



# NExSS HabWorlds 2 Pre-Meeting Update

Cayman Unterborn  
ASU

# Habitable Worlds 2021 Workshop

## February 22-26, 2021



Astronomy  
Astrophysics

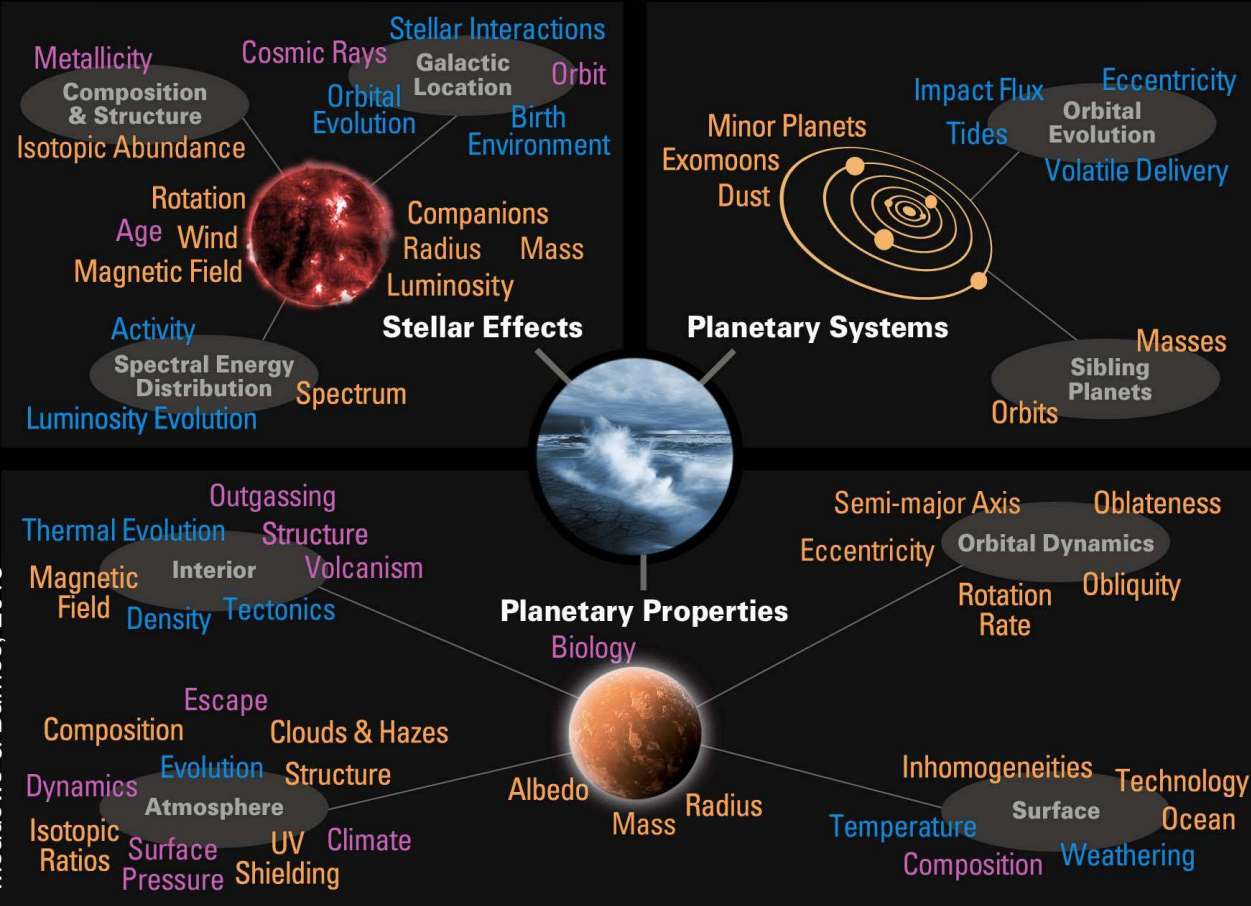
Astrobiology

Geoscience

Planetary  
Science

<https://aas.org/meetings/aastcs8/habitable>

# What makes for a habitable planet?

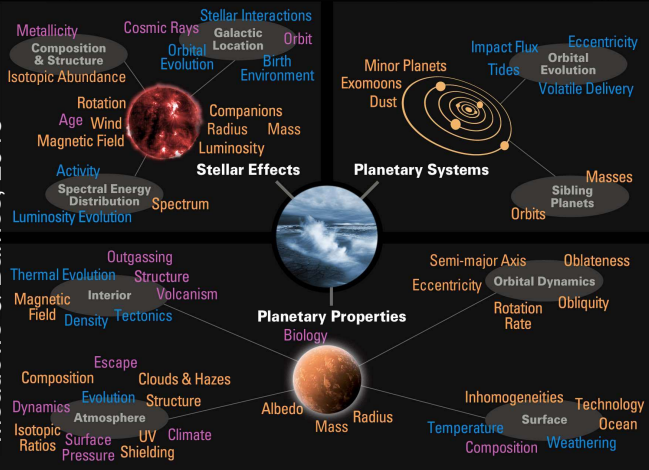


Astronomy  
Astrophysics

Geoscience

Planetary  
Science

Astrobiology



Astronomy  
Astrophysics

Geoscience

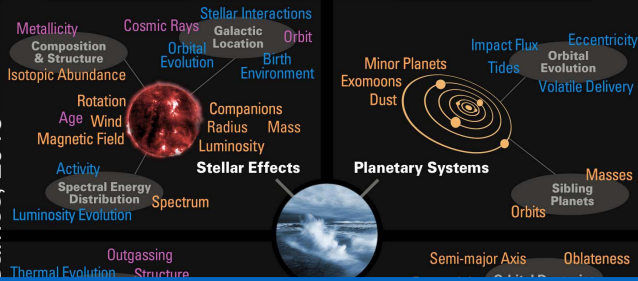
Planetary  
Science

Astrobiology

# Individual Fields have:

- Different definitions  
“Core”
- Different contexts  
Planet Formation
