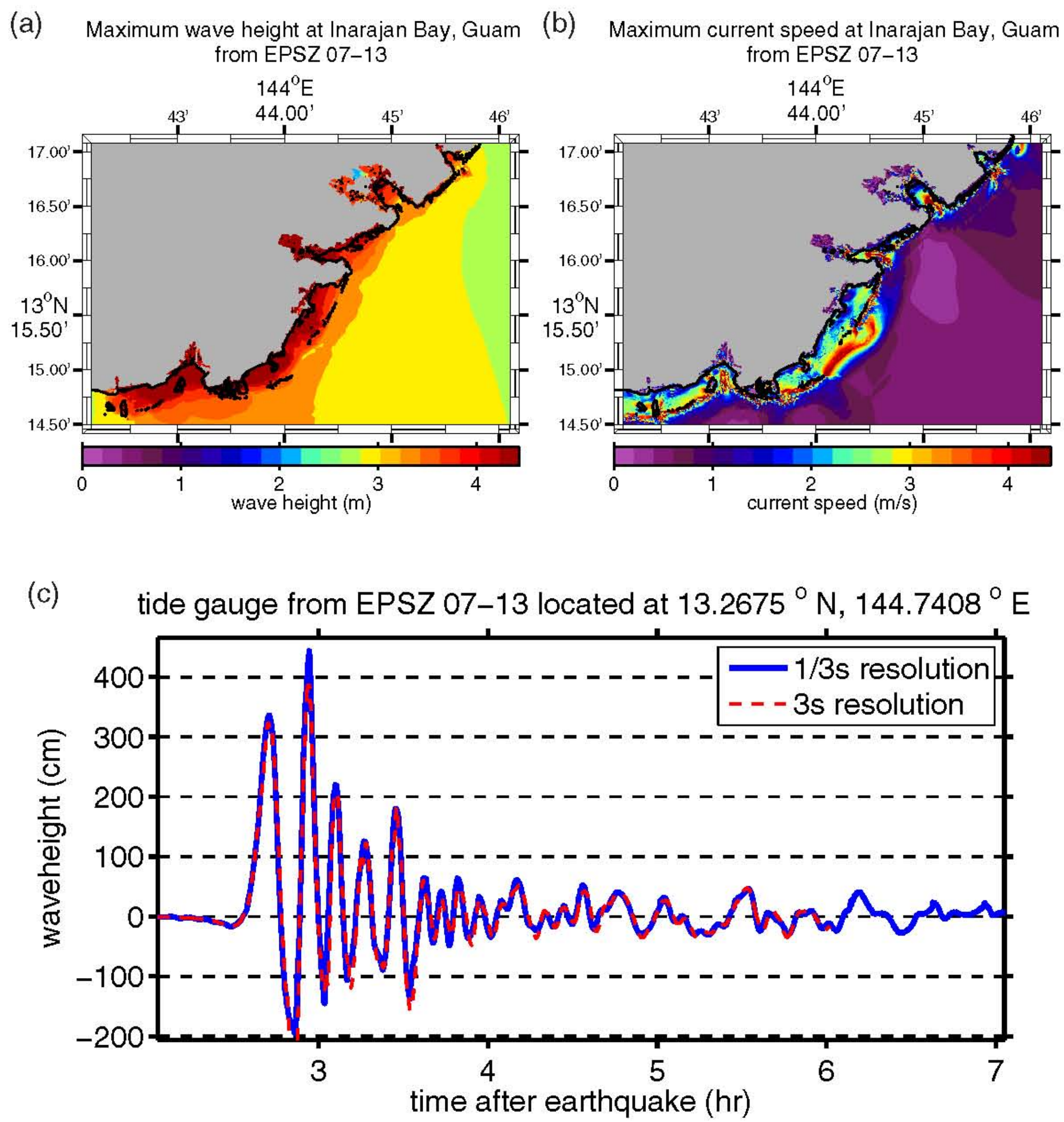

Figure G.12: (a) Maximum computed wave heights, (b) maximum computed currents, and (c) tsunami time history at the numerical tide gauge at Inarajan Bay from a tsunami triggered by a Mw = 9.0 earthquake on EPSZ segments 07–13 by a 20-m slip.

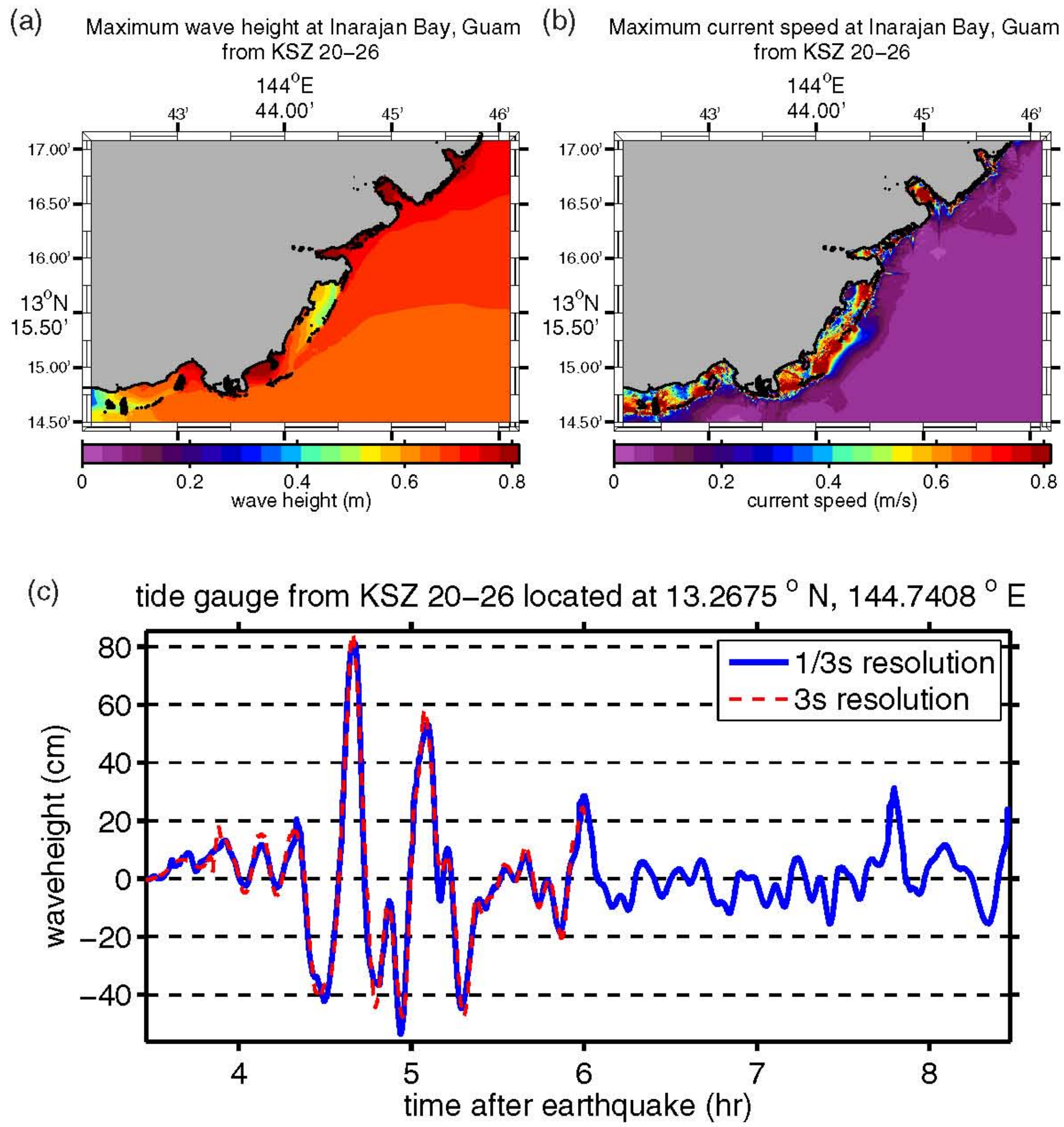

Figure G.13: (a) Maximum computed wave heights, (b) maximum computed currents, and (c) tsunami time history at the numerical tide gauge at Inarajan Bay from a tsunami triggered by a Mw = 9.0 earthquake on KSZ segments 20–26 by a 20-m slip.

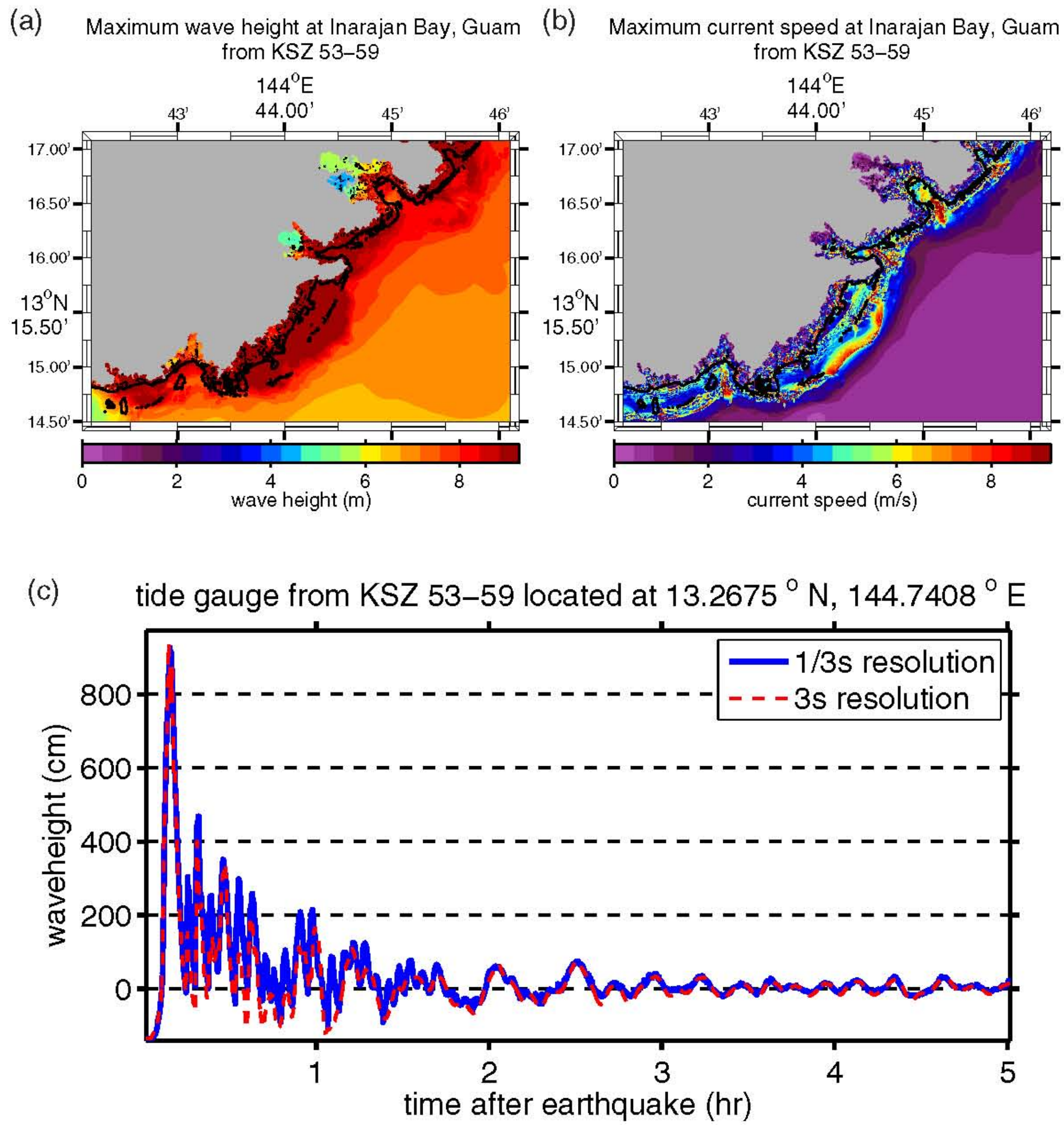

Figure G.14: (a) Maximum computed wave heights, (b) maximum computed currents, and (c) tsunami time history at the numerical tide gauge at Inarajan Bay from a tsunami triggered by a Mw = 9.0 earthquake on KSZ segments 53–60 by a 20-m slip.

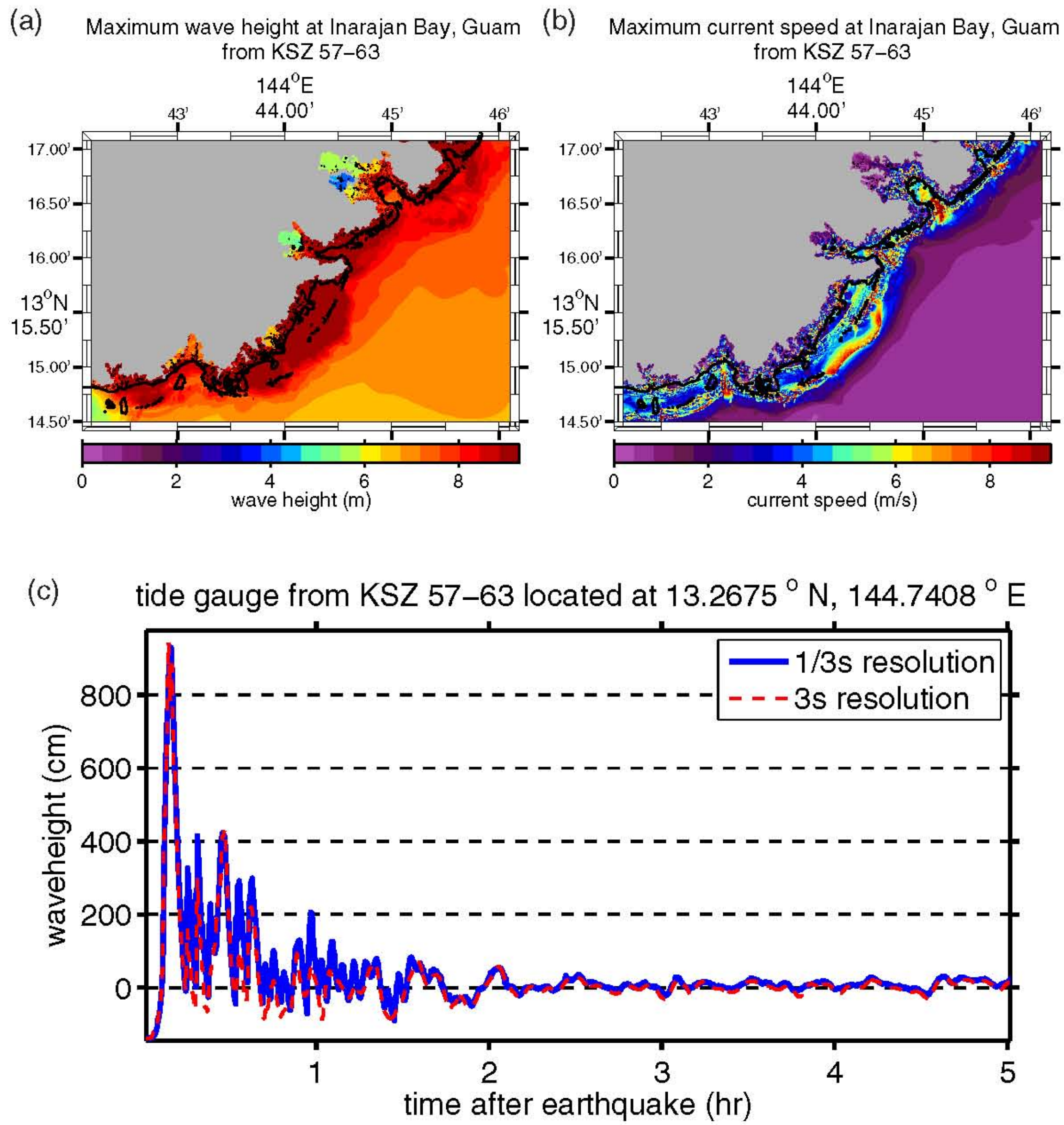

Figure G.15: (a) Maximum computed wave heights, (b) maximum computed currents, and (c) tsunami time history at the numerical tide gauge at Inarajan Bay from a tsunami triggered by a Mw = 9.0 earthquake on KSZ segments 57–63 by a 20-m slip.

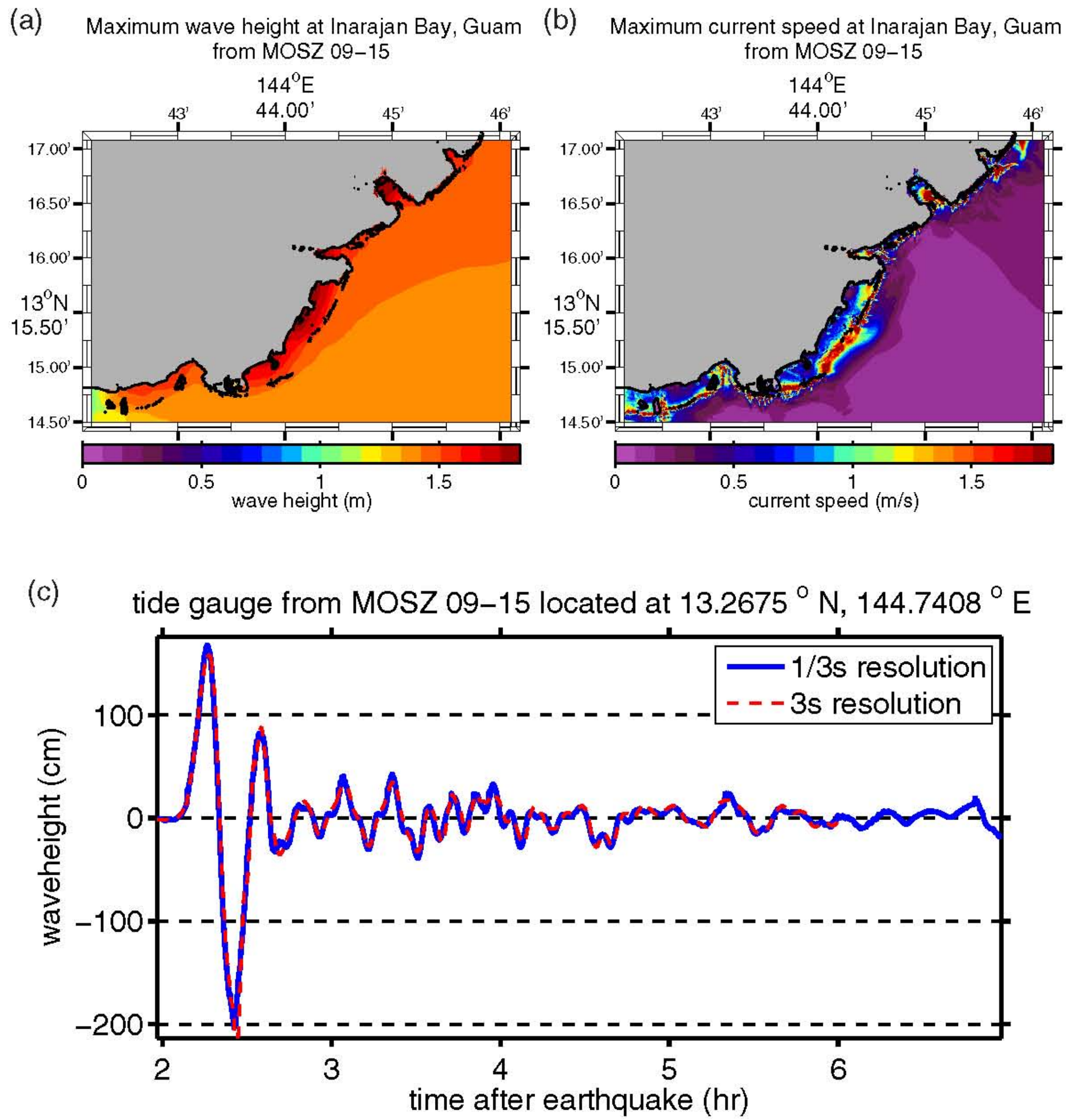

Figure G.16: (a) Maximum computed wave heights, (b) maximum computed currents, and (c) tsunami time history at the numerical tide gauge at Inarajan Bay from a tsunami triggered by a Mw = 9.0 earthquake on MOSZ segments 09–15 by a 20-m slip.

