

## Section 5 Earthquake Centered Off the Coast of Fukushima Prefecture in 2022

### (1) Overview

At 11:36 p.m. of March 16, 2022, an earthquake of magnitude 7.4 (provisional figure) occurred at a depth of 57 km (provisional figure) off the coast of Fukushima Prefecture. The seismic intensity was 6+ in Tome City and Zao Town in Miyagi Prefecture, and Soma City, Minamisoma City and Kunimi Town in Fukushima Prefecture, and 6- to 1 from Hokkaido through the Chugoku region, mainly in the Tohoku region.

Seismic Intensity in Each Area (Enlarged View)



Source: Japan Meteorological Agency website

### (2) Overview of Damage

The earthquake caused 3 deaths (2 in Miyagi (including 1 disaster-related death) and 1 in Fukushima Prefectures), 28 seriously injured and 217 slightly injured (Source: Cabinet Office information as of April 19, 2022).

As for damage to homes, 111 were completely destroyed, 1,285 were half destroyed, and 19,048 were partially destroyed (Source: Cabinet Office information as of April 19, 2022).

(Reference: [https://www.bousai.go.jp/updates/r4fukushima\\_eq\\_0317/pdf/r4fukushima\\_eq\\_0317\\_08.pdf](https://www.bousai.go.jp/updates/r4fukushima_eq_0317/pdf/r4fukushima_eq_0317_08.pdf))

### Human and Housing Damage (as of April 19, 2022)

#### Human Damage

	Death	Disaster-Related Deaths (included in deaths)	Major Injuries	Minor Injuries
Miyagi	2	1	10	96
Fukushima	1		9	92
Other	0		9	29
<b>Total</b>	<b>3</b>	<b>1</b>	<b>28</b>	<b>217</b>

#### Housing Damage

	Completely Destroyed	Half Destroyed	Partial Damage
Miyagi	30	189	7,668
Fukushima	81	1,095	11,372
Others	0	1	8
<b>Total</b>	<b>111</b>	<b>1,285</b>	<b>19,048</b>

Source: Prepared by the Cabinet Office from the Fire and Disaster Management Agency website.

As a result of this earthquake, up to 2.23 million households in the areas served by Tokyo Electric Power Company and Tohoku Electric Power Company experienced blackouts, and over 69,999 households in Iwate, Miyagi, Fukushima, Saitama, and Chiba Prefectures suffered from suspension of water supply. In addition to such damage to lifelines, there was also damage to transportation infrastructure such as suspension of operations of Tohoku bullet train due to derailment between Fukushima and Shiroishizao Stations.



Cracks in the road surface (Soma City, Fukushima Prefecture)

### **(3) Response by the Government**

At 11:38 p.m. of March 16, 2022, Prime Minister Kishida instructed to: (1) “grasp the state of damage immediately,” (2) “make the best effort for disaster response measures including lifesaving and rescue of affected people” and (3) “provide information on evacuation and damage to the public in a timely and accurate manner.” In light of these instructions, at 11:39 p.m., an Emergency Response Office in the Prime Minister’s Office was established.

On March 19, Minister of State for Disaster Management Ninoyu visited the affected site in Fukushima Prefecture.

In addition, on March 28, Prime Minister Kishida instructed Minister of State for Disaster Management Ninoyu to take the initiative in forming support plans, taking into account the state of damage and requests from local governments (prefectures, municipalities). In response to this, on April 8, the “Set of Support Measures for the Earthquake Centered Off the Coast of Fukushima Prefecture in 2022” was compiled as an urgent measure for the purpose of rebuilding lives and livelihoods of the affected people.

The referenced support measures covered not only exceptional support through subsidies for small and medium-sized companies and support of demolishing half destroyed houses which had not originally been included in the support coverage, but also measures of restoration work for Date Bridge in Fukushima Prefecture in place of the government authority because recovering Date Bridge requires high technical competence.

With regard to designation as a disaster of extreme severity, it was disclosed that disasters in the area of Shinchi Town, Soma County in Fukushima Prefecture was assumed to be designated as disaster of extreme severity on April 8, 2022 in accordance with Article 5 and Article 24 of the “Act on Special Financial Support to Deal with Extremely Severe Disasters” (Act No. 150 of 1962) (See Annex 14-4).



