

CASSINI-HUYGENS

Huygens and Titan's methane cycle

The beginning of the Cassini mission was marked by the deployment of the Huygens probe on the surface of Titan. Detached on 25 December 2004 and landing a couple of weeks later, Huygens still holds the record of farthest man-made object to soft-land on a celestial body. Yet the most exciting thing about the images taken by its downward-looking camera (DISR) during the descent is not how alien this distant world looks, but instead how familiar it is, as this mosaic of three DISR images shows. It seems we are observing an Earth shoreline, with a fluvial channel flowing into the sea and a few bright water clouds floating around.

Of course, despite the visual similarities, Titan still has conditions very different from those on Earth. Due to Titan's cold temperatures (93 K at the surface), it is liquid methane that carved that fluvial basin, not water. In addition, what we are observing is the remnant of past events, as the whole area is now dry. Huygens landed on the sea-like region and did not float over some liquid surface, but rather touched down on an icy lakebed. The round pebbles scattered around, however, indicate that the area was indeed filled with liquid at some time. Subsequent climate modelling showed that Titan's global circulation disfavours the accumulation of liquid hydrocarbon at the equator, where the Huygens landing site is, but episodic flooding could happen.

Huygens images and data gave the definitive in situ evidence that Titan possesses a full hydrological cycle, parallel to Earth's water cycle but based on methane. This cycle, which

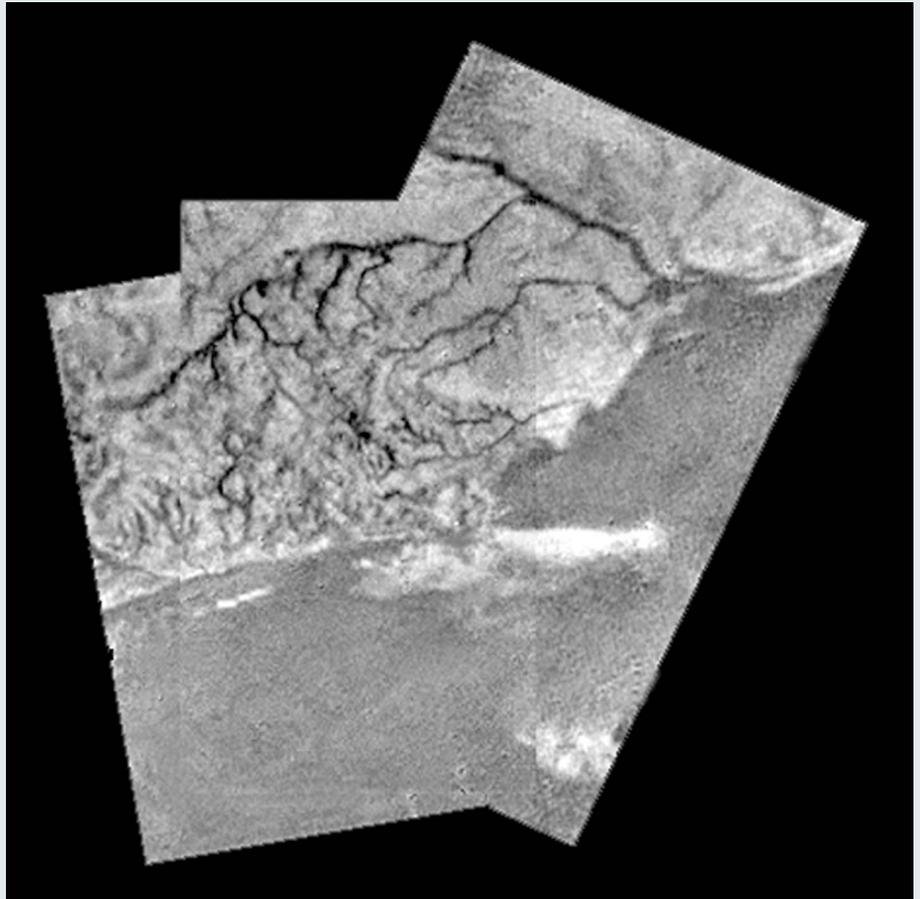


Image credit: NASA/JPL/ESA/University of Arizona

couples the subsurface, surface and atmosphere through complex physical and chemical processes involving methane at all three states (gas, liquid and solid), clearly affected Titan's environment and may have impacted its potential for habitability. Few images

exemplify the surprises and excitement of space exploration like this one.

Luca Maltagliati

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