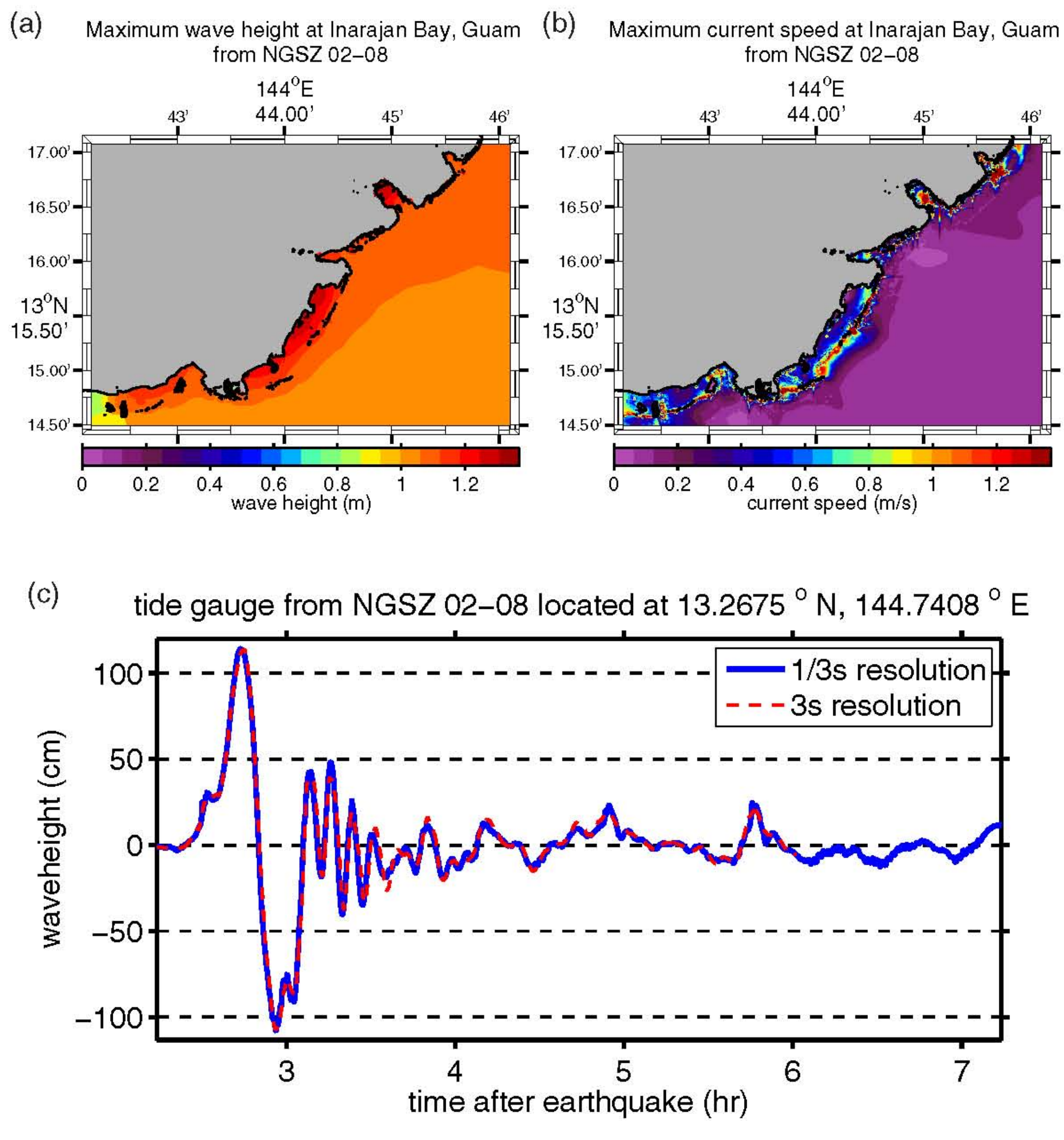

Figure G.17: (a) Maximum computed wave heights, (b) maximum computed currents, and (c) tsunami time history at the numerical tide gauge at Inarajan Bay from a tsunami triggered by a Mw = 9.0 earthquake on NGSZ segments 02–08 by a 20-m slip.

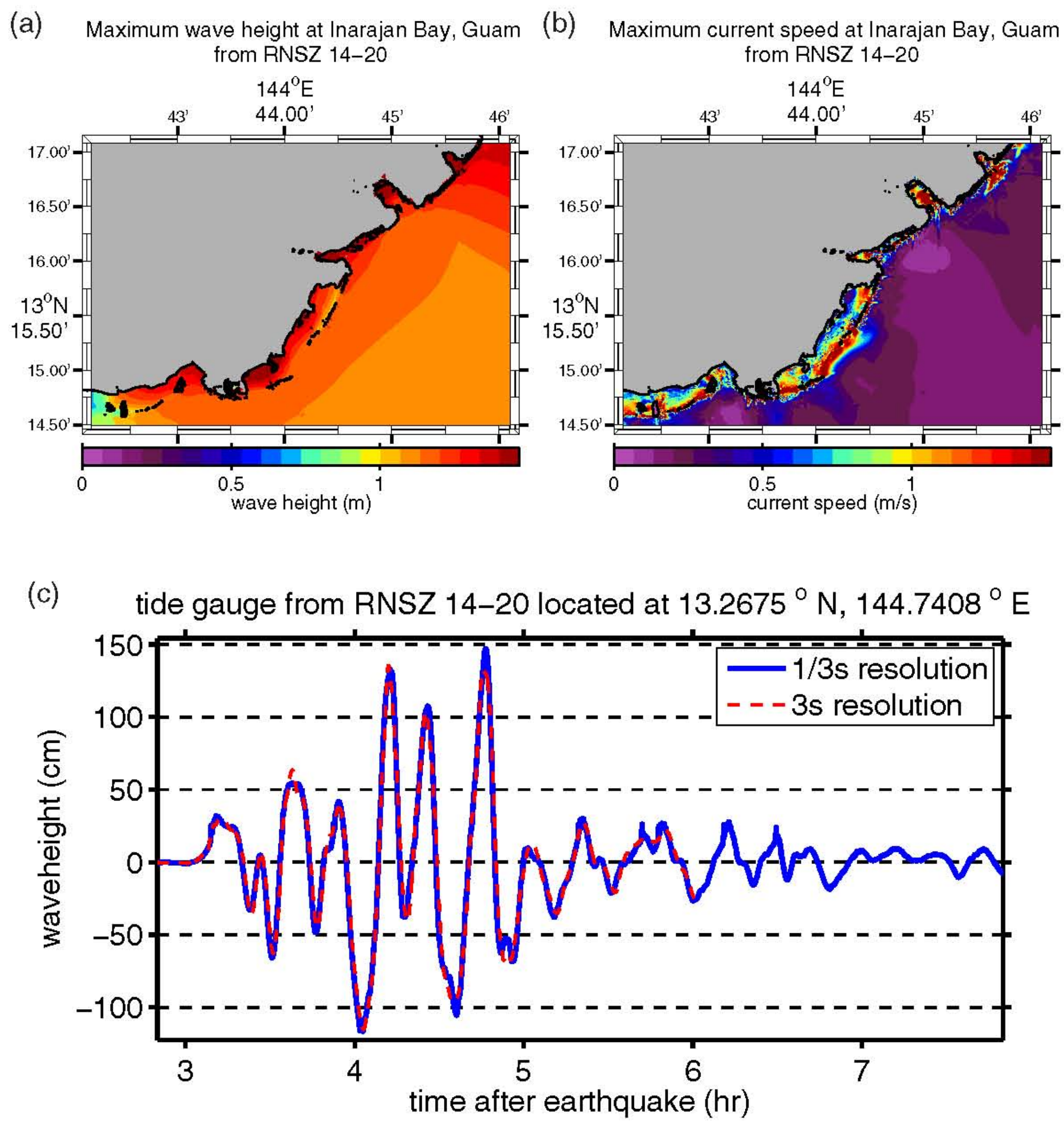

Figure G.18: (a) Maximum computed wave heights, (b) maximum computed currents, and (c) tsunami time history at the numerical tide gauge at Inarajan Bay from a tsunami triggered by a Mw = 9.0 earthquake on RNSZ segments 14–20 by a 20-m slip.

Appendix H
Propagation Database Unit Sources

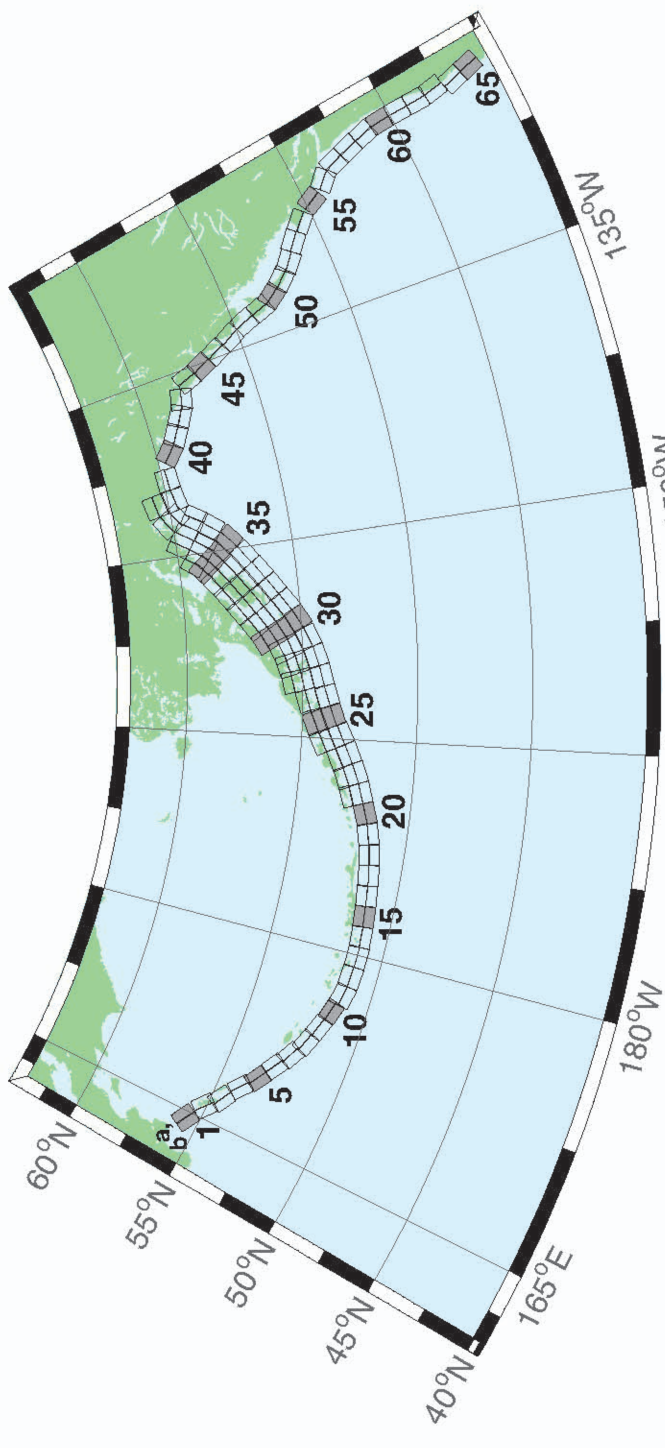

Figure H.1: Aleutian–Alaska–Cascadia Subduction Zone unit sources.

Table H.1: Earthquake parameters for Aleutian–Alaska–Cascadia Subduction Zone unit sources.

Segment	Description	Longitude (°E)	Latitude (°N)	Strike (°)	Dip (°)	Depth (km)
acsz–1a	Aleutian–Alaska–Cascadia	164.7994	55.9606	299	17	19.61
acsz–1b	Aleutian–Alaska–Cascadia	164.4310	55.5849	299	17	5
acsz–2a	Aleutian–Alaska–Cascadia	166.3418	55.4016	310.2	17	19.61
acsz–2b	Aleutian–Alaska–Cascadia	165.8578	55.0734	310.2	17	5
acsz–3a	Aleutian–Alaska–Cascadia	167.2939	54.8919	300.2	23.36	24.82
acsz–3b	Aleutian–Alaska–Cascadia	166.9362	54.5356	300.2	23.36	5
acsz–4a	Aleutian–Alaska–Cascadia	168.7131	54.2852	310.2	38.51	25.33
acsz–4b	Aleutian–Alaska–Cascadia	168.3269	54.0168	310.2	24	5
acsz–5a	Aleutian–Alaska–Cascadia	169.7447	53.7808	302.8	37.02	23.54
acsz–5b	Aleutian–Alaska–Cascadia	169.4185	53.4793	302.8	21.77	5
acsz–6a	Aleutian–Alaska–Cascadia	171.0144	53.3054	303.2	35.31	22.92
acsz–6b	Aleutian–Alaska–Cascadia	170.6813	52.9986	303.2	21	5
acsz–7a	Aleutian–Alaska–Cascadia	172.1500	52.8528	298.2	35.56	20.16
acsz–7b	Aleutian–Alaska–Cascadia	171.8665	52.5307	298.2	17.65	5
acsz–8a	Aleutian–Alaska–Cascadia	173.2726	52.4579	290.8	37.92	20.35
acsz–8b	Aleutian–Alaska–Cascadia	173.0681	52.1266	290.8	17.88	5
acsz–9a	Aleutian–Alaska–Cascadia	174.5866	52.1434	289	39.09	21.05
acsz–9b	Aleutian–Alaska–Cascadia	174.4027	51.8138	289	18.73	5
acsz–10a	Aleutian–Alaska–Cascadia	175.8784	51.8526	286.1	40.51	20.87
acsz–10b	Aleutian–Alaska–Cascadia	175.7265	51.5245	286.1	18.51	5
acsz–11a	Aleutian–Alaska–Cascadia	177.1140	51.6488	280	15	17.94
acsz–11b	Aleutian–Alaska–Cascadia	176.9937	51.2215	280	15	5
acsz–12a	Aleutian–Alaska–Cascadia	178.4500	51.5690	273	15	17.94
acsz–12b	Aleutian–Alaska–Cascadia	178.4130	51.1200	273	15	5
acsz–13a	Aleutian–Alaska–Cascadia	179.8550	51.5340	271	15	17.94
acsz–13b	Aleutian–Alaska–Cascadia	179.8420	51.0850	271	15	5
acsz–14a	Aleutian–Alaska–Cascadia	181.2340	51.5780	267	15	17.94
acsz–14b	Aleutian–Alaska–Cascadia	181.2720	51.1290	267	15	5
acsz–15a	Aleutian–Alaska–Cascadia	182.6380	51.6470	265	15	17.94
acsz–15b	Aleutian–Alaska–Cascadia	182.7000	51.2000	265	15	5
acsz–16a	Aleutian–Alaska–Cascadia	184.0550	51.7250	264	15	17.94
acsz–16b	Aleutian–Alaska–Cascadia	184.1280	51.2780	264	15	5
acsz–17a	Aleutian–Alaska–Cascadia	185.4560	51.8170	262	15	17.94
acsz–17b	Aleutian–Alaska–Cascadia	185.5560	51.3720	262	15	5
acsz–18a	Aleutian–Alaska–Cascadia	186.8680	51.9410	261	15	17.94
acsz–18b	Aleutian–Alaska–Cascadia	186.9810	51.4970	261	15	5
acsz–19a	Aleutian–Alaska–Cascadia	188.2430	52.1280	257	15	17.94
acsz–19b	Aleutian–Alaska–Cascadia	188.4060	51.6900	257	15	5
acsz–20a	Aleutian–Alaska–Cascadia	189.5810	52.3550	251	15	17.94
acsz–20b	Aleutian–Alaska–Cascadia	189.8180	51.9300	251	15	5
acsz–21a	Aleutian–Alaska–Cascadia	190.9570	52.6470	251	15	17.94
acsz–21b	Aleutian–Alaska–Cascadia	191.1960	52.2220	251	15	5
acsz–21z	Aleutian–Alaska–Cascadia	190.7399	53.0443	250.8	15	30.88
acsz–22a	Aleutian–Alaska–Cascadia	192.2940	52.9430	247	15	17.94
acsz–22b	Aleutian–Alaska–Cascadia	192.5820	52.5300	247	15	5
acsz–22z	Aleutian–Alaska–Cascadia	192.0074	53.3347	247.8	15	30.88
acsz–23a	Aleutian–Alaska–Cascadia	193.6270	53.3070	245	15	17.94
acsz–23b	Aleutian–Alaska–Cascadia	193.9410	52.9000	245	15	5
acsz–23z	Aleutian–Alaska–Cascadia	193.2991	53.6768	244.6	15	30.88
acsz–24a	Aleutian–Alaska–Cascadia	194.9740	53.6870	245	15	17.94
acsz–24b	Aleutian–Alaska–Cascadia	195.2910	53.2800	245	15	5
acsz–24y	Aleutian–Alaska–Cascadia	194.3645	54.4604	244.4	15	43.82
acsz–24z	Aleutian–Alaska–Cascadia	194.6793	54.0674	244.6	15	30.88
acsz–25a	Aleutian–Alaska–Cascadia	196.4340	54.0760	250	15	17.94
acsz–25b	Aleutian–Alaska–Cascadia	196.6930	53.6543	250	15	5

(continued on next page)

Table H.1: (continued)

