

Exoplanet Weather Forecast: How do we study the climate and habitability of other worlds?

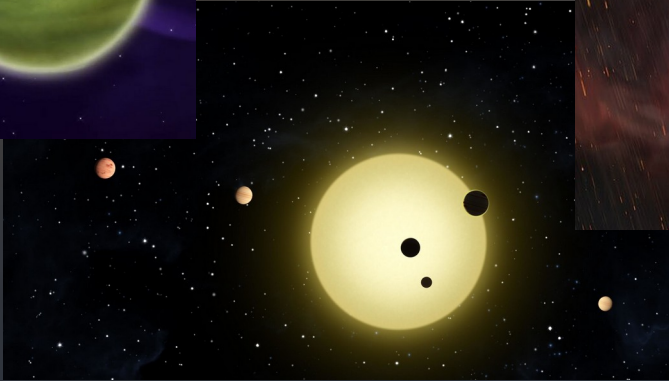
Sven Kiefer

The Pillars of Exoplanet Research

What is an
exoplanet?



How do we discover
new planets?



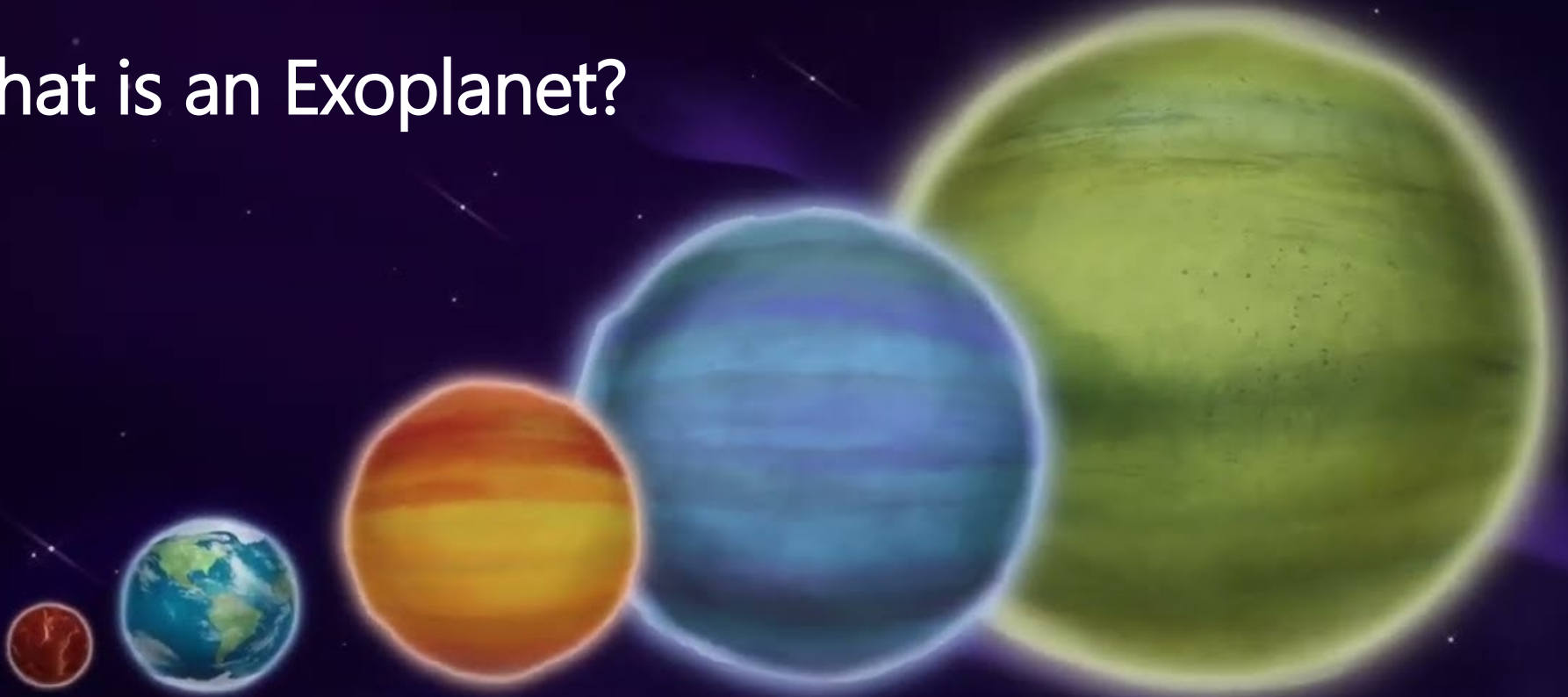
What do we know
about their climate?



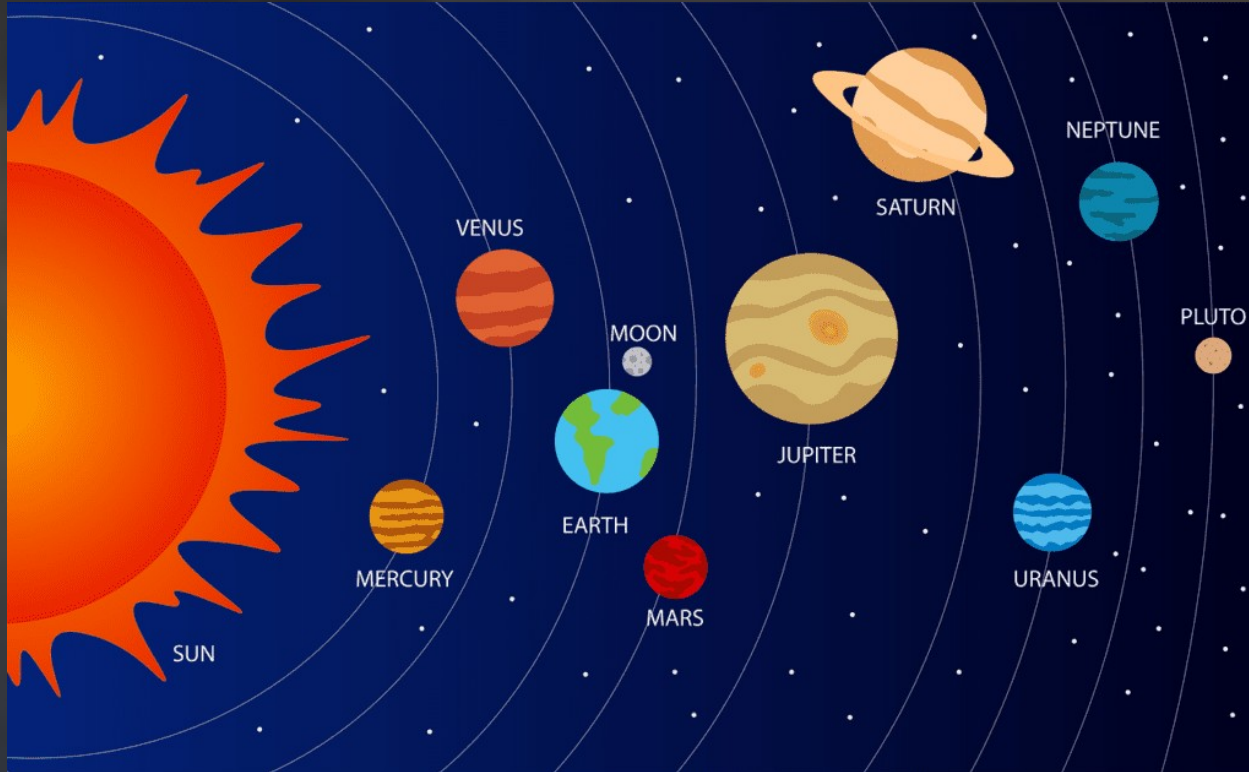
Is there life outside our
solar system?



What is an Exoplanet?



What is an Exoplanet?



What is an Exoplanet?



What is an Exoplanet?



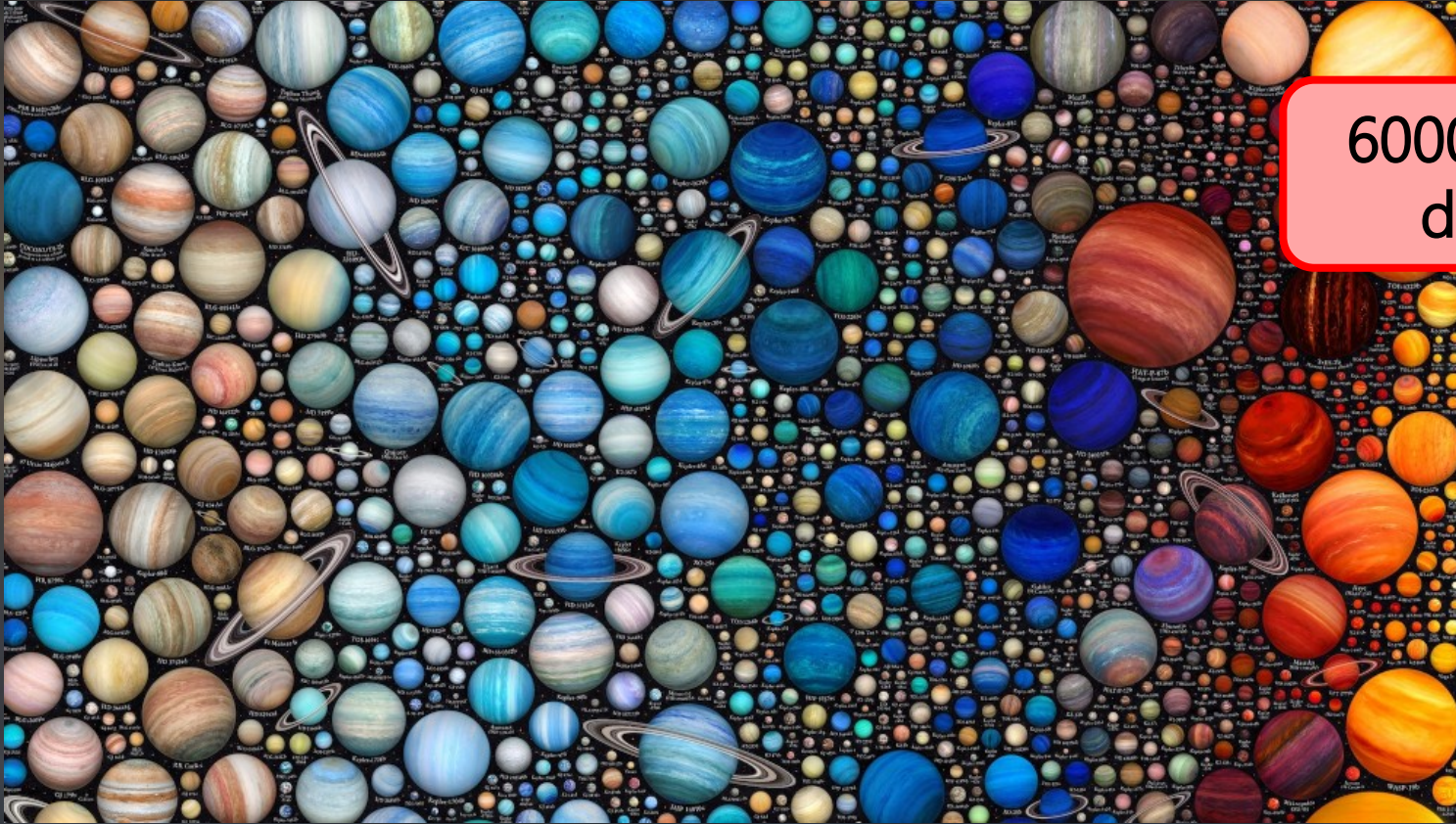
SORRY !

What is an Exoplanet?

McDonald Observatory
in West Texas!

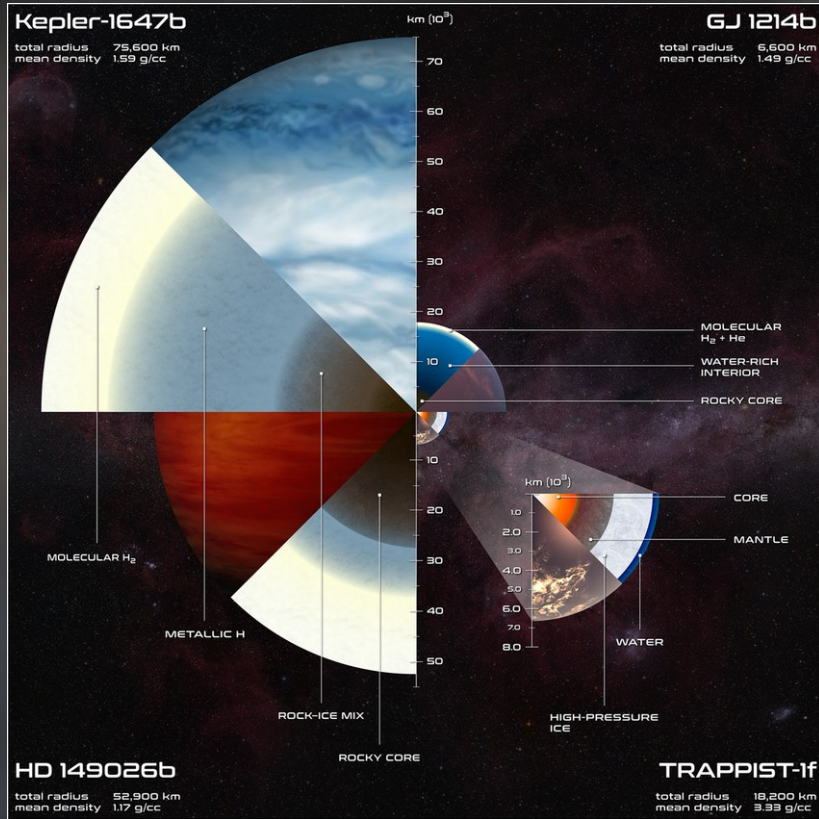


What is an Exoplanet?