- Different levels of importance for habitability  
Age? Role of tectonics?
- Different levels of feasibility/uncertainties  
Atmosphere/Interior compositions

Barnes, 2018



# Individual Fields have:

- Different definitions

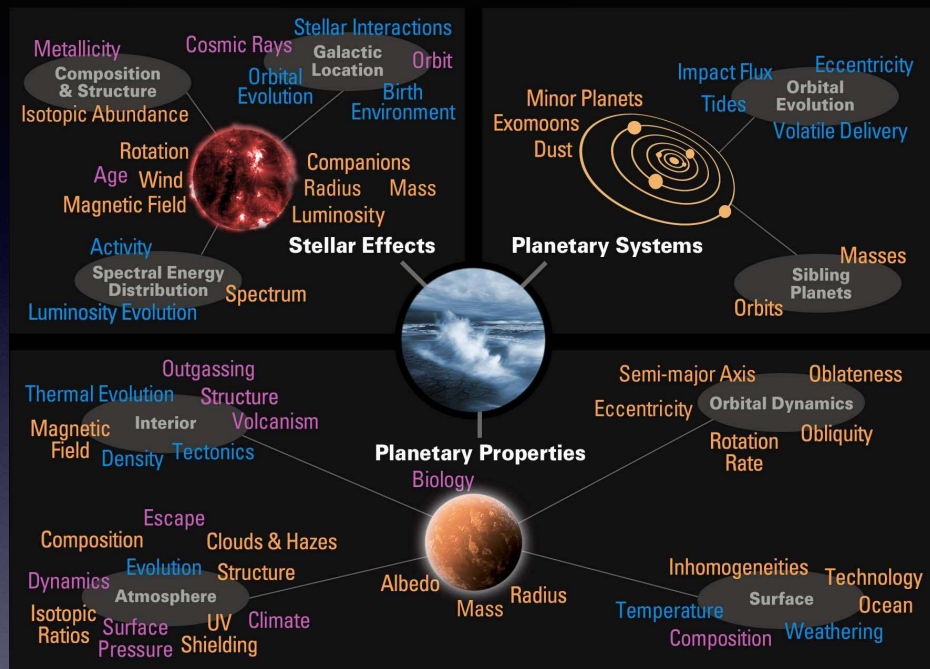
# Can create a language “barrier”

Planetary  
Science

Astrobiology

- Different levels of feasibility/uncertainties  
Atmosphere/Interior compositions

# Form: bit.ly/HabWorld2021Define



How would you define this term for a non-expert? \*

Your answer

Why is this term important for planetary habitability and the detectability of life? \*

Your answer

Which other topics does this term relate to?