Segment	Description	Longitude (°E)	Latitude (°N)	Strike (°)	Dip (°)	Depth (km)
acsz–25y	Aleutian–Alaska–Cascadia	195.9009	54.8572	247.9	15	43.82
acsz–25z	Aleutian–Alaska–Cascadia	196.1761	54.4536	248.1	15	30.88
acsz–26a	Aleutian–Alaska–Cascadia	197.8970	54.3600	253	15	17.94
acsz–26b	Aleutian–Alaska–Cascadia	198.1200	53.9300	253	15	5
acsz–26y	Aleutian–Alaska–Cascadia	197.5498	55.1934	253.1	15	43.82
acsz–26z	Aleutian–Alaska–Cascadia	197.7620	54.7770	253.3	15	30.88
acsz–27a	Aleutian–Alaska–Cascadia	199.4340	54.5960	256	15	17.94
acsz–27b	Aleutian–Alaska–Cascadia	199.6200	54.1600	256	15	5
acsz–27x	Aleutian–Alaska–Cascadia	198.9736	55.8631	256.5	15	56.24
acsz–27y	Aleutian–Alaska–Cascadia	199.1454	55.4401	256.6	15	43.82
acsz–27z	Aleutian–Alaska–Cascadia	199.3135	55.0170	256.8	15	30.88
acsz–28a	Aleutian–Alaska–Cascadia	200.8820	54.8300	253	15	17.94
acsz–28b	Aleutian–Alaska–Cascadia	201.1080	54.4000	253	15	5
acsz–28x	Aleutian–Alaska–Cascadia	200.1929	56.0559	252.5	15	56.24
acsz–28y	Aleutian–Alaska–Cascadia	200.4167	55.6406	252.7	15	43.82
acsz–28z	Aleutian–Alaska–Cascadia	200.6360	55.2249	252.9	15	30.88
acsz–29a	Aleutian–Alaska–Cascadia	202.2610	55.1330	247	15	17.94
acsz–29b	Aleutian–Alaska–Cascadia	202.5650	54.7200	247	15	5
acsz–29x	Aleutian–Alaska–Cascadia	201.2606	56.2861	245.7	15	56.24
acsz–29y	Aleutian–Alaska–Cascadia	201.5733	55.8888	246	15	43.82
acsz–29z	Aleutian–Alaska–Cascadia	201.8797	55.4908	246.2	15	30.88
acsz–30a	Aleutian–Alaska–Cascadia	203.6040	55.5090	240	15	17.94
acsz–30b	Aleutian–Alaska–Cascadia	203.9970	55.1200	240	15	5
acsz–30w	Aleutian–Alaska–Cascadia	201.9901	56.9855	239.5	15	69.12
acsz–30x	Aleutian–Alaska–Cascadia	202.3851	56.6094	239.8	15	56.24
acsz–30y	Aleutian–Alaska–Cascadia	202.7724	56.2320	240.2	15	43.82
acsz–30z	Aleutian–Alaska–Cascadia	203.1521	55.8534	240.5	15	30.88
acsz–31a	Aleutian–Alaska–Cascadia	204.8950	55.9700	236	15	17.94
acsz–31b	Aleutian–Alaska–Cascadia	205.3400	55.5980	236	15	5
acsz–31w	Aleutian–Alaska–Cascadia	203.0825	57.3740	234.5	15	69.12
acsz–31x	Aleutian–Alaska–Cascadia	203.5408	57.0182	234.9	15	56.24
acsz–31y	Aleutian–Alaska–Cascadia	203.9904	56.6607	235.3	15	43.82
acsz–31z	Aleutian–Alaska–Cascadia	204.4315	56.3016	235.7	15	30.88
acsz–32a	Aleutian–Alaska–Cascadia	206.2080	56.4730	236	15	17.94
acsz–32b	Aleutian–Alaska–Cascadia	206.6580	56.1000	236	15	5
acsz–32w	Aleutian–Alaska–Cascadia	204.4129	57.8908	234.3	15	69.12
acsz–32x	Aleutian–Alaska–Cascadia	204.8802	57.5358	234.7	15	56.24
acsz–32y	Aleutian–Alaska–Cascadia	205.3385	57.1792	235.1	15	43.82
acsz–32z	Aleutian–Alaska–Cascadia	205.7880	56.8210	235.5	15	30.88
acsz–33a	Aleutian–Alaska–Cascadia	207.5370	56.9750	236	15	17.94
acsz–33b	Aleutian–Alaska–Cascadia	207.9930	56.6030	236	15	5
acsz–33w	Aleutian–Alaska–Cascadia	205.7126	58.3917	234.2	15	69.12
acsz–33x	Aleutian–Alaska–Cascadia	206.1873	58.0371	234.6	15	56.24
acsz–33y	Aleutian–Alaska–Cascadia	206.6527	57.6808	235	15	43.82
acsz–33z	Aleutian–Alaska–Cascadia	207.1091	57.3227	235.4	15	30.88
acsz–34a	Aleutian–Alaska–Cascadia	208.9371	57.5124	236	15	17.94
acsz–34b	Aleutian–Alaska–Cascadia	209.4000	57.1400	236	15	5
acsz–34w	Aleutian–Alaska–Cascadia	206.9772	58.8804	233.5	15	69.12
acsz–34x	Aleutian–Alaska–Cascadia	207.4677	58.5291	233.9	15	56.24
acsz–34y	Aleutian–Alaska–Cascadia	207.9485	58.1760	234.3	15	43.82
acsz–34z	Aleutian–Alaska–Cascadia	208.4198	57.8213	234.7	15	30.88
acsz–35a	Aleutian–Alaska–Cascadia	210.2597	58.0441	230	15	17.94
acsz–35b	Aleutian–Alaska–Cascadia	210.8000	57.7000	230	15	5
acsz–35w	Aleutian–Alaska–Cascadia	208.0204	59.3199	228.8	15	69.12
acsz–35x	Aleutian–Alaska–Cascadia	208.5715	58.9906	229.3	15	56.24

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Table H.1: (continued)

Segment	Description	Longitude (°E)	Latitude (°N)	Strike (°)	Dip (°)	Depth (km)
acsz–35y	Aleutian–Alaska–Cascadia	209.1122	58.6590	229.7	15	43.82
acsz–35z	Aleutian–Alaska–Cascadia	209.6425	58.3252	230.2	15	30.88
acsz–36a	Aleutian–Alaska–Cascadia	211.3249	58.6565	218	15	17.94
acsz–36b	Aleutian–Alaska–Cascadia	212.0000	58.3800	218	15	5
acsz–36w	Aleutian–Alaska–Cascadia	208.5003	59.5894	215.6	15	69.12
acsz–36x	Aleutian–Alaska–Cascadia	209.1909	59.3342	216.2	15	56.24
acsz–36y	Aleutian–Alaska–Cascadia	209.8711	59.0753	216.8	15	43.82
acsz–36z	Aleutian–Alaska–Cascadia	210.5412	58.8129	217.3	15	30.88
acsz–37a	Aleutian–Alaska–Cascadia	212.2505	59.2720	213.7	15	17.94
acsz–37b	Aleutian–Alaska–Cascadia	212.9519	59.0312	213.7	15	5
acsz–37x	Aleutian–Alaska–Cascadia	210.1726	60.0644	213	15	56.24
acsz–37y	Aleutian–Alaska–Cascadia	210.8955	59.8251	213.7	15	43.82
acsz–37z	Aleutian–Alaska–Cascadia	211.6079	59.5820	214.3	15	30.88
acsz–38a	Aleutian–Alaska–Cascadia	214.6555	60.1351	260.1	0	15
acsz–38b	Aleutian–Alaska–Cascadia	214.8088	59.6927	260.1	0	15
acsz–38y	Aleutian–Alaska–Cascadia	214.3737	60.9838	259	0	15
acsz–38z	Aleutian–Alaska–Cascadia	214.5362	60.5429	259	0	15
acsz–39a	Aleutian–Alaska–Cascadia	216.5607	60.2480	267	0	15
acsz–39b	Aleutian–Alaska–Cascadia	216.6068	59.7994	267	0	15
acsz–40a	Aleutian–Alaska–Cascadia	219.3069	59.7574	310.9	0	15
acsz–40b	Aleutian–Alaska–Cascadia	218.7288	59.4180	310.9	0	15
acsz–41a	Aleutian–Alaska–Cascadia	220.4832	59.3390	300.7	0	15
acsz–41b	Aleutian–Alaska–Cascadia	220.0382	58.9529	300.7	0	15
acsz–42a	Aleutian–Alaska–Cascadia	221.8835	58.9310	298.9	0	15
acsz–42b	Aleutian–Alaska–Cascadia	221.4671	58.5379	298.9	0	15
acsz–43a	Aleutian–Alaska–Cascadia	222.9711	58.6934	282.3	0	15
acsz–43b	Aleutian–Alaska–Cascadia	222.7887	58.2546	282.3	0	15
acsz–44a	Aleutian–Alaska–Cascadia	224.9379	57.9054	340.9	12	11.09
acsz–44b	Aleutian–Alaska–Cascadia	224.1596	57.7617	340.9	7	5
acsz–45a	Aleutian–Alaska–Cascadia	225.4994	57.1634	334.1	12	11.09
acsz–45b	Aleutian–Alaska–Cascadia	224.7740	56.9718	334.1	7	5
acsz–46a	Aleutian–Alaska–Cascadia	226.1459	56.3552	334.1	12	11.09
acsz–46b	Aleutian–Alaska–Cascadia	225.4358	56.1636	334.1	7	5
acsz–47a	Aleutian–Alaska–Cascadia	226.7731	55.5830	332.3	12	11.09
acsz–47b	Aleutian–Alaska–Cascadia	226.0887	55.3785	332.3	7	5
acsz–48a	Aleutian–Alaska–Cascadia	227.4799	54.6763	339.4	12	11.09
acsz–48b	Aleutian–Alaska–Cascadia	226.7713	54.5217	339.4	7	5
acsz–49a	Aleutian–Alaska–Cascadia	227.9482	53.8155	341.2	12	11.09
acsz–49b	Aleutian–Alaska–Cascadia	227.2462	53.6737	341.2	7	5
acsz–50a	Aleutian–Alaska–Cascadia	228.3970	53.2509	324.5	12	11.09
acsz–50b	Aleutian–Alaska–Cascadia	227.8027	52.9958	324.5	7	5
acsz–51a	Aleutian–Alaska–Cascadia	229.1844	52.6297	318.4	12	11.09
acsz–51b	Aleutian–Alaska–Cascadia	228.6470	52.3378	318.4	7	5
acsz–52a	Aleutian–Alaska–Cascadia	230.0306	52.0768	310.9	12	11.09
acsz–52b	Aleutian–Alaska–Cascadia	229.5665	51.7445	310.9	7	5
acsz–53a	Aleutian–Alaska–Cascadia	231.1735	51.5258	310.9	12	11.09
acsz–53b	Aleutian–Alaska–Cascadia	230.7150	51.1935	310.9	7	5
acsz–54a	Aleutian–Alaska–Cascadia	232.2453	50.8809	314.1	12	11.09
acsz–54b	Aleutian–Alaska–Cascadia	231.7639	50.5655	314.1	7	5
acsz–55a	Aleutian–Alaska–Cascadia	233.3066	49.9032	333.7	12	11.09
acsz–55b	Aleutian–Alaska–Cascadia	232.6975	49.7086	333.7	7	5
acsz–56a	Aleutian–Alaska–Cascadia	234.0588	49.1702	315	11	12.82
acsz–56b	Aleutian–Alaska–Cascadia	233.5849	48.8584	315	9	5
acsz–57a	Aleutian–Alaska–Cascadia	234.9041	48.2596	341	11	12.82
acsz–57b	Aleutian–Alaska–Cascadia	234.2797	48.1161	341	9	5

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Table H.1: (continued)

Segment	Description	Longitude (°E)	Latitude (°N)	Strike (°)	Dip (°)	Depth (km)
acsz–58a	Aleutian–Alaska–Cascadia	235.3021	47.3812	344	11	12.82
acsz–58b	Aleutian–Alaska–Cascadia	234.6776	47.2597	344	9	5
acsz–59a	Aleutian–Alaska–Cascadia	235.6432	46.5082	345	11	12.82
acsz–59b	Aleutian–Alaska–Cascadia	235.0257	46.3941	345	9	5
acsz–60a	Aleutian–Alaska–Cascadia	235.8640	45.5429	356	11	12.82
acsz–60b	Aleutian–Alaska–Cascadia	235.2363	45.5121	356	9	5
acsz–61a	Aleutian–Alaska–Cascadia	235.9106	44.6227	359	11	12.82
acsz–61b	Aleutian–Alaska–Cascadia	235.2913	44.6150	359	9	5
acsz–62a	Aleutian–Alaska–Cascadia	235.9229	43.7245	359	11	12.82
acsz–62b	Aleutian–Alaska–Cascadia	235.3130	43.7168	359	9	5
acsz–63a	Aleutian–Alaska–Cascadia	236.0220	42.9020	350	11	12.82
acsz–63b	Aleutian–Alaska–Cascadia	235.4300	42.8254	350	9	5
acsz–64a	Aleutian–Alaska–Cascadia	235.9638	41.9818	345	11	12.82
acsz–64b	Aleutian–Alaska–Cascadia	235.3919	41.8677	345	9	5
acsz–65a	Aleutian–Alaska–Cascadia	236.2643	41.1141	345	11	12.82
acsz–65b	Aleutian–Alaska–Cascadia	235.7000	41.0000	345	9	5
acsz–238a	Aleutian–Alaska–Cascadia	213.2878	59.8406	236.8	15	17.94
acsz–238y	Aleutian–Alaska–Cascadia	212.3424	60.5664	236.8	15	43.82
acsz–238z	Aleutian–Alaska–Cascadia	212.8119	60.2035	236.8	15	30.88

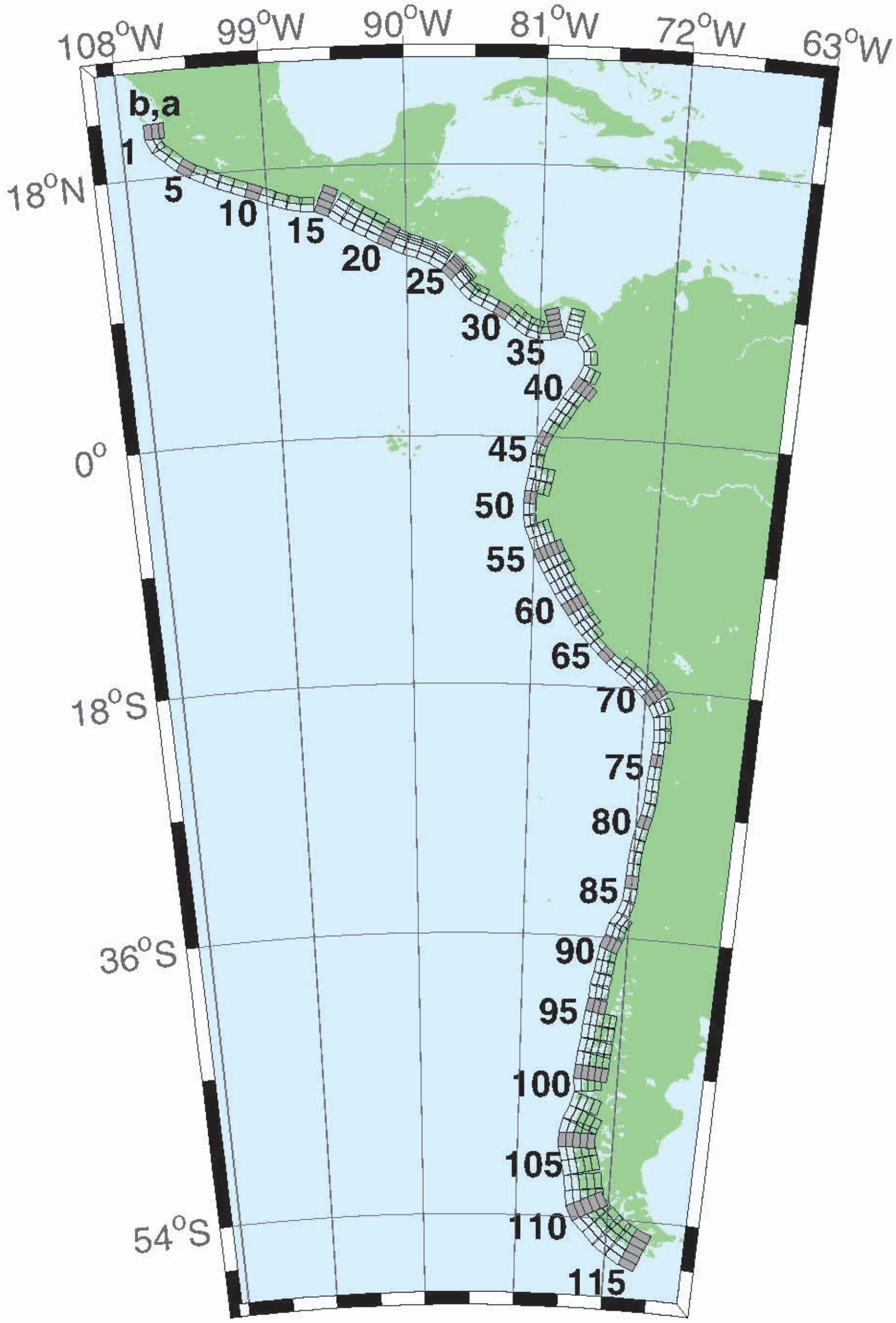

Figure H.2: Central and South America Subduction Zone unit sources.

Table H.2: Earthquake parameters for Central and South America Subduction Zone unit sources.

Segment	Description	Longitude (°E)	Latitude (°N)	Strike (°)	Dip (°)	Depth (km)
cssz–1a	Central and South America	254.4573	20.8170	359	19	15.4
cssz–1b	Central and South America	254.0035	20.8094	359	12	5
cssz–1z	Central and South America	254.7664	20.8222	359	50	31.67
cssz–2a	Central and South America	254.5765	20.2806	336.8	19	15.4
cssz–2b	Central and South America	254.1607	20.1130	336.8	12	5
cssz–3a	Central and South America	254.8789	19.8923	310.6	18.31	15.27
cssz–3b	Central and South America	254.5841	19.5685	310.6	11.85	5
cssz–4a	Central and South America	255.6167	19.2649	313.4	17.62	15.12
cssz–4b	Central and South America	255.3056	18.9537	313.4	11.68	5
cssz–5a	Central and South America	256.2240	18.8148	302.7	16.92	15
cssz–5b	Central and South America	255.9790	18.4532	302.7	11.54	5
cssz–6a	Central and South America	256.9425	18.4383	295.1	16.23	14.87
cssz–6b	Central and South America	256.7495	18.0479	295.1	11.38	5
cssz–7a	Central and South America	257.8137	18.0339	296.9	15.54	14.74
cssz–7b	Central and South America	257.6079	17.6480	296.9	11.23	5
cssz–8a	Central and South America	258.5779	17.7151	290.4	14.85	14.61
cssz–8b	Central and South America	258.4191	17.3082	290.4	11.08	5
cssz–9a	Central and South America	259.4578	17.4024	290.5	14.15	14.47
cssz–9b	Central and South America	259.2983	16.9944	290.5	10.92	5
cssz–10a	Central and South America	260.3385	17.0861	290.8	13.46	14.34
cssz–10b	Central and South America	260.1768	16.6776	290.8	10.77	5
cssz–11a	Central and South America	261.2255	16.7554	291.8	12.77	14.21
cssz–11b	Central and South America	261.0556	16.3487	291.8	10.62	5
cssz–12a	Central and South America	262.0561	16.4603	288.9	12.08	14.08
cssz–12b	Central and South America	261.9082	16.0447	288.9	10.46	5
cssz–13a	Central and South America	262.8638	16.2381	283.2	11.38	13.95
cssz–13b	Central and South America	262.7593	15.8094	283.2	10.31	5
cssz–14a	Central and South America	263.6066	16.1435	272.1	10.69	13.81
cssz–14b	Central and South America	263.5901	15.7024	272.1	10.15	5
cssz–15a	Central and South America	264.8259	15.8829	293	10	13.68
cssz–15b	Central and South America	264.6462	15.4758	293	10	5
cssz–15y	Central and South America	265.1865	16.6971	293	10	31.05
cssz–15z	Central and South America	265.0060	16.2900	293	10	22.36
cssz–16a	Central and South America	265.7928	15.3507	304.9	15	15.82
cssz–16b	Central and South America	265.5353	14.9951	304.9	12.5	5
cssz–16y	Central and South America	266.3092	16.0619	304.9	15	41.7
cssz–16z	Central and South America	266.0508	15.7063	304.9	15	28.76
cssz–17a	Central and South America	266.4947	14.9019	299.5	20	17.94
cssz–17b	Central and South America	266.2797	14.5346	299.5	15	5
cssz–17y	Central and South America	266.9259	15.6365	299.5	20	52.14
cssz–17z	Central and South America	266.7101	15.2692	299.5	20	35.04
cssz–18a	Central and South America	267.2827	14.4768	298	21.5	17.94
cssz–18b	Central and South America	267.0802	14.1078	298	15	5
cssz–18y	Central and South America	267.6888	15.2148	298	21.5	54.59
cssz–18z	Central and South America	267.4856	14.8458	298	21.5	36.27
cssz–19a	Central and South America	268.0919	14.0560	297.6	23	17.94
cssz–19b	Central and South America	267.8943	13.6897	297.6	15	5
cssz–19y	Central and South America	268.4880	14.7886	297.6	23	57.01
cssz–19z	Central and South America	268.2898	14.4223	297.6	23	37.48
cssz–20a	Central and South America	268.8929	13.6558	296.2	24	17.94
cssz–20b	Central and South America	268.7064	13.2877	296.2	15	5
cssz–20y	Central and South America	269.1796	14.2206	296.2	45.5	73.94
cssz–20z	Central and South America	269.0362	13.9382	296.2	45.5	38.28
cssz–21a	Central and South America	269.6797	13.3031	292.6	25	17.94
cssz–21b	Central and South America	269.5187	12.9274	292.6	15	5

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Table H.2: (continued)

