

Summary Report on the Kyushu Earthquakes of April 14 and 16, 2016

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The report that follows is based on news media reports in English language newspapers, JMA and USGS reports and NHK World television. In some cases, these reports cite city and prefectural government reports in the affected region and others are based on the observations of reporters on site. The report is divided into sections based on topic.

Seismology/Geology

Initial earthquake (foreshock): JMA M6.5 (USGS M6.2) occurred at 9:26 PM Japan Standard Time, April 14, 2016. Lat. 32.7, Long. 130.8E. Depth 10km, region Kumamoto-ken, Kumamoto-chiho. Maximum JMA Intensity 7 (highest on the intensity scale).

Significant aftershocks of the April 14 event:

10:07 PM	4-14	M5.7	Intensity 6-
10:38 PM		M5.0	5-
11:43 PM		M5.0	4
12:03 AM	4-15	M6.4	6+

In addition to these large aftershocks, there were:

M4.0 to M4.9	12	JMA 4
M3.0 to M3.9	13	JMA 3-4

Mainshock: JMA M7.3 (USGS M7.0) occurred at 1:25 AM Japan Standard Time, April 16, 2016. Lat. 32.8, long. 130.7E. Depth 10km, Region Kumamoto-ken. Maximum JMA Intensity 6+, mechanism-strike-slip. News reports indicated that the earthquake occurred on the Futagawa fault.

Significant aftershocks of the April 16 event:

1:46 AM	April 16	M6.0	JMA Intensity 6-
3:55 AM		M5.8	6+

9:48 AM

M5.4

6-

The Japan Times, citing the JMA, reported on April 29, 2016 that to date over 1,000 earthquakes have occurred in Kumamoto and Oita Prefectures since the initial event at 9:26 PM on April 14. The article, again citing the JMA, reported that the total number of earthquakes in all of Japan last year was 1,842.

Surface Rupture and Liquefaction: surface rupture was observed as was liquefaction along rivers and in other areas of the impact zone.

Aftershock Warnings: The JMA, which routinely issues aftershock probabilities following a mainshock, reportedly provided warnings after the 4-14 event but discontinued doing so after the mainshock of 4-16. According to a Yomiuri Shimbun article that appeared on 4-21, the JMA released a statement following the 4-14 M6.5 event stating that there was a 20% probability of aftershocks measuring lower 6 or higher. The rationale for cessation of aftershock forecasts, according to the article was that the JMA felt that past occurrences of aftershock sequences were not providing adequate guidance as they have in the past.

Basic Situation Statistics

Impact Areas: Kumamoto City, Mashiki and Minami-Aso. There are other towns in Kumamoto and Oita prefectures but these are the areas most often mentioned in news reports.

Fatalities: 49 as a direct effect of the earthquakes, 16 additional fatalities indirectly attributed to the earthquake and 1 person is missing in Minami-Aso.

Injuries: 1,100, no breakdown in terms of severity at the time of this report.

Displaced: the number of evacuees reported has fluctuated considerable from as low as 80,000 to a high of 180,000. On 4-24, the Japan Times cited "government reports" of 89,513 evacuees in Kumamoto Prefecture and 637 from Oita Prefecture. NHK World TV reported on April 28, 2016 that there are currently 38,000 people currently sheltered in Kumamoto Prefecture. On 4-29-16, the Japan Times reported that the current number of evacuees is 30,000.

Shelters: There are 623 official shelters as reported by the Yomiuri Shimbun on 4-21 mainly public buildings and schools. At least three ferry boats serve as shelters and the Kumamoto Prison was opened to evacuees where 250 people were sheltered as of 4-21.

Building Damage: The Japan Times cited a Kumamoto Prefectural Government report that 10,271 building were damaged. Another article cited an official Kumamoto Prefectural Government report that 1,526 houses were totally destroyed.

In addition 4 government buildings in Yatsushiro, Uto, Hitoyoshi and Mashiki have been severely damaged and cannot be occupied.

Mutual Aid: The national government has deployed 26,000 Self Defense Army personnel to the region. The US base in Okinawa has dispatched 4 MV-22 Ospreys which delivered 20 tons of relief supplies (food, water and blankets) to Minami-Aso.

Volunteers: Approximately 700 people have registered with government agencies in the impact region, the first of whom were registered on April 22nd. They will assist in the distribution of food and supplies at the evacuation centers, clear debris and help clean up homes.