Minister of State for Disaster Management Ninoyu visiting an affected site

[Column]

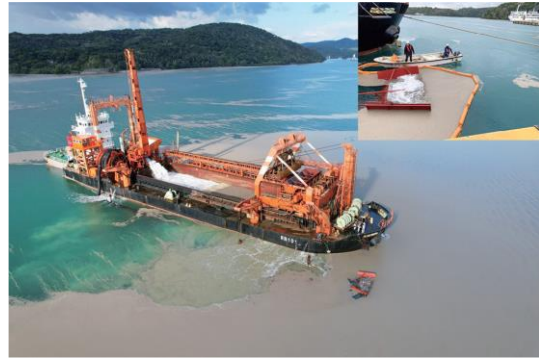
**“Pumice due to Eruption of Submarine Volcano ‘Fukutoku-Oka-no-Ba’”**

The sea surface was filled with a great amount of pumice like floating rafts after the eruption of a submarine volcano occurred in “Fukutoku-Oka-no-Ba,” Ogasawara region from August 13 to 15 in 2021. These “Pumice Rafts” moved westward, being extended by the current, and there were many cases to be observed where pumice was floating and drifting along the coasts of Japan since October of the same year. This pumice was thought to originate from the eruption of “Fukutoku-Oka-no-Ba,” which caused various effects on vessels in harbors and fishing ports such as engine troubles on their way as well as preventing them from coming in and out. As of the end of FY2021, pumice was seen floating and drifting at a total of 91 harbors, 154 fishing ports and the coasts of 62 municipalities from Okinawa and Kagoshima (Nansei Islands) to Ibaraki Prefectures. This caused ferry services to be suspended and fishing boats to be unable to sail due to engine troubles.

On October 28, 2021, the government established the “Inter-Agency Countermeasure Meeting on Eruption of Submarine Volcano ‘Fukutoku-Oka-no-Ba’” under the Deputy Chief Cabinet Secretary, and have been working in cooperation with related ministries and agencies to promptly respond to the situation. In order to prevent damages due to pumice, the related ministries and agencies have cautioned prefectures and shipping business operators. Measures, including setting and preparing oil fences to prevent pumice inflow, have been taken in harbors and fishing ports along the Pacific Ocean side of Japan since it was assumed that pumice had been floating and drifting into those areas. In order to collect and dispose of pumice that had already drifted into the harbors and fishing ports, the government has provided financial support including through disaster rehabilitation operations and the like. In addition, the Ports and Harbours Bureau from the Ministry of Land, Infrastructure, Transport and the Tourism (MLIT) and the Fisheries Agency established the “Working Group on Technologies to Collect Floating Pumice,” to work together, disclosed a collection of case studies regarding technologies to collect pumice, and provided technical support including through liaisons. As for Unten Port in Okinawa Prefecture, the Minister of MLIT partially manages harbor facilities in Unten Port as deputy of the port management body, or Okinawa Prefecture, in accordance with the “Port and Harbour Act” (Act No. 218 of 1950). And the Minister also provides various assistance such as developing overall plans for pumice removal from the sea. In addition, the MLIT is taking necessary measures to prevent damage to vessels and continuously ensure safe operation of vessels by publishing “Key Points for Safe Operation to Prevent Pumice Damage” and “Case Studies of Pumice Countermeasures by Shipping Business Operators,” which compiles information to help shipping business operators implement countermeasures against pumice. Moreover, as a response to damage to the fishing industry, such as voluntary restraint on operations, vessel breakdowns and the loss of income consequent to them, fisheries mutual aid and other programs are being used to compensate for the loss of income and providing support for vessel repair costs.



Fukutoku-Oka-no-Ba (August 26, 2021)  
(Source: Japan Coast Guard)



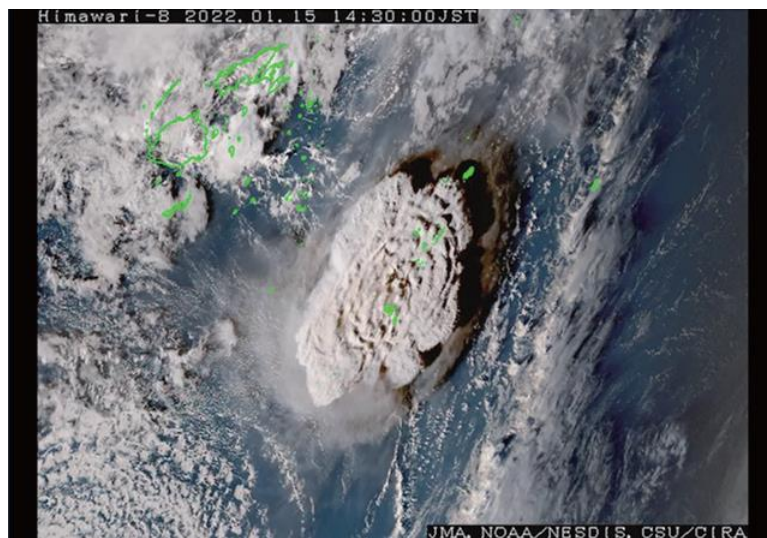
Pumice removal at Unten Port  
(Source: MLIT)

