Atmospheric Modeling of TOI-700 d

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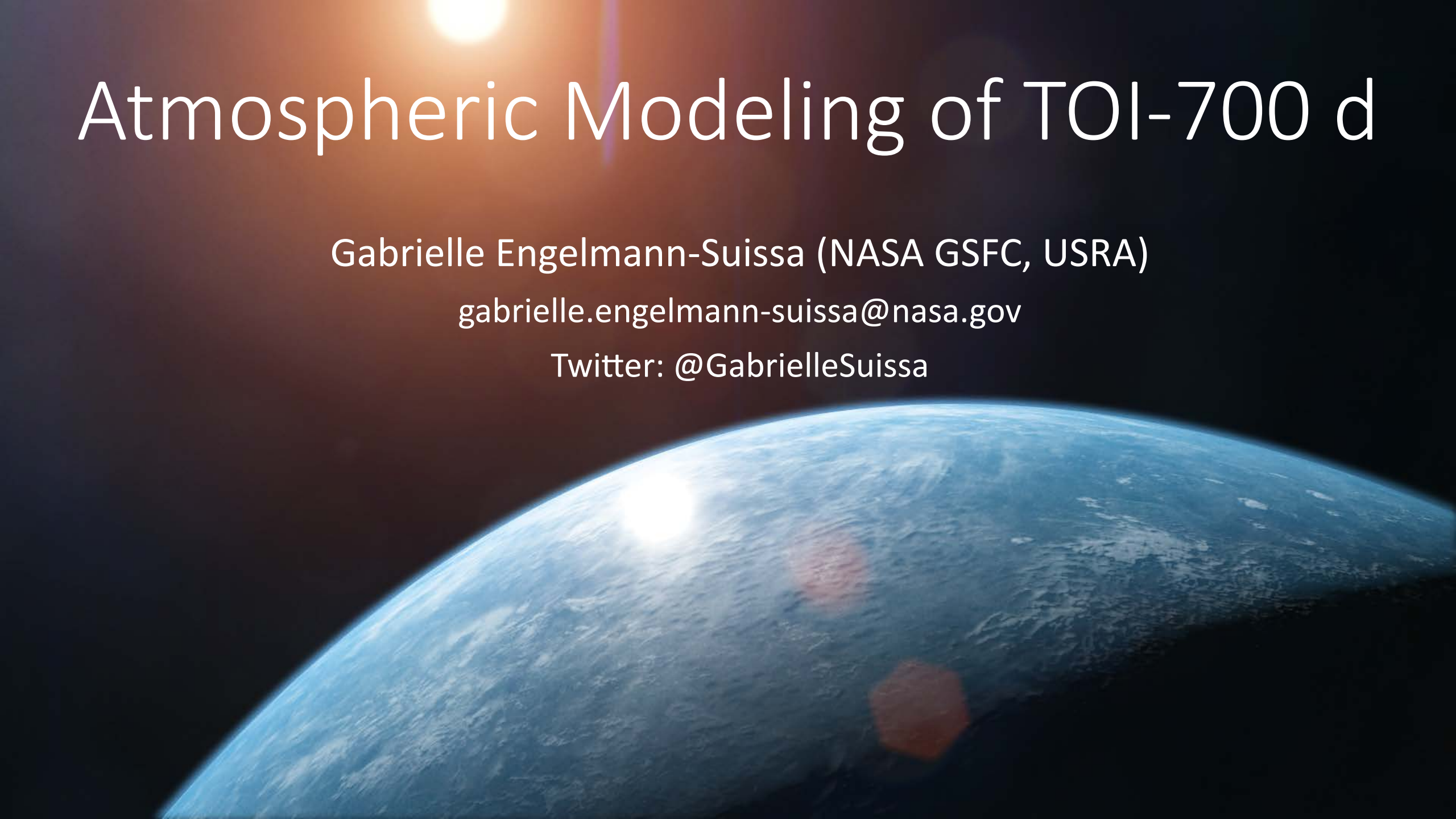
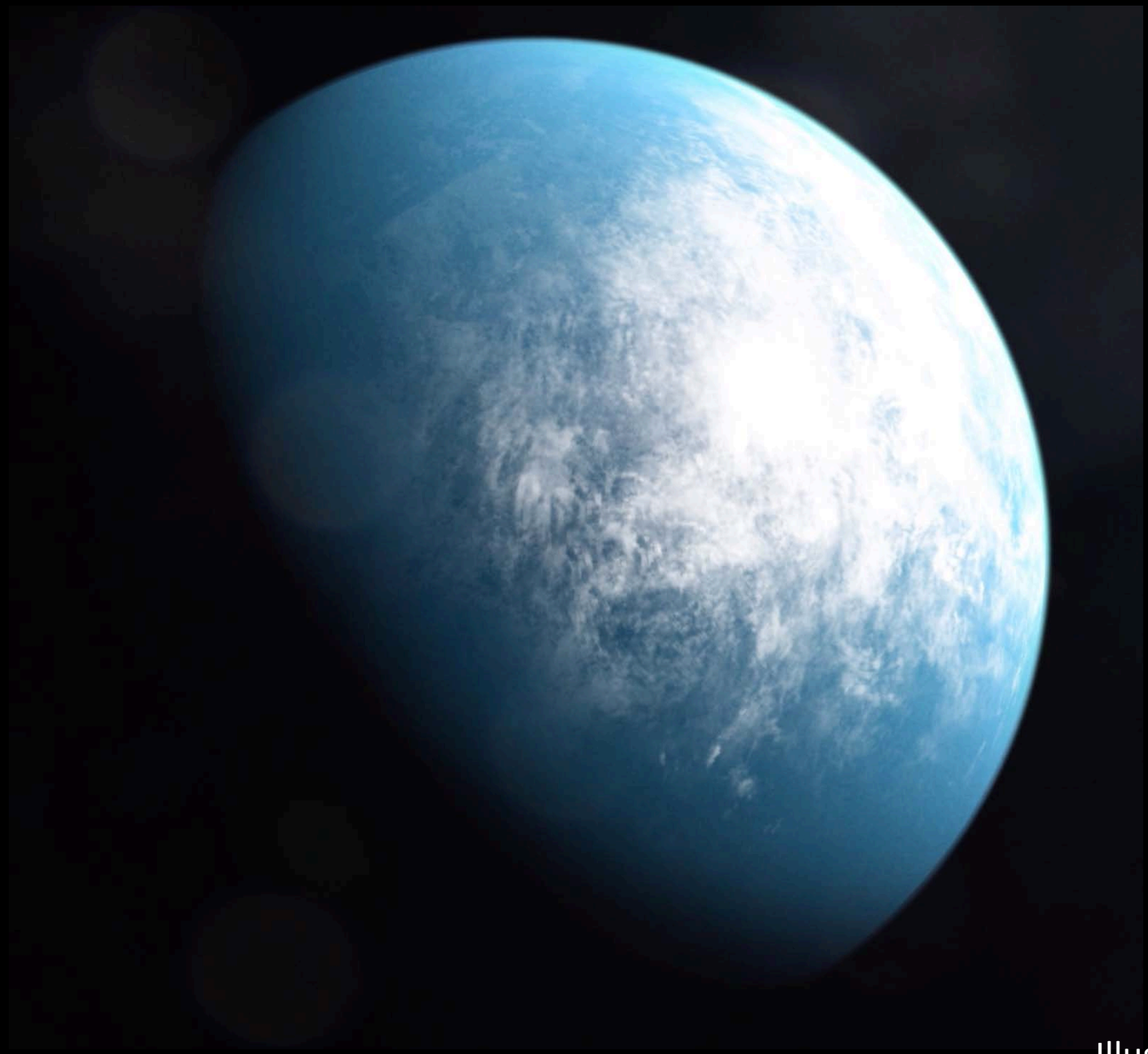


