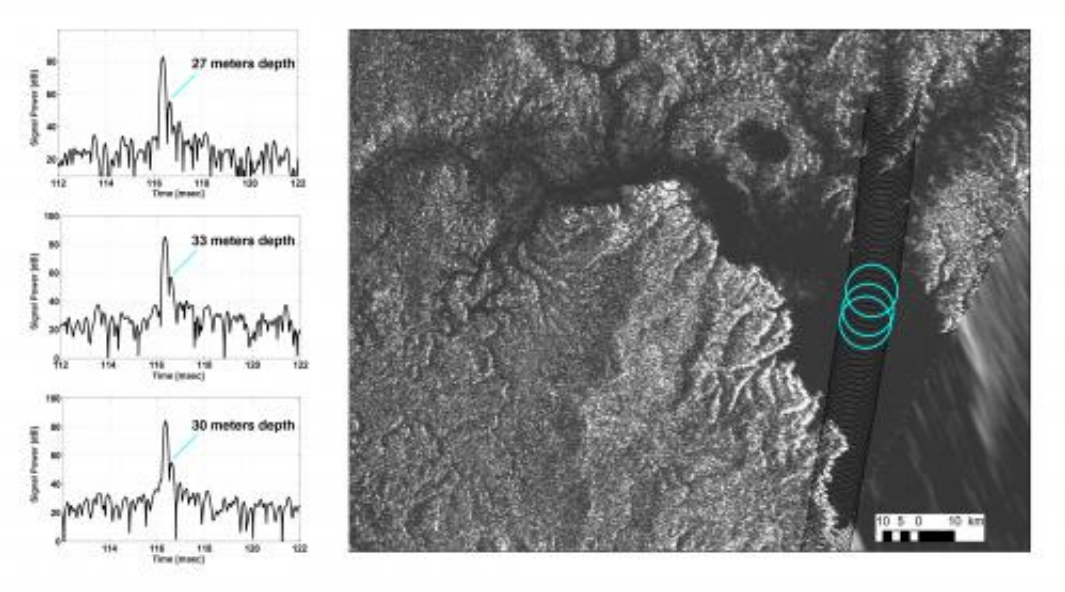
Cassini sails into new ocean adventures on Titan

November 11 2014



Cassini's Titan flyby on August 21, 2014, included a segment designed to collect altimetry (or height) data, using the spacecraft's radar instrument, along a 120-mile (200-kilometer) shore-to-shore track on Kraken Mare, Titan's largest hydrocarbon sea. For a 25-mile (40-kilometer) stretch of this data, along the sea's eastern shoreline, Cassini's radar beam bounced off the sea bottom and back to the spacecraft, revealing the sea's depth in that area. Observations in this region, near the mouth of a large, flooded river valley, showed depths ranging from 66 to 115 feet (20 to 35 meters). Plots of three radar echoes are shown at left, indicating depths of 89 feet (27 meters), 108 feet (33 meters) and 98 feet (30 meters), respectively. The altimetry echoes show the characteristic double-peaked returns of a bottom-reflection. The tallest peak represents the sea surface; the shorter of the pair represents the sea bottom. The distance between the two peaks is a measure of the liquid's depth. Credit: NASA/JPL-Caltech/ASI/Cornell

(Phys.org) —NASA's Cassini mission continues its adventures in extraterrestrial oceanography with new findings about the hydrocarbon seas on Saturn's moon Titan. During a flyby in August, the spacecraft sounded the depths near the mouth of a flooded river valley and observed new, bright features in the seas that might be related to the mysterious feature that researchers dubbed the "magic island."