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**"Change of Tide Level Associated with the Eruption of Hunga Tonga-Hunga Ha'apai Volcano  
and the Response by the Government"**

An eruption occurred from the Hunga Tonga-Hunga Ha'apai volcano near the Tongan Islands from December 2021 to January 2022. A series of eruptive activities began with an explosive eruption on December 20, and although the eruptive activity temporarily slowed down in January, a large scale of eruptions occurred on January 14 and 15. The plumes from these eruptions were observed by the Japanese geostationary meteorological satellite Himawari (see figure below). In particular, the eruption on January 15 was so large that the plumes reached an altitude of about 52,000 feet (approx. 16,000 m), and the upper part of the plumes in diameter extended more than 600 km, according to New Zealand's Wellington Volcanic Ash Advisory Center (VAAC). According to the Smithsonian National Museum of Natural History in the U.S., it is reported that there was a great deal of ashfall on islands 70 to 100 km east from the Hunga Tonga-Hunga Ha'apai volcano.

**Satellite image of the large-scale eruption of Hunga Tonga-Hunga Ha'apai volcano on January 15, 2022**



Source: Japan Meteorological Agency

Changes of tide level were observed at Nuku'alofa (Kingdom of Tonga) near the Hunga Tonga-Hunga Ha'apai volcano at 1:25 p.m. (Japanese Standard Time) of January 15, 2022, likely due to the volcanic eruption. Since the possibility of the tide change was anticipated in Japan as well, the Japan Meteorological Agency issued information on the distant earthquake (investigating whether or not a tsunami would reach Japan) at 6:00 p.m. of the same day. Since the level of the tide change at overseas tide observation stations along the propagation path to Japan was small, information on the distant earthquake that the sea level will slightly change along the coast of Japan and tsunami forecast with the slight sea level changes were announced at 7:01 and 7:03 p.m. respectively, of the same day. Subsequently, the changes of the tide level began to be observed at tide observation stations in Japan two hours earlier than the expected normal arrival time of tsunami due to an earthquake, with tide level changes tending high. Therefore, because of the possibility of disasters and the need to urge alert and advisory, Tsunami Warnings were issued for the Amami Islands and the Tokara Islands at 0:15 a.m. of the 16<sup>th</sup> of the same month,

and Tsunami Advisories were issued for the Pacific coast from the eastern part of Hokkaido to Miyako Island and the Yaeyama regions. Furthermore, at 2:54 a.m. on the same day, the Tsunami Advisory for Iwate Prefecture was switched to Tsunami Warning, and at 4:07 a.m. on the same day, Tsunami Advisories were issued for western Nagasaki and western Kagoshima Prefectures (thereafter, Tsunami Warnings and Advisories were sequentially switched and cancelled according to decaying tide level change). When this change in tide height was measured by a tsunami height measurement method, changes in tide level were observed throughout the country. For instance, a height of 134 cm was observed at Kominato, Amami City in Kagoshima Prefecture (Source: Japan Meteorological Agency) and 107 cm at Kuji Port in Iwate Prefecture (MLIT).

In light of these situations, the government established an Emergency Contact Office in the Prime Minister's Office at 0:15 a.m. of January 16 to collect information on the damages.

As a result of these tide changes, it was reported that 30 fishing vessels had capsized or sank, with damage to 158 fishing gear, aquaculture facilities, and common facilities in total, and 143 fish farms. (As of April 15, 2022)

This tide change was different from those caused by normal earthquakes in that the tide level changed more than two hours earlier than the normal arrival time of tsunamis caused by earthquakes, and the level of tide change at observation points was small along the route from Tonga to Japan. However, the tsunami warning system was used in order to encourage the public to take proactive disaster risk reduction behavior. At the time when the tide level change was observed, a change in atmospheric pressure of about 2 hectopascals was observed at ground meteorological stations in Japan.

In a series of responses to the tide level change, there were some issues that: (1) it took a while before the Tsunami Warnings were announced because the mechanism of the tide level change was not clear at the time the change was observed, and (2) the provision of information was insufficient between the eruption and the announcement of the Tsunami Warnings. In light of these issues, the Japan Meteorological Agency has been taking measures since February 2022 to notify, for the time being, that tide changes may be observed in Japan due to overseas volcanic eruptions under the "information on distant earthquakes." This is in case where (1) a large-scale eruption occurs overseas or (2) after a large-scale eruption, tide changes are observed at overseas tsunami monitoring stations which are located along the tsunami transmission route to Japan. This information was announced at the time of the eruption of the Manam volcano (Independent State of Papua New Guinea) on March 8, 2022. In addition, the "Study Group on Tsunami Prediction Technology" examined what mechanism was thought to have caused the tidal level changes in order to contribute to the discussion on how information should be shared regarding tide level changes due to volcanic eruptions based on the recent eruption. A report was compiled in April 2022, including the assumption that the tidal changes were thought to have been caused by an interaction between the ocean and the atmosphere. Based on this report, since May 2022, a study group has been discussing how information on changes in tide levels should be shared in the event of a large-scale eruption, with the participation of experts on tsunami, volcanoes, and disaster prevention information, local government disaster management officials, and the media to convey information.