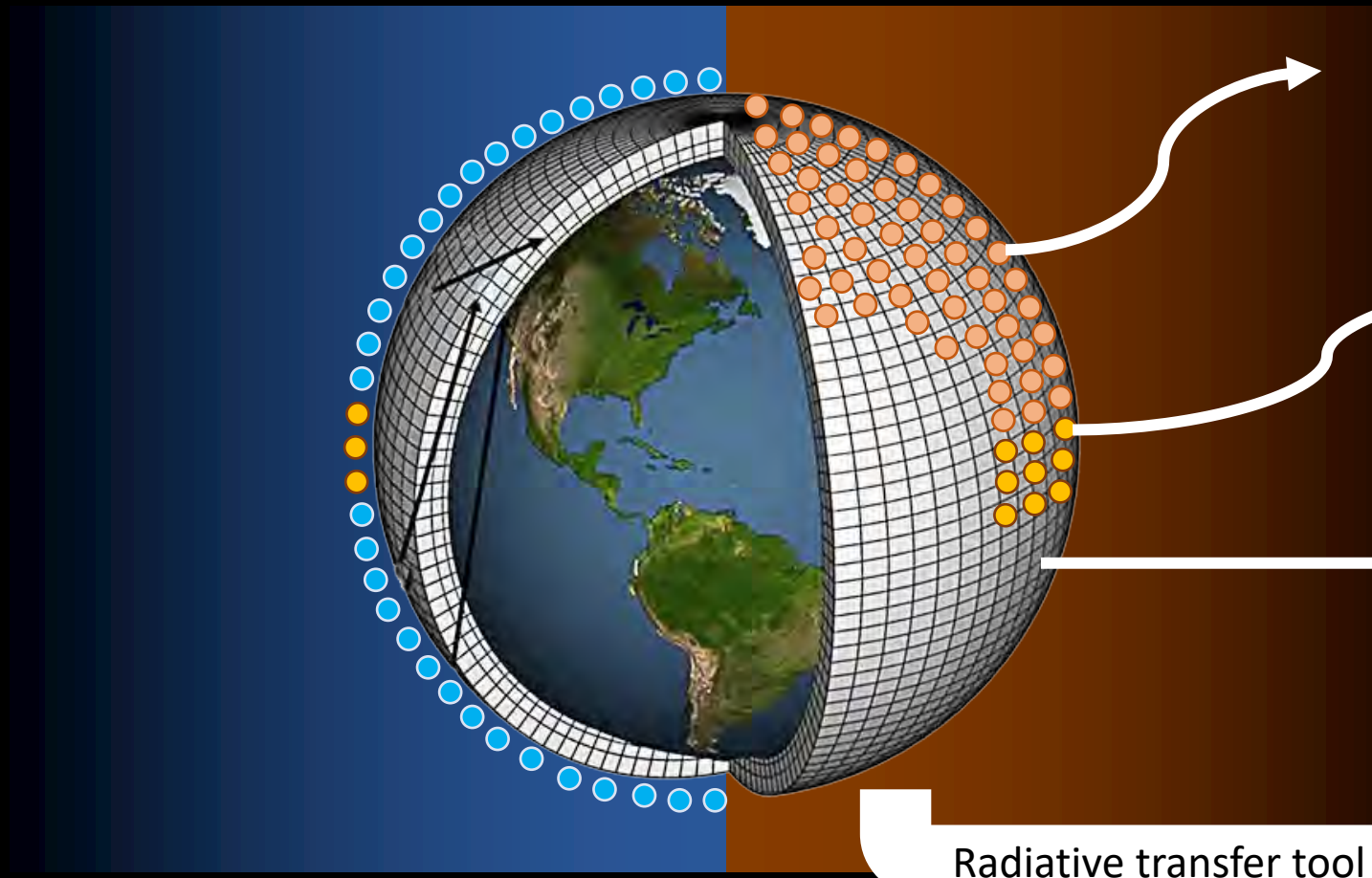
TOI-700 d

- Third planet away from M star TOI-700
- Radius is close to that of the Earth
- Orbital period of 37 days
- Receives 86% of the starlight that Earth receives from the Sun



Illustration

3-D General Circulation Models



How cloudy could the atmosphere be?

How hot could the surface be? Livable temperatures?

How much water vapor will be in the atmosphere?

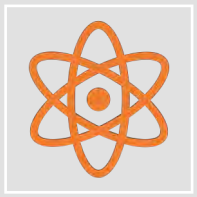
Radiative transfer tool

What observable signals could we detect from this planet?