Segment	Description	Longitude (°E)	Latitude (°N)	Strike (°)	Dip (°)	Depth (km)
cssz–21x	Central and South America	269.8797	13.7690	292.6	68	131.8
cssz–21y	Central and South America	269.8130	13.6137	292.6	68	85.43
cssz–21z	Central and South America	269.7463	13.4584	292.6	68	39.07
cssz–22a	Central and South America	270.4823	13.0079	288.6	25	17.94
cssz–22b	Central and South America	270.3492	12.6221	288.6	15	5
cssz–22x	Central and South America	270.6476	13.4864	288.6	68	131.8
cssz–22y	Central and South America	270.5925	13.3269	288.6	68	85.43
cssz–22z	Central and South America	270.5374	13.1674	288.6	68	39.07
cssz–23a	Central and South America	271.3961	12.6734	292.4	25	17.94
cssz–23b	Central and South America	271.2369	12.2972	292.4	15	5
cssz–23x	Central and South America	271.5938	13.1399	292.4	68	131.8
cssz–23y	Central and South America	271.5279	12.9844	292.4	68	85.43
cssz–23z	Central and South America	271.4620	12.8289	292.4	68	39.07
cssz–24a	Central and South America	272.3203	12.2251	300.2	25	17.94
cssz–24b	Central and South America	272.1107	11.8734	300.2	15	5
cssz–24x	Central and South America	272.5917	12.6799	300.2	67	131.1
cssz–24y	Central and South America	272.5012	12.5283	300.2	67	85.1
cssz–24z	Central and South America	272.4107	12.3767	300.2	67	39.07
cssz–25a	Central and South America	273.2075	11.5684	313.8	25	17.94
cssz–25b	Central and South America	272.9200	11.2746	313.8	15	5
cssz–25x	Central and South America	273.5950	11.9641	313.8	66	130.4
cssz–25y	Central and South America	273.4658	11.8322	313.8	66	84.75
cssz–25z	Central and South America	273.3366	11.7003	313.8	66	39.07
cssz–26a	Central and South America	273.8943	10.8402	320.4	25	17.94
cssz–26b	Central and South America	273.5750	10.5808	320.4	15	5
cssz–26x	Central and South America	274.3246	11.1894	320.4	66	130.4
cssz–26y	Central and South America	274.1811	11.0730	320.4	66	84.75
cssz–26z	Central and South America	274.0377	10.9566	320.4	66	39.07
cssz–27a	Central and South America	274.4569	10.2177	316.1	25	17.94
cssz–27b	Central and South America	274.1590	9.9354	316.1	15	5
cssz–27z	Central and South America	274.5907	10.3444	316.1	66	39.07
cssz–28a	Central and South America	274.9586	9.8695	297.1	22	14.54
cssz–28b	Central and South America	274.7661	9.4988	297.1	11	5
cssz–28z	Central and South America	275.1118	10.1643	297.1	42.5	33.27
cssz–29a	Central and South America	275.7686	9.4789	296.6	19	11.09
cssz–29b	Central and South America	275.5759	9.0992	296.6	7	5
cssz–30a	Central and South America	276.6346	8.9973	302.2	19	9.36
cssz–30b	Central and South America	276.4053	8.6381	302.2	5	5
cssz–31a	Central and South America	277.4554	8.4152	309.1	19	7.62
cssz–31b	Central and South America	277.1851	8.0854	309.1	3	5
cssz–31z	Central and South America	277.7260	8.7450	309.1	19	23.9
cssz–32a	Central and South America	278.1112	7.9425	303	18.67	8.49
cssz–32b	Central and South America	277.8775	7.5855	303	4	5
cssz–32z	Central and South America	278.3407	8.2927	303	21.67	24.49
cssz–33a	Central and South America	278.7082	7.6620	287.6	18.33	10.23
cssz–33b	Central and South America	278.5785	7.2555	287.6	6	5
cssz–33z	Central and South America	278.8328	8.0522	287.6	24.33	25.95
cssz–34a	Central and South America	279.3184	7.5592	269.5	18	17.94
cssz–34b	Central and South America	279.3223	7.1320	269.5	15	5
cssz–35a	Central and South America	280.0039	7.6543	255.9	17.67	14.54
cssz–35b	Central and South America	280.1090	7.2392	255.9	11	5
cssz–35x	Central and South America	279.7156	8.7898	255.9	29.67	79.22
cssz–35y	Central and South America	279.8118	8.4113	255.9	29.67	54.47
cssz–35z	Central and South America	279.9079	8.0328	255.9	29.67	29.72
cssz–36a	Central and South America	281.2882	7.6778	282.5	17.33	11.09

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Table H.2: (continued)

Segment	Description	Longitude (°E)	Latitude (°N)	Strike (°)	Dip (°)	Depth (km)
cssz–36b	Central and South America	281.1948	7.2592	282.5	7	5
cssz–36x	Central and South America	281.5368	8.7896	282.5	32.33	79.47
cssz–36y	Central and South America	281.4539	8.4190	282.5	32.33	52.73
cssz–36z	Central and South America	281.3710	8.0484	282.5	32.33	25.99
cssz–37a	Central and South America	282.5252	6.8289	326.9	17	10.23
cssz–37b	Central and South America	282.1629	6.5944	326.9	6	5
cssz–38a	Central and South America	282.9469	5.5973	355.4	17	10.23
cssz–38b	Central and South America	282.5167	5.5626	355.4	6	5
cssz–39a	Central and South America	282.7236	4.3108	24.13	17	10.23
cssz–39b	Central and South America	282.3305	4.4864	24.13	6	5
cssz–39z	Central and South America	283.0603	4.1604	24.13	35	24.85
cssz–40a	Central and South America	282.1940	3.3863	35.28	17	10.23
cssz–40b	Central and South America	281.8427	3.6344	35.28	6	5
cssz–40y	Central and South America	282.7956	2.9613	35.28	35	53.52
cssz–40z	Central and South America	282.4948	3.1738	35.28	35	24.85
cssz–41a	Central and South America	281.6890	2.6611	34.27	17	10.23
cssz–41b	Central and South America	281.3336	2.9030	34.27	6	5
cssz–41z	Central and South America	281.9933	2.4539	34.27	35	24.85
cssz–42a	Central and South America	281.2266	1.9444	31.29	17	10.23
cssz–42b	Central and South America	280.8593	2.1675	31.29	6	5
cssz–42z	Central and South America	281.5411	1.7533	31.29	35	24.85
cssz–43a	Central and South America	280.7297	1.1593	33.3	17	10.23
cssz–43b	Central and South America	280.3706	1.3951	33.3	6	5
cssz–43z	Central and South America	281.0373	0.9573	33.3	35	24.85
cssz–44a	Central and South America	280.3018	0.4491	28.8	17	10.23
cssz–44b	Central and South America	279.9254	0.6560	28.8	6	5
cssz–45a	Central and South America	279.9083	–0.3259	26.91	10	8.49
cssz–45b	Central and South America	279.5139	–0.1257	26.91	4	5
cssz–46a	Central and South America	279.6461	–0.9975	15.76	10	8.49
cssz–46b	Central and South America	279.2203	–0.8774	15.76	4	5
cssz–47a	Central and South America	279.4972	–1.7407	6.9	10	8.49
cssz–47b	Central and South America	279.0579	–1.6876	6.9	4	5
cssz–48a	Central and South America	279.3695	–2.6622	8.96	10	8.49
cssz–48b	Central and South America	278.9321	–2.5933	8.96	4	5
cssz–48y	Central and South America	280.2444	–2.8000	8.96	10	25.85
cssz–48z	Central and South America	279.8070	–2.7311	8.96	10	17.17
cssz–49a	Central and South America	279.1852	–3.6070	13.15	10	8.49
cssz–49b	Central and South America	278.7536	–3.5064	13.15	4	5
cssz–49y	Central and South America	280.0486	–3.8082	13.15	10	25.85
cssz–49z	Central and South America	279.6169	–3.7076	13.15	10	17.17
cssz–50a	Central and South America	279.0652	–4.3635	4.78	10.33	9.64
cssz–50b	Central and South America	278.6235	–4.3267	4.78	5.33	5
cssz–51a	Central and South America	279.0349	–5.1773	359.4	10.67	10.81
cssz–51b	Central and South America	278.5915	–5.1817	359.4	6.67	5
cssz–52a	Central and South America	279.1047	–5.9196	349.8	11	11.96
cssz–52b	Central and South America	278.6685	–5.9981	349.8	8	5
cssz–53a	Central and South America	279.3044	–6.6242	339.2	10.25	11.74
cssz–53b	Central and South America	278.8884	–6.7811	339.2	7.75	5
cssz–53y	Central and South America	280.1024	–6.3232	339.2	19.25	37.12
cssz–53z	Central and South America	279.7035	–6.4737	339.2	19.25	20.64
cssz–54a	Central and South America	279.6256	–7.4907	340.8	9.5	11.53
cssz–54b	Central and South America	279.2036	–7.6365	340.8	7.5	5
cssz–54y	Central and South America	280.4267	–7.2137	340.8	20.5	37.29
cssz–54z	Central and South America	280.0262	–7.3522	340.8	20.5	19.78
cssz–55a	Central and South America	279.9348	–8.2452	335.4	8.75	11.74

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Table H.2: (continued)

Segment	Description	Longitude (°E)	Latitude (°N)	Strike (°)	Dip (°)	Depth (km)
cssz–55b	Central and South America	279.5269	–8.4301	335.4	7.75	5
cssz–55x	Central and South America	281.0837	–7.7238	335.4	21.75	56.4
cssz–55y	Central and South America	280.7009	–7.8976	335.4	21.75	37.88
cssz–55z	Central and South America	280.3180	–8.0714	335.4	21.75	19.35
cssz–56a	Central and South America	280.3172	–8.9958	331.6	8	11.09
cssz–56b	Central and South America	279.9209	–9.2072	331.6	7	5
cssz–56x	Central and South America	281.4212	–8.4063	331.6	23	57.13
cssz–56y	Central and South America	281.0534	–8.6028	331.6	23	37.59
cssz–56z	Central and South America	280.6854	–8.7993	331.6	23	18.05
cssz–57a	Central and South America	280.7492	–9.7356	328.7	8.6	10.75
cssz–57b	Central and South America	280.3640	–9.9663	328.7	6.6	5
cssz–57x	Central and South America	281.8205	–9.0933	328.7	23.4	57.94
cssz–57y	Central and South America	281.4636	–9.3074	328.7	23.4	38.08
cssz–57z	Central and South America	281.1065	–9.5215	328.7	23.4	18.22
cssz–58a	Central and South America	281.2275	–10.5350	330.5	9.2	10.4
cssz–58b	Central and South America	280.8348	–10.7532	330.5	6.2	5
cssz–58y	Central and South America	281.9548	–10.1306	330.5	23.8	38.57
cssz–58z	Central and South America	281.5913	–10.3328	330.5	23.8	18.39
cssz–59a	Central and South America	281.6735	–11.2430	326.2	9.8	10.05
cssz–59b	Central and South America	281.2982	–11.4890	326.2	5.8	5
cssz–59y	Central and South America	282.3675	–10.7876	326.2	24.2	39.06
cssz–59z	Central and South America	282.0206	–11.0153	326.2	24.2	18.56
cssz–60a	Central and South America	282.1864	–11.9946	326.5	10.4	9.71
cssz–60b	Central and South America	281.8096	–12.2384	326.5	5.4	5
cssz–60y	Central and South America	282.8821	–11.5438	326.5	24.6	39.55
cssz–60z	Central and South America	282.5344	–11.7692	326.5	24.6	18.73
cssz–61a	Central and South America	282.6944	–12.7263	325.5	11	9.36
cssz–61b	Central and South America	282.3218	–12.9762	325.5	5	5
cssz–61y	Central and South America	283.3814	–12.2649	325.5	25	40.03
cssz–61z	Central and South America	283.0381	–12.4956	325.5	25	18.9
cssz–62a	Central and South America	283.1980	–13.3556	319	11	9.79
cssz–62b	Central and South America	282.8560	–13.6451	319	5.5	5
cssz–62y	Central and South America	283.8178	–12.8300	319	27	42.03
cssz–62z	Central and South America	283.5081	–13.0928	319	27	19.33
cssz–63a	Central and South America	283.8032	–14.0147	317.9	11	10.23
cssz–63b	Central and South America	283.4661	–14.3106	317.9	6	5
cssz–63z	Central and South America	284.1032	–13.7511	317.9	29	19.77
cssz–64a	Central and South America	284.4144	–14.6482	315.7	13	11.96
cssz–64b	Central and South America	284.0905	–14.9540	315.7	8	5
cssz–65a	Central and South America	285.0493	–15.2554	313.2	15	13.68
cssz–65b	Central and South America	284.7411	–15.5715	313.2	10	5
cssz–66a	Central and South America	285.6954	–15.7816	307.7	14.5	13.68
cssz–66b	Central and South America	285.4190	–16.1258	307.7	10	5
cssz–67a	Central and South America	286.4127	–16.2781	304.3	14	13.68
cssz–67b	Central and South America	286.1566	–16.6381	304.3	10	5
cssz–67z	Central and South America	286.6552	–15.9365	304.3	23	25.78
cssz–68a	Central and South America	287.2481	–16.9016	311.8	14	13.68
cssz–68b	Central and South America	286.9442	–17.2264	311.8	10	5
cssz–68z	Central and South America	287.5291	–16.6007	311.8	26	25.78
cssz–69a	Central and South America	287.9724	–17.5502	314.9	14	13.68
cssz–69b	Central and South America	287.6496	–17.8590	314.9	10	5
cssz–69y	Central and South America	288.5530	–16.9934	314.9	29	50.02
cssz–69z	Central and South America	288.2629	–17.2718	314.9	29	25.78
cssz–70a	Central and South America	288.6731	–18.2747	320.4	14	13.25
cssz–70b	Central and South America	288.3193	–18.5527	320.4	9.5	5

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Table H.2: (continued)

Segment	Description	Longitude (°E)	Latitude (°N)	Strike (°)	Dip (°)	Depth (km)
cssz–70y	Central and South America	289.3032	–17.7785	320.4	30	50.35
cssz–70z	Central and South America	288.9884	–18.0266	320.4	30	25.35
cssz–71a	Central and South America	289.3089	–19.1854	333.2	14	12.82
cssz–71b	Central and South America	288.8968	–19.3820	333.2	9	5
cssz–71y	Central and South America	290.0357	–18.8382	333.2	31	50.67
cssz–71z	Central and South America	289.6725	–19.0118	333.2	31	24.92
cssz–72a	Central and South America	289.6857	–20.3117	352.4	14	12.54
cssz–72b	Central and South America	289.2250	–20.3694	352.4	8.67	5
cssz–72z	Central and South America	290.0882	–20.2613	352.4	32	24.63
cssz–73a	Central and South America	289.7731	–21.3061	358.9	14	12.24
cssz–73b	Central and South America	289.3053	–21.3142	358.9	8.33	5
cssz–73z	Central and South America	290.1768	–21.2991	358.9	33	24.34
cssz–74a	Central and South America	289.7610	–22.2671	3.06	14	11.96
cssz–74b	Central and South America	289.2909	–22.2438	3.06	8	5
cssz–75a	Central and South America	289.6982	–23.1903	4.83	14.09	11.96
cssz–75b	Central and South America	289.2261	–23.1536	4.83	8	5
cssz–76a	Central and South America	289.6237	–24.0831	4.67	14.18	11.96
cssz–76b	Central and South America	289.1484	–24.0476	4.67	8	5
cssz–77a	Central and South America	289.5538	–24.9729	4.3	14.27	11.96
cssz–77b	Central and South America	289.0750	–24.9403	4.3	8	5
cssz–78a	Central and South America	289.4904	–25.8621	3.86	14.36	11.96
cssz–78b	Central and South America	289.0081	–25.8328	3.86	8	5
cssz–79a	Central and South America	289.3491	–26.8644	11.34	14.45	11.96
cssz–79b	Central and South America	288.8712	–26.7789	11.34	8	5
cssz–80a	Central and South America	289.1231	–27.7826	14.16	14.54	11.96
cssz–80b	Central and South America	288.6469	–27.6762	14.16	8	5
cssz–81a	Central and South America	288.8943	–28.6409	13.19	14.63	11.96
cssz–81b	Central and South America	288.4124	–28.5417	13.19	8	5
cssz–82a	Central and South America	288.7113	–29.4680	9.68	14.72	11.96
cssz–82b	Central and South America	288.2196	–29.3950	9.68	8	5
cssz–83a	Central and South America	288.5944	–30.2923	5.36	14.81	11.96
cssz–83b	Central and South America	288.0938	–30.2517	5.36	8	5
cssz–84a	Central and South America	288.5223	–31.1639	3.8	14.9	11.96
cssz–84b	Central and South America	288.0163	–31.1351	3.8	8	5
cssz–85a	Central and South America	288.4748	–32.0416	2.55	15	11.96
cssz–85b	Central and South America	287.9635	–32.0223	2.55	8	5
cssz–86a	Central and South America	288.3901	–33.0041	7.01	15	11.96
cssz–86b	Central and South America	287.8768	–32.9512	7.01	8	5
cssz–87a	Central and South America	288.1050	–34.0583	19.4	15	11.96
cssz–87b	Central and South America	287.6115	–33.9142	19.4	8	5
cssz–88a	Central and South America	287.5309	–35.0437	32.81	15	11.96
cssz–88b	Central and South America	287.0862	–34.8086	32.81	8	5
cssz–88z	Central and South America	287.9308	–35.2545	32.81	30	24.9
cssz–89a	Central and South America	287.2380	–35.5993	14.52	16.67	11.96
cssz–89b	Central and South America	286.7261	–35.4914	14.52	8	5
cssz–89z	Central and South America	287.7014	–35.6968	14.52	30	26.3
cssz–90a	Central and South America	286.8442	–36.5645	22.64	18.33	11.96
cssz–90b	Central and South America	286.3548	–36.4004	22.64	8	5
cssz–90z	Central and South America	287.2916	–36.7142	22.64	30	27.68
cssz–91a	Central and South America	286.5925	–37.2488	10.9	20	11.96
cssz–91b	Central and South America	286.0721	–37.1690	10.9	8	5
cssz–91z	Central and South America	287.0726	–37.3224	10.9	30	29.06
cssz–92a	Central and South America	286.4254	–38.0945	8.23	20	11.96
cssz–92b	Central and South America	285.8948	–38.0341	8.23	8	5
cssz–92z	Central and South America	286.9303	–38.1520	8.23	26.67	29.06

(continued on next page)

Table H.2: (continued)