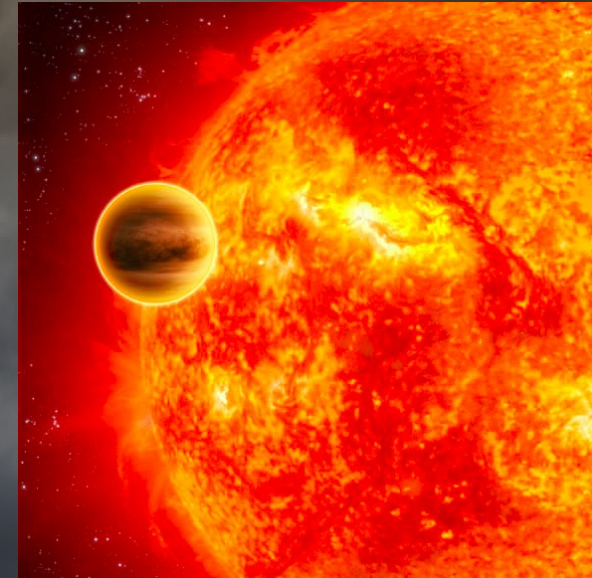
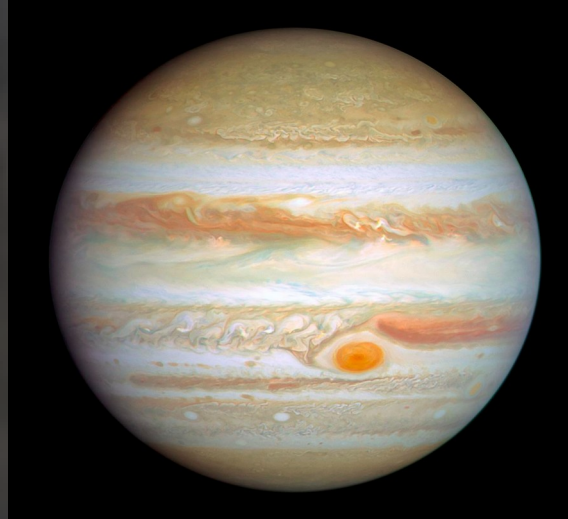
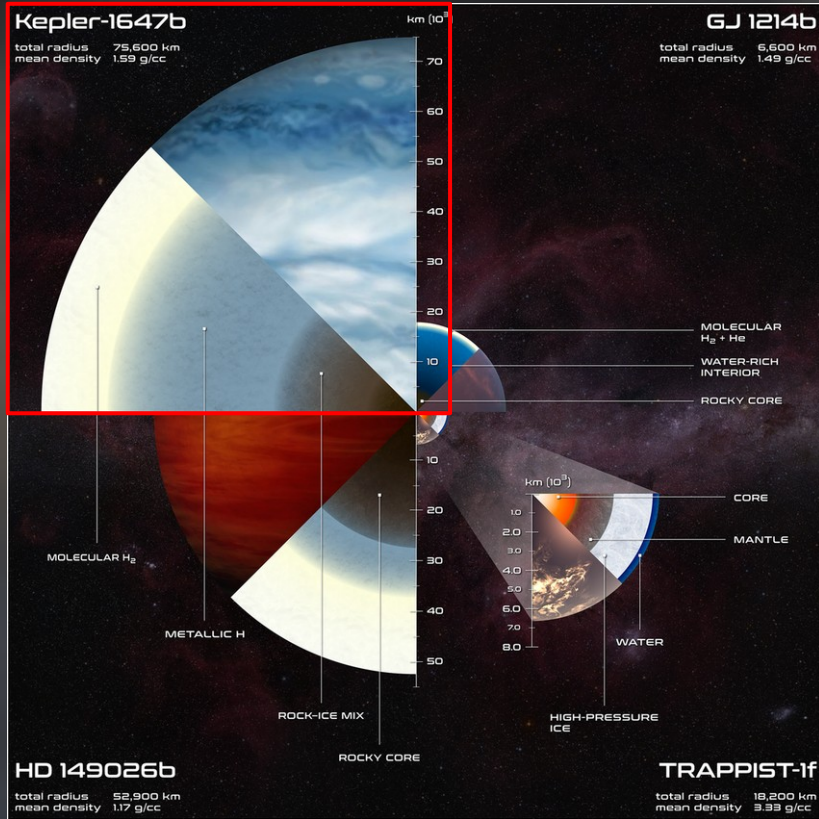


6000 Exoplanets
discovered

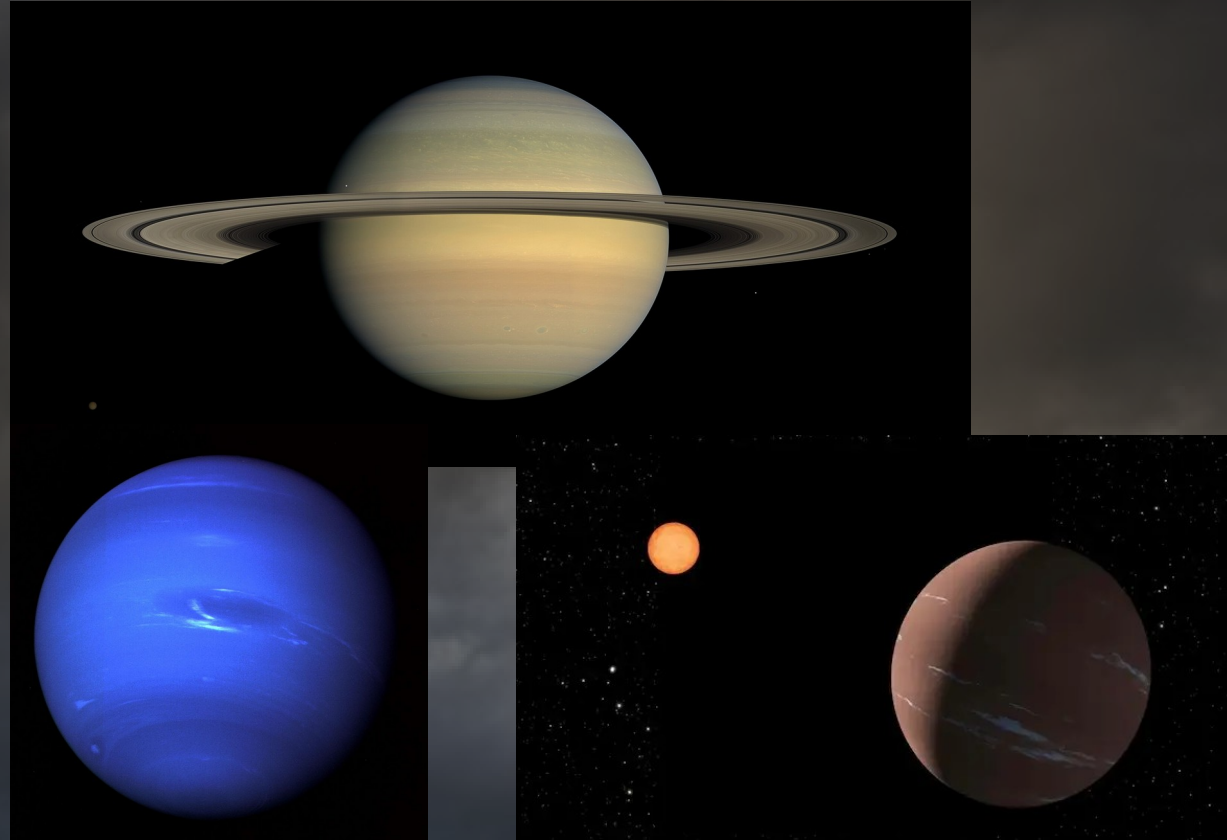
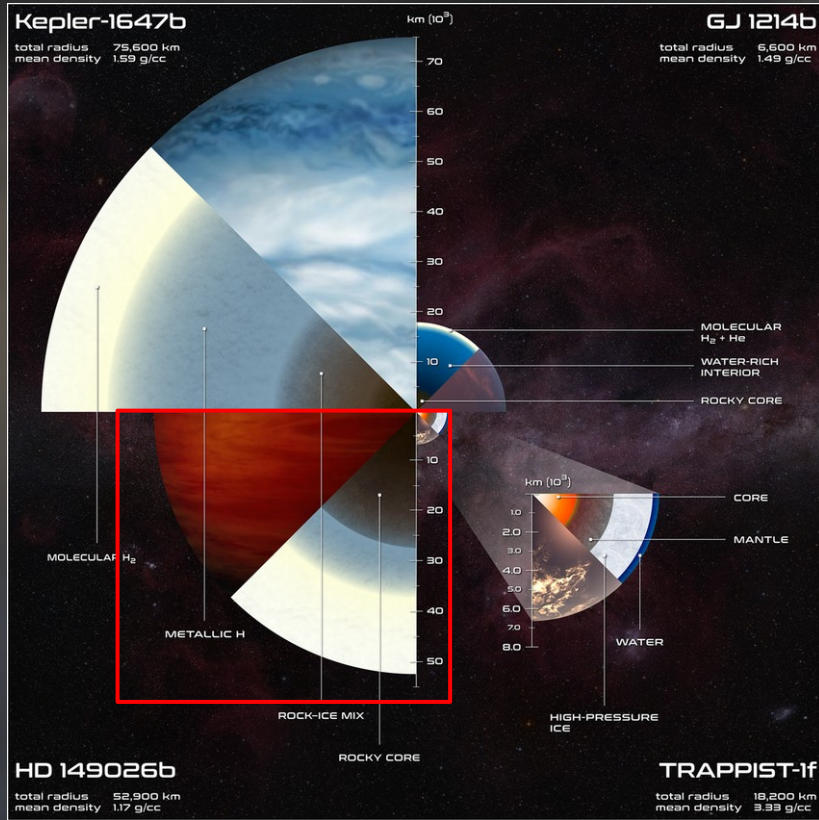
What is an Exoplanet?



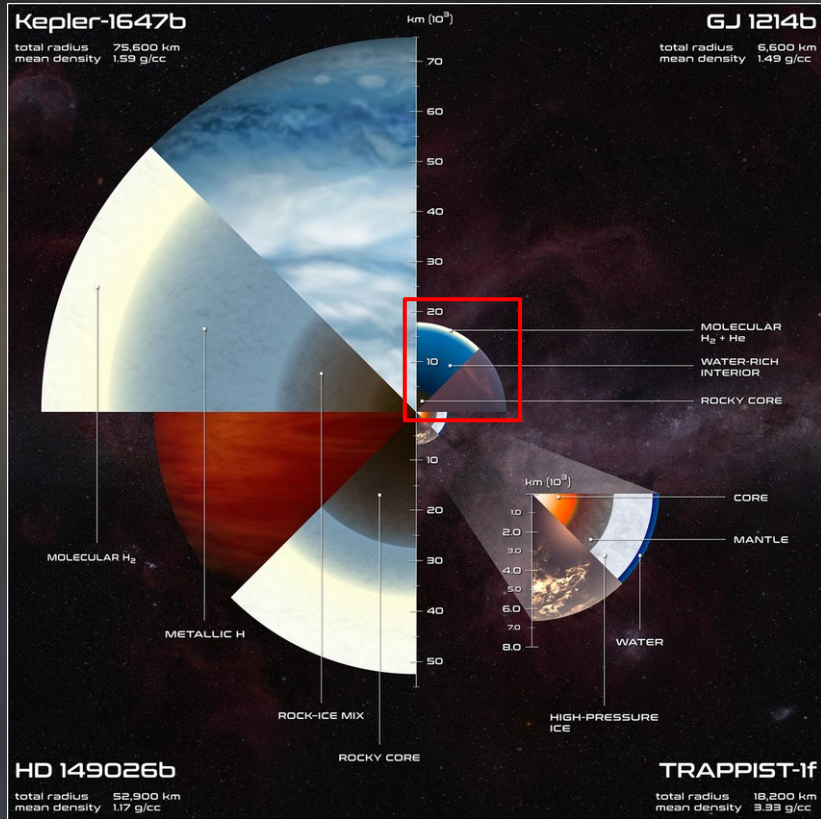
What is an Exoplanet?



