

# New Scientist

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20 MILLION YEARS**

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DISCOVERED IN THE  
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## Space

# A closer look at Titan's strange seas

The hydrocarbon lakes and rivers of Saturn's moon have similarities with our own water world

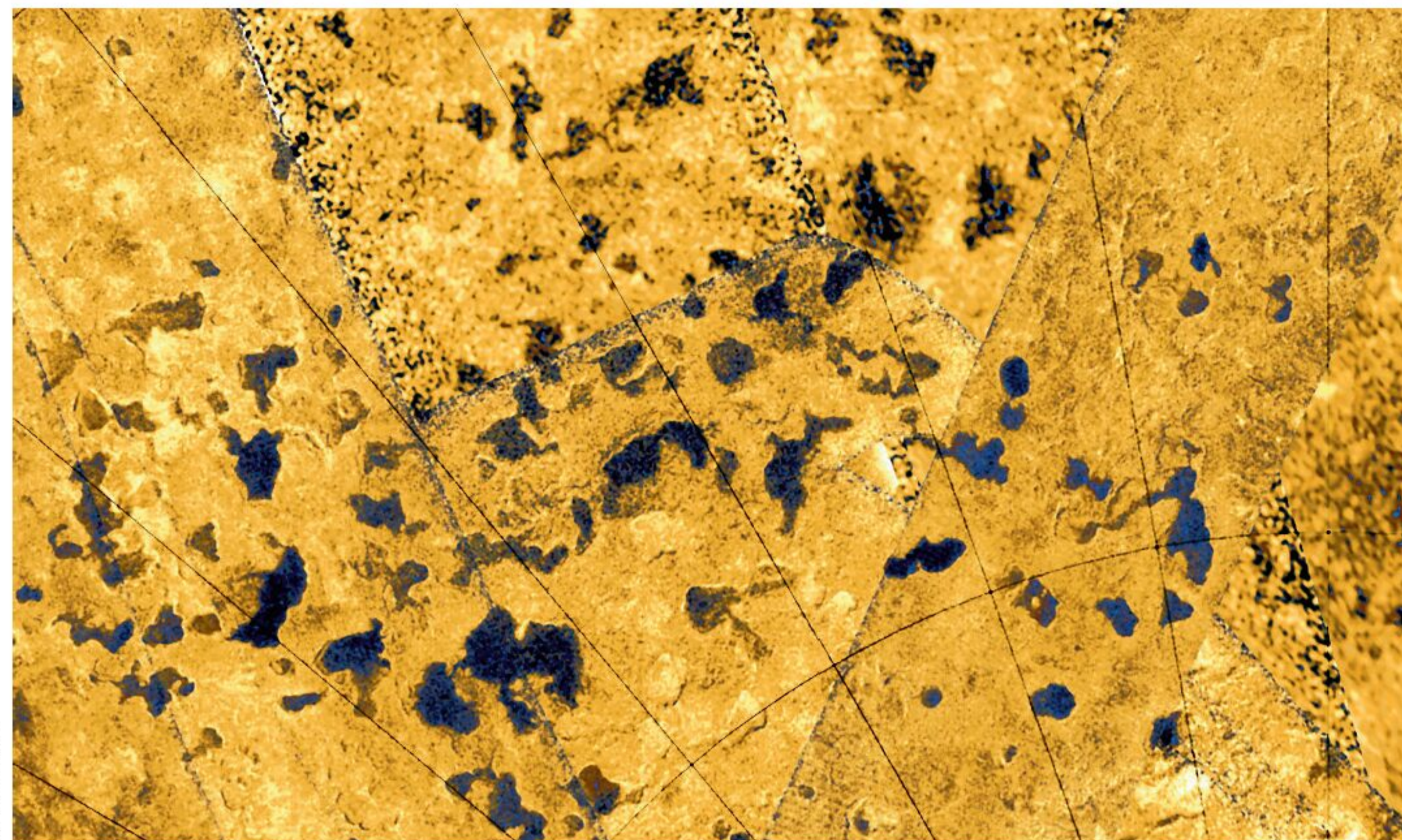
Alex Wilkins

OUR most detailed look yet at the strange lakes of Saturn's moon Titan has revealed a diverse seascape, similar to Earth's combination of freshwater rivers and salty oceans.

