Support leg breaks as SpaceX rocket lands on ocean barge (Update)

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This undated artist rendering provided by NASA shows the Jason-3 satellite. The latest in a series of U.S.-European satellites designed to detect ocean events like El Nino is scheduled for launch Sunday, Jan. 17, from California. If successful, the Jason 3 satellite will continue more than two decades of sea level measurements. (NASA via AP)

After successfully delivering a U.S.-European ocean-monitoring satellite into orbit, a Space X rocket made a hard landing on a floating barge in

the roiling Pacific, breaking a support leg and toppling over Sunday.

SpaceX announcers said the first stage of the Falcon 9 was not upright after reaching the 300-by-170 foot landing pad in choppy seas about 200 miles west of San Diego.

The rocket launched as planned at 10:42 a.m. from Vandenberg Air Force Base, northwest of Los Angeles, streaking through a cloud-filled sky before eventually sending its second stage and a Jason-3 satellite into orbit.

The failed landing was a setback for the Hawthorne, California, company's plan to reduce launch costs by reusing rockets rather than having them fall into the ocean. Meteorologists predicted swells of 10- to 13-feet where the barge waited for the landing attempt.

SpaceX founder Elon Musk said on Twitter that the rocket's speed at touchdown was OK, "but a leg lockout didn't latch, so it tipped over after landing."

Two previous attempts to land a rocket on a barge in the Atlantic failed, but last month SpaceX succeeded in returning a rocket to a vertical landing at Cape Canaveral, Florida, after putting a cluster of satellites into orbit.

In an image providfed by NASA TV, Space-X's Falcon 9 rocket with the Jason-3 satellite aboard is shown less than four minutes from launch at Vandenberg Air Force Base, Calif. Sunday, Jan. 17, 2016. It's the latest in a series of U.S.-European satellites designed to detect ocean events like El Nino. If successful, the Jason 3 satellite will continue more than two decades of sea level measurements. (NASA TV via AP)

Meanwhile NASA said Jason-3 was "ready for science operations" after it reached orbit and had its solar arrays deployed. The satellite's mission is to continue an unbroken record of more than two decades of sea level measurements from orbit. As the current El Nino in the eastern Pacific has strengthened, Jason-3 had been stuck on the ground.

Jason-3's launch was originally scheduled for August 2015 aboard a SpaceX Falcon 9 rocket. However, the launch was postponed after a different Falcon 9 rocket failed during a supply mission to the International Space Station in June. After correcting the problem, a successful launch last month restored Falcon 9s to flight status.

Like its predecessors, Jason-3 is equipped with radar altimeter to bounce microwave energy off the ocean and a GPS system to identify the satellite's precise location. Timing of how long it takes the signal to return indicates sea level height, which rises or falls depending on the temperature of the water.

The data collected can detect the weather-altering El Nino condition and its opposite, La Nina, and are most familiar to the public in images of the Pacific Ocean that use colors to illustrate variations in heat. Other pragmatic uses include measuring global sea level rise, and forecasting the strength of hurricanes, other severe weather and ocean conditions for the shipping industry and in response to oil spills.

The SpaceX Falcon 9 rocket is seen as it launches with the Jason-3 spacecraft onboard, Sunday, Jan. 17, 2016, from Vandenberg Air Force Base Space Launch Complex 4 East in California. Jason-3, an international mission led by the National Oceanic and Atmospheric Administration (NOAA), will help continue U.S.-European satellite measurements of global ocean height changes. (Bill Ingalls/NASA via AP))

"Jason allows us to get the big picture in terms of sea-level change in the years to come," said Laury Miller, Jason-3 program scientist.

Jason-3 is a project of the National Oceanic and Atmospheric Administration, NASA, the French space agency Centre National d'Etudes Spatiales, and the European Organization for the Exploitation of Meteorological Satellites. It was built by Thales Alenia of France.

Jason-3 will ultimately replace Jason-2, which has been in orbit since mid-2008 and has been tracking the current El Nino that experts say has tied the 1997-98 version as the strongest recorded and is expected to last through the winter before weakening in spring.

Despite being in its eighth year and only designed to last five, Jason-2 "is still in great shape," Jason-3 project scientist Josh Willis said. After being used to help calibrate the new satellite, Jason-2 will be moved to an orbit to study the shape of the sea floor.

The series of spacecraft began with Topex-Poseidon, which operated from 1992 to 2006. Topex, short for ocean surface topography experiment, revolutionized understanding of the role of ocean temperature on climate. Its successor, Jason-1, operated from 2001 until it was decommissioned in 2013.

Mission scientists emphasized at a prelaunch briefing that it was important to maintain a continuous record of global sea level variation.

Hans Koenigsmann, vice president of mission assurance for SpaceX, said previously that the current rocket would have been able to return to land, but the company does not have environmental approval at Vandenberg yet.

The cost of the mission, including five years of operation, was put at $180 million.