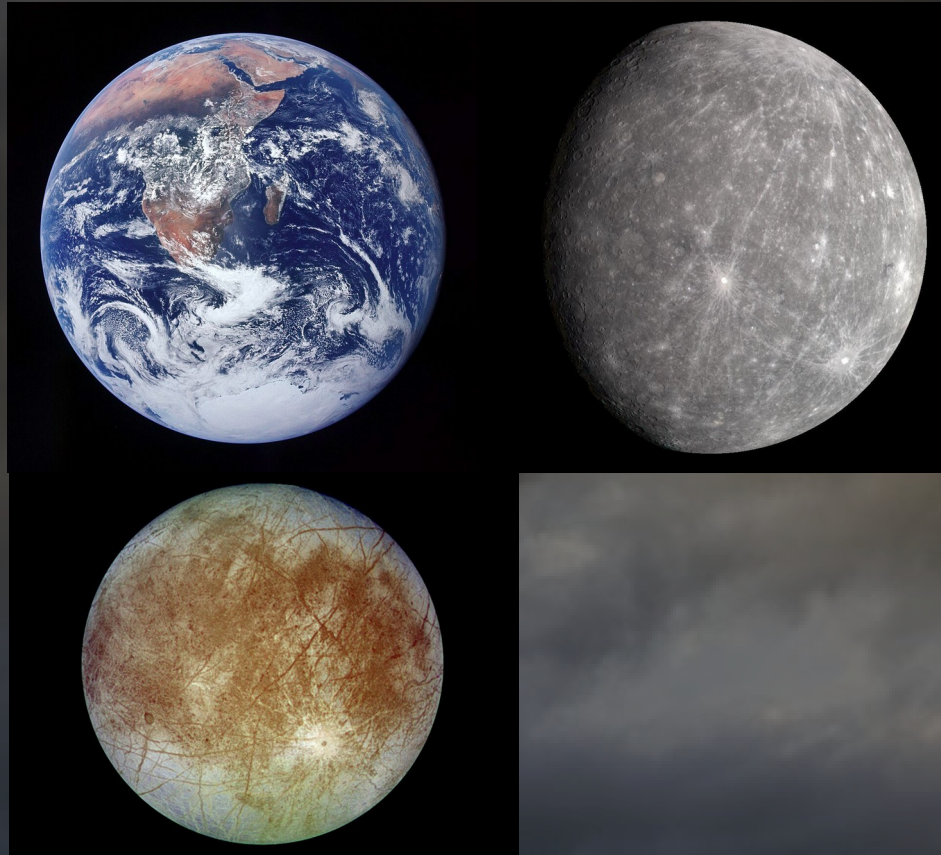
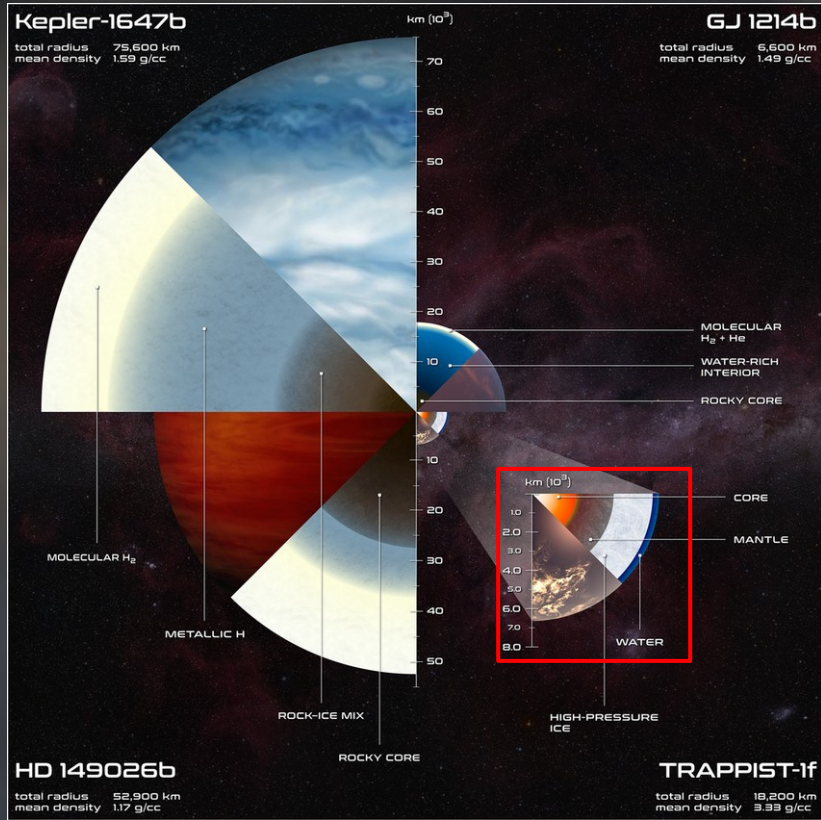
What is an Exoplanet?



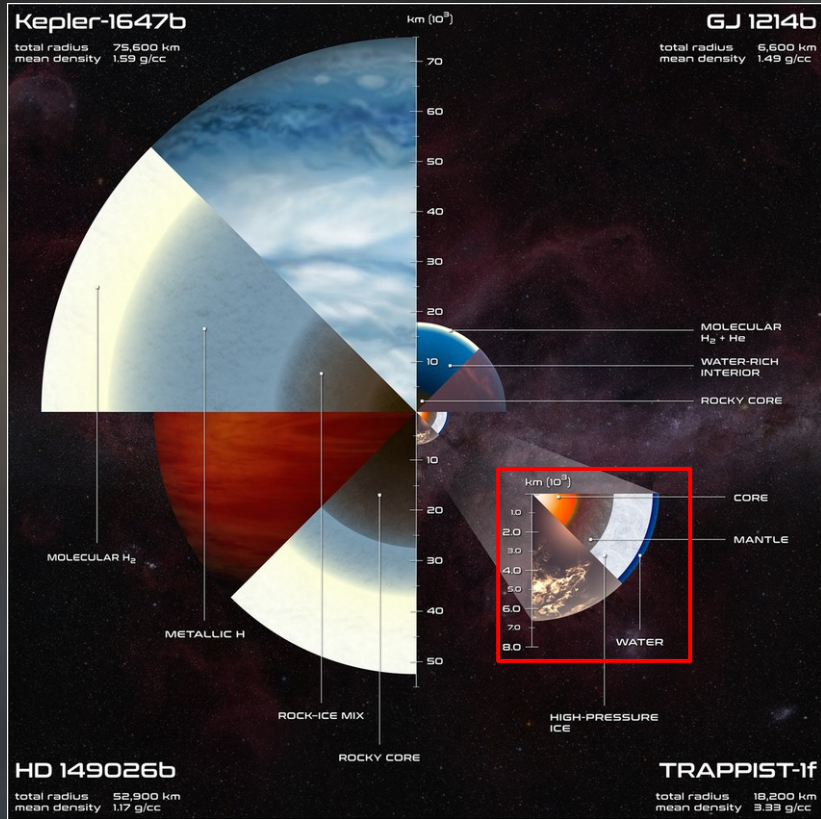
What is an Exoplanet?



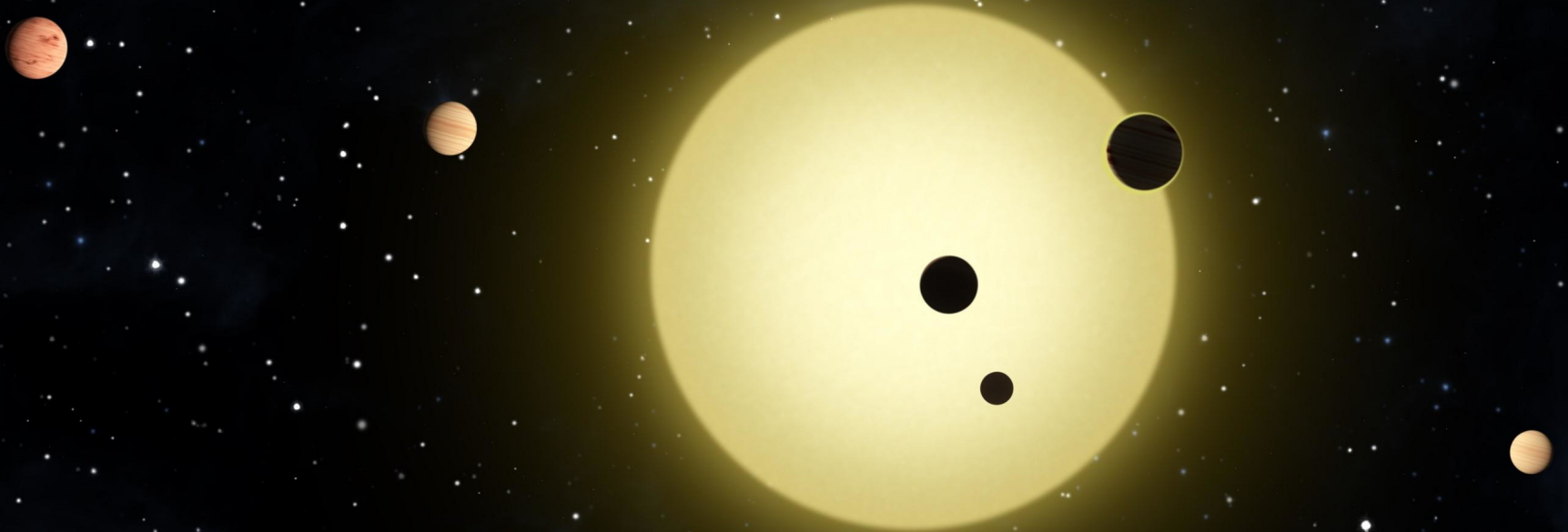
What is an Exoplanet?



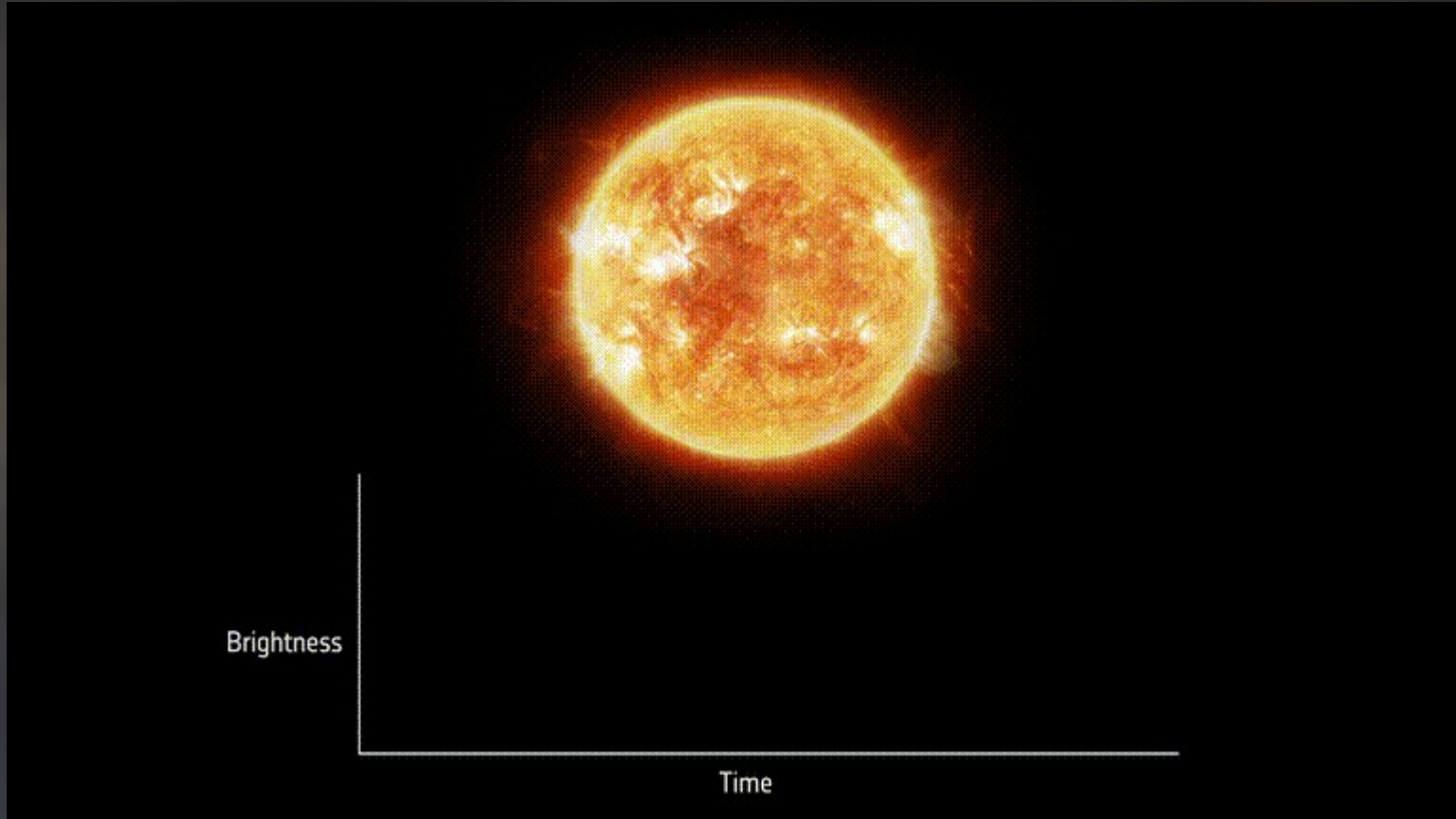
What is an Exoplanet?



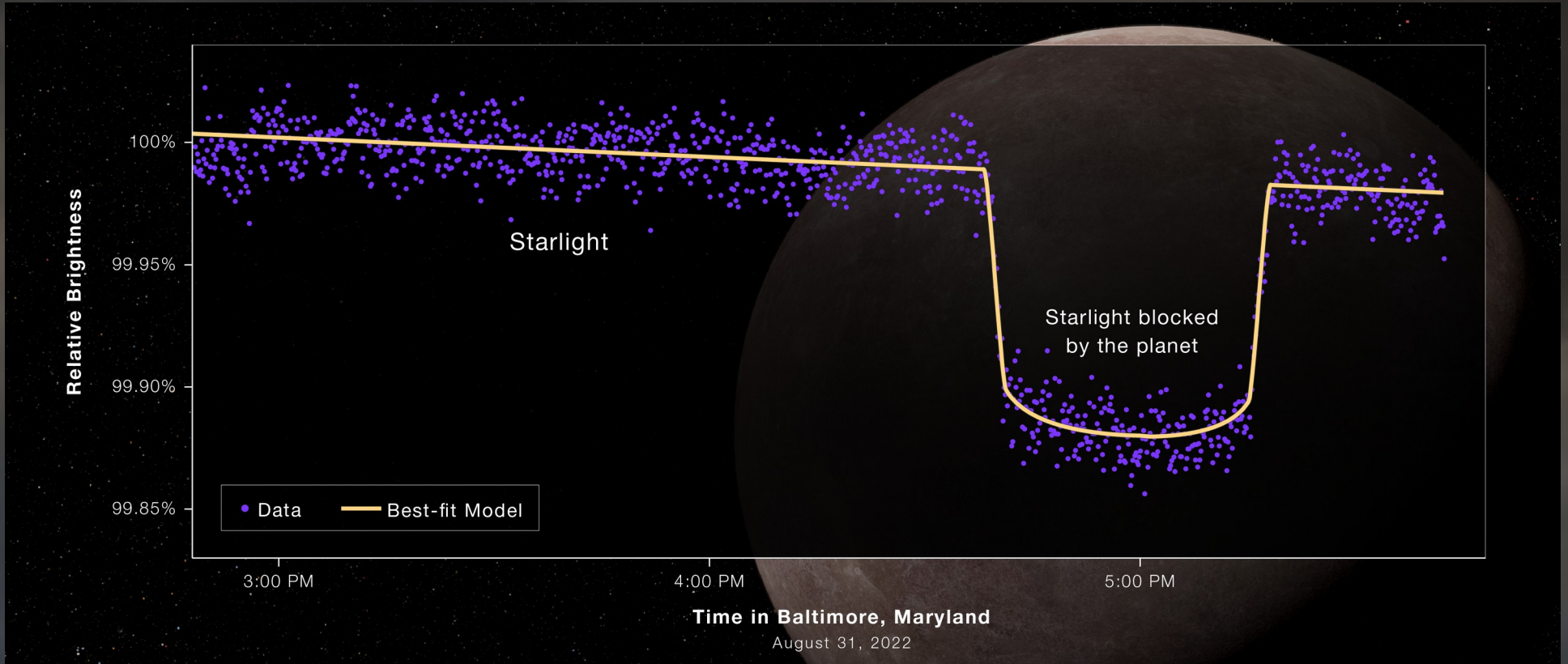
How do we discover new exoplanets?