Segment	Description	Longitude (°E)	Latitude (°N)	Strike (°)	Dip (°)	Depth (km)
cssz–93a	Central and South America	286.2047	–39.0535	13.46	20	11.96
cssz–93b	Central and South America	285.6765	–38.9553	13.46	8	5
cssz–93z	Central and South America	286.7216	–39.1495	13.46	23.33	29.06
cssz–94a	Central and South America	286.0772	–39.7883	3.4	20	11.96
cssz–94b	Central and South America	285.5290	–39.7633	3.4	8	5
cssz–94z	Central and South America	286.6255	–39.8133	3.4	20	29.06
cssz–95a	Central and South America	285.9426	–40.7760	9.84	20	11.96
cssz–95b	Central and South America	285.3937	–40.7039	9.84	8	5
cssz–95z	Central and South America	286.4921	–40.8481	9.84	20	29.06
cssz–96a	Central and South America	285.7839	–41.6303	7.6	20	11.96
cssz–96b	Central and South America	285.2245	–41.5745	7.6	8	5
cssz–96x	Central and South America	287.4652	–41.7977	7.6	20	63.26
cssz–96y	Central and South America	286.9043	–41.7419	7.6	20	46.16
cssz–96z	Central and South America	286.3439	–41.6861	7.6	20	29.06
cssz–97a	Central and South America	285.6695	–42.4882	5.3	20	11.96
cssz–97b	Central and South America	285.0998	–42.4492	5.3	8	5
cssz–97x	Central and South America	287.3809	–42.6052	5.3	20	63.26
cssz–97y	Central and South America	286.8101	–42.5662	5.3	20	46.16
cssz–97z	Central and South America	286.2396	–42.5272	5.3	20	29.06
cssz–98a	Central and South America	285.5035	–43.4553	10.53	20	11.96
cssz–98b	Central and South America	284.9322	–43.3782	10.53	8	5
cssz–98x	Central and South America	287.2218	–43.6866	10.53	20	63.26
cssz–98y	Central and South America	286.6483	–43.6095	10.53	20	46.16
cssz–98z	Central and South America	286.0755	–43.5324	10.53	20	29.06
cssz–99a	Central and South America	285.3700	–44.2595	4.86	20	11.96
cssz–99b	Central and South America	284.7830	–44.2237	4.86	8	5
cssz–99x	Central and South America	287.1332	–44.3669	4.86	20	63.26
cssz–99y	Central and South America	286.5451	–44.3311	4.86	20	46.16
cssz–99z	Central and South America	285.9574	–44.2953	4.86	20	29.06
cssz–100a	Central and South America	285.2713	–45.1664	5.68	20	11.96
cssz–100b	Central and South America	284.6758	–45.1246	5.68	8	5
cssz–100x	Central and South America	287.0603	–45.2918	5.68	20	63.26
cssz–100y	Central and South America	286.4635	–45.2500	5.68	20	46.16
cssz–100z	Central and South America	285.8672	–45.2082	5.68	20	29.06
cssz–101a	Central and South America	285.3080	–45.8607	352.6	20	9.36
cssz–101b	Central and South America	284.7067	–45.9152	352.6	5	5
cssz–101y	Central and South America	286.5089	–45.7517	352.6	20	43.56
cssz–101z	Central and South America	285.9088	–45.8062	352.6	20	26.46
cssz–102a	Central and South America	285.2028	–47.1185	17.72	5	9.36
cssz–102b	Central and South America	284.5772	–46.9823	17.72	5	5
cssz–102y	Central and South America	286.4588	–47.3909	17.72	5	18.07
cssz–102z	Central and South America	285.8300	–47.2547	17.72	5	13.72
cssz–103a	Central and South America	284.7075	–48.0396	23.37	7.5	11.53
cssz–103b	Central and South America	284.0972	–47.8630	23.37	7.5	5
cssz–103x	Central and South America	286.5511	–48.5694	23.37	7.5	31.11
cssz–103y	Central and South America	285.9344	–48.3928	23.37	7.5	24.58
cssz–103z	Central and South America	285.3199	–48.2162	23.37	7.5	18.05
cssz–104a	Central and South America	284.3440	–48.7597	14.87	10	13.68
cssz–104b	Central and South America	283.6962	–48.6462	14.87	10	5
cssz–104x	Central and South America	286.2962	–49.1002	14.87	10	39.73
cssz–104y	Central and South America	285.6440	–48.9867	14.87	10	31.05
cssz–104z	Central and South America	284.9933	–48.8732	14.87	10	22.36
cssz–105a	Central and South America	284.2312	–49.4198	0.25	9.67	13.4
cssz–105b	Central and South America	283.5518	–49.4179	0.25	9.67	5
cssz–105x	Central and South America	286.2718	–49.4255	0.25	9.67	38.59

(continued on next page)

Table H.2: (continued)

Segment	Description	Longitude (°E)	Latitude (°N)	Strike (°)	Dip (°)	Depth (km)
cssz–105y	Central and South America	285.5908	–49.4236	0.25	9.67	30.2
cssz–105z	Central and South America	284.9114	–49.4217	0.25	9.67	21.8
cssz–106a	Central and South America	284.3730	–50.1117	347.5	9.25	13.04
cssz–106b	Central and South America	283.6974	–50.2077	347.5	9.25	5
cssz–106x	Central and South America	286.3916	–49.8238	347.5	9.25	37.15
cssz–106y	Central and South America	285.7201	–49.9198	347.5	9.25	29.11
cssz–106z	Central and South America	285.0472	–50.0157	347.5	9.25	21.07
cssz–107a	Central and South America	284.7130	–50.9714	346.5	9	12.82
cssz–107b	Central and South America	284.0273	–51.0751	346.5	9	5
cssz–107x	Central and South America	286.7611	–50.6603	346.5	9	36.29
cssz–107y	Central and South America	286.0799	–50.7640	346.5	9	28.47
cssz–107z	Central and South America	285.3972	–50.8677	346.5	9	20.64
cssz–108a	Central and South America	285.0378	–51.9370	352	8.67	12.54
cssz–108b	Central and South America	284.3241	–51.9987	352	8.67	5
cssz–108x	Central and South America	287.1729	–51.7519	352	8.67	35.15
cssz–108y	Central and South America	286.4622	–51.8136	352	8.67	27.61
cssz–108z	Central and South America	285.7505	–51.8753	352	8.67	20.07
cssz–109a	Central and South America	285.2635	–52.8439	353.1	8.33	12.24
cssz–109b	Central and South America	284.5326	–52.8974	353.1	8.33	5
cssz–109x	Central and South America	287.4508	–52.6834	353.1	8.33	33.97
cssz–109y	Central and South America	286.7226	–52.7369	353.1	8.33	26.73
cssz–109z	Central and South America	285.9935	–52.7904	353.1	8.33	19.49
cssz–110a	Central and South America	285.5705	–53.4139	334.2	8	11.96
cssz–110b	Central and South America	284.8972	–53.6076	334.2	8	5
cssz–110x	Central and South America	287.5724	–52.8328	334.2	8	32.83
cssz–110y	Central and South America	286.9081	–53.0265	334.2	8	25.88
cssz–110z	Central and South America	286.2408	–53.2202	334.2	8	18.92
cssz–111a	Central and South America	286.1627	–53.8749	313.8	8	11.96
cssz–111b	Central and South America	285.6382	–54.1958	313.8	8	5
cssz–111x	Central and South America	287.7124	–52.9122	313.8	8	32.83
cssz–111y	Central and South America	287.1997	–53.2331	313.8	8	25.88
cssz–111z	Central and South America	286.6832	–53.5540	313.8	8	18.92
cssz–112a	Central and South America	287.3287	–54.5394	316.4	8	11.96
cssz–112b	Central and South America	286.7715	–54.8462	316.4	8	5
cssz–112x	Central and South America	288.9756	–53.6190	316.4	8	32.83
cssz–112y	Central and South America	288.4307	–53.9258	316.4	8	25.88
cssz–112z	Central and South America	287.8817	–54.2326	316.4	8	18.92
cssz–113a	Central and South America	288.3409	–55.0480	307.6	8	11.96
cssz–113b	Central and South America	287.8647	–55.4002	307.6	8	5
cssz–113x	Central and South America	289.7450	–53.9914	307.6	8	32.83
cssz–113y	Central and South America	289.2810	–54.3436	307.6	8	25.88
cssz–113z	Central and South America	288.8130	–54.6958	307.6	8	18.92
cssz–114a	Central and South America	289.5342	–55.5026	301.5	8	11.96
cssz–114b	Central and South America	289.1221	–55.8819	301.5	8	5
cssz–114x	Central and South America	290.7472	–54.3647	301.5	8	32.83
cssz–114y	Central and South America	290.3467	–54.7440	301.5	8	25.88
cssz–114z	Central and South America	289.9424	–55.1233	301.5	8	18.92
cssz–115a	Central and South America	290.7682	–55.8485	292.7	8	11.96
cssz–115b	Central and South America	290.4608	–56.2588	292.7	8	5
cssz–115x	Central and South America	291.6714	–54.6176	292.7	8	32.83
cssz–115y	Central and South America	291.3734	–55.0279	292.7	8	25.88
cssz–115z	Central and South America	291.0724	–55.4382	292.7	8	18.92

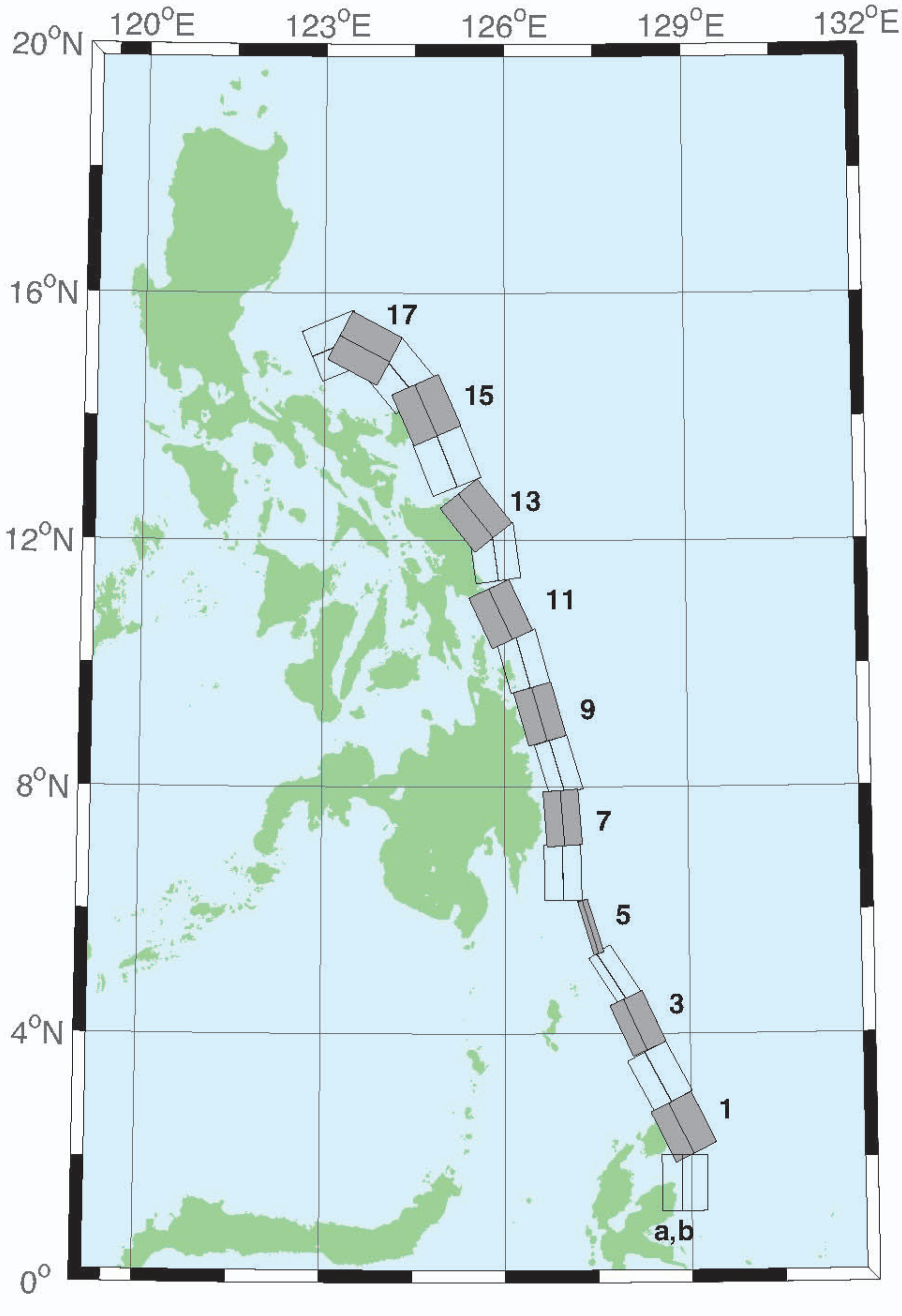

Figure H.3: Eastern Philippines Subduction Zone unit sources.

Table H.3: Earthquake parameters for Eastern Philippines Subduction Zone unit sources.

Segment	Description	Longitude (°E)	Latitude (°N)	Strike (°)	Dip (°)	Depth (km)
epsz–0a	Eastern Philippines	128.5264	1.5930	180	44	26.92
epsz–0b	Eastern Philippines	128.8496	1.5930	180	26	5
epsz–1a	Eastern Philippines	128.5521	2.3289	153.6	44.2	27.62
epsz–1b	Eastern Philippines	128.8408	2.4720	153.6	26.9	5
epsz–2a	Eastern Philippines	128.1943	3.1508	151.9	45.9	32.44
epsz–2b	Eastern Philippines	128.4706	3.2979	151.9	32.8	5.35
epsz–3a	Eastern Philippines	127.8899	4.0428	155.2	57.3	40.22
epsz–3b	Eastern Philippines	128.1108	4.1445	155.2	42.7	6.31
epsz–4a	Eastern Philippines	127.6120	4.8371	146.8	71.4	48.25
epsz–4b	Eastern Philippines	127.7324	4.9155	146.8	54.8	7.39
epsz–5a	Eastern Philippines	127.3173	5.7040	162.9	79.9	57.4
epsz–5b	Eastern Philippines	127.3930	5.7272	162.9	79.4	8.25
epsz–6a	Eastern Philippines	126.6488	6.6027	178.9	48.6	45.09
epsz–6b	Eastern Philippines	126.9478	6.6085	178.9	48.6	7.58
epsz–7a	Eastern Philippines	126.6578	7.4711	175.8	50.7	45.52
epsz–7b	Eastern Philippines	126.9439	7.4921	175.8	50.7	6.83
epsz–8a	Eastern Philippines	126.6227	8.2456	163.3	56.7	45.6
epsz–8b	Eastern Philippines	126.8614	8.3164	163.3	48.9	7.92
epsz–9a	Eastern Philippines	126.2751	9.0961	164.1	47	43.59
epsz–9b	Eastern Philippines	126.5735	9.1801	164.1	44.9	8.3
epsz–10a	Eastern Philippines	125.9798	9.9559	164.5	43.1	42.25
epsz–10b	Eastern Philippines	126.3007	10.0438	164.5	43.1	8.09
epsz–11a	Eastern Philippines	125.6079	10.6557	155	37.8	38.29
epsz–11b	Eastern Philippines	125.9353	10.8059	155	37.8	7.64
epsz–12a	Eastern Philippines	125.4697	11.7452	172.1	36	37.01
epsz–12b	Eastern Philippines	125.8374	11.7949	172.1	36	7.62
epsz–13a	Eastern Philippines	125.2238	12.1670	141.5	32.4	33.87
epsz–13b	Eastern Philippines	125.5278	12.4029	141.5	32.4	7.08
epsz–14a	Eastern Philippines	124.6476	13.1365	158.2	23	25.92
epsz–14b	Eastern Philippines	125.0421	13.2898	158.2	23	6.38
epsz–15a	Eastern Philippines	124.3107	13.9453	156.1	24.1	26.51
epsz–15b	Eastern Philippines	124.6973	14.1113	156.1	24.1	6.09
epsz–16a	Eastern Philippines	123.8998	14.4025	140.3	19.5	21.69
epsz–16b	Eastern Philippines	124.2366	14.6728	140.3	19.5	5
epsz–17a	Eastern Philippines	123.4604	14.7222	117.6	15.3	18.19
epsz–17b	Eastern Philippines	123.6682	15.1062	117.6	15.3	5
epsz–18a	Eastern Philippines	123.3946	14.7462	67.4	15	17.94
epsz–18b	Eastern Philippines	123.2219	15.1467	67.4	15	5

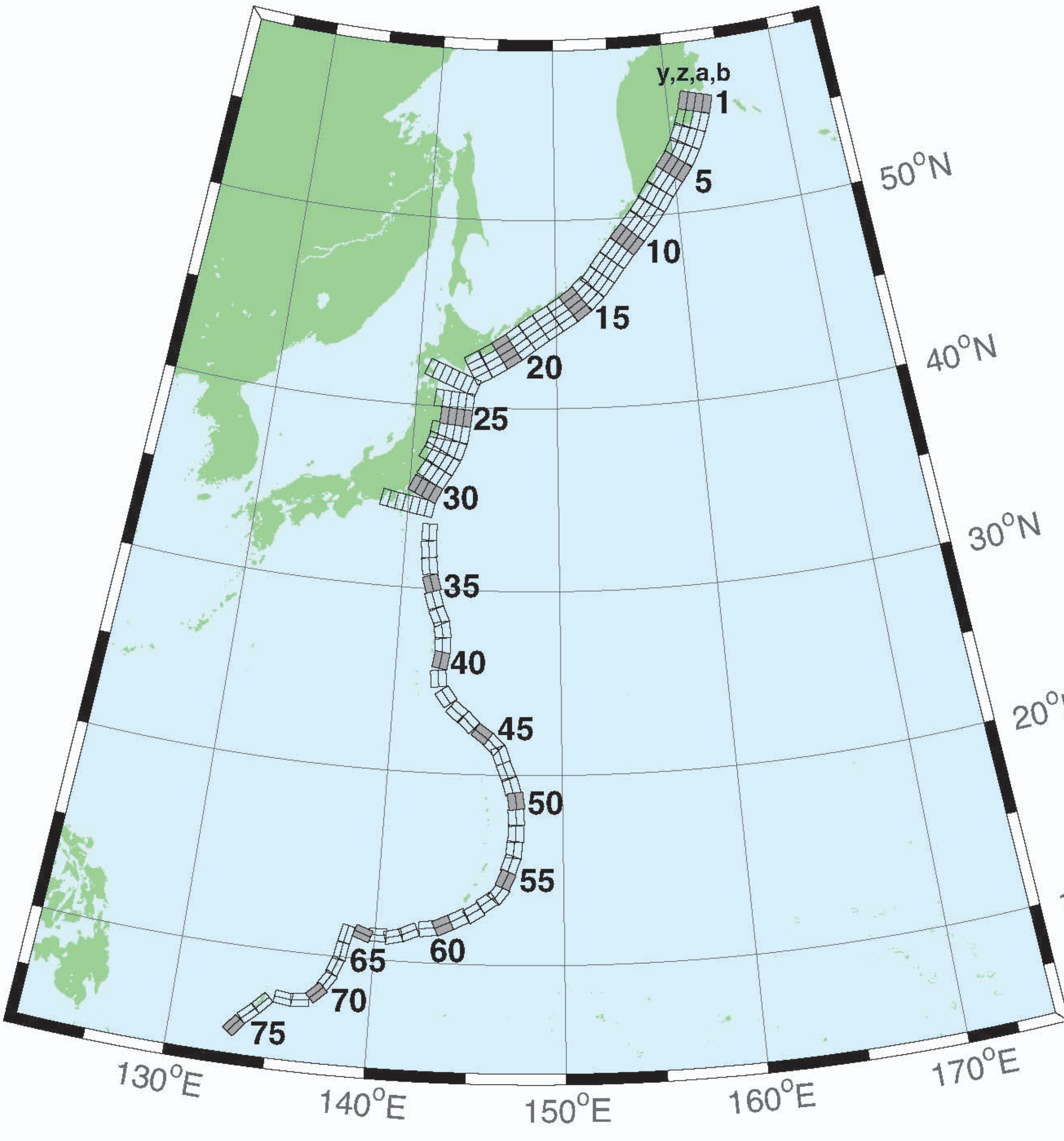

Figure H.4: Kamchatka-Kuril-Japan-Izu-Mariana-Yap Subduction Zone unit sources.

Table H.4: Earthquake parameters for Kamchatka-Kuril-Japan-Izu-Mariana-Yap Subduction Zone unit sources.