Also, based on this change in tide levels, the Cabinet Office and the Fire and Disaster Management Agency issued a notice to the municipalities through prefectures in order to urge them to take appropriate measures such as issuing evacuation instructions in the event of tsunami.



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**Support Grants for Reconstructing Livelihoods of the Affected  
Households with Minor Destruction Newly Eligible for Payments**

The Act on Support for Reconstructing Livelihoods of Disaster Victims (Act No. 66 of 1998) is the act to provide assistance to affected people who suffer from significant damage to the foundation of their livelihood in the event of natural disasters. In case where the natural disasters occur and it is difficult for the affected municipalities or prefectures to respond on their own, the funds contributed by prefectures in the context of mutual assistance are utilized to provide assistance payments under this Act, and it has been amended continuously several times so far.

A fact-finding survey conducted in June 2019 by the "Working-level Conference on the System on Support for Reconstructing Livelihoods of the Affected due to Disaster," which was established by the Cabinet Office, the National Governors' Association, and others in order to discuss the ideal System on Support for Reconstructing Livelihoods of the Affected due to Disaster. According to this survey, it turned out that, out of the houses designated as half destroyed (damage ratio of 20% to less than 40%), some of the houses that were not damaged enough to be designated as largely destroyed (damage ratio in the 30% range) cost less than 5 million yen on average for repairs, indicating that people could not live without large-scale repairs for their main rooms, functions and others.

Therefore, the "Bill for Partial Amendment of the Act on Support for Reconstructing Livelihoods of Disaster Victims" was submitted to the extraordinary diet session in November 2020 in order to add some of the houses designated as half destroyed (damage ratio in the 30% range) newly called 'moderately destroyed' to the object of the subsidy and eligible to receive assistance payments. According to this act, 1,000,000 yen is to be provided for building or purchasing a house, 500,000 yen for repairs, and 250,000 yen for renting. After deliberations by both the House of Representatives and House of Councilors, the act was unanimously passed and enacted on December 2, 2020, and was promulgated and enforced on December 4, 2020.

This amended act applied to the Heavy Rain Event of July 2020 and disasters after that. As of the end of February 2022, in case of 5 disasters which were applied to the Act on Support for Reconstructing Livelihoods of the Affected Disaster Victims, 2,660 houses (31.7% out of houses with half destroyed under the previous criteria (damage ratio between 20% and 40%)) have been newly eligible for payments.

**Damage to residential homes affected by the disasters covered by the amended Act on Support for Reconstructing Livelihoods of Disaster Victims (as of the end of February 2022)**

※Based on Disaster Affected Certificates

Completely Destroyed	Largely Destroyed (50 to 70%)	Moderately Destroyed (A)	Half Destroyed (B)	Quasi-Half Destroyed	Partially but Non-Quasi-Half Destroyed
2,096 Buildings	1,700 Buildings	2,660 Buildings	5,733 Buildings	10,455 Buildings	26,603 Buildings

※ The list only covers the damage to residential homes in municipalities covered by Act on Support for Reconstructing Livelihoods of Disaster Victims.

※ Disasters to which the amended Act on Support for Reconstructing Livelihoods of Disaster Victims applies.

- Disaster caused by the Heavy Rain Event of July 2020, Earthquake Centered Off the Coast of Fukushima Prefecture in 2021 and Gale on April 1 of 2021
- Heavy Rain from July 1 and from August 11 of 2021

※ Out of half-destroyed houses, the percentage of moderately destroyed is 31.7% (=A/(A+B))

\*Only damage to houses in municipalities applicable under the Act on Support for Reconstructing Livelihoods of the Affected Disaster Victims is listed.

\*Disasters applicable under the Act on Support for Reconstructing Livelihoods of the Affected Disaster Victims are as follows:

- The Heavy Rain Event of July 2020, Earthquake Centered Off the Coast of Fukushima Prefecture in 2021
- Disaster caused by strong winds on April 1, 2021, The Heavy Rain from July 1 of 2021
- The Heavy Rain from August 11 of 2021

\*The percentage of moderately destroyed houses out of half destroyed houses is 31.7% ( $=A/(A+B)$ ).