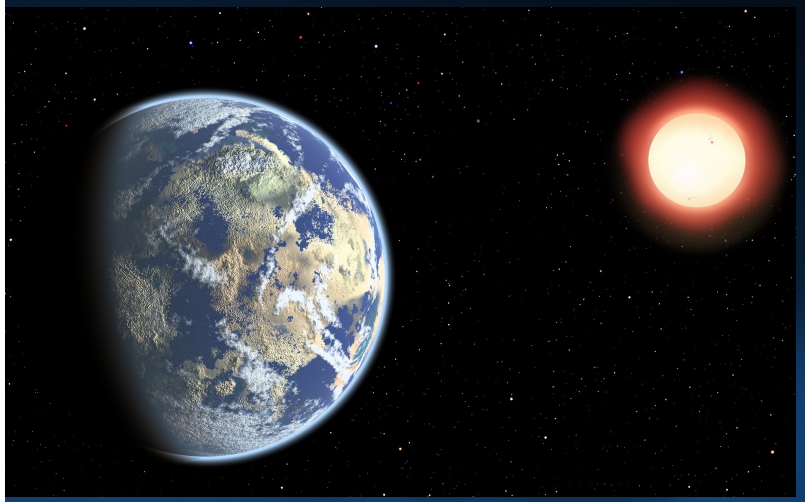
A Potentially Habitable World Next Door

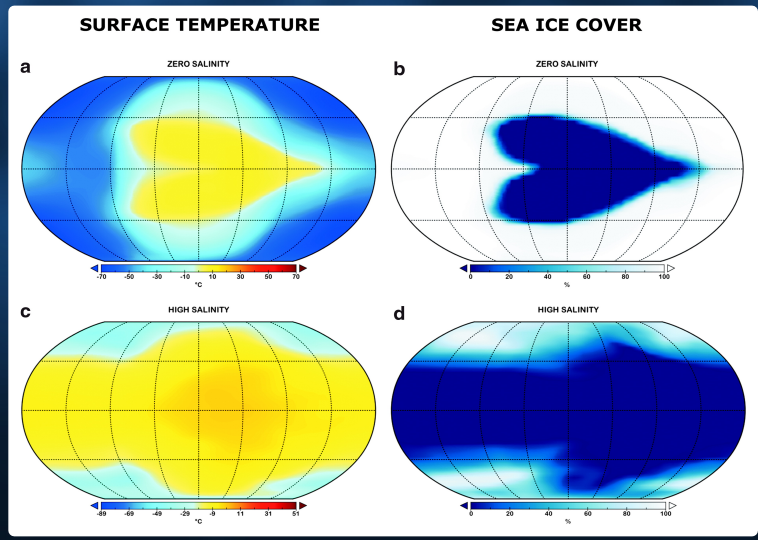


The exoplanet Proxima Centauri b has been shown to have a much wider range of potential habitable conditions than previously thought.

- Since the discovery in 2016 of an exoplanet around our nearest stellar neighbor, Proxima Centauri, much work had gone into characterizing the environment of the planet and studying its potential habitability. Although it is within the habitable zone of it's parent star, a number of factors could make it difficult to retain surface liquid water, including the volatile nature of red dwarf stars and the tidally-locked nature of the planet.

Del Genio et al. (2016) *Astrobiology*.

- Many previous studies have focused on either static models of the ocean or atmosphere, but a new study using the Resolving Orbital and Climate Keys of Earth and Extraterrestrial Environments with Dynamics (ROCKE-3-D) software uses a coupled atmosphere and dynamic ocean GCM and different combinations of land and ocean surface cover to understand a range of potential configurations for Proxima Centauri b.
- Although the planet would not have an ocean like the modern Earth, past "slushball" episodes from our distant past with cold, liquid, oceans in the tropics are possible, particularly at higher salinities, even with a tidally locked planet. This research has important implications for the complexity of the concept of "habitable zones" around planets.



Surface temperature and sea ice cover for zero salinity and high salinity (S=230psu) oceans show the dramatic effect of freezing point depression in salty water.