Segment	Description	Longitude (°E)	Latitude (°N)	Strike (°)	Dip (°)	Depth (km)
kisz–1a	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	162.4318	55.5017	195	29	26.13
kisz–1b	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	163.1000	55.4000	195	25	5
kisz–1y	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	161.0884	55.7050	195	29	74.61
kisz–1z	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	161.7610	55.6033	195	29	50.37
kisz–2a	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	161.9883	54.6784	200	29	26.13
kisz–2b	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	162.6247	54.5440	200	25	5
kisz–2y	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	160.7072	54.9471	200	29	74.61
kisz–2z	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	161.3488	54.8127	200	29	50.37
kisz–3a	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	161.4385	53.8714	204	29	26.13
kisz–3b	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	162.0449	53.7116	204	25	5
kisz–3y	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	160.2164	54.1910	204	29	74.61
kisz–3z	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	160.8286	54.0312	204	29	50.37
kisz–4a	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	160.7926	53.1087	210	29	26.13
kisz–4b	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	161.3568	52.9123	210	25	5
kisz–4y	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	159.6539	53.5015	210	29	74.61
kisz–4z	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	160.2246	53.3051	210	29	50.37
kisz–5a	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	160.0211	52.4113	218	29	26.13
kisz–5b	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	160.5258	52.1694	218	25	5
kisz–5y	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	159.0005	52.8950	218	29	74.61
kisz–5z	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	159.5122	52.6531	218	29	50.37
kisz–6a	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	159.1272	51.7034	218	29	26.13
kisz–6b	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	159.6241	51.4615	218	25	5
kisz–6y	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	158.1228	52.1871	218	29	74.61
kisz–6z	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	158.6263	51.9452	218	29	50.37
kisz–7a	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	158.2625	50.9549	214	29	26.13
kisz–7b	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	158.7771	50.7352	214	25	5
kisz–7y	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	157.2236	51.3942	214	29	74.61
kisz–7z	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	157.7443	51.1745	214	29	50.37
kisz–8a	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	157.4712	50.2459	218	31	27.7
kisz–8b	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	157.9433	50.0089	218	27	5
kisz–8y	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	156.5176	50.7199	218	31	79.2
kisz–8z	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	156.9956	50.4829	218	31	53.45
kisz–9a	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	156.6114	49.5583	220	31	27.7
kisz–9b	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	157.0638	49.3109	220	27	5
kisz–9y	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	155.6974	50.0533	220	31	79.2
kisz–9z	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	156.1556	49.8058	220	31	53.45
kisz–10a	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	155.7294	48.8804	221	31	27.7
kisz–10b	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	156.1690	48.6278	221	27	5
kisz–10y	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	154.8413	49.3856	221	31	79.2
kisz–10z	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	155.2865	49.1330	221	31	53.45
kisz–11a	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	154.8489	48.1821	219	31	27.7
kisz–11b	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	155.2955	47.9398	219	27	5
kisz–11y	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	153.9472	48.6667	219	31	79.2
kisz–11z	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	154.3991	48.4244	219	31	53.45
kisz–12a	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	153.9994	47.4729	217	31	27.7
kisz–12b	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	154.4701	47.2320	217	27	5
kisz–12y	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	153.0856	47.9363	217	31	79.2
kisz–12z	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	153.5435	47.7046	217	31	53.45
kisz–13a	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	153.2239	46.7564	218	31	27.7
kisz–13b	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	153.6648	46.5194	218	27	5
kisz–13y	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	152.3343	47.2304	218	31	79.2
kisz–13z	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	152.7801	46.9934	218	31	53.45
kisz–14a	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	152.3657	46.1514	225	23	24.54
kisz–14b	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	152.7855	45.8591	225	23	5

(continued on next page)

Table H.4: (continued)

Segment	Description	Longitude (°E)	Latitude (°N)	Strike (°)	Dip (°)	Depth (km)
kisz–14y	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	151.5172	46.7362	225	23	63.62
kisz–14z	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	151.9426	46.4438	225	23	44.08
kisz–15a	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	151.4663	45.5963	233	25	23.73
kisz–15b	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	151.8144	45.2712	233	22	5
kisz–15y	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	150.7619	46.2465	233	25	65.99
kisz–15z	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	151.1151	45.9214	233	25	44.86
kisz–16a	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	150.4572	45.0977	237	25	23.73
kisz–16b	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	150.7694	44.7563	237	22	5
kisz–16y	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	149.8253	45.7804	237	25	65.99
kisz–16z	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	150.1422	45.4390	237	25	44.86
kisz–17a	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	149.3989	44.6084	237	25	23.73
kisz–17b	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	149.7085	44.2670	237	22	5
kisz–17y	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	148.7723	45.2912	237	25	65.99
kisz–17z	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	149.0865	44.9498	237	25	44.86
kisz–18a	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	148.3454	44.0982	235	25	23.73
kisz–18b	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	148.6687	43.7647	235	22	5
kisz–18y	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	147.6915	44.7651	235	25	65.99
kisz–18z	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	148.0194	44.4316	235	25	44.86
kisz–19a	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	147.3262	43.5619	233	25	23.73
kisz–19b	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	147.6625	43.2368	233	22	5
kisz–19y	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	146.6463	44.2121	233	25	65.99
kisz–19z	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	146.9872	43.8870	233	25	44.86
kisz–20a	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	146.3513	43.0633	237	25	23.73
kisz–20b	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	146.6531	42.7219	237	22	5
kisz–20y	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	145.7410	43.7461	237	25	65.99
kisz–20z	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	146.0470	43.4047	237	25	44.86
kisz–21a	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	145.3331	42.5948	239	25	23.73
kisz–21b	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	145.6163	42.2459	239	22	5
kisz–21y	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	144.7603	43.2927	239	25	65.99
kisz–21z	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	145.0475	42.9438	239	25	44.86
kisz–22a	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	144.3041	42.1631	242	25	23.73
kisz–22b	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	144.5605	41.8037	242	22	5
kisz–22y	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	143.7854	42.8819	242	25	65.99
kisz–22z	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	144.0455	42.5225	242	25	44.86
kisz–23a	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	143.2863	41.3335	202	21	21.28
kisz–23b	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	143.8028	41.1764	202	19	5
kisz–23v	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	140.6816	42.1189	202	21	110.9
kisz–23w	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	141.2050	41.9618	202	21	92.95
kisz–23x	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	141.7273	41.8047	202	21	75.04
kisz–23y	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	142.2482	41.6476	202	21	57.12
kisz–23z	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	142.7679	41.4905	202	21	39.2
kisz–24a	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	142.9795	40.3490	185	21	21.28
kisz–24b	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	143.5273	40.3125	185	19	5
kisz–24x	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	141.3339	40.4587	185	21	75.04
kisz–24y	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	141.8827	40.4221	185	21	57.12
kisz–24z	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	142.4312	40.3856	185	21	39.2
kisz–25a	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	142.8839	39.4541	185	21	21.28
kisz–25b	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	143.4246	39.4176	185	19	5
kisz–25y	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	141.8012	39.5272	185	21	57.12
kisz–25z	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	142.3426	39.4907	185	21	39.2
kisz–26a	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	142.7622	38.5837	188	21	21.28
kisz–26b	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	143.2930	38.5254	188	19	5
kisz–26x	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	141.1667	38.7588	188	21	75.04
kisz–26y	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	141.6990	38.7004	188	21	57.12
kisz–26z	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	142.2308	38.6421	188	21	39.2

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Table H.4: (continued)

Segment	Description	Longitude (°E)	Latitude (°N)	Strike (°)	Dip (°)	Depth (km)
kisz–27a	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	142.5320	37.7830	198	21	21.28
kisz–27b	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	143.0357	37.6534	198	19	5
kisz–27x	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	141.0142	38.1717	198	21	75.04
kisz–27y	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	141.5210	38.0421	198	21	57.12
kisz–27z	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	142.0269	37.9126	198	21	39.2
kisz–28a	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	142.1315	37.0265	208	21	21.28
kisz–28b	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	142.5941	36.8297	208	19	5
kisz–28x	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	140.7348	37.6171	208	21	75.04
kisz–28y	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	141.2016	37.4202	208	21	57.12
kisz–28z	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	141.6671	37.2234	208	21	39.2
kisz–29a	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	141.5970	36.2640	211	21	21.28
kisz–29b	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	142.0416	36.0481	211	19	5
kisz–29y	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	140.7029	36.6960	211	21	57.12
kisz–29z	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	141.1506	36.4800	211	21	39.2
kisz–30a	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	141.0553	35.4332	205	21	21.28
kisz–30b	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	141.5207	35.2560	205	19	5
kisz–30y	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	140.1204	35.7876	205	21	57.12
kisz–30z	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	140.5883	35.6104	205	21	39.2
kisz–31a	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	140.6956	34.4789	190	22	22.1
kisz–31b	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	141.1927	34.4066	190	20	5
kisz–31v	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	138.2025	34.8405	190	22	115.8
kisz–31w	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	138.7021	34.7682	190	22	97.02
kisz–31x	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	139.2012	34.6958	190	22	78.29
kisz–31y	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	139.6997	34.6235	190	22	59.56
kisz–31z	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	140.1979	34.5512	190	22	40.83
kisz–32a	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	141.0551	33.0921	180	32	23.48
kisz–32b	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	141.5098	33.0921	180	21.69	5
kisz–33a	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	141.0924	32.1047	173.8	27.65	20.67
kisz–33b	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	141.5596	32.1473	173.8	18.27	5
kisz–34a	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	141.1869	31.1851	172.1	25	18.26
kisz–34b	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	141.6585	31.2408	172.1	15.38	5
kisz–35a	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	141.4154	30.1707	163	25	17.12
kisz–35b	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	141.8662	30.2899	163	14.03	5
kisz–36a	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	141.6261	29.2740	161.7	25.73	18.71
kisz–36b	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	142.0670	29.4012	161.7	15.91	5
kisz–37a	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	142.0120	28.3322	154.7	20	14.54
kisz–37b	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	142.4463	28.5124	154.7	11	5
kisz–38a	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	142.2254	27.6946	170.3	20	14.54
kisz–38b	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	142.6955	27.7659	170.3	11	5
kisz–39a	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	142.3085	26.9127	177.2	24.23	17.42
kisz–39b	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	142.7674	26.9325	177.2	14.38	5
kisz–40a	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	142.2673	26.1923	189.4	26.49	22.26
kisz–40b	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	142.7090	26.1264	189.4	20.2	5
kisz–41a	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	142.1595	25.0729	173.7	22.07	19.08
kisz–41b	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	142.6165	25.1184	173.7	16.36	5
kisz–42a	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	142.7641	23.8947	143.5	21.54	18.4
kisz–42b	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	143.1321	24.1432	143.5	15.54	5
kisz–43a	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	143.5281	23.0423	129.2	23.02	18.77
kisz–43b	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	143.8128	23.3626	129.2	15.99	5
kisz–44a	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	144.2230	22.5240	134.6	28.24	18.56
kisz–44b	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	144.5246	22.8056	134.6	15.74	5
kisz–45a	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	145.0895	21.8866	125.8	36.73	22.79
kisz–45b	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	145.3171	22.1785	125.8	20.84	5
kisz–46a	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	145.6972	21.3783	135.9	30.75	20.63
kisz–46b	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	145.9954	21.6469	135.9	18.22	5

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Table H.4: (continued)

Segment	Description	Longitude (°E)	Latitude (°N)	Strike (°)	Dip (°)	Depth (km)
kisz–47a	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	146.0406	20.9341	160.1	29.87	19.62
kisz–47b	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	146.4330	21.0669	160.1	17	5
kisz–48a	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	146.3836	20.0690	158	32.75	19.68
kisz–48b	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	146.7567	20.2108	158	17.07	5
kisz–49a	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	146.6689	19.3123	164.5	25.07	21.41
kisz–49b	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	147.0846	19.4212	164.5	19.16	5
kisz–50a	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	146.9297	18.5663	172.1	22	22.1
kisz–50b	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	147.3650	18.6238	172.1	20	5
kisz–51a	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	146.9495	17.7148	175.1	22.06	22.04
kisz–51b	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	147.3850	17.7503	175.1	19.93	5
kisz–52a	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	146.9447	16.8869	180	25.51	18.61
kisz–52b	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	147.3683	16.8869	180	15.79	5
kisz–53a	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	146.8626	16.0669	185.2	27.39	18.41
kisz–53b	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	147.2758	16.0309	185.2	15.56	5
kisz–54a	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	146.7068	15.3883	199.1	28.12	20.91
kisz–54b	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	147.0949	15.2590	199.1	18.56	5
kisz–55a	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	146.4717	14.6025	204.3	29.6	26.27
kisz–55b	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	146.8391	14.4415	204.3	25.18	5
kisz–56a	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	146.1678	13.9485	217.4	32.04	26.79
kisz–56b	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	146.4789	13.7170	217.4	25.84	5
kisz–57a	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	145.6515	13.5576	235.8	37	24.54
kisz–57b	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	145.8586	13.2609	235.8	23	5
kisz–58a	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	144.9648	12.9990	237.8	37.72	24.54
kisz–58b	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	145.1589	12.6984	237.8	23	5
kisz–59a	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	144.1799	12.6914	242.9	34.33	22.31
kisz–59b	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	144.3531	12.3613	242.9	20.25	5
kisz–60a	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	143.3687	12.3280	244.9	30.9	20.62
kisz–60b	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	143.5355	11.9788	244.9	18.2	5
kisz–61a	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	142.7051	12.1507	261.8	35.41	25.51
kisz–61b	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	142.7582	11.7883	261.8	24.22	5
kisz–62a	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	141.6301	11.8447	245.7	39.86	34.35
kisz–62b	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	141.7750	11.5305	245.7	35.94	5
kisz–63a	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	140.8923	11.5740	256.2	42	38.46
kisz–63b	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	140.9735	11.2498	256.2	42	5
kisz–64a	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	140.1387	11.6028	269.6	42.48	38.77
kisz–64b	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	140.1410	11.2716	269.6	42.48	5
kisz–65a	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	139.4595	11.5883	288.7	44.16	39.83
kisz–65b	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	139.3541	11.2831	288.7	44.16	5
kisz–66a	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	138.1823	11.2648	193.1	45	40.36
kisz–66b	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	138.4977	11.1929	193.1	45	5
kisz–67a	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	137.9923	10.3398	189.8	45	40.36
kisz–67b	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	138.3104	10.2856	189.8	45	5
kisz–68a	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	137.7607	9.6136	201.7	45	40.36
kisz–68b	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	138.0599	9.4963	201.7	45	5
kisz–69a	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	137.4537	8.8996	213.5	45	40.36
kisz–69b	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	137.7215	8.7241	213.5	45	5
kisz–70a	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	137.0191	8.2872	226.5	45	40.36
kisz–70b	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	137.2400	8.0569	226.5	45	5
kisz–71a	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	136.3863	7.9078	263.9	45	40.36
kisz–71b	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	136.4202	7.5920	263.9	45	5
kisz–72a	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	135.6310	7.9130	276.9	45	40.36
kisz–72b	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	135.5926	7.5977	276.9	45	5
kisz–73a	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	134.3296	7.4541	224	45	40.36
kisz–73b	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	134.5600	7.2335	224	45	5
kisz–74a	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	133.7125	6.8621	228.1	45	40.36

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Table H.4: (continued)

Segment	Description	Longitude (°E)	Latitude (°N)	Strike (°)	Dip (°)	Depth (km)
kisz–74b	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	133.9263	6.6258	228.1	45	5
kisz–75a	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	133.0224	6.1221	217.7	45	40.36
kisz–75b	Kamchatka-Kuril-Japan-Izu-Mariana-Yap	133.2751	5.9280	217.7	45	5

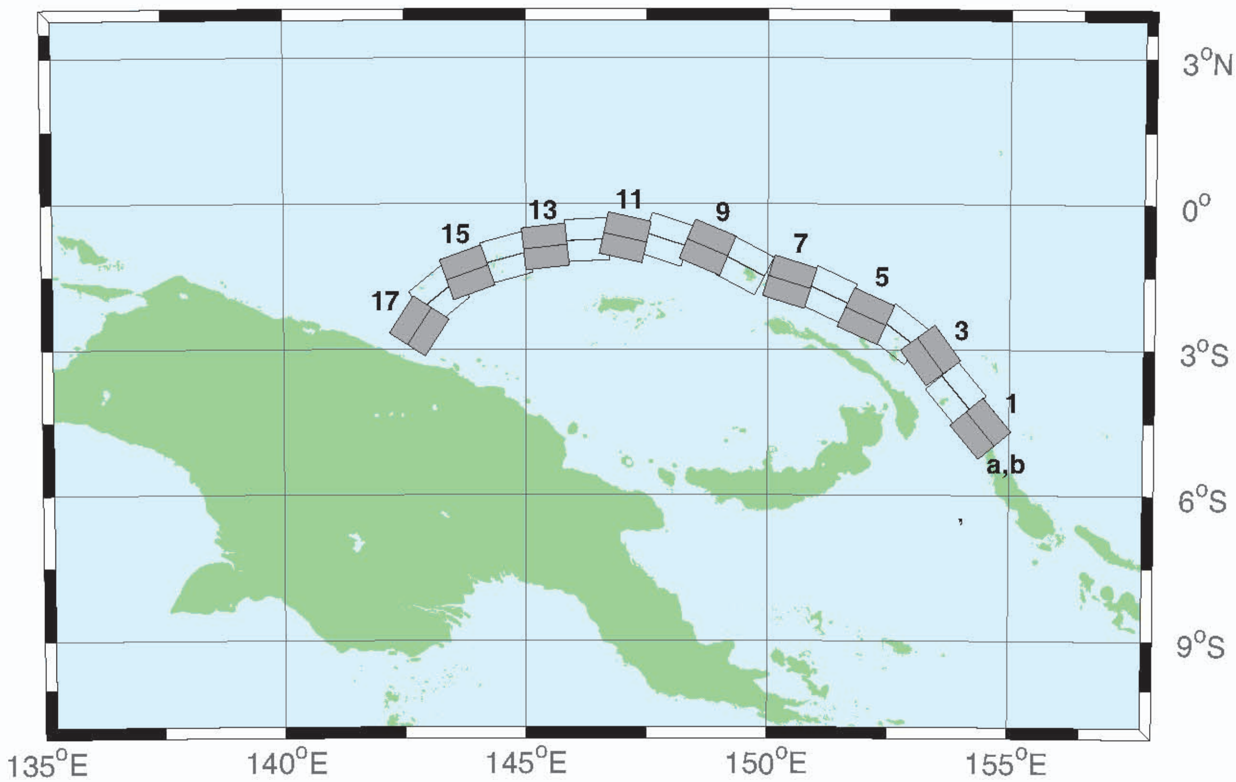

Figure H.5: Manus–Oceanic Convergent Boundary Subduction Zone unit sources.

Table H.5: Earthquake parameters for Manus–Oceanic Convergent Boundary Subduction Zone unit sources.