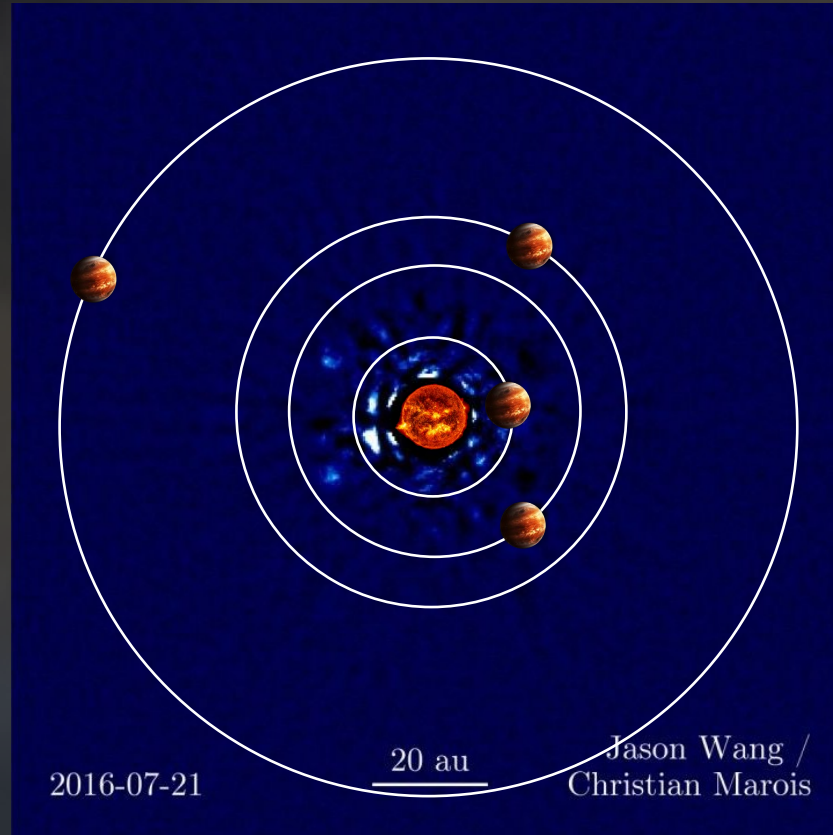
How do we Discover Exoplanets?



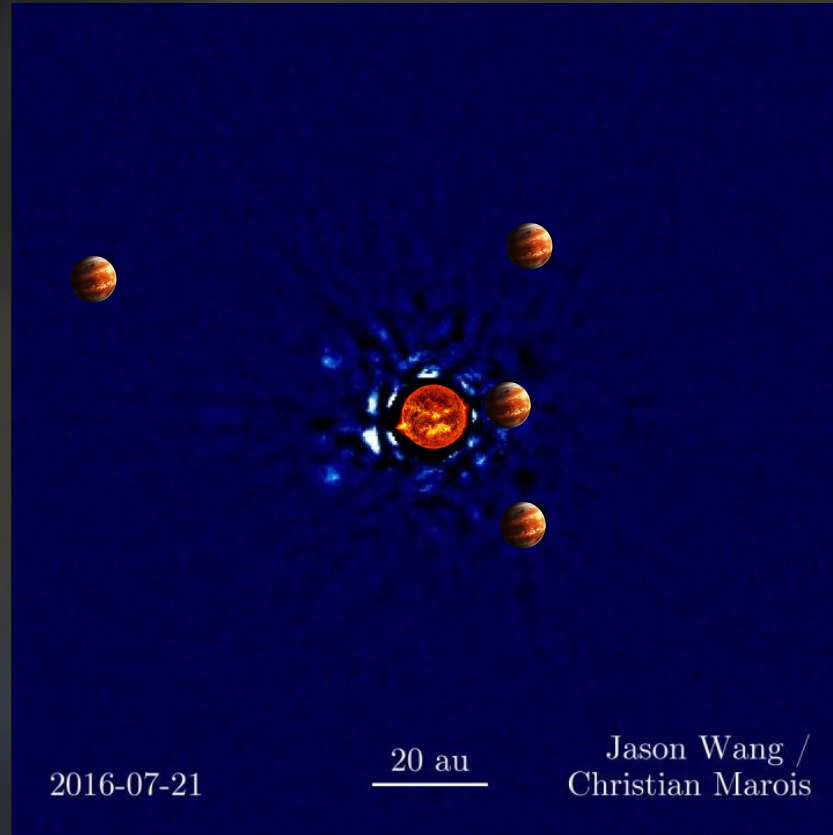
How do we Discover Exoplanets?



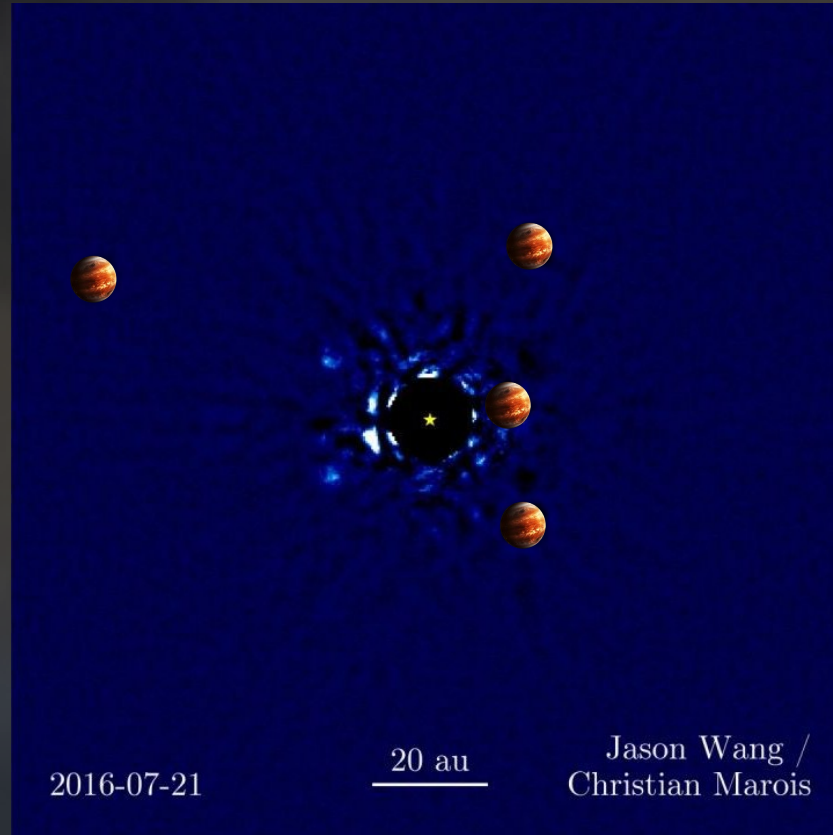
How do we Discover Exoplanets?



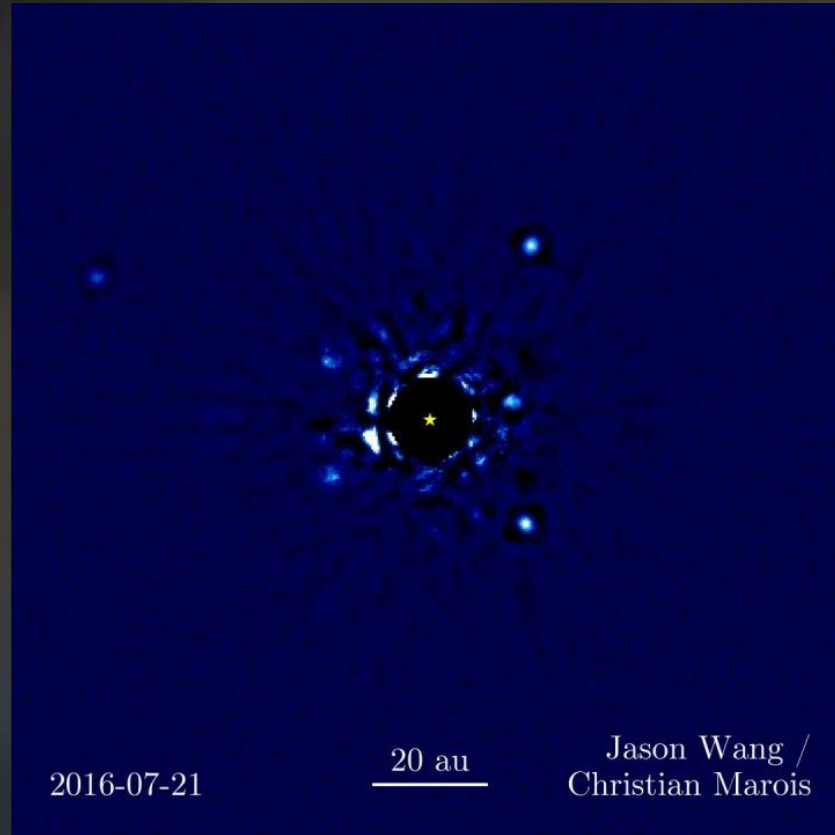
How do we Discover Exoplanets?



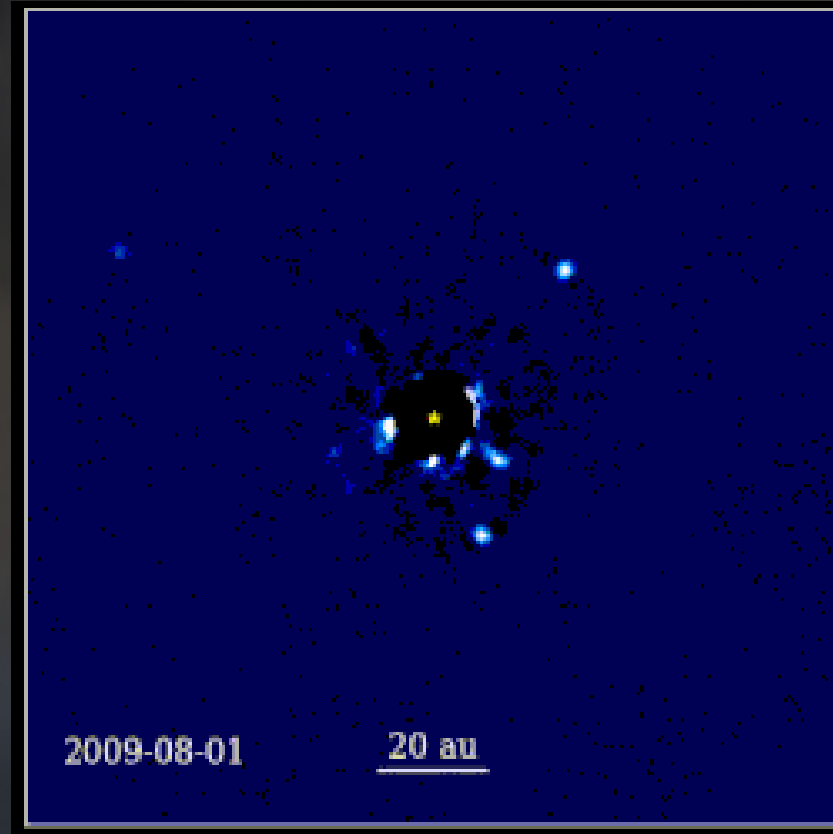
How do we Discover Exoplanets?




How do we Discover Exoplanets?