Modeled Possibilities

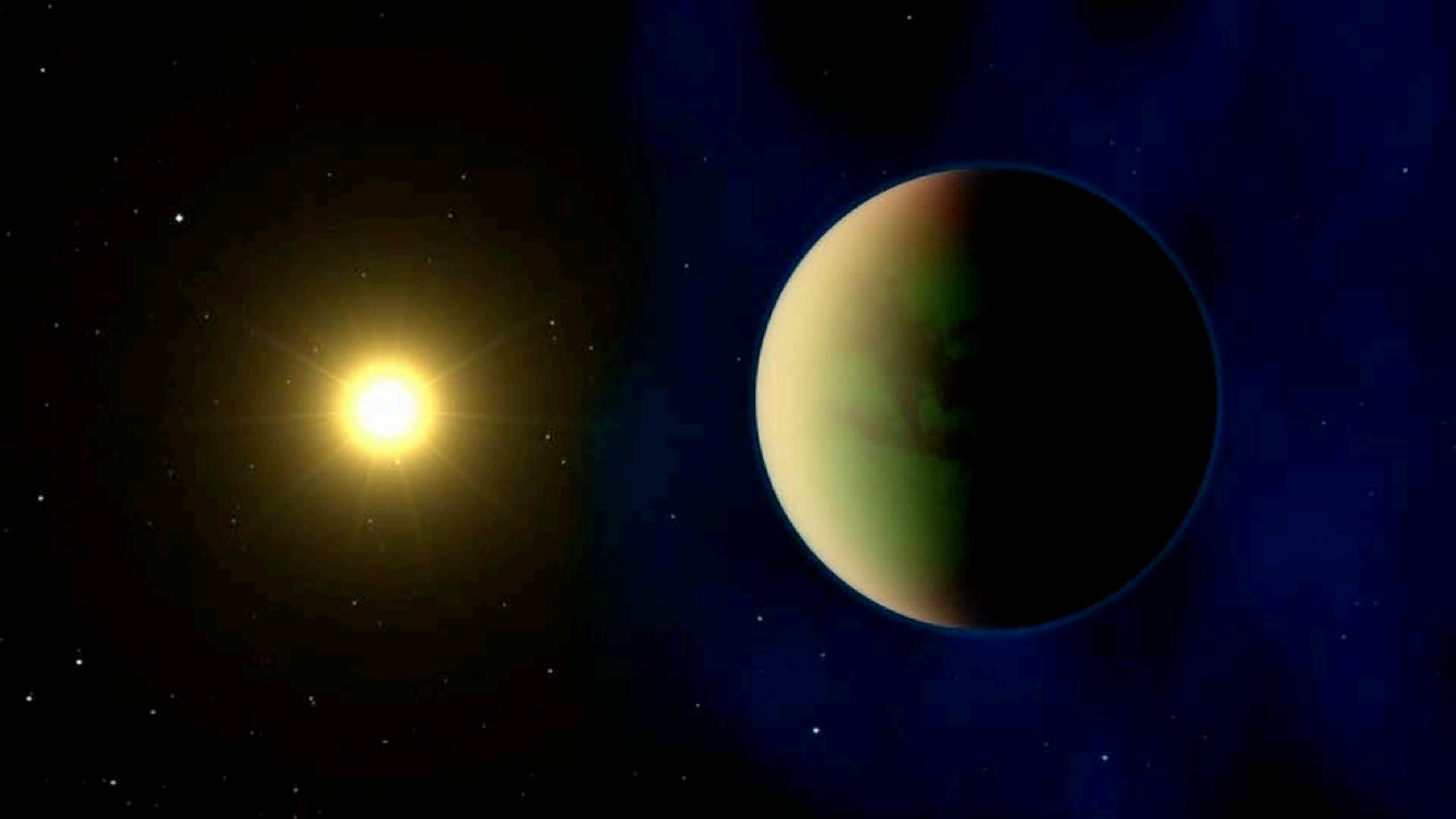
20 simulations total

