



Comparing Titan's Atmosphere with the Ancient Earth



Author Melissa Ugelow

What is the science question? Saturn's moon Titan is often used as an example of what the atmosphere of Earth was like billions of years ago. But while there are similarities, there may be significant differences in how haze formed, leading to different climates at a pivotal time when life was first forming.

What were your findings? Laboratory studies show that atmospheric hazes formed in simulated Titan environments have different properties than those formed in simulated ancient Earth environments, due to different amounts of oxygen present. In addition, at the wavelengths studied, hazes formed with oxygen absorb less light than hazes formed without oxygen.

What was the impact? Currently, most theoretical models use the properties of Titan's haze to explain the influence of haze on Earth's atmosphere during the time when life began. But, since hazes that contain oxygen absorb less light, they would have acted like a light scattering layer in the atmosphere -not as the absorbing layer that is observed on Titan. A light-scattering layer in the ancient Earth's atmosphere would impact the surface temperature at this crucial time period in Earth's history. In addition, the scattering haze could shield greenhouse gases (and potentially early life) from UV breakdown.

Why does it matter to non-scientists? We are trying to understand what the conditions of Earth were like when life arose. To accurately understand an atmosphere, the properties of that specific atmosphere are needed.



An artist's concept of the surface of Titan