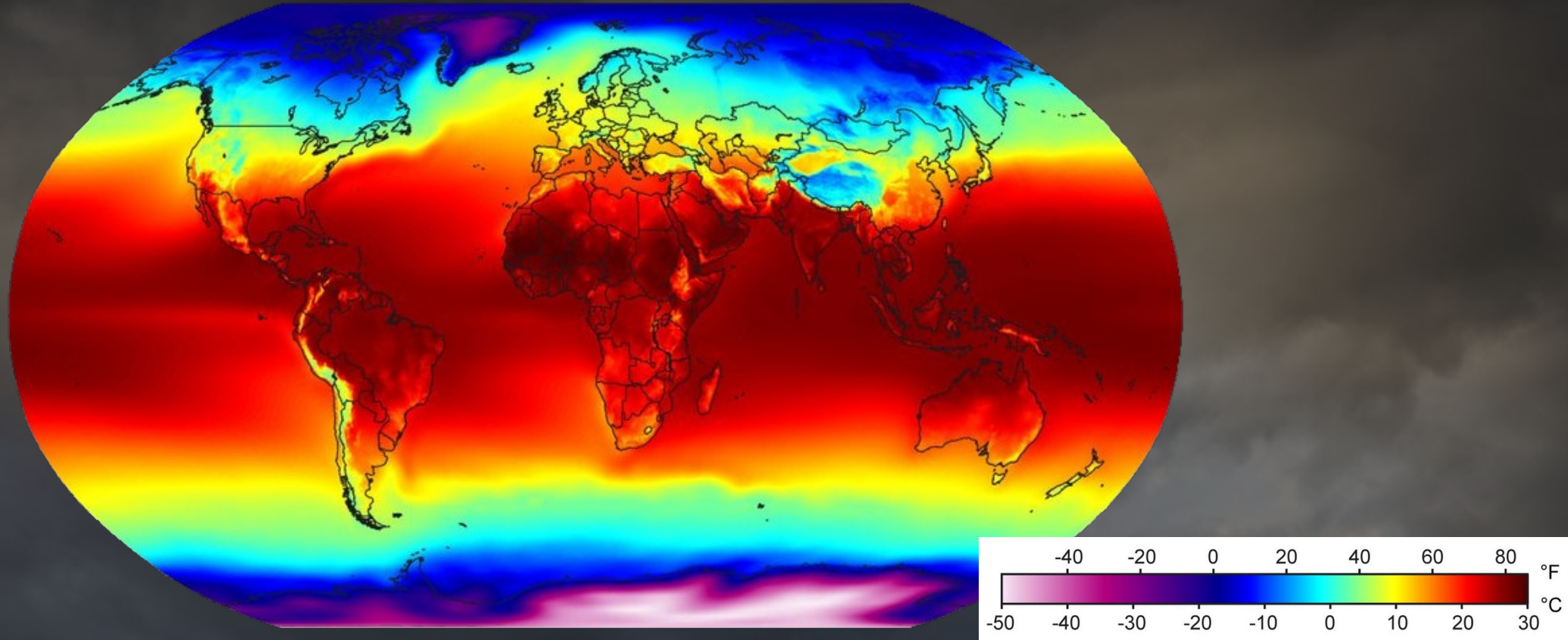
How do we Discover Exoplanets?



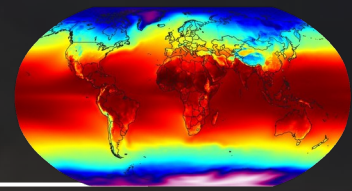


What do we know about the climate of exoplanets?

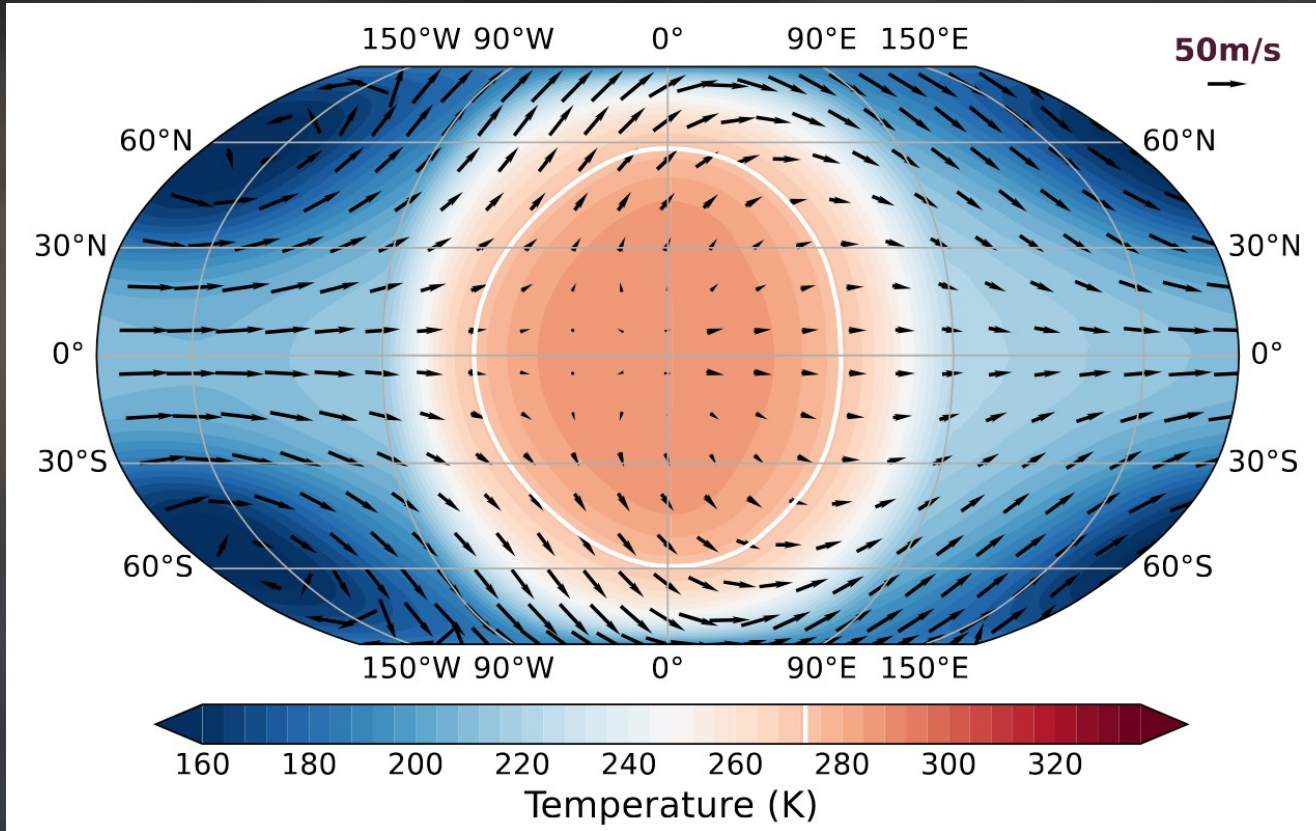
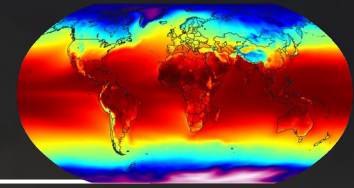
The Climate of Exoplanets



The Climate of Exoplanets

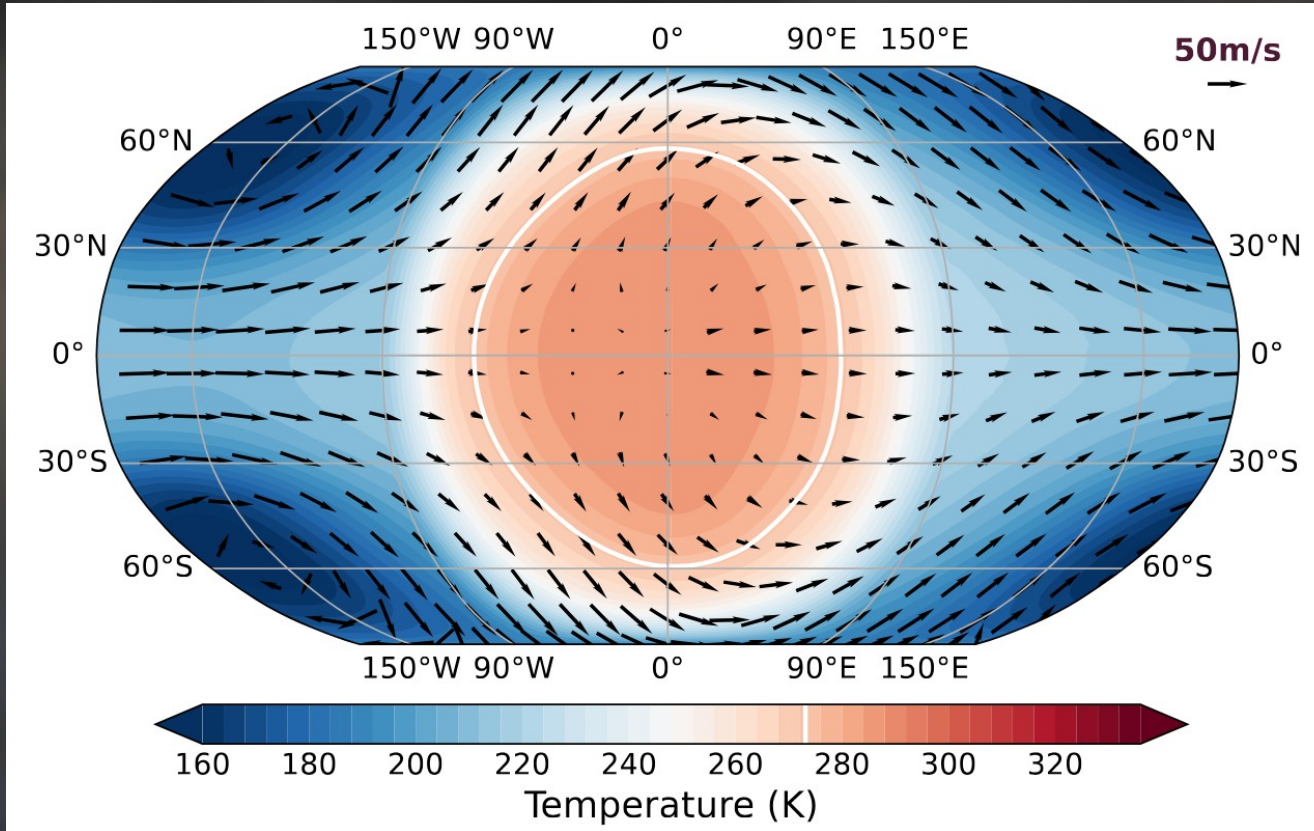
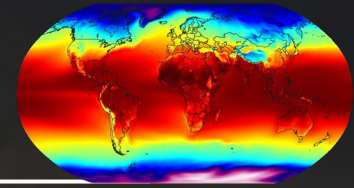


The Climate of Exoplanets



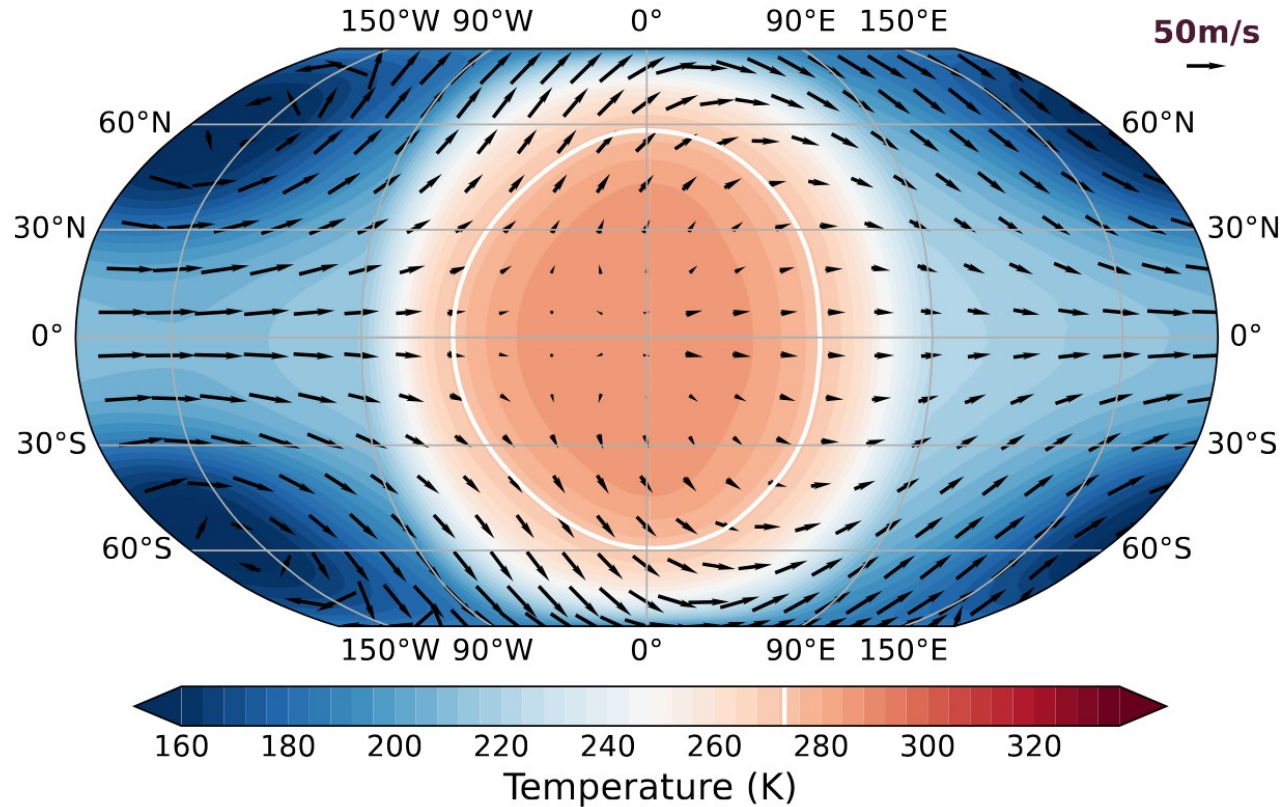
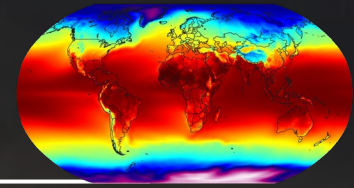
Proxima Centauri b
→ Nearest Planet to Earth

