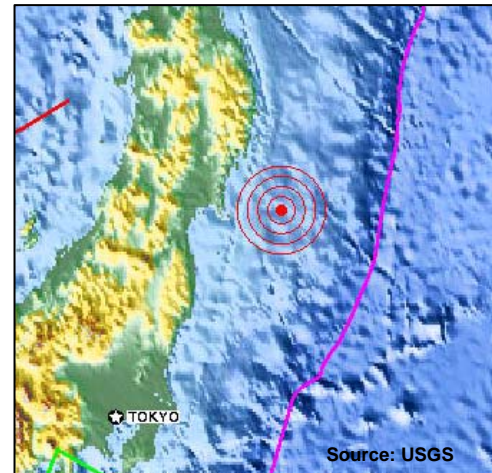


A mega-earthquake and tsunami struck off the northeastern coast of Japan this morning, with initial reports suggesting significant damage, injuries and fatalities. The United States Geological Survey (USGS) recorded the magnitude-8.9 earthquake at 2:46 PM local time (5:46 UTC) with an epicenter 130 kilometers (80 miles) east of Sendai, Japan and 373 kilometers (231 miles) northeast of Tokyo at a depth of 24.4 kilometers (15.2 miles). Ground shaking from the temblor lasted for nearly two full minutes. Following the main tremor, several aftershocks stronger than magnitude-6.0 occurred (including a magnitude-7.1). The earthquake was felt as far away as Beijing, China – some 2,500 kilometers (1,550 miles) from the epicenter. According to official reports, this is the strongest earthquake ever recorded in Japan.



Immediately after the initial earthquake struck, the Japan Meteorological Agency and the Pacific Tsunami Warning Center both issued tsunami watches and warnings for the majority of areas bordering along the Pacific Ocean. Notable warning areas included Japan, Russia, Guam, Taiwan, Philippines, Indonesia, Papua New Guinea, Hawaii, Samoa, Australia, Fiji, Tonga, Mexico, New Zealand, Guatemala, El Salvador, Costa Rica, Nicaragua, Antarctica, Panama, Honduras, Chile, Ecuador, Colombia, Peru and the entire western coasts of the United States and Canada. Local governments in these regions issued mandatory evacuations for residents along coastal areas as waves were projected to come ashore.

Reports from Japan noted that tsunami waves reaching upwards of 10 meters (33 feet) swept away homes, boats, cars, buildings and excessive amounts of debris several kilometers (miles) inland. It should be noted that the 10-meter (30-foot) wave height has not been officially confirmed at this time. Officially, the PTWC measured a 2.79-meter (9.2-foot) tsunami wave at the Hanasaki Hokkaido, Japan recording station. The JMA noted that large tsunamis washed ashore along a 2,100-kilometer (1,300-mile) stretch of the country's eastern shore from the northern island of Hokkaido to central Wakayama Prefecture.



Preliminary damage assessments indicate that the event has caused significant structural damage throughout Japan's Honshu Island, with fires, landslides and flooding also being reported. According to local media reports, one of the hardest hit tsunami areas came in the city of Sendai, where television footage showed waves of muddy water carrying buildings (some of which were on fire) that were sweeping over farmland. Reports noted that the tsunami waves later reversed their direction after coming inland and washed debris back out into the ocean. The Japanese public broadcaster NHK showed footage of a large ship that had been swept away by the tsunami and crashed directly into a breakwater in the city of Kesenuma in Miyagi Prefecture. Similar tsunami destruction was seen in dozens of communities along the coast. Local police reports noted that liquefaction was also found throughout the region. One specific report of liquefaction came from Tokyo's Disneyland and Disney Sea theme parks.

Japan's prime minister released a statement noting 'major (structural) damage in broad areas' across northeastern sections of the country due to the earthquake itself outside of the tsunami. Some of the most significant damage has been reported in the Tohoku area to the north of Tokyo. In downtown Tokyo, highrises and skyscrapers shook violently as residents and workers evacuated into the streets. The Japanese media reported that the ceiling of the Kudan Kaikan building (a large hall) had collapsed and injured an unspecified number of people who were attending a wedding ceremony. Shattered glass and debris was commonly found in streets.