Segment	Description	Longitude (°E)	Latitude (°N)	Strike (°)	Dip (°)	Depth (km)
mosz–1a	Manus–Oceanic Convergent Boundary	154.0737	–4.8960	140.2	15	15.88
mosz–1b	Manus–Oceanic Convergent Boundary	154.4082	–4.6185	140.2	15	5
mosz–2a	Manus–Oceanic Convergent Boundary	153.5589	–4.1575	140.2	15	15.91
mosz–2b	Manus–Oceanic Convergent Boundary	153.8931	–3.8800	140.2	15	5.35
mosz–3a	Manus–Oceanic Convergent Boundary	153.0151	–3.3716	143.9	15	16.64
mosz–3b	Manus–Oceanic Convergent Boundary	153.3662	–3.1160	143.9	15	6.31
mosz–4a	Manus–Oceanic Convergent Boundary	152.4667	–3.0241	127.7	15	17.32
mosz–4b	Manus–Oceanic Convergent Boundary	152.7321	–2.6806	127.7	15	7.39
mosz–5a	Manus–Oceanic Convergent Boundary	151.8447	–2.7066	114.3	15	17.57
mosz–5b	Manus–Oceanic Convergent Boundary	152.0235	–2.3112	114.3	15	8.25
mosz–6a	Manus–Oceanic Convergent Boundary	151.0679	–2.2550	115	15	17.66
mosz–6b	Manus–Oceanic Convergent Boundary	151.2513	–1.8618	115	15	7.58
mosz–7a	Manus–Oceanic Convergent Boundary	150.3210	–2.0236	107.2	15	17.73
mosz–7b	Manus–Oceanic Convergent Boundary	150.4493	–1.6092	107.2	15	6.83
mosz–8a	Manus–Oceanic Convergent Boundary	149.3226	–1.6666	117.8	15	17.83
mosz–8b	Manus–Oceanic Convergent Boundary	149.5251	–1.2829	117.8	15	7.92
mosz–9a	Manus–Oceanic Convergent Boundary	148.5865	–1.3017	112.7	15	17.84
mosz–9b	Manus–Oceanic Convergent Boundary	148.7540	–0.9015	112.7	15	8.3
mosz–10a	Manus–Oceanic Convergent Boundary	147.7760	–1.1560	108	15	17.78
mosz–10b	Manus–Oceanic Convergent Boundary	147.9102	–0.7434	108	15	8.09
mosz–11a	Manus–Oceanic Convergent Boundary	146.9596	–1.1226	102.5	15	17.54
mosz–11b	Manus–Oceanic Convergent Boundary	147.0531	–0.6990	102.5	15	7.64
mosz–12a	Manus–Oceanic Convergent Boundary	146.2858	–1.1820	87.48	15	17.29
mosz–12b	Manus–Oceanic Convergent Boundary	146.2667	–0.7486	87.48	15	7.62
mosz–13a	Manus–Oceanic Convergent Boundary	145.4540	–1.3214	83.75	15	17.34
mosz–13b	Manus–Oceanic Convergent Boundary	145.4068	–0.8901	83.75	15	7.08
mosz–14a	Manus–Oceanic Convergent Boundary	144.7151	–1.5346	75.09	15	17.21
mosz–14b	Manus–Oceanic Convergent Boundary	144.6035	–1.1154	75.09	15	6.38
mosz–15a	Manus–Oceanic Convergent Boundary	143.9394	–1.8278	70.43	15	16.52
mosz–15b	Manus–Oceanic Convergent Boundary	143.7940	–1.4190	70.43	15	6.09
mosz–16a	Manus–Oceanic Convergent Boundary	143.4850	–2.2118	50.79	15	15.86
mosz–16b	Manus–Oceanic Convergent Boundary	143.2106	–1.8756	50.79	15	5
mosz–17a	Manus–Oceanic Convergent Boundary	143.1655	–2.7580	33	15	16.64
mosz–17b	Manus–Oceanic Convergent Boundary	142.8013	–2.5217	33	15	5

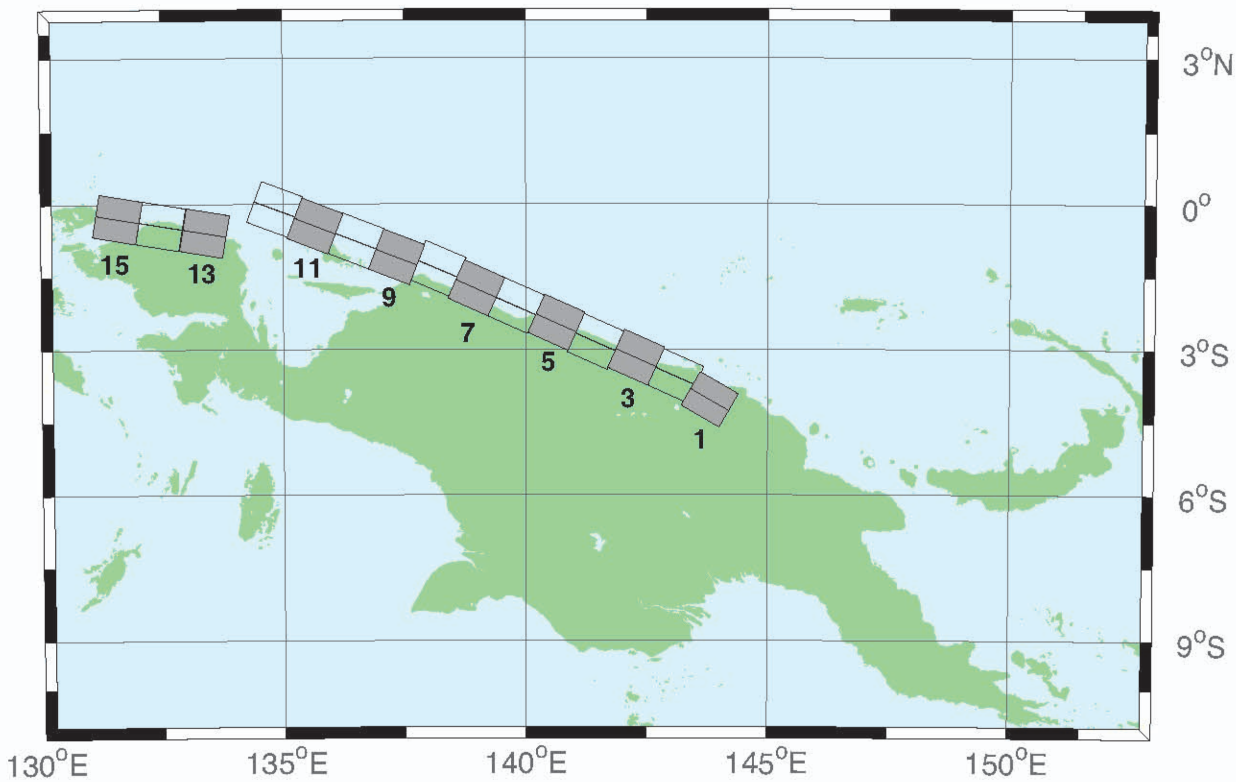

Figure H.6: New Guinea Subduction Zone unit sources.

Table H.6: Earthquake parameters for New Guinea Subduction Zone unit sources.

Segment	Description	Longitude (°E)	Latitude (°N)	Strike (°)	Dip (°)	Depth (km)
ngsz–1a	New Guinea	143.6063	–4.3804	120	29	25.64
ngsz–1b	New Guinea	143.8032	–4.0402	120	29	1.4
ngsz–2a	New Guinea	142.9310	–3.9263	114	27.63	20.1
ngsz–2b	New Guinea	143.0932	–3.5628	114	21.72	1.6
ngsz–3a	New Guinea	142.1076	–3.5632	114	20.06	18.73
ngsz–3b	New Guinea	142.2795	–3.1778	114	15.94	5
ngsz–4a	New Guinea	141.2681	–3.2376	114	21	17.76
ngsz–4b	New Guinea	141.4389	–2.8545	114	14.79	5
ngsz–5a	New Guinea	140.4592	–2.8429	114	21.26	16.14
ngsz–5b	New Guinea	140.6296	–2.4605	114	12.87	5
ngsz–6a	New Guinea	139.6288	–2.4960	114	22.72	15.4
ngsz–6b	New Guinea	139.7974	–2.1175	114	12	5
ngsz–7a	New Guinea	138.8074	–2.1312	114	21.39	15.4
ngsz–7b	New Guinea	138.9776	–1.7491	114	12	5
ngsz–8a	New Guinea	138.0185	–1.7353	113.1	18.79	15.14
ngsz–8b	New Guinea	138.1853	–1.3441	113.1	11.7	5
ngsz–9a	New Guinea	137.1805	–1.5037	111	15.24	13.23
ngsz–9b	New Guinea	137.3358	–1.0991	111	9.47	5
ngsz–10a	New Guinea	136.3418	–1.1774	111	13.51	11.09
ngsz–10b	New Guinea	136.4983	–0.7697	111	7	5
ngsz–11a	New Guinea	135.4984	–0.8641	111	11.38	12.49
ngsz–11b	New Guinea	135.6562	–0.4530	111	8.62	5
ngsz–12a	New Guinea	134.6759	–0.5216	110.5	10	13.68
ngsz–12b	New Guinea	134.8307	–0.1072	110.5	10	5
ngsz–13a	New Guinea	133.3065	–1.0298	99.5	10	13.68
ngsz–13b	New Guinea	133.3795	–0.5935	99.5	10	5
ngsz–14a	New Guinea	132.4048	–0.8816	99.5	10	13.68
ngsz–14b	New Guinea	132.4778	–0.4453	99.5	10	5
ngsz–15a	New Guinea	131.5141	–0.7353	99.5	10	13.68
ngsz–15b	New Guinea	131.5871	–0.2990	99.5	10	5

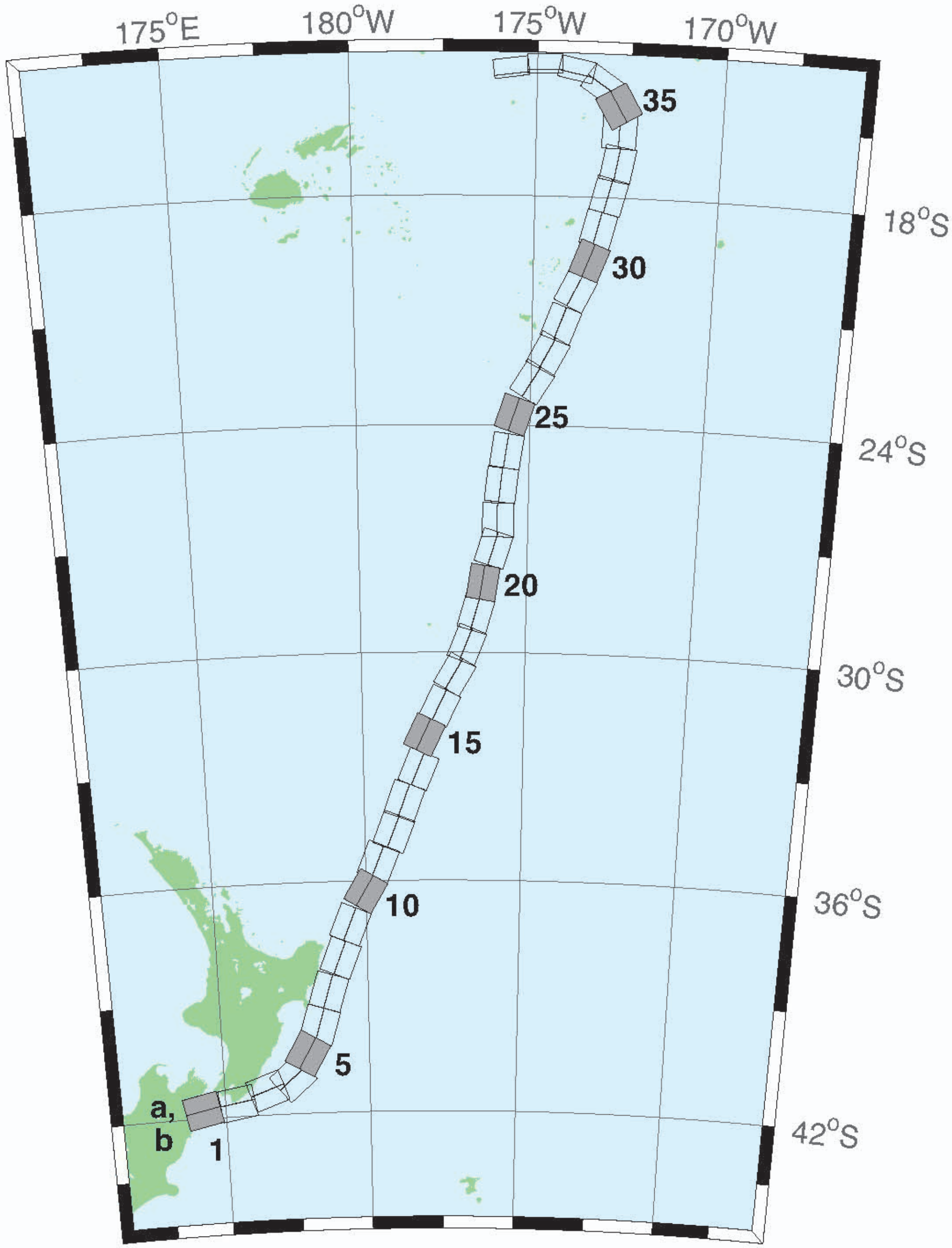

Figure H.7: New Zealand–Keradec–Tonga Subduction Zone unit sources.

Table H.7: Earthquake parameters for New Zealand–Keradec–Tonga Subduction Zone unit sources.

Segment	Description	Longitude (°E)	Latitude (°N)	Strike (°)	Dip (°)	Depth (km)
ntsz–1a	New Zealand–Keradec–Tonga	174.0985	–41.3951	258.6	24	25.34
ntsz–1b	New Zealand–Keradec–Tonga	174.2076	–41.7973	258.6	24	5
ntsz–2a	New Zealand–Keradec–Tonga	175.3289	–41.2592	260.6	29.38	23.17
ntsz–2b	New Zealand–Keradec–Tonga	175.4142	–41.6454	260.6	21.31	5
ntsz–3a	New Zealand–Keradec–Tonga	176.2855	–40.9950	250.7	29.54	21.74
ntsz–3b	New Zealand–Keradec–Tonga	176.4580	–41.3637	250.7	19.56	5
ntsz–4a	New Zealand–Keradec–Tonga	177.0023	–40.7679	229.4	24.43	18.87
ntsz–4b	New Zealand–Keradec–Tonga	177.3552	–41.0785	229.4	16.1	5
ntsz–5a	New Zealand–Keradec–Tonga	177.4114	–40.2396	210	18.8	19.29
ntsz–5b	New Zealand–Keradec–Tonga	177.8951	–40.4525	210	16.61	5
ntsz–6a	New Zealand–Keradec–Tonga	177.8036	–39.6085	196.7	18.17	15.8
ntsz–6b	New Zealand–Keradec–Tonga	178.3352	–39.7310	196.7	12.48	5
ntsz–7a	New Zealand–Keradec–Tonga	178.1676	–38.7480	197	28.1	17.85
ntsz–7b	New Zealand–Keradec–Tonga	178.6541	–38.8640	197	14.89	5
ntsz–8a	New Zealand–Keradec–Tonga	178.6263	–37.8501	201.4	31.47	18.78
ntsz–8b	New Zealand–Keradec–Tonga	179.0788	–37.9899	201.4	16	5
ntsz–9a	New Zealand–Keradec–Tonga	178.9833	–36.9770	202.2	29.58	20.02
ntsz–9b	New Zealand–Keradec–Tonga	179.4369	–37.1245	202.2	17.48	5
ntsz–10a	New Zealand–Keradec–Tonga	179.5534	–36.0655	210.6	32.1	20.72
ntsz–10b	New Zealand–Keradec–Tonga	179.9595	–36.2593	210.6	18.32	5
ntsz–11a	New Zealand–Keradec–Tonga	179.9267	–35.3538	201.7	25	16.09
ntsz–11b	New Zealand–Keradec–Tonga	180.3915	–35.5040	201.7	12.81	5
ntsz–12a	New Zealand–Keradec–Tonga	180.4433	–34.5759	201.2	25	15.46
ntsz–12b	New Zealand–Keradec–Tonga	180.9051	–34.7230	201.2	12.08	5
ntsz–13a	New Zealand–Keradec–Tonga	180.7990	–33.7707	199.8	25.87	19.06
ntsz–13b	New Zealand–Keradec–Tonga	181.2573	–33.9073	199.8	16.33	5
ntsz–14a	New Zealand–Keradec–Tonga	181.2828	–32.9288	202.4	31.28	22.73
ntsz–14b	New Zealand–Keradec–Tonga	181.7063	–33.0751	202.4	20.77	5
ntsz–15a	New Zealand–Keradec–Tonga	181.4918	–32.0035	205.4	32.33	22.64
ntsz–15b	New Zealand–Keradec–Tonga	181.8967	–32.1665	205.4	20.66	5
ntsz–16a	New Zealand–Keradec–Tonga	181.9781	–31.2535	205.5	34.29	23.59
ntsz–16b	New Zealand–Keradec–Tonga	182.3706	–31.4131	205.5	21.83	5
ntsz–17a	New Zealand–Keradec–Tonga	182.4819	–30.3859	210.3	37.6	25.58
ntsz–17b	New Zealand–Keradec–Tonga	182.8387	–30.5655	210.3	24.3	5
ntsz–18a	New Zealand–Keradec–Tonga	182.8176	–29.6545	201.6	37.65	26.13
ntsz–18b	New Zealand–Keradec–Tonga	183.1985	–29.7856	201.6	25	5
ntsz–19a	New Zealand–Keradec–Tonga	183.0622	–28.8739	195.7	34.41	26.13
ntsz–19b	New Zealand–Keradec–Tonga	183.4700	–28.9742	195.7	25	5
ntsz–20a	New Zealand–Keradec–Tonga	183.2724	–28.0967	188.8	38	26.13
ntsz–20b	New Zealand–Keradec–Tonga	183.6691	–28.1508	188.8	25	5
ntsz–21a	New Zealand–Keradec–Tonga	183.5747	–27.1402	197.1	32.29	24.83
ntsz–21b	New Zealand–Keradec–Tonga	183.9829	–27.2518	197.1	23.37	5
ntsz–22a	New Zealand–Keradec–Tonga	183.6608	–26.4975	180	29.56	18.63
ntsz–22b	New Zealand–Keradec–Tonga	184.0974	–26.4975	180	15.82	5
ntsz–23a	New Zealand–Keradec–Tonga	183.7599	–25.5371	185.8	32.42	20.56
ntsz–23b	New Zealand–Keradec–Tonga	184.1781	–25.5752	185.8	18.13	5
ntsz–24a	New Zealand–Keradec–Tonga	183.9139	–24.6201	188.2	33.31	23.73
ntsz–24b	New Zealand–Keradec–Tonga	184.3228	–24.6734	188.2	22	5
ntsz–25a	New Zealand–Keradec–Tonga	184.1266	–23.5922	198.5	29.34	19.64
ntsz–25b	New Zealand–Keradec–Tonga	184.5322	–23.7163	198.5	17.03	5
ntsz–26a	New Zealand–Keradec–Tonga	184.6613	–22.6460	211.7	30.26	19.43
ntsz–26b	New Zealand–Keradec–Tonga	185.0196	–22.8497	211.7	16.78	5
ntsz–27a	New Zealand–Keradec–Tonga	185.0879	–21.9139	207.9	31.73	20.67
ntsz–27b	New Zealand–Keradec–Tonga	185.4522	–22.0928	207.9	18.27	5
ntsz–28a	New Zealand–Keradec–Tonga	185.4037	–21.1758	200.5	32.44	21.76

(continued on next page)

Table H.7: (continued)

Segment	Description	Longitude (°E)	Latitude (°N)	Strike (°)	Dip (°)	Depth (km)
ntsz–28b	New Zealand–Keradec–Tonga	185.7849	–21.3084	200.5	19.58	5
ntsz–29a	New Zealand–Keradec–Tonga	185.8087	–20.2629	206.4	32.47	20.4
ntsz–29b	New Zealand–Keradec–Tonga	186.1710	–20.4312	206.4	17.94	5
ntsz–30a	New Zealand–Keradec–Tonga	186.1499	–19.5087	200.9	32.98	22.46
ntsz–30b	New Zealand–Keradec–Tonga	186.5236	–19.6432	200.9	20.44	5
ntsz–31a	New Zealand–Keradec–Tonga	186.3538	–18.7332	193.9	34.41	21.19
ntsz–31b	New Zealand–Keradec–Tonga	186.7339	–18.8221	193.9	18.89	5
ntsz–32a	New Zealand–Keradec–Tonga	186.5949	–17.8587	194.1	30	19.12
ntsz–32b	New Zealand–Keradec–Tonga	186.9914	–17.9536	194.1	16.4	5
ntsz–33a	New Zealand–Keradec–Tonga	186.8172	–17.0581	190	33.15	23.34
ntsz–33b	New Zealand–Keradec–Tonga	187.2047	–17.1237	190	21.52	5
ntsz–34a	New Zealand–Keradec–Tonga	186.7814	–16.2598	182.1	15	13.41
ntsz–34b	New Zealand–Keradec–Tonga	187.2330	–16.2759	182.1	9.68	5
ntsz–35a	New Zealand–Keradec–Tonga	186.8000	–15.8563	149.8	15	12.17
ntsz–35b	New Zealand–Keradec–Tonga	187.1896	–15.6384	149.8	8.24	5
ntsz–36a	New Zealand–Keradec–Tonga	186.5406	–15.3862	123.9	40.44	36.72
ntsz–36b	New Zealand–Keradec–Tonga	186.7381	–15.1025	123.9	39.38	5
ntsz–37a	New Zealand–Keradec–Tonga	185.9883	–14.9861	102	68.94	30.99
ntsz–37b	New Zealand–Keradec–Tonga	186.0229	–14.8282	102	31.32	5
ntsz–38a	New Zealand–Keradec–Tonga	185.2067	–14.8259	88.4	80	26.13
ntsz–38b	New Zealand–Keradec–Tonga	185.2044	–14.7479	88.4	25	5
ntsz–39a	New Zealand–Keradec–Tonga	184.3412	–14.9409	82.55	80	26.13
ntsz–39b	New Zealand–Keradec–Tonga	184.3307	–14.8636	82.55	25	5