The Climate of Exoplanets



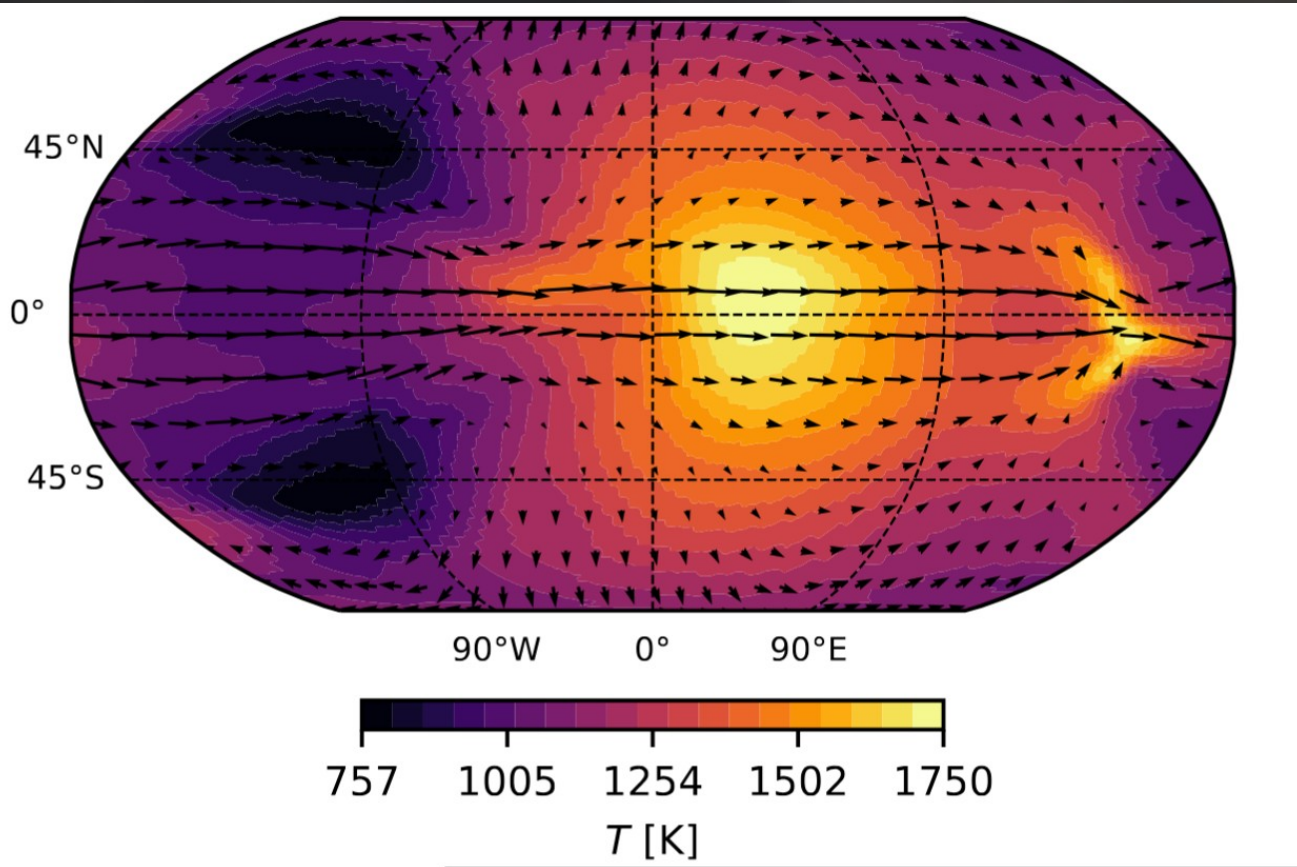
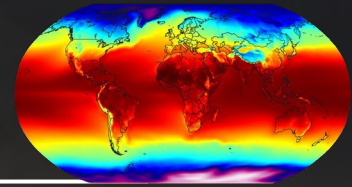
Proxima Centauri b
→ Nearest Planet to Earth
→ Tidally locked

The Climate of Exoplanets



Proxima Centauri b
→ Nearest Planet to Earth
→ Tidally locked
→ Maybe water?

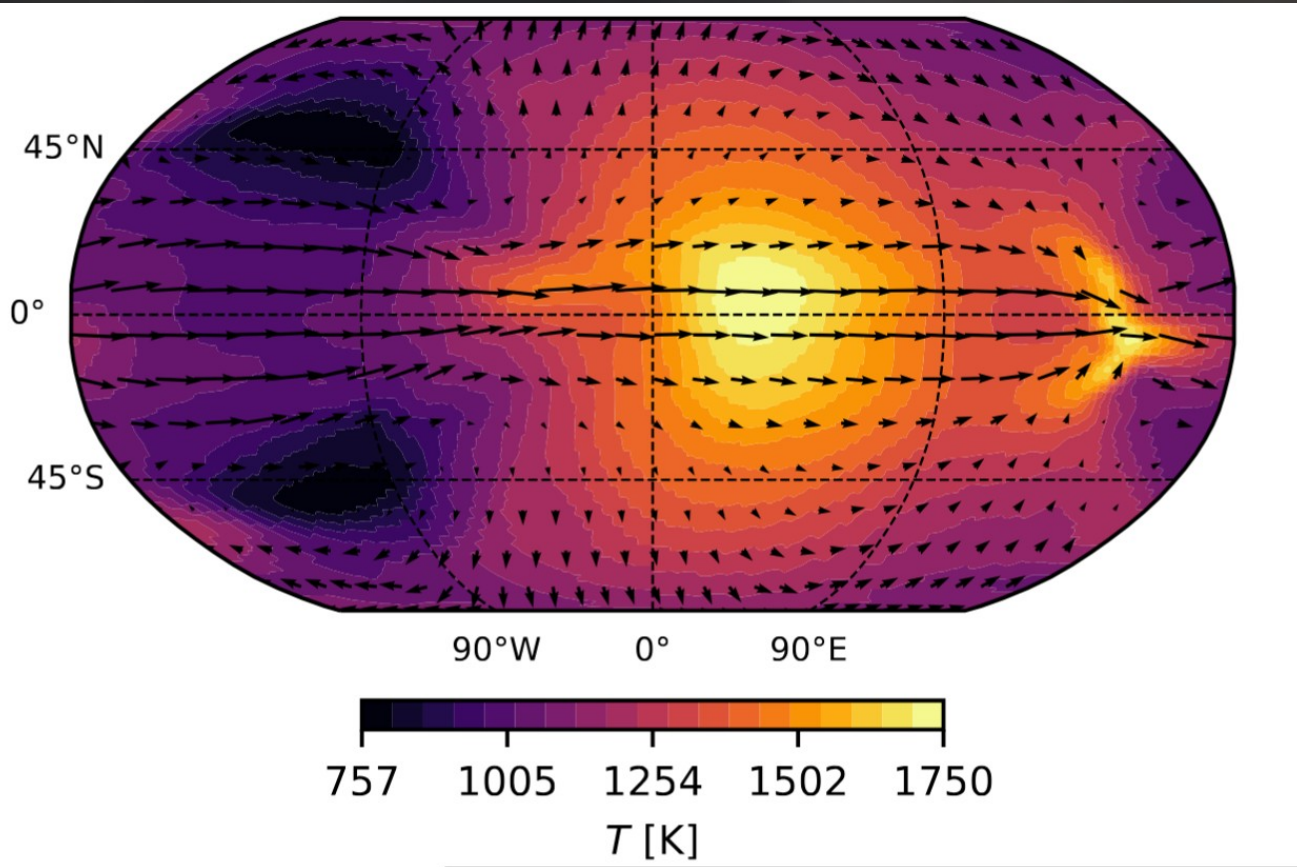
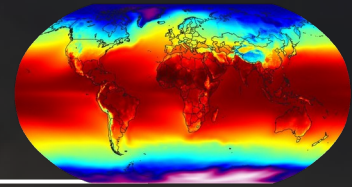
The Climate of Exoplanets



HD 209458 b
→ First Transit measurement



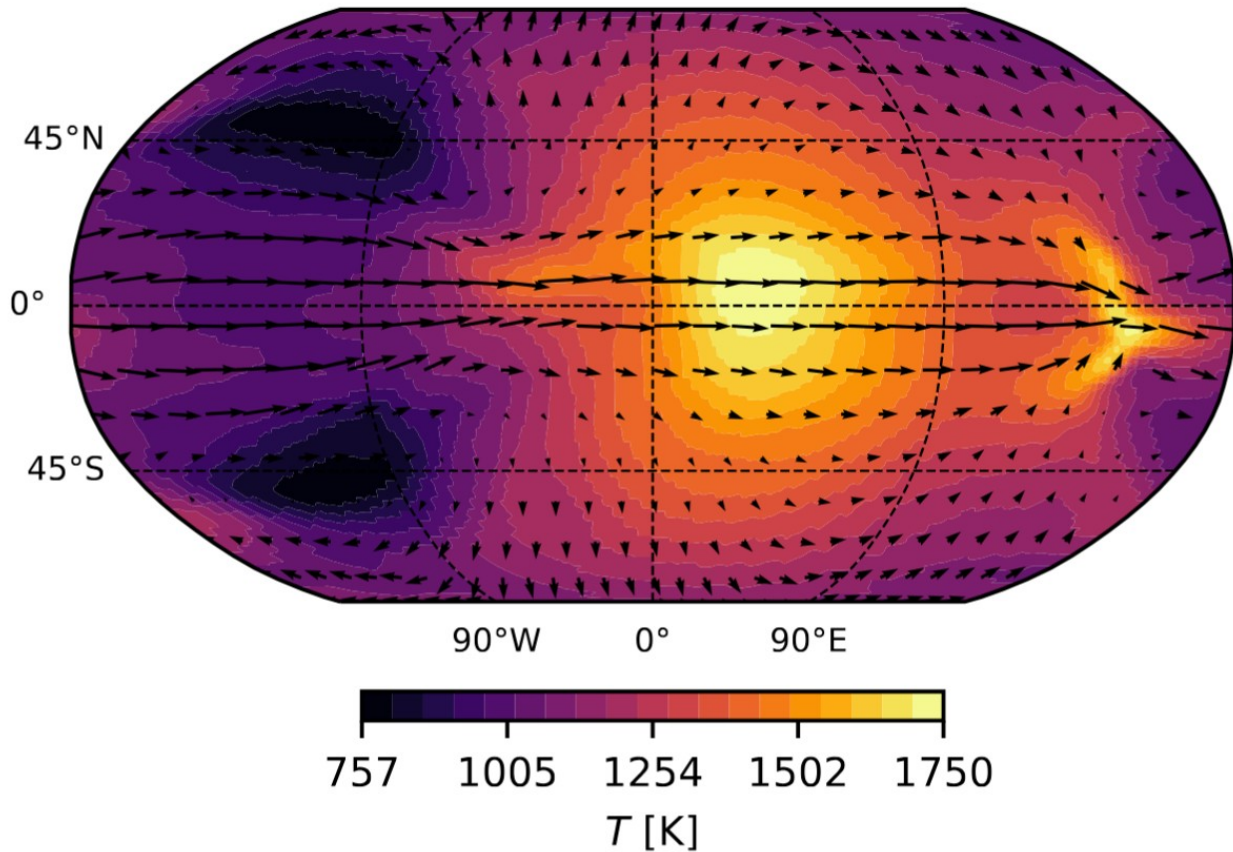
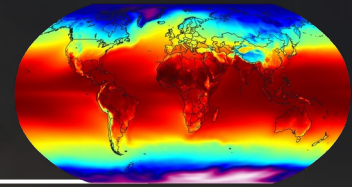
The Climate of Exoplanets