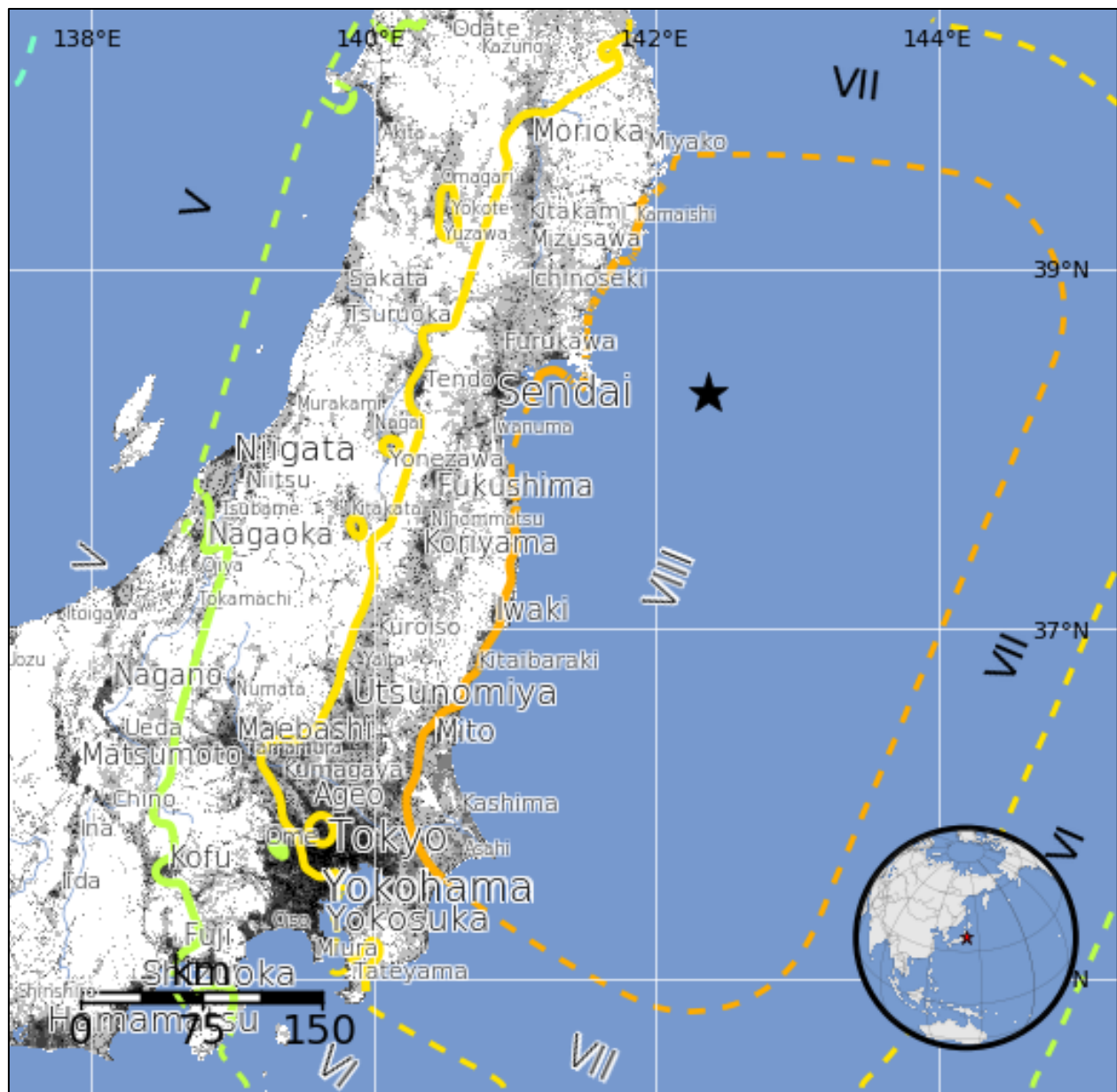
The earthquake has also triggered multiple fires throughout Honshu. A large fire, with flames shooting in excess of 30 meters (100 feet) in the air, is burning at the Cosmo oil refinery in Ichihara City in Chiba Prefecture near Tokyo after an unknown number of storage tanks exploded – see a picture of the blaze on the right. Another major fire is burning at an industrial area in Yokohama's Isogo region. A third notable fire was burning in Miyagi Prefecture, where a fire broke out in a turbine building of a nuclear power plant. In the city of Tokyo itself, at least 10 fires were burning with the most notable being a large building immersed in flames in the Odaiba district of the city. Dozens of additional fires were reported in northern prefectures of Fukushima, Sendai, Iwate and Ibaraki after gas lines exploded.