Specific Incidents and Issues

Shinkansen Derailment: A Shinkansen train and 6 cars derailed while traveling at approximately 80 kph between Shin-Minimata and Kumamoto in the April 14 M6.5 foreshock. No passengers were on board and the driver was not injured. The train and cars are expected to be cleared and this stretch of the railway opened on April 28. The Japan Times reported on 4-29-16 that the Kyushu Shinkansen has resumed all services in Kyushu.

Transportation Impacts: As of 4-29-16, the Kyushu Expressway is expected to be opened by Friday 4-29, but many secondary roads in Kumamoto Prefecture are still blocked by debris and landslides per Japan Times 4-29-16. Blockages exist at 295 locations in the prefecture.

Conditions at the Shelters: Conditions at the shelters have been a subject of nearly daily news reports. There are 623 officially recognized shelters mostly in public buildings. Some shelters are extremely crowded, and are inadequately provided with potable water, food and blankets. While many evacuees have homes that are uninhabitable, others have evacuated due to utility outages and lack of adequate food and water supplies at home. A large number of people have evacuated to their cars due to fear that ongoing aftershocks will cause their houses to collapse, giving rise to concerns among health care professionals that some of these people who spend lengthy periods of time confined to their cars will develop blood clots that could cause death, this situation has been referred to as “economy class syndrome.” Nearly 100 people have been diagnosed with or suspected to have so-called economy class syndrome, caused by prolonged inactivity, according to a Kyodo News Survey (Japan Times, 4-29-16). Some evacuees have chosen to remain in their cars because pets are not permitted in the shelters. NHK TV reported outbreaks of Norovirus at one the evacuation centers in Minami-Aso and health officials are concerned about the disease spreading.

Temporary Housing: The Kumamoto prefectural government has decided to secure some 4,200 temporary housing units, half through construction and the other half by

renting, using a supplementary budget of ¥36.6 billion for fiscal 2016 (Japan Times, 4-29-16).

Weather in the Region: Search and rescue/recovery and activities in response to the earthquakes has been hampered by persistent rain causing concern that further landslides will be triggered, particularly in mountainous Minami-Aso, one of the hardest hit areas. An Asahi Shimbun article on 4-22 reported that 1000 people (500 households) had been ordered to evacuate due to possible flooding. The rain has also resulted in lengthy confinement of people who have evacuated in their cars prompting increased concern that they will develop “economy class syndrome.”

Impacts on Schools: Between April 19 and 23rd, 1,267 school buildings at 163 locations were inspected for damage. A total of 134 locations had buildings that were “red tagged” meaning that they were considered dangerous and unusable. Another 354 sites had buildings that were “yellow tagged” meaning “caution needed.” (Asahi Shimbun, April 26).

Disabled and Special Needs Persons: In 2012, Kumamoto signed agreements with 176 social welfare facilities that accommodate the elderly, disabled and others with special needs in the event of a disaster. But following the earthquakes of 4-14 and 4-16, only 34 of these facilities were able to accept special needs evacuees. These facilities were expected to take in 1,700 evacuees. Damage to these facilities, utility outages and staff shortages were blamed for the inability to accept more special needs evacuees. Recently, volunteers have been assigned to these facilities that should ease some of the difficulties. (Asahi Shimbun, 4-27)

Damage to Historic Sites:

-Asojinja Shrine: Destroyed were its worship hall and main gate. The gate has been designated and “important cultural property” and is one of three famed “Romon” two-story temples and shrine gate structures in Japan. There are plans to rebuild it.

-Kumamoto Castle: Drones were employed to do a damage assessment of Kumamoto Castle’s main tower because on-site inspection is too dangerous due to continuing aftershocks. Engineers noted damage to the supporting foundation of the castle due to use of smaller stones and a 1960 reconstruction of the main tower was thought responsible for damage due to use of steel reinforced concrete rather than wood (used in the original construction) that made the structure heavier and less flexible. The castle also lost most of its roof tiles as well as “shachihoko” a fabled fish roof ornament.

School Closures: approximately 150,000 children were unable to attend classes on Monday April 25 due to damage to schools and the use of schools for evacuation centers.

Business Impacts

Business Interruption

Toyota suspended production at most of its factories (15) in Japan due to scarcity of parts with cascading effects on other manufacturers.

Honda's motorcycle plant in Kumamoto was severely damaged in the earthquakes.