HD 209458 b

- First Transit measurement
- Tidally locked hot Jupiter

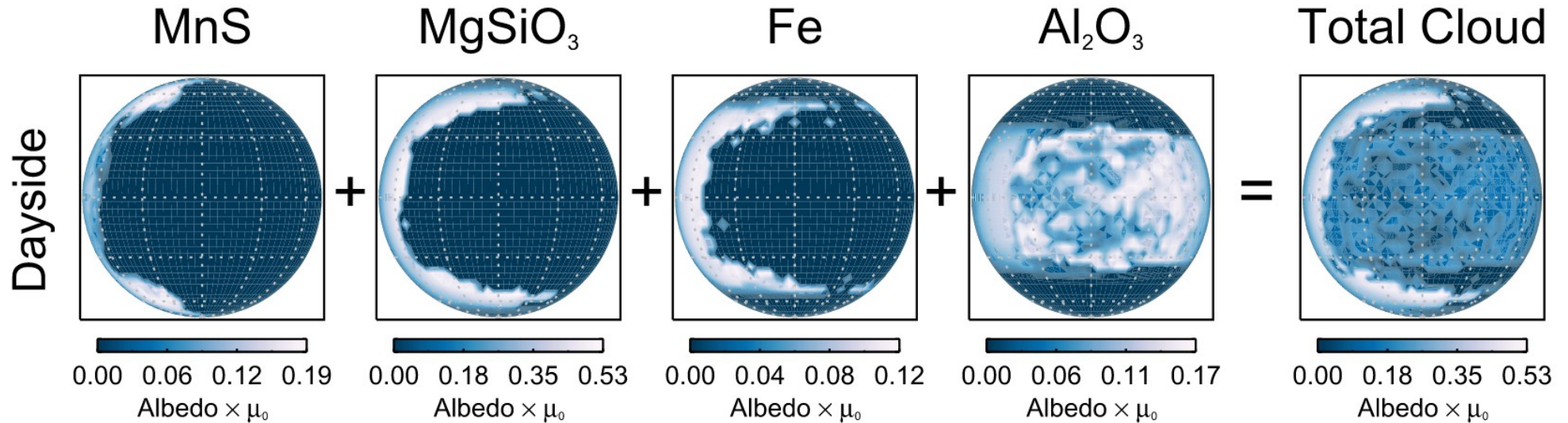
The Climate of Exoplanets



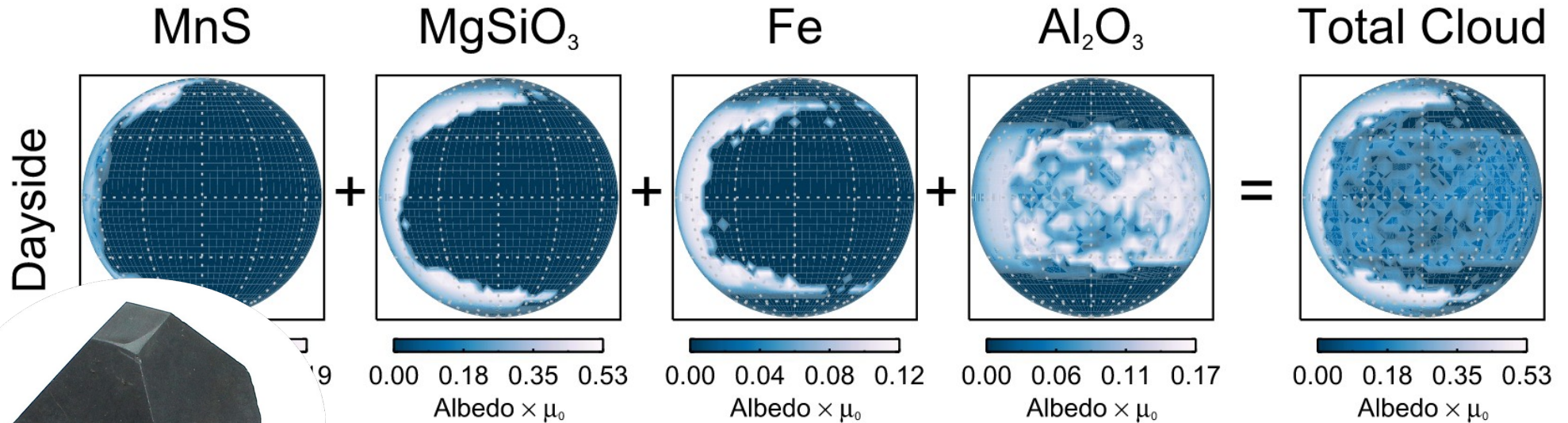
HD 209458 b

- First Transit measurement
- Tidally locked hot Jupiter
- Extended Atmosphere

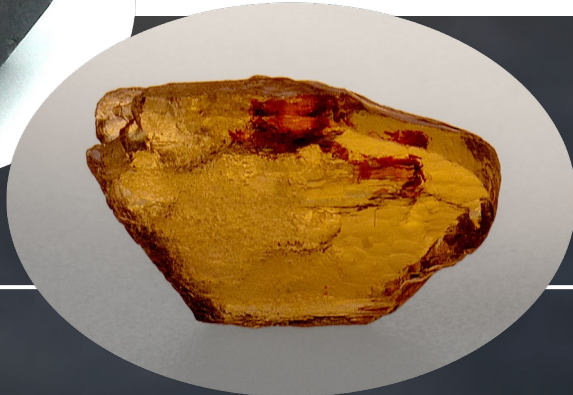
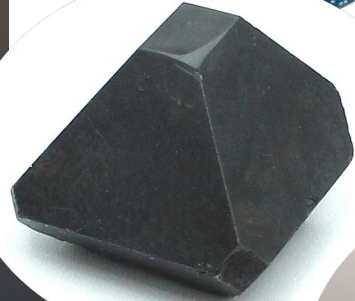
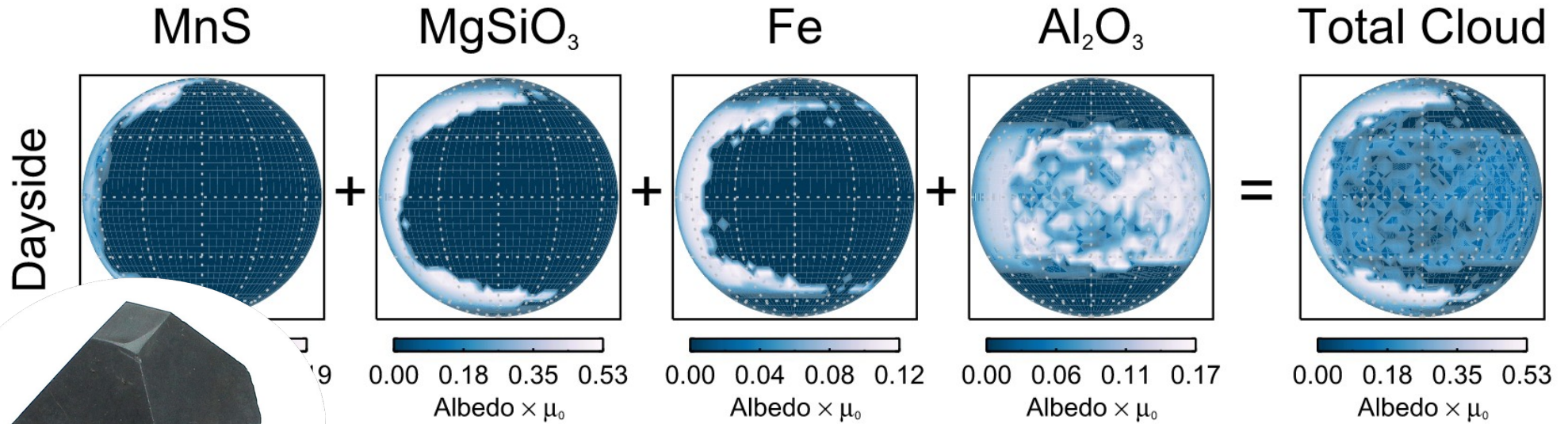
The Climate of Exoplanets



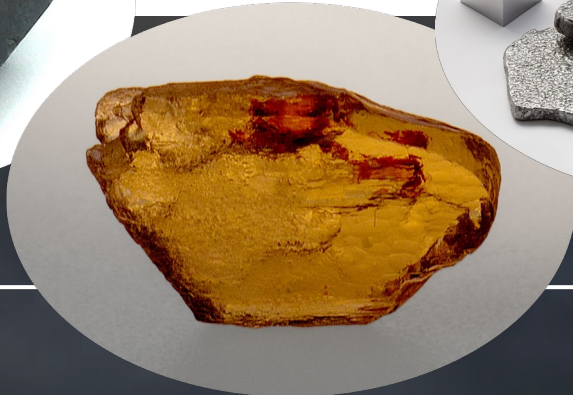
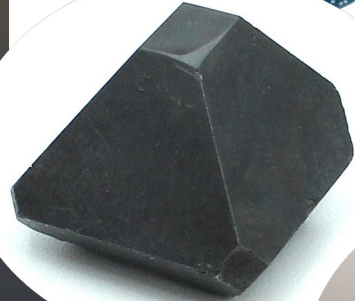
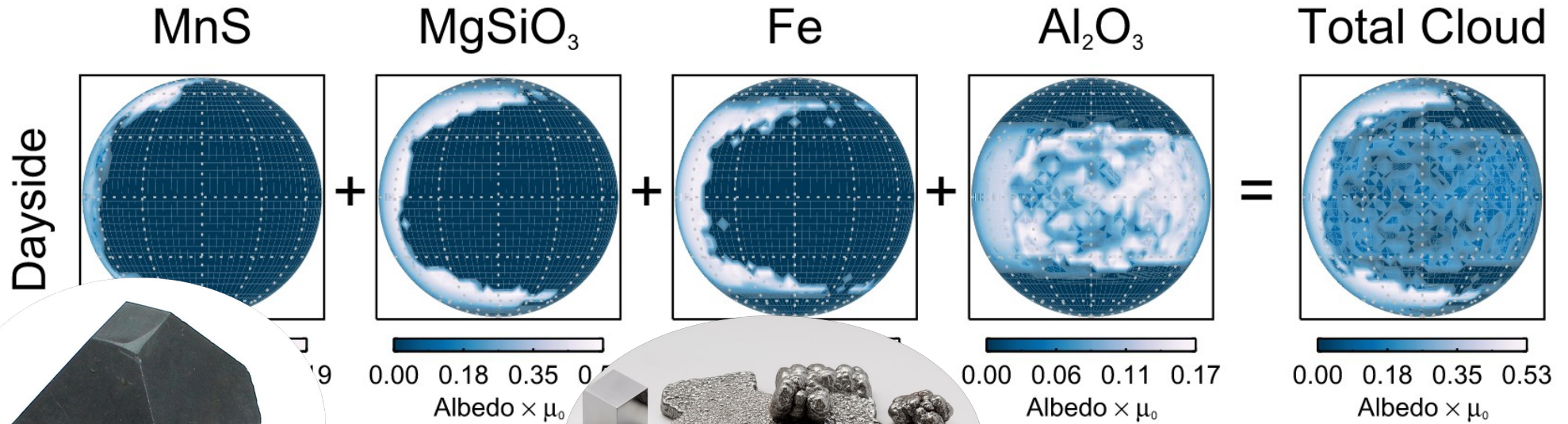
The Climate of Exoplanets



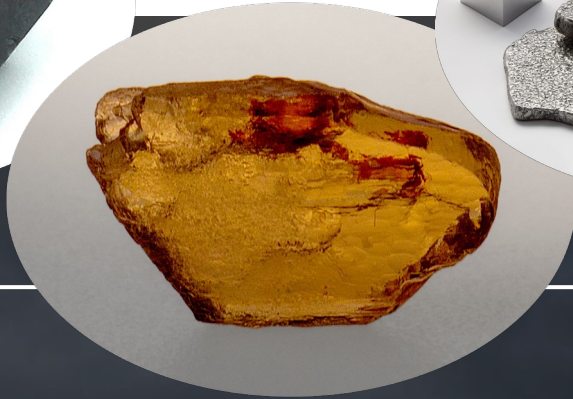
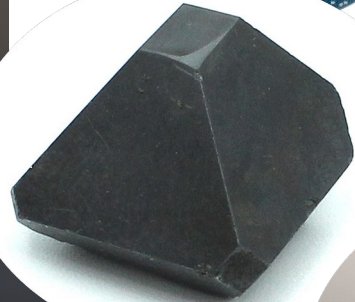
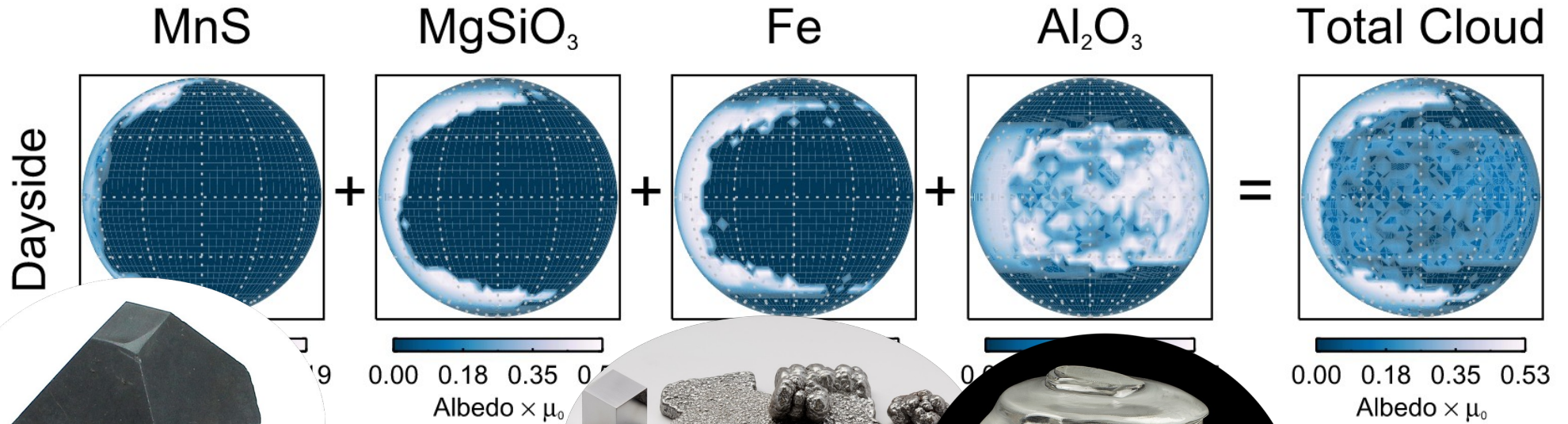
The Climate of Exoplanets



The Climate of Exoplanets



The Climate of Exoplanets



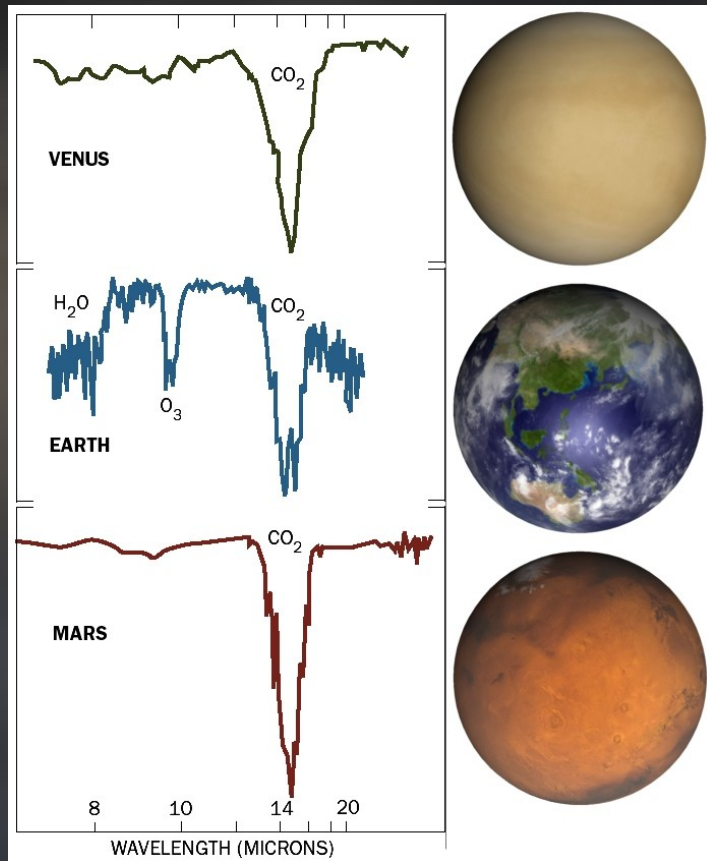


Are we alone?