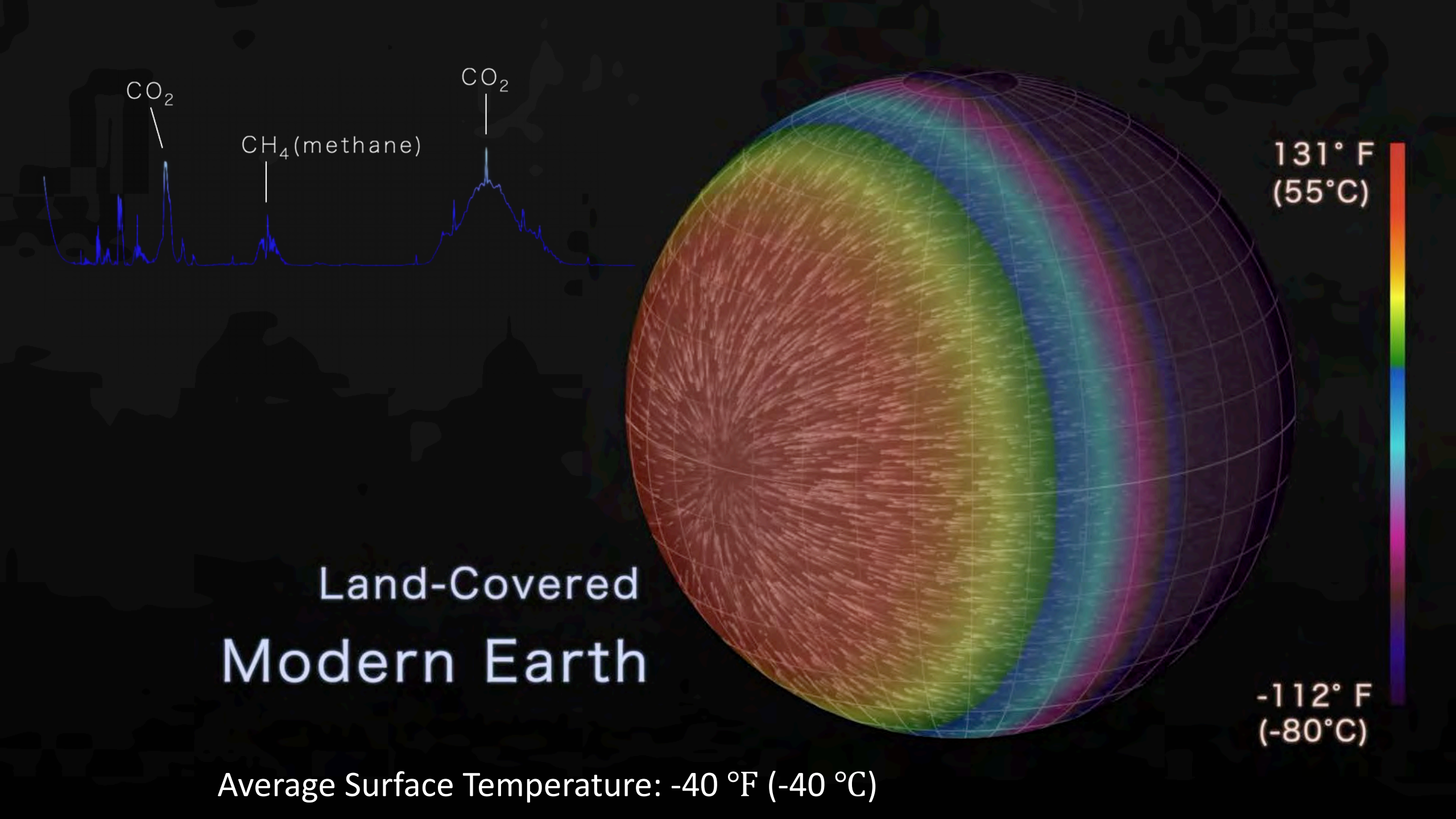
Ocean or land-covered



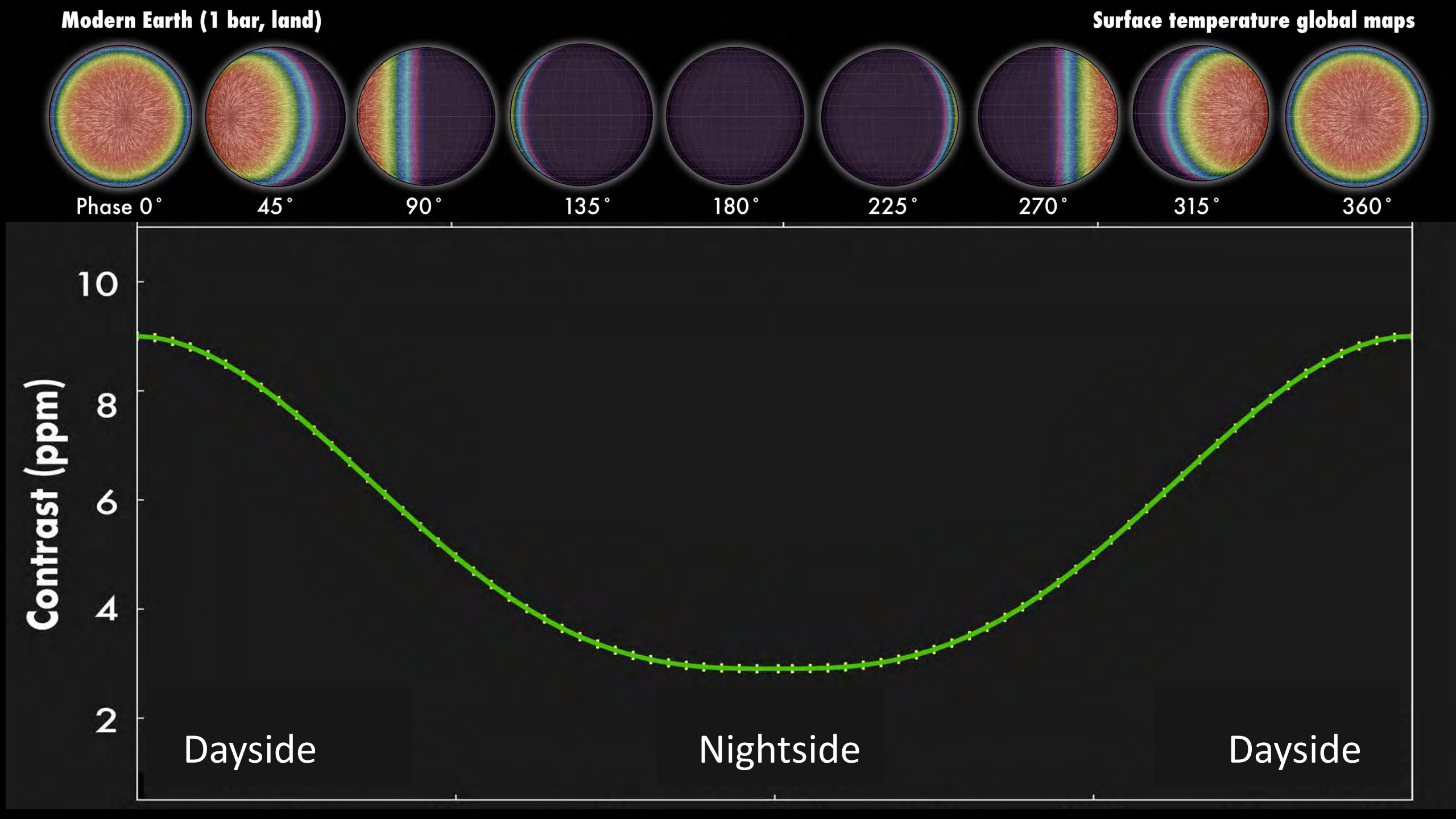
Modern Earth-like atmosphere,
Archean Earth-like atmosphere,
Early Mars-like atmosphere

