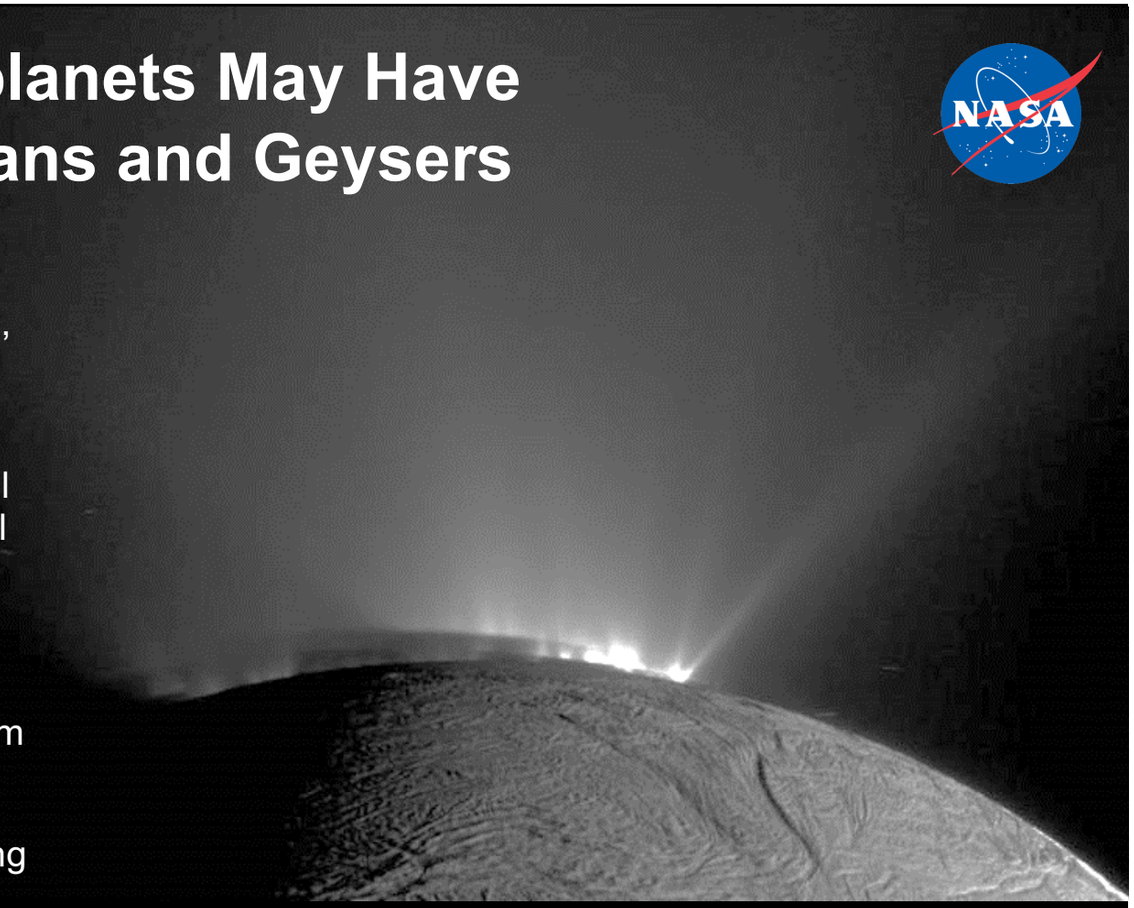
# Some Icy Exoplanets May Have Habitable Oceans and Geysers

A study from Goddard scientists indicates that 17 exoplanets could have oceans of liquid water, an essential ingredient for life, beneath icy shells and that water from these oceans could occasionally erupt through the ice crust as geysers.

Although the planets' exact compositions remain unknown, initial estimates of their surface temperatures from previous studies all indicate that they are much colder than Earth, suggesting that their surfaces could be covered in ice.

An exoplanet could have an ocean underneath an ice crust if it has enough internal heating. Such is the case in our solar system where Europa, a moon of Jupiter, and Enceladus, a moon of Saturn, have subsurface oceans because they are heated by tides from the gravitational pull of the host planet and neighboring moons.

The science team calculated the amount of geyser activity on several of these exoplanets, the first time these estimates have been made, and identified two exoplanets sufficiently close where signs of these eruptions could be observed with telescopes.



*NASA's Cassini spacecraft captured this image of Enceladus on Nov. 30, 2010. The shadow of the body of Enceladus on the lower portions of the jets is clearly visible. NASA/JPL-Caltech/Space Science Institute*

L. Quick (698), A. Roberge (660), G. T. Mendoza (U. of Washington), E. Quintana (667), A. A. Youngblood (667), 2023, *Astrophysical Journal* 956, 29.
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