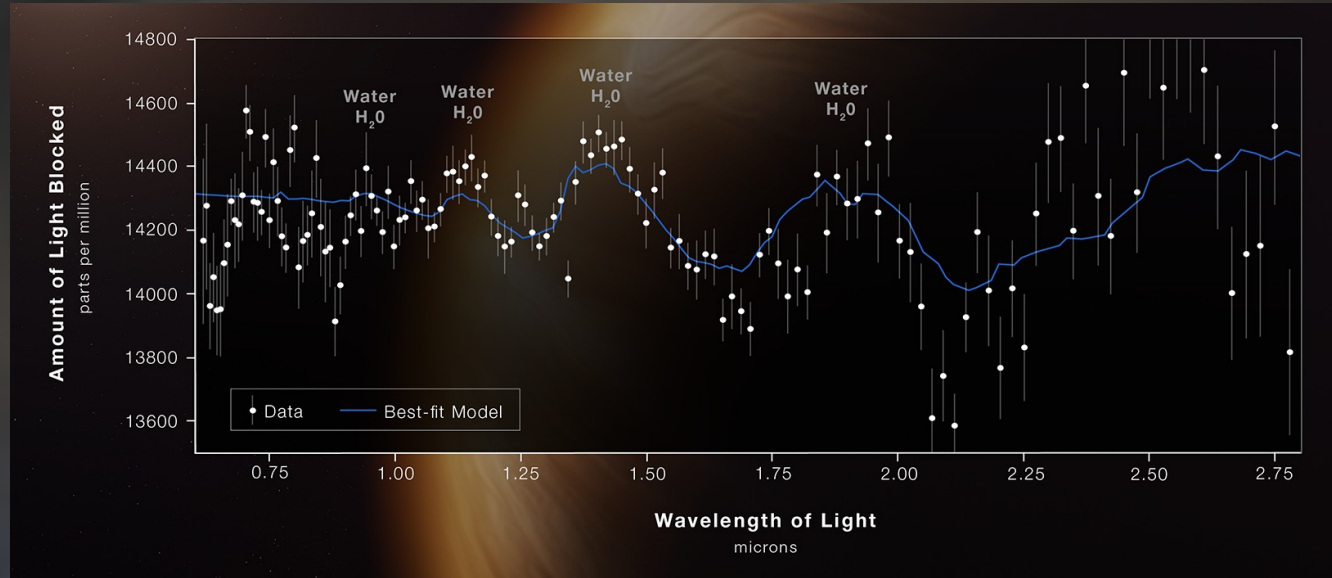
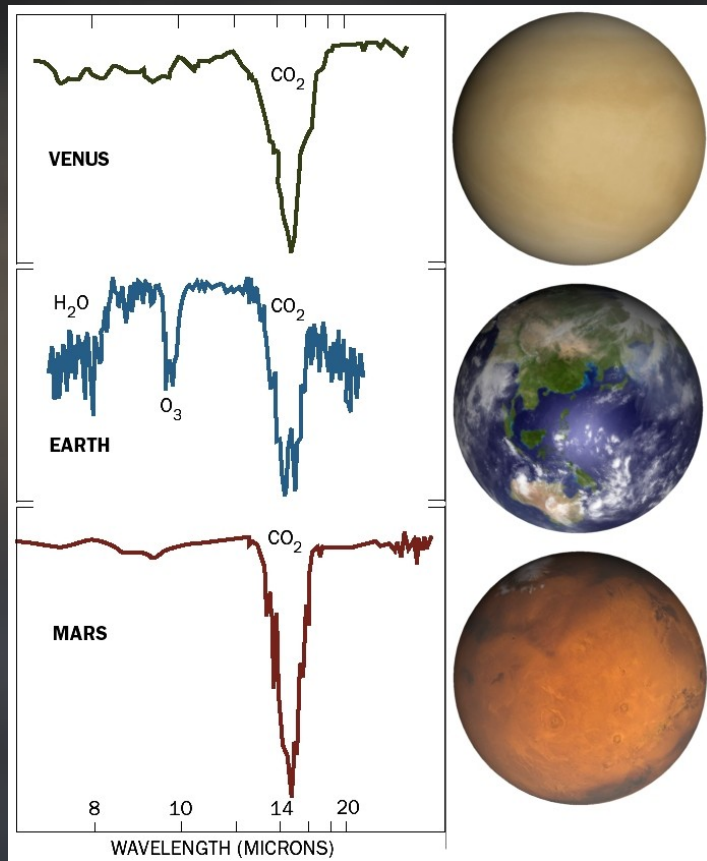


Are we alone?
→ We don't know yet!

How do we Search for Life?



How do we Search for Life?



How do we Search for Life?

Search for biomarkers



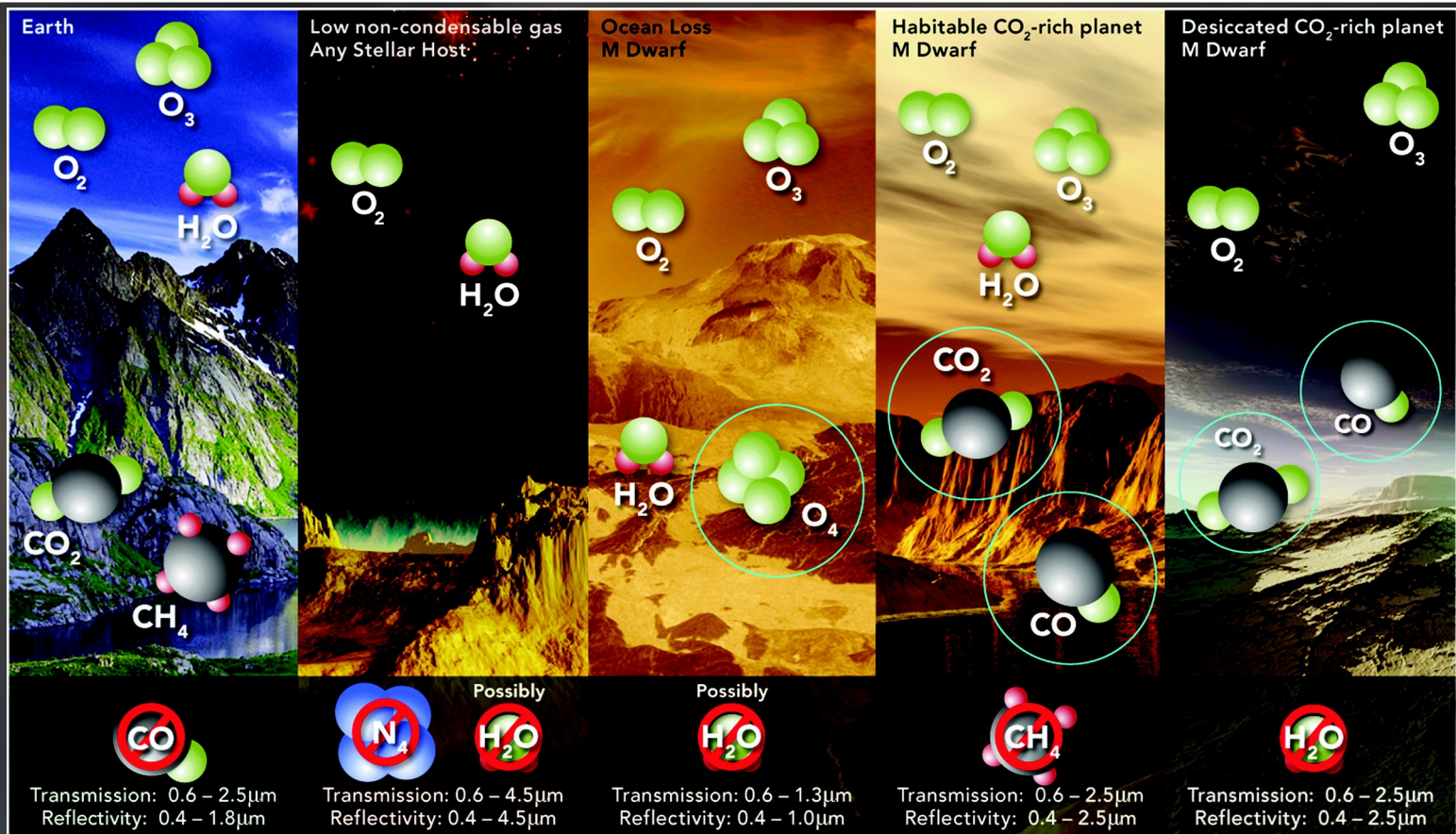
Search for intelligence



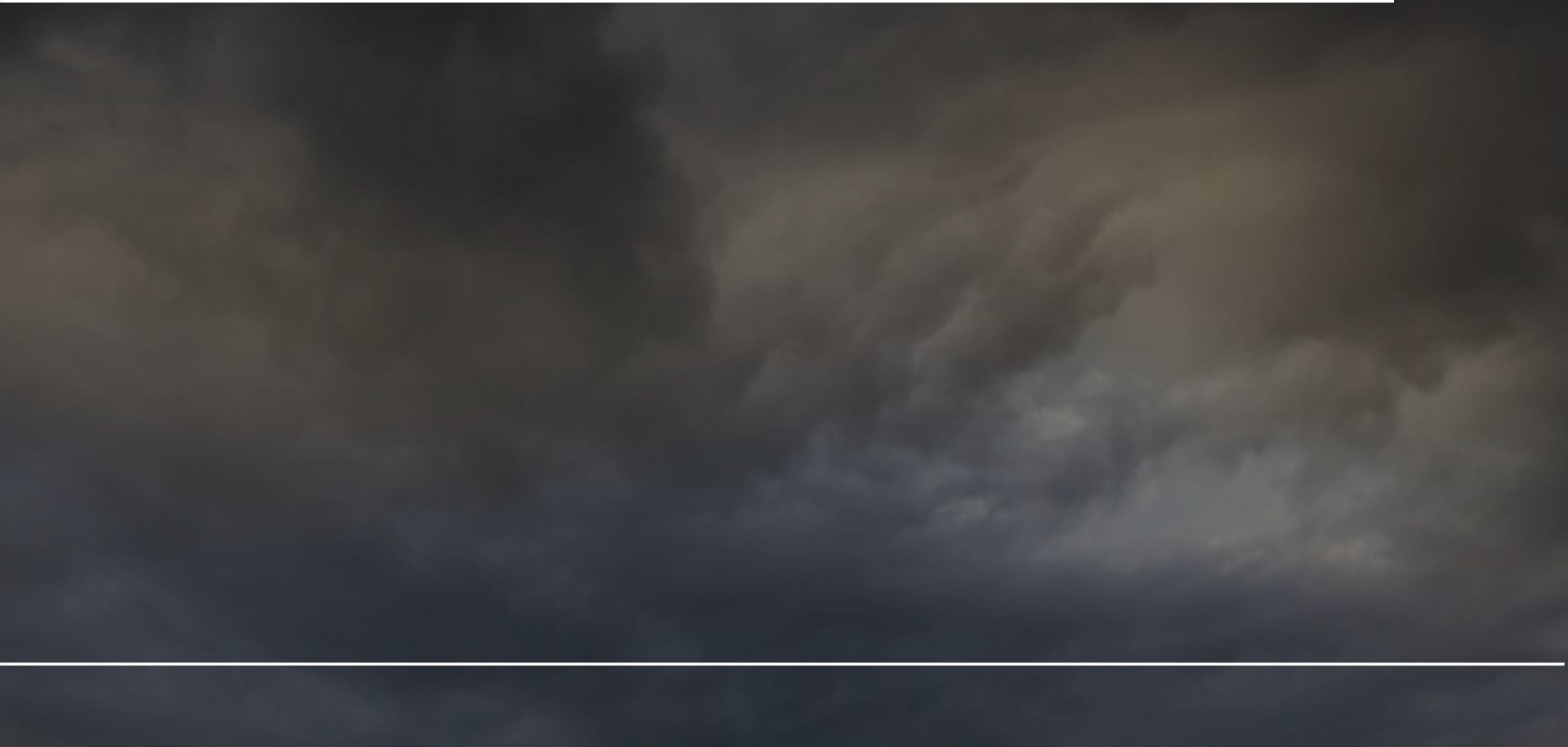
Image Credit cell: NewScientist (DOI: 10.1101/2021.02.26.433123)

Image Credit SETI: 3D Illustration Getty Images/NASA

How do we Search for Life?



Exoplanet Weather Forecast



Exoplanet Weather Forecast

Exoplanets
are diverse!

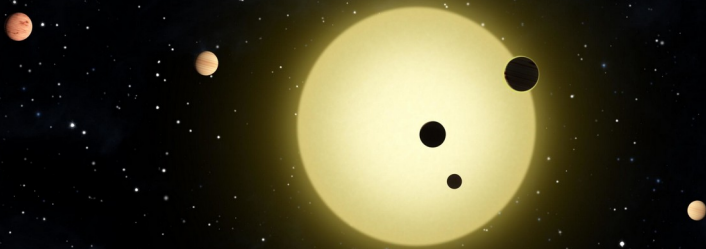


Exoplanet Weather Forecast

Exoplanets
are diverse!



We have discovered over
6000 exoplanets!



Exoplanet Weather Forecast

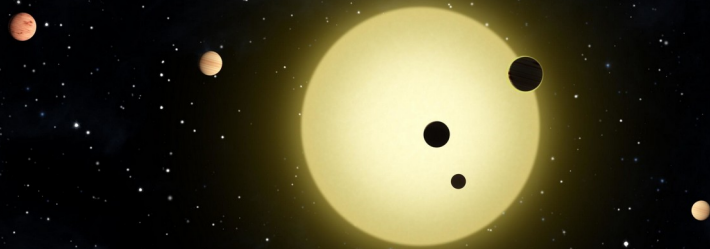
Exoplanets
are diverse!



Exoplanets have
extreme climates!



We have discovered over
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Exoplanet Weather Forecast

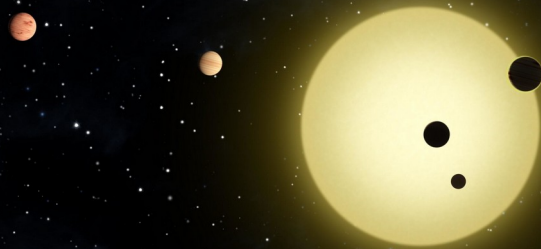
Exoplanets
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Exoplanets have
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We have discovered over
6000 exoplanets!



We are still looking
for life outside Earth!