Unlike Earth's water oceans, Titan's lakes consist of methane and ethane, which are liquid at the planet's average surface temperatures of about  $-179^{\circ}\text{C}$  ( $-290^{\circ}\text{F}$ ).

Radar measurements from NASA's Cassini spacecraft, which orbited Saturn between 2004 and 2017, have hinted at differences in the lakes' properties, such as their composition and the waves on their surface. But there wasn't enough information in the signals to distinguish between them.

Now, Valerio Poggiali at Cornell University, New York, and his colleagues have mapped the composition and surface of Titan's seas using a different radar technique, revealing an increasing amount of ethane as you travel down the planet from its north pole. "The more north you go, the cleaner and purer the seas are; they're more methane-



NASA/ESA

## Lakes of methane and ethane on the surface of Titan, imaged by radar

dominated," says Poggiali.

Previous radar measurements were made using signals emitted and received at the same location, on the Cassini probe. This meant that the reflected radio waves were polarised, or twisted, in one direction.

The new study analysed signals from Cassini's radar that had been reflected off the surface of the lakes and then received using

radio antennae on Earth operated by NASA, called the Deep Space Network. The shallower angle of the reflected signal meant that it included two kinds of polarised waves, giving Poggiali and his colleagues more information about the lakes' properties (*Nature Communications*, doi.org/m8q6).

They found that many of the rivers and estuaries that fed the lakes and seas had rough surfaces, probably caused by wind-whipped waves. This might be a sign of active tides or currents feeding into the lakes, says Poggiali.

"Activity on the surface of the seas is super important if you want to plan a future mission, like a Titan submarine, but also to be able to better understand Titan's

**"Activity on the surface of the seas is super important if you want to plan a Titan submarine mission"**

environments in terms of wind and its atmospheric characteristics."

Poggiali and his colleagues also found that the rivers had a higher composition of methane before they fed the lakes. This could help us track the methane and ethane cycle on Titan, says Ingo Mueller-Wodarg at Imperial College London.

"When a river enters a large, salty ocean on Earth, then you would see that, near where the river enters, you have a lower salinity of the water," he says. "It's kind of a similar thing happening here, only that it's not about the content of salt, but the relative proportion of methane and ethane." ■

## Animals

## Bees use their wings to slap ants that try to raid their nests

WHEN ants threaten their hive, Japanese honeybees see off the enemies with the flick of a wing.

Ants often invade honeybee nests, seeking to steal honey, prey on eggs or kill worker bees. In defence, bees have been known to fan their wings to blow ants away. Now, researchers have documented them making contact with their wings and physically batting ants out of the hive, a behaviour that

hasn't been studied before.

Footage from a high-speed camera shows that guard bees, positioned near a nest's entrance, tilt their bodies towards approaching ants and flutter their wings while pivoting away. A successful hit sends the ant flying.

Many beekeepers seem unaware of this strategy, says Yoshiko Sakamoto at the National Institute for Environmental Studies in Tsukuba, Japan. "I myself did not notice this behaviour during my approximately 10 years of beekeeping experience," she says.

Sakamoto and her colleagues



SEIJINARITA

A Japanese honeybee slapping an ant with its wing

introduced three local species of ant to the entrance of two Japanese honeybee (*Apis cerana japonica*) colonies and filmed hundreds of showdowns between the insects (*Ecology*, doi.org/m8q7).

In most of these interactions, the bees smacked at ants with their

wings. For two ant species, about one-third to half of attempts flung ants away. Wing-slapping was far less successful against Japanese wood ants (*Formica japonica*), a larger and faster species.

Ants vary in their level of menace to bees: some species bite or kill workers, while others are less of a threat. Bees may have evolved to favour the fanning defence to avoid making contact with the more dangerous ants, but wing-slapping may be a more efficient option against other species, the researchers suggest. ■

Carolyn Wilke