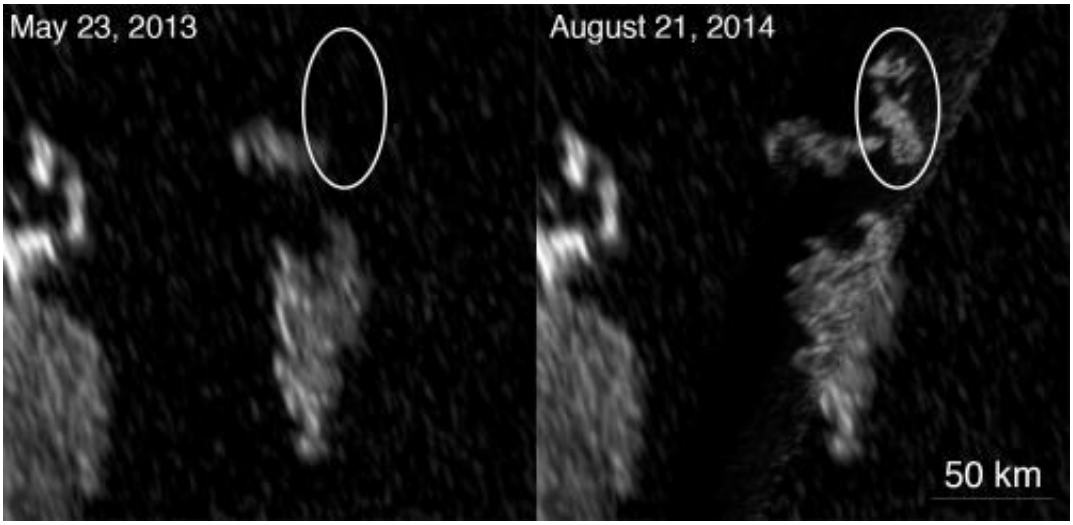
The findings are being presented this week at the Division for Planetary Sciences Meeting of the American Astronomical Society held in Tucson, Arizona.

To the delight of Cassini scientists, two new bright features appeared in Titan's largest sea, Kraken Mare, during the August 21 flyby. In contrast to a previously reported bright, mystery feature in another of Titan's large seas, Ligeia Mare, the new features in Kraken Mare were observed in both radar data and images from Cassini's Visible and Infrared Mapping Spectrometer (VIMS). Having observations at two different wavelengths provides researchers with important clues to the nature of these enigmatic objects.

The VIMS data suggest the new features might have similarities to places in and around the seas that the Cassini team has interpreted as waves or wet ground. The observations support two of the possible explanations the team thinks are most likely—that the features might be waves or floating debris.

Unfortunately for mystery lovers, the August Titan flyby marked the final opportunity for Cassini's radar to observe Kraken Mare. However, the spacecraft is scheduled to observe the original "magic island" feature in Ligeia Mare once more, in January 2015.

The August Titan flyby also included a segment designed to collect altimetry (or height) data, using the spacecraft's radar instrument along a 120-mile (200-kilometer) shore-to-shore track of Kraken Mare. For a 25-mile (40-kilometer) segment of this data along the sea's eastern shoreline, Cassini's radar beam bounced off the sea bottom and back to the spacecraft, revealing the sea's depth in that area. This region, which is near the mouth of a large, flooded river valley, showed depths of 66 to 115 feet (20 to 35 meters). Cassini will perform this experiment one last time in January 2015, to try to measure the depth of Punga Mare. Punga Mare is the smallest of three large seas in Titan's far north, and the only sea whose depth has not been observed by Cassini.



Two Synthetic Aperture Radar (SAR) images from the radar experiment on NASA's Cassini spacecraft show that, between May 2013 and August 2014, a bright feature appeared in Kraken Mare, the largest hydrocarbon sea on Saturn's moon Titan. Researchers think the bright feature is likely representative of something on the hydrocarbon sea's surface, such as waves or floating debris. A similar feature appeared in Ligea Mare, another Titan sea, and was seen to evolve in appearance between 2013 and 2014 (see PIA18430). Credit: NASA/JPL-Caltech/ASI/Cornell

Scientists think that, for the areas in which Cassini did not observe a radar echo from the seafloor, Kraken Mare might be too deep for the radar beam to penetrate. Alternatively, the signal over this region might simply have been absorbed by the liquid, which is mostly methane and ethane. The altimetry data for the area in and around Kraken Mare also showed relatively steep slopes leading down to the sea, which also suggests the Kraken Mare might indeed be quite deep.

Provided by JPL/NASA