Sony reported a fourth-quarter loss after booking a charge against its chip business and delayed giving a full-year forecast to assess damage from an earthquake that shut its main plant for camera sensors. The net loss was ¥88.3 billion in the quarter ended March, the Tokyo-based company said Thursday. Sony, which also recorded its first full-year profit in three years, will probably see annual net income in the current fiscal period climb to ¥212.2 billion, according to the average of estimates compiled by Bloomberg. Operations at its Sony's Kumamoto facility remained suspended after this month's earthquakes on Kyushu, with some parts to reopen at the end of May. The company has said there's been damage to the building, clean rooms and equipment. The facility is the primary manufacturing site for image sensors used in digital and security cameras as well as micro-display devices. (Japan Times, 4-29-16; Associated Press, 4-29-16)

Renesas Electronics Corp. in Kumamoto was closed for safety evaluation particularly for dangerous gases used to maintain antiseptic conditions for chip production.

Japans Nikkei 225 stock index fell by 3% on Monday April 18, in addition:

Toyota was down 4.8%
Nissan was down by 2.8%
Sony down by 6.8%

The above are from an Associated Press report that appeared on 4-18. The report, which focused on business interruption, also noted that Kyushu is home to about 25% of Japans semi-conductor production. Kyushu is known as "Silicon Island." The island also has auto, steel and ship manufacturers.

The earthquakes impact on business (losses and impacts on supply chains) will depend on how long factories are closed

Insurance: According to the Insurance Information Institute, earthquake damage in Kyushu is not likely to have a significant impact on insurance pricing nor will it cause insurers or modeling companies to reassess their catastrophe models.

Tourism: According to an Asahi Shimbun article on April 21st, tourist numbers in Kyushu have plunged since the earthquake disaster. China and Hong Kong have

issued travel warnings against visiting Kyushu according to the Japan Tourist Agency. Fukuoka, Miyazaki and Kagoshima Prefectures have also observed declines in visitors. The Camellia Line ferry, which makes a daily round trip between Busan Port in South Korea and Hakata Port in Fukuoka reported 2,400 cancellations after April 14. Areas within Kyushu that are popular tourist destinations including Mt. Aso, which receives about 16 million visitors per year will experience declines due to damage to many of the inns and businesses that cater to visitors. Also, the Asojinjja Shrine and the Kumamoto castle, also popular with tourists have been severely damaged and will be closed for lengthy periods of time. Golden Week during which many Japanese people take vacations, begins on Friday April 29.

New Legislation: The central government adopted an ordinance Thursday (4-28) for extending deadlines for some administrative procedures, including updating driving licenses. Among the more than 200 special measures expected to be launched based on the ordinance is one to freeze bankruptcy procedures for companies that went bust due to the earthquakes for a maximum of two years. The measure is designed to prevent chain-reaction bankruptcies (Japan Times, 4-29-16).

Issues cited in Editorials

Citing the conditions at the shelters, Kumamoto prefectural government was criticized for poor planning and failure to conduct adequate needs assessments resulting in shortages of food, water and other necessities at the evacuation centers (Yomiuri Shimbun, 4-19).

Editorial writer expressed concern about health impacts on the evacuees and advocated the movement of vulnerable people—the elderly, people with disabilities and infants to neighboring jurisdictions that have offered publicly run housing free of charge. The article also urged better information sharing, particularly about the status of the Sendai Nuclear Power Plant run by Kyushu Electric Power Company. (Yomiuri Shimbun, 4-20)

Editorial emphasizes health impacts of evacuation and that conditions at the evacuation centers will result in stress and fatigue, leading to illness and possibly death. Noted that 80% of the post-earthquake fatalities following the 2004 Chuetsu earthquake were due to the effects of long-term evacuation. (Yomiuri Shimbun, 4-19)

This article was critical of local government due to the severe damage to municipal buildings and hospitals that are critical to an effective disaster response. The writer identified several such buildings including the Uto Municipal Government building that was in danger of collapse, the Uto Disaster Control headquarters that was badly damaged and personnel were forced to respond to the earthquake from tents, and Kumamoto Hospital which was forced to move patients to other hospitals. (Yomiuri Shimbun, 4-16)

This editorial was critical of the Japan Railway for the derailment of a Shinkansen train and 6 cars. The writer noted that “derailment prevention guards” had been installed in some areas but not the stretch of track where the train derailed and called for a more aggressive program of hazard mitigation for the Shinkansen which travel at high speeds and usually have large numbers of passengers. (Japan Times, 4-23)