Both the electrical and transportation infrastructures have also been heavily affected. The Tokyo Electric Power Company indicated that more than four million homes were without electricity in and around Tokyo. Telecommunications (including mobile phone service) has been virtually shut off as mobile networks were downed. In terms of transportation, many sections of the Tohoku Expressway serving northern Japan were severely damaged. Tokyo's main Narita International Airport and its secondary Haneda Airport were both closed and passengers were quickly evacuated. Media footage from Sendai's airport showed cars, trucks, buses and thick mud deposited over its runways. At the one-year-old Ibaraki Airport in the city of Omitama in Ibaraki Prefecture, a large section of the main terminal ceiling collapsed to the ground. Ports along coastal sections have also sustained major flood inundation. Underground subway trains and bullet train service was also halted throughout the country. Several nuclear power plants along the coastline were automatically shut down immediately after the earthquake occurred, though there have not been any reports of radioactive leakage at this time.

The Japanese government has ordered members of the military to begin relief and recovery efforts across central and northern sections of the country.

Based on data from the USGS, an estimated 58.8 million people felt direct shaking from the event when using the Modified Mercalli Intensity scale. As of a 5:00 AM CST Friday morning report, the population exposure based on the scale included: 2.14 million (VIII – Severe), 29.96 million (VII – Very Strong), 19.69 million (VI – Strong) and 7.07 million (V – Moderate). See the next page for a graphic from the USGS showing the estimated population exposed to ground shaking.



Estimated Modified Mercalli Intensity	I	II-III	IV	V	VI	VII	VIII	IX	X	
Est. Population Exposure	---	---	---	7,071k*	19,695k*	29,969k*	2,144k	0	0	
Perceived Shaking	Not Felt	Weak	Light	Moderate	Strong	Very Strong	Severe	Violent	Extreme	
Potential Structure Damage	Resistant	none	none	none	V. Light	Light	Moderate	Moderate/Heavy	Heavy	V. Heavy
	Vulnerable	none	none	none	Light	Moderate	Moderate/Heavy	Heavy	V. Heavy	V. Heavy



The USGS has provided the following tectonic summary of the event:

“The 3/11/2011 earthquake (preliminary magnitude-8.9) near the east coast of Honshu, Japan, occurred as a result of thrust faulting on or near the subduction zone interface plate boundary between the Pacific and North America plates. At the latitude of this earthquake, the Pacific plate moves approximately westwards with respect to the North America plate at a velocity of 83 mm/yr. The Pacific plate thrusts underneath Japan at the Japan Trench, and dips to the west beneath Eurasia. The location, depth, and focal mechanism of the March 11 earthquake are consistent with the event having occurred as thrust faulting associated with subduction along this plate boundary. Note that some authors divide this region into several microplates that together define the relative motions between the larger Pacific, North America and Eurasia plates; these include the Okhotsk and Amur microplates that are respectively part of North America and Eurasia.”

At this time, there have yet to be any preliminary estimates of both economic and insured losses.

It should be noted that Japan has a rigorous earthquake building code in direct response to being located on the Pacific Ocean ‘Ring of Fire’ – which is a highly seismic region where earthquakes and volcanoes are regularly recorded.

To put the current situation into historical context, this surpasses the magnitude-7.9 Great Kanto earthquake from September 1, 1923 in strength. That event left more than 140,000 people dead in the greater Tokyo region. The Great Hanshin event on January 17, 1995 was a magnitude-6.8 tremor that killed 6,400 people. Economic damages were in excess of USD100 billion and insured losses were approximately USD3 billion.

In recent global history, the current earthquake becomes the seventh strongest tremor ever recorded. The temblor was the biggest since a magnitude-9.1 earthquake triggered a tsunami off northern Sumatra, Indonesia in December 2004 that left about 220,000 people dead or missing in 12 countries around the Indian Ocean. The earthquake was even stronger than the February 27, 2010 magnitude-8.8 tremor that struck Chile. The largest recorded earthquake in world history was a magnitude-9.5 earthquake that hit Chile on May 22, 1960.

Further details will be included in this week’s Weekly Cat Report to be released on Friday.



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