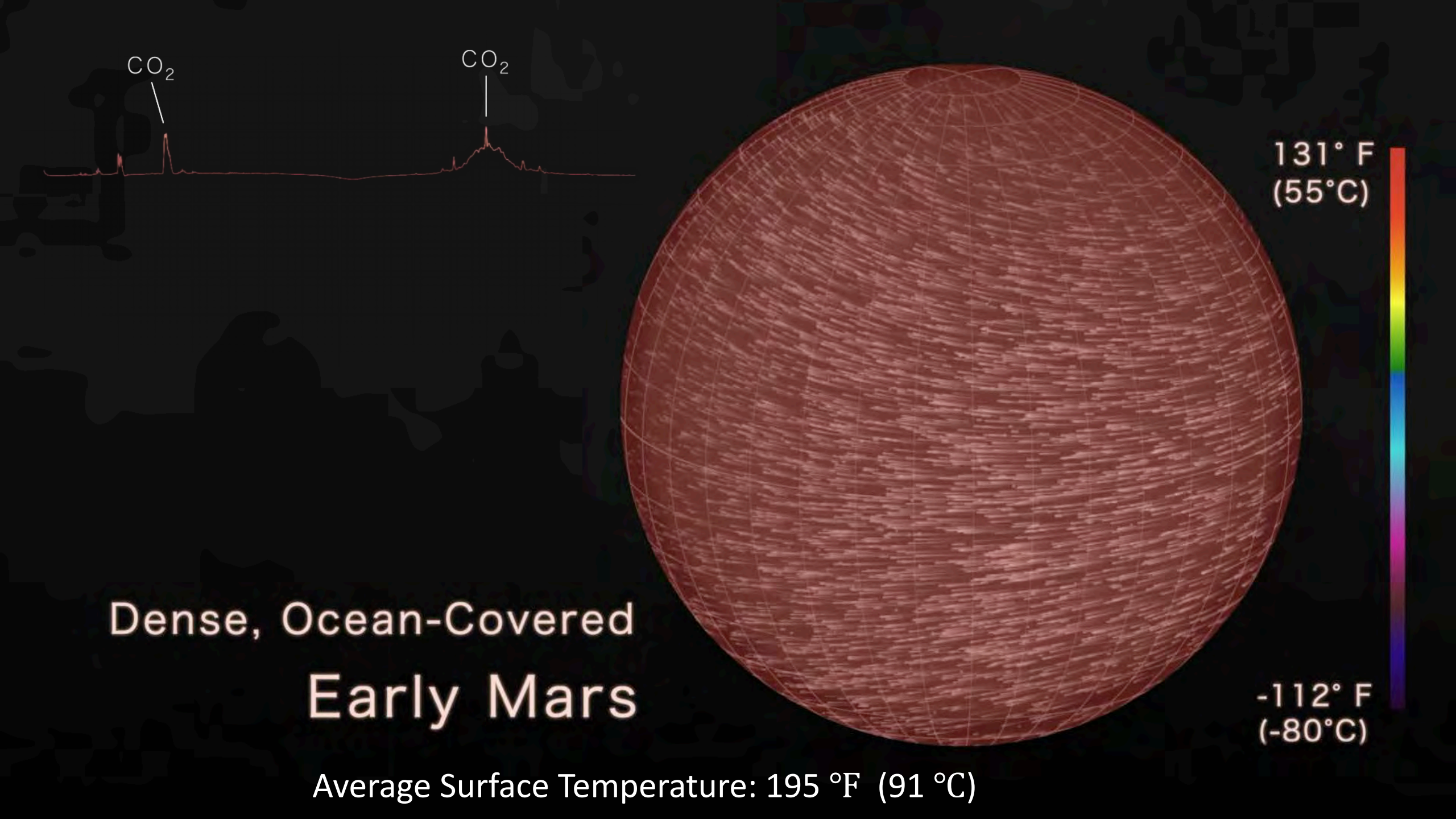
Different atmospheric pressures





Average Surface Temperature: -40 °F (-40 °C)


Modern Earth (1 bar, land)
Surface temperature global maps
Phase 0°
45°
90°
135°
180°
225°
270°
315°
360°
Contrast (ppm)
10
8
6
4
2
Dayside
Nightside
Dayside



Average Surface Temperature: 195 ℉ (91 ℃)

Our models will:

- Motivate technological advances needed to detect these signals
- Help put future atmospheric observations into context

Collaborators

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