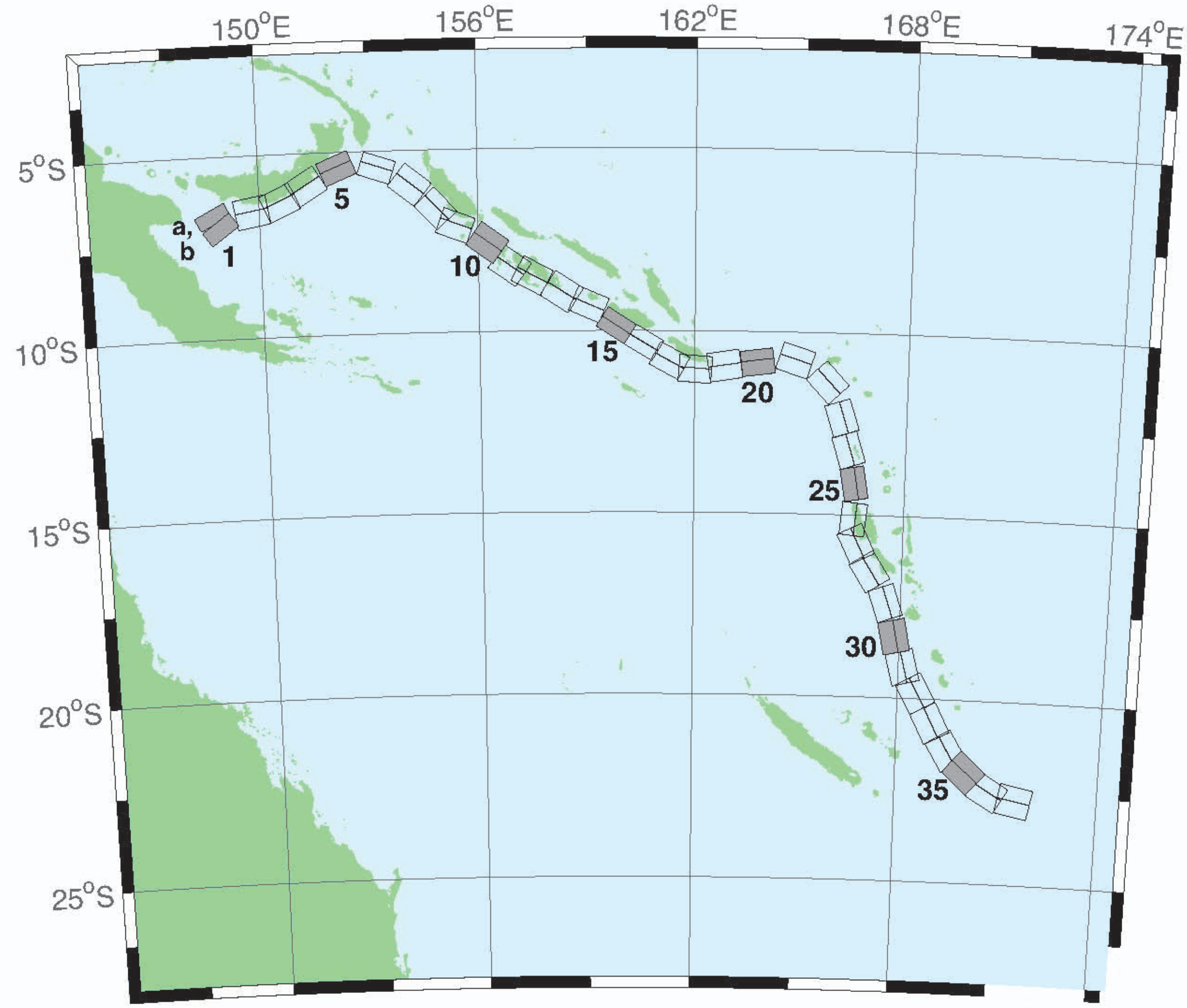

Figure H.8: New Britain–Solomons–Vanuatu Zone unit sources.

Table H.8: Earthquake parameters for New Britain–Solomons–Vanuatu Subduction Zone unit sources.

Segment	Description	Longitude (°E)	Latitude (°N)	Strike (°)	Dip (°)	Depth (km)
nvsz–1a	New Britain–Solomons–Vanuatu	148.6217	–6.4616	243.2	32.34	15.69
nvsz–1b	New Britain–Solomons–Vanuatu	148.7943	–6.8002	234.2	12.34	5
nvsz–2a	New Britain–Solomons–Vanuatu	149.7218	–6.1459	260.1	35.1	16.36
nvsz–2b	New Britain–Solomons–Vanuatu	149.7856	–6.5079	260.1	13.13	5
nvsz–3a	New Britain–Solomons–Vanuatu	150.4075	–5.9659	245.7	42.35	18.59
nvsz–3b	New Britain–Solomons–Vanuatu	150.5450	–6.2684	245.7	15.77	5
nvsz–4a	New Britain–Solomons–Vanuatu	151.1095	–5.5820	238.2	42.41	23.63
nvsz–4b	New Britain–Solomons–Vanuatu	151.2851	–5.8639	238.2	21.88	5
nvsz–5a	New Britain–Solomons–Vanuatu	152.0205	–5.1305	247.7	49.22	32.39
nvsz–5b	New Britain–Solomons–Vanuatu	152.1322	–5.4020	247.7	33.22	5
nvsz–6a	New Britain–Solomons–Vanuatu	153.3450	–5.1558	288.6	53.53	33.59
nvsz–6b	New Britain–Solomons–Vanuatu	153.2595	–5.4089	288.6	34.87	5
nvsz–7a	New Britain–Solomons–Vanuatu	154.3814	–5.6308	308.3	39.72	19.18
nvsz–7b	New Britain–Solomons–Vanuatu	154.1658	–5.9017	308.3	16.48	5
nvsz–8a	New Britain–Solomons–Vanuatu	155.1097	–6.3511	317.2	45.33	22.92
nvsz–8b	New Britain–Solomons–Vanuatu	154.8764	–6.5656	317.2	21	5
nvsz–9a	New Britain–Solomons–Vanuatu	155.5027	–6.7430	290.5	48.75	22.92
nvsz–9b	New Britain–Solomons–Vanuatu	155.3981	–7.0204	290.5	21	5
nvsz–10a	New Britain–Solomons–Vanuatu	156.4742	–7.2515	305.9	36.88	27.62
nvsz–10b	New Britain–Solomons–Vanuatu	156.2619	–7.5427	305.9	26.9	5
nvsz–11a	New Britain–Solomons–Vanuatu	157.0830	–7.8830	305.4	32.97	29.72
nvsz–11b	New Britain–Solomons–Vanuatu	156.8627	–8.1903	305.4	29.63	5
nvsz–12a	New Britain–Solomons–Vanuatu	157.6537	–8.1483	297.9	37.53	28.57
nvsz–12b	New Britain–Solomons–Vanuatu	157.4850	–8.4630	297.9	28.13	5
nvsz–13a	New Britain–Solomons–Vanuatu	158.5089	–8.5953	302.7	33.62	23.02
nvsz–13b	New Britain–Solomons–Vanuatu	158.3042	–8.9099	302.7	21.12	5
nvsz–14a	New Britain–Solomons–Vanuatu	159.1872	–8.9516	293.3	38.44	34.06
nvsz–14b	New Britain–Solomons–Vanuatu	159.0461	–9.2747	293.3	35.54	5
nvsz–15a	New Britain–Solomons–Vanuatu	159.9736	–9.5993	302.8	46.69	41.38
nvsz–15b	New Britain–Solomons–Vanuatu	159.8044	–9.8584	302.8	46.69	5
nvsz–16a	New Britain–Solomons–Vanuatu	160.7343	–10.0574	301	46.05	41
nvsz–16b	New Britain–Solomons–Vanuatu	160.5712	–10.3246	301	46.05	5
nvsz–17a	New Britain–Solomons–Vanuatu	161.4562	–10.5241	298.4	40.12	37.22
nvsz–17b	New Britain–Solomons–Vanuatu	161.2900	–10.8263	298.4	40.12	5
nvsz–18a	New Britain–Solomons–Vanuatu	162.0467	–10.6823	274.1	40.33	29.03
nvsz–18b	New Britain–Solomons–Vanuatu	162.0219	–11.0238	274.1	28.72	5
nvsz–19a	New Britain–Solomons–Vanuatu	162.7818	–10.5645	261.3	34.25	24.14
nvsz–19b	New Britain–Solomons–Vanuatu	162.8392	–10.9315	261.3	22.51	5
nvsz–20a	New Britain–Solomons–Vanuatu	163.7222	–10.5014	262.9	50.35	26.3
nvsz–20b	New Britain–Solomons–Vanuatu	163.7581	–10.7858	262.9	25.22	5
nvsz–21a	New Britain–Solomons–Vanuatu	164.9445	–10.4183	287.9	40.31	23.3
nvsz–21b	New Britain–Solomons–Vanuatu	164.8374	–10.7442	287.9	21.47	5
nvsz–22a	New Britain–Solomons–Vanuatu	166.0261	–11.1069	317.1	42.39	20.78
nvsz–22b	New Britain–Solomons–Vanuatu	165.7783	–11.3328	317.1	18.4	5
nvsz–23a	New Britain–Solomons–Vanuatu	166.5179	–12.2260	342.4	47.95	22.43
nvsz–23b	New Britain–Solomons–Vanuatu	166.2244	–12.3171	342.4	20.4	5
nvsz–24a	New Britain–Solomons–Vanuatu	166.7236	–13.1065	342.6	47.13	28.52
nvsz–24b	New Britain–Solomons–Vanuatu	166.4241	–13.1979	342.6	28.06	5
nvsz–25a	New Britain–Solomons–Vanuatu	166.8914	–14.0785	350.3	54.1	31.16
nvsz–25b	New Britain–Solomons–Vanuatu	166.6237	–14.1230	350.3	31.55	5
nvsz–26a	New Britain–Solomons–Vanuatu	166.9200	–15.1450	365.6	50.46	29.05
nvsz–26b	New Britain–Solomons–Vanuatu	166.6252	–15.1170	365.6	28.75	5
nvsz–27a	New Britain–Solomons–Vanuatu	167.0053	–15.6308	334.2	44.74	25.46
nvsz–27b	New Britain–Solomons–Vanuatu	166.7068	–15.7695	334.2	24.15	5
nvsz–28a	New Britain–Solomons–Vanuatu	167.4074	–16.3455	327.5	41.53	22.44

(continued on next page)

Table H.8: (continued)

Segment	Description	Longitude (°E)	Latitude (°N)	Strike (°)	Dip (°)	Depth (km)
nvsz–28b	New Britain–Solomons–Vanuatu	167.1117	–16.5264	327.5	20.42	5
nvsz–29a	New Britain–Solomons–Vanuatu	167.9145	–17.2807	341.2	49.1	24.12
nvsz–29b	New Britain–Solomons–Vanuatu	167.6229	–17.3757	341.2	22.48	5
nvsz–30a	New Britain–Solomons–Vanuatu	168.2220	–18.2353	348.6	44.19	23.99
nvsz–30b	New Britain–Solomons–Vanuatu	167.8895	–18.2991	348.6	22.32	5
nvsz–31a	New Britain–Solomons–Vanuatu	168.5022	–19.0510	345.6	42.2	22.26
nvsz–31b	New Britain–Solomons–Vanuatu	168.1611	–19.1338	345.6	20.2	5
nvsz–32a	New Britain–Solomons–Vanuatu	168.8775	–19.6724	331.1	42.03	21.68
nvsz–32b	New Britain–Solomons–Vanuatu	168.5671	–19.8338	331.1	19.49	5
nvsz–33a	New Britain–Solomons–Vanuatu	169.3422	–20.4892	332.9	40.25	22.4
nvsz–33b	New Britain–Solomons–Vanuatu	169.0161	–20.6453	332.9	20.37	5
nvsz–34a	New Britain–Solomons–Vanuatu	169.8304	–21.2121	329.1	39	22.73
nvsz–34b	New Britain–Solomons–Vanuatu	169.5086	–21.3911	329.1	20.77	5
nvsz–35a	New Britain–Solomons–Vanuatu	170.3119	–21.6945	311.9	39	22.13
nvsz–35b	New Britain–Solomons–Vanuatu	170.0606	–21.9543	311.9	20.03	5
nvsz–36a	New Britain–Solomons–Vanuatu	170.9487	–22.1585	300.4	39.42	23.5
nvsz–36b	New Britain–Solomons–Vanuatu	170.7585	–22.4577	300.4	21.71	5
nvsz–37a	New Britain–Solomons–Vanuatu	171.6335	–22.3087	281.3	30	22.1
nvsz–37b	New Britain–Solomons–Vanuatu	171.5512	–22.6902	281.3	20	5

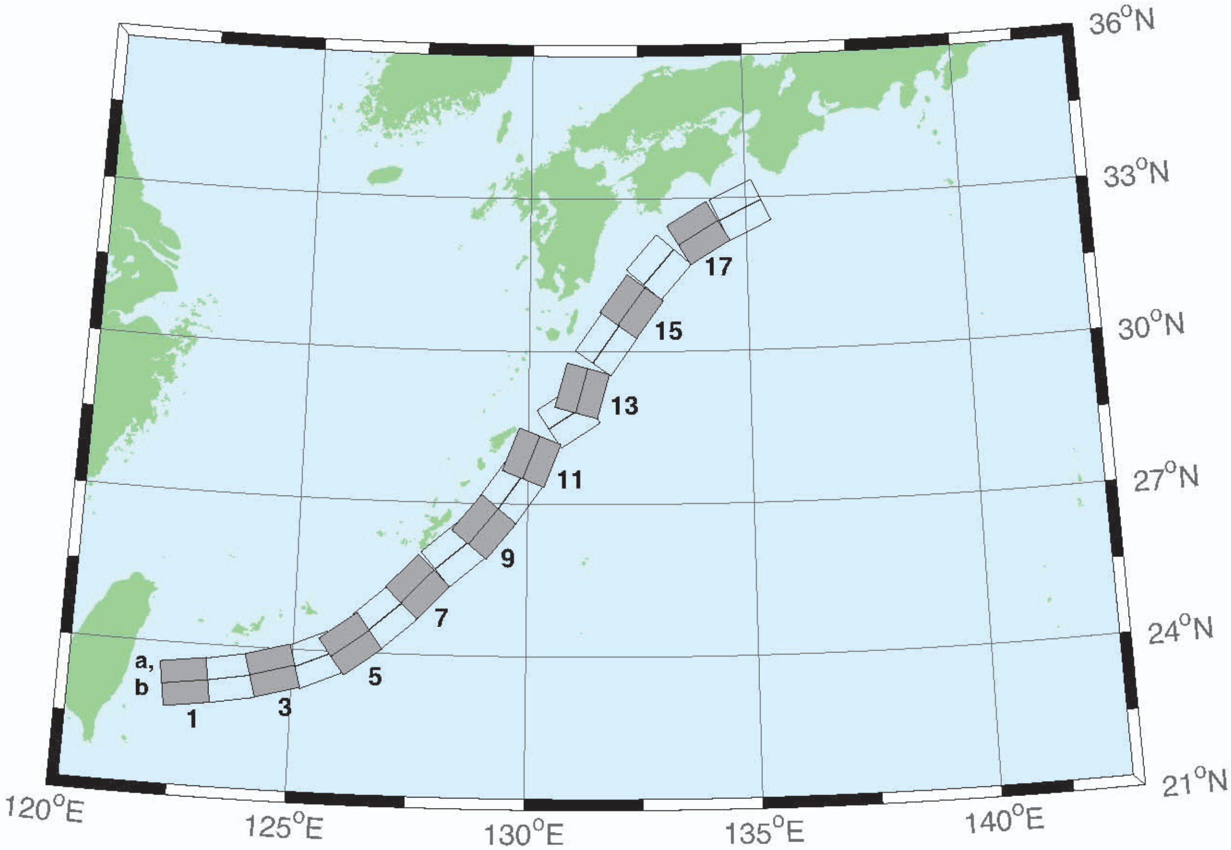

Figure H.9: Ryukyu–Kyushu–Nankai Zone unit sources.

Table H.9: Earthquake parameters for Ryukyu–Kyushu–Nankai Subduction Zone unit sources.

Segment	Description	Longitude (°E)	Latitude (°N)	Strike (°)	Dip (°)	Depth (km)
rnsz–1a	Ryukyu–Kyushu–Nankai	122.6672	23.6696	262	14	11.88
rnsz–1b	Ryukyu–Kyushu–Nankai	122.7332	23.2380	262	10	3.2
rnsz–2a	Ryukyu–Kyushu–Nankai	123.5939	23.7929	259.9	18.11	12.28
rnsz–2b	Ryukyu–Kyushu–Nankai	123.6751	23.3725	259.9	10	3.6
rnsz–3a	Ryukyu–Kyushu–Nankai	124.4604	23.9777	254.6	19.27	14.65
rnsz–3b	Ryukyu–Kyushu–Nankai	124.5830	23.5689	254.6	12.18	4.1
rnsz–4a	Ryukyu–Kyushu–Nankai	125.2720	24.2102	246.8	18	20.38
rnsz–4b	Ryukyu–Kyushu–Nankai	125.4563	23.8177	246.8	16	6.6
rnsz–5a	Ryukyu–Kyushu–Nankai	125.9465	24.5085	233.6	18	20.21
rnsz–5b	Ryukyu–Kyushu–Nankai	126.2241	24.1645	233.6	16	6.43
rnsz–6a	Ryukyu–Kyushu–Nankai	126.6349	25.0402	228.7	17.16	19.55
rnsz–6b	Ryukyu–Kyushu–Nankai	126.9465	24.7176	228.7	15.16	6.47
rnsz–7a	Ryukyu–Kyushu–Nankai	127.2867	25.6343	224	15.85	17.98
rnsz–7b	Ryukyu–Kyushu–Nankai	127.6303	25.3339	224	13.56	6.26
rnsz–8a	Ryukyu–Kyushu–Nankai	128.0725	26.3146	229.7	14.55	14.31
rnsz–8b	Ryukyu–Kyushu–Nankai	128.3854	25.9831	229.7	9.64	5.94
rnsz–9a	Ryukyu–Kyushu–Nankai	128.6642	26.8177	219.2	15.4	12.62
rnsz–9b	Ryukyu–Kyushu–Nankai	129.0391	26.5438	219.2	8	5.66
rnsz–10a	Ryukyu–Kyushu–Nankai	129.2286	27.4879	215.2	17	12.55
rnsz–10b	Ryukyu–Kyushu–Nankai	129.6233	27.2402	215.2	8.16	5.45
rnsz–11a	Ryukyu–Kyushu–Nankai	129.6169	28.0741	201.3	17	12.91
rnsz–11b	Ryukyu–Kyushu–Nankai	130.0698	27.9181	201.3	8.8	5.26
rnsz–12a	Ryukyu–Kyushu–Nankai	130.6175	29.0900	236.7	16.42	13.05
rnsz–12b	Ryukyu–Kyushu–Nankai	130.8873	28.7299	236.7	9.57	4.74
rnsz–13a	Ryukyu–Kyushu–Nankai	130.7223	29.3465	195.2	20.25	15.89
rnsz–13b	Ryukyu–Kyushu–Nankai	131.1884	29.2362	195.2	12.98	4.66
rnsz–14a	Ryukyu–Kyushu–Nankai	131.3467	30.3899	215.1	22.16	19.73
rnsz–14b	Ryukyu–Kyushu–Nankai	131.7402	30.1507	215.1	17.48	4.71
rnsz–15a	Ryukyu–Kyushu–Nankai	131.9149	31.1450	216	15.11	16.12
rnsz–15b	Ryukyu–Kyushu–Nankai	132.3235	30.8899	216	13.46	4.48
rnsz–16a	Ryukyu–Kyushu–Nankai	132.5628	31.9468	220.9	10.81	10.88
rnsz–16b	Ryukyu–Kyushu–Nankai	132.9546	31.6579	220.9	7.19	4.62
rnsz–17a	Ryukyu–Kyushu–Nankai	133.6125	32.6956	239	10.14	12.01
rnsz–17b	Ryukyu–Kyushu–Nankai	133.8823	32.3168	239	8.41	4.7
rnsz–18a	Ryukyu–Kyushu–Nankai	134.6416	33.1488	244.7	10.99	14.21
rnsz–18b	Ryukyu–Kyushu–Nankai	134.8656	32.7502	244.5	10.97	4.7