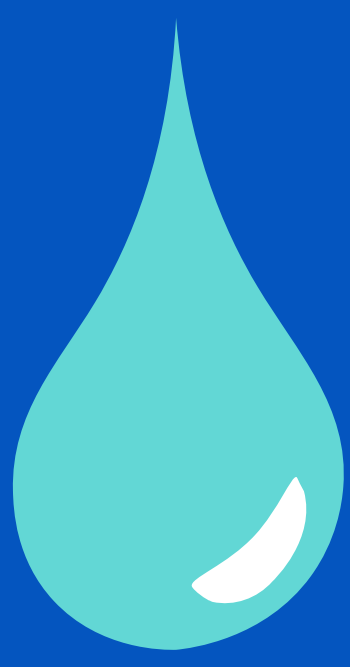
IS ANYONE HOME?

Your guide to exoplanet habitability
(for life as we know it)



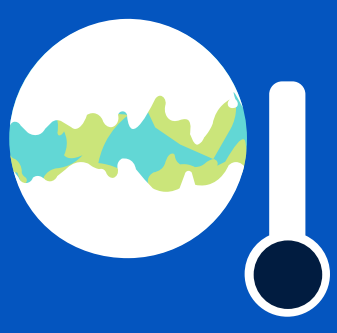
WATER

ICE CAPS

As on Earth, ice caps help regulate the climate of a planet by reflecting energy from its star.

The larger the ice caps, the colder the atmosphere, meaning more ice can form.

If the caps become too large, they can lead to an extreme ice age! In response the planet will accumulate greenhouse gases, heat up and melt the ice.



ICY OCEAN WORLDS

Like Jupiter's moon Europa, exoplanets may have vast oceans hidden beneath thick layers of ice.

It's possible that life thrives in these oceans if tidal heating and radioactivity keep them warm. The ice would protect life from dangerous activity from the star.

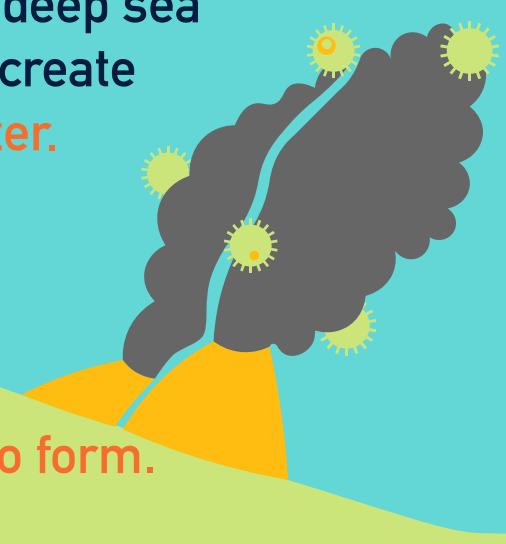
OCEANS

Water is essential for life as we know it, because it acts as a solvent for organic chemistry, the foundation of life on Earth.

Deep oceans can protect early life from an active star. They also help stabilize the climate and transport energy across its surface.

HYDROTHERMAL VENTS

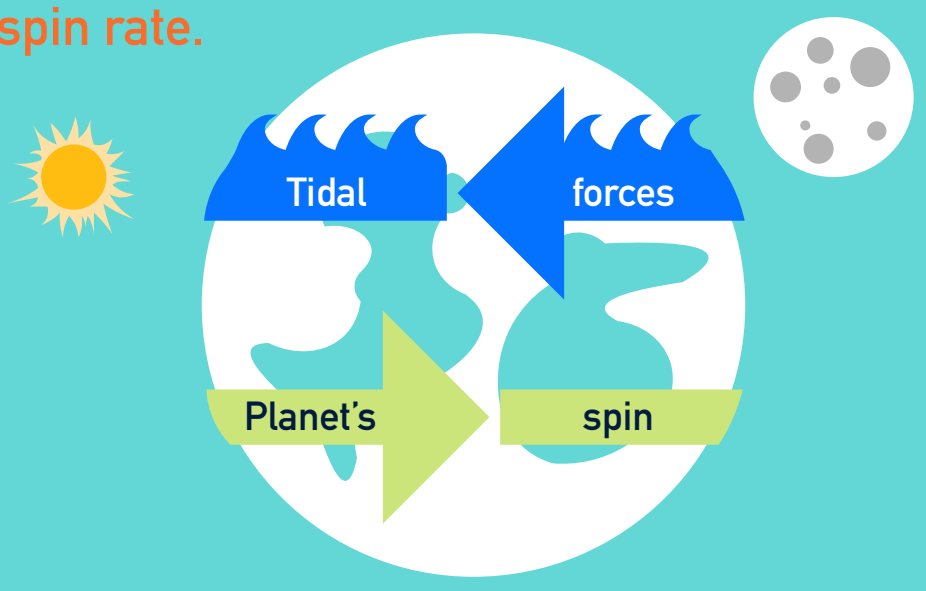
These vents are like deep sea mini-volcanoes that create nutrient-rich hot water.



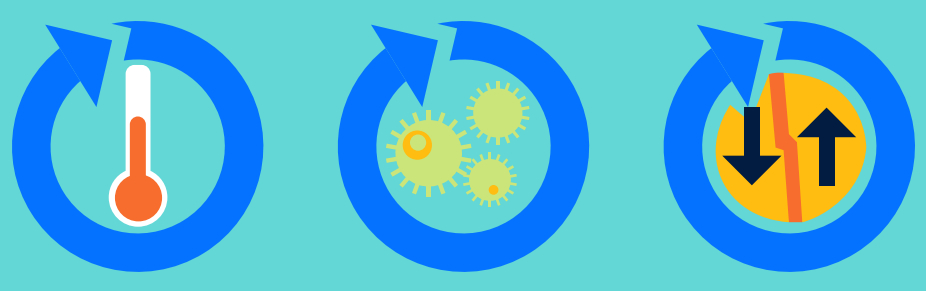
They are possible places for early life to form.

TIDES

Tides on Earth are powered by the Moon and the Sun. They help stabilize the orbit and tilt of the planet, as well as slow the spin rate.



If the tidal force is too strong the planet could experience tidal locking, which would dramatically alter the planet's climate.



Tides help warm oceans, circulate nutrients all over the planet, move currents, and influence plate tectonics.

SOURCES

Based on "Impact of Space Weather on Climate and Habitability of Terrestrial Type of Exoplanets," Airapetian et al. (2019).
Specific contributions from Ravi Kumar Kopparapu, Wade Henning and Joshua Schlieder.