- Activity
- Age
- Albedo
- Atmosphere
- Biology

# Definitions: [bit.ly/HabWorlds2021Defs](https://bit.ly/HabWorlds2021Defs)

## Definitions and Concepts (please edit!)

### Activity


#### Abiogenesis

The transition from a mixture of lifeless molecules to life-full entities. A small number of common molecules is at the basis of the cells, which are the starting point of life. This similarity tends to show that lipids, nucleotides and amino acids are mandatory for the outbreak of life. These building blocks of life could have either come from space by meteorites or they could have already been present on the primitive Earth. Amphiphilic compounds, nucleotides and amino acids, were found in different amounts in carbonaceous meteorites, and glycine (the simplest amino acid) is present in very small parts in interstellar dust. Research in prebiotic chemistry has given several plausible explanations for the formation of important biomolecules, such as amino acids and nucleotides, and different chemical approaches have been considered.

#### Age

The age of a star is the time elapsed since it formed. The exact moment of formation is ambiguous, but solar-type stars last for ~10 billion years, and the ambiguity is <~1 million years, and so is of no real consequence.

 **Karan Molaverdik...** ✓ ✕  
1:37 AM Oct 19  
**Add:** "Abiogenesis"

 **Javier Darío Burg...** ✓ ✕  
11:10 AM Oct 22  
**Add:** "The transition from a mixture of lifeless molecules to life-full entities. A small number of common ..."

# Importance to Habitability

Astronomy  
Astrophysics

Planetary  
Science

Geoscience

Astrobiology

Feasibility to generate  
data or model





# Survey



Q1. What is your core area of expertise? (you may select only one)

Earth Science

Astronomy/Astrophysics

Planetary Science

Astrobiology

Other (Please specify)

22 participants  
Completed Survey

13 Astronomers

9 Everyone Else

# Survey

3 Subsequent Questions:

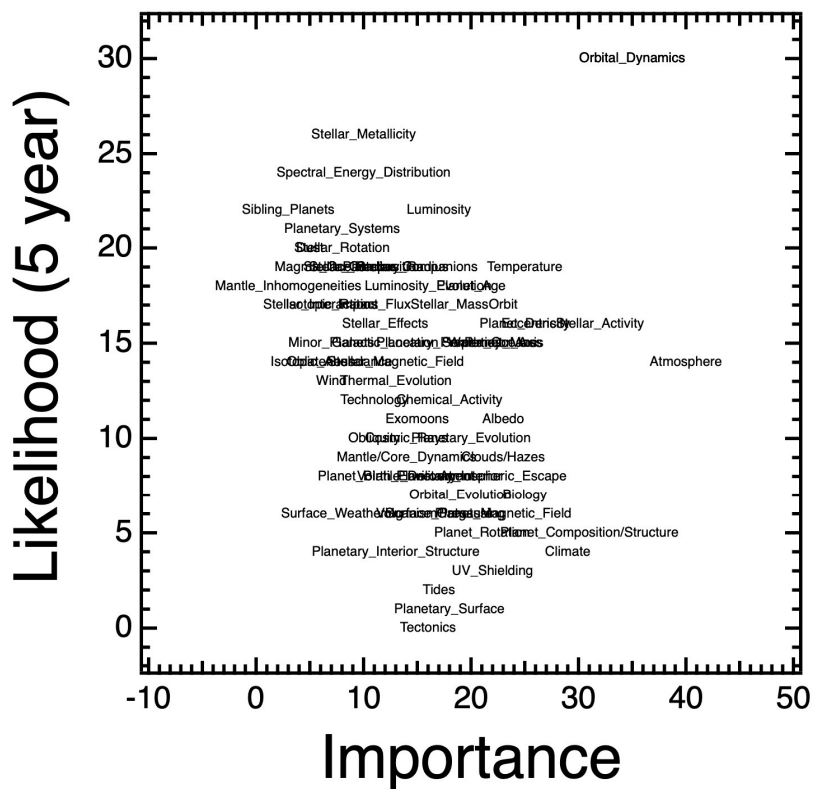
Rate the importance to habitability

Feasibility of acquiring data to assess habitability w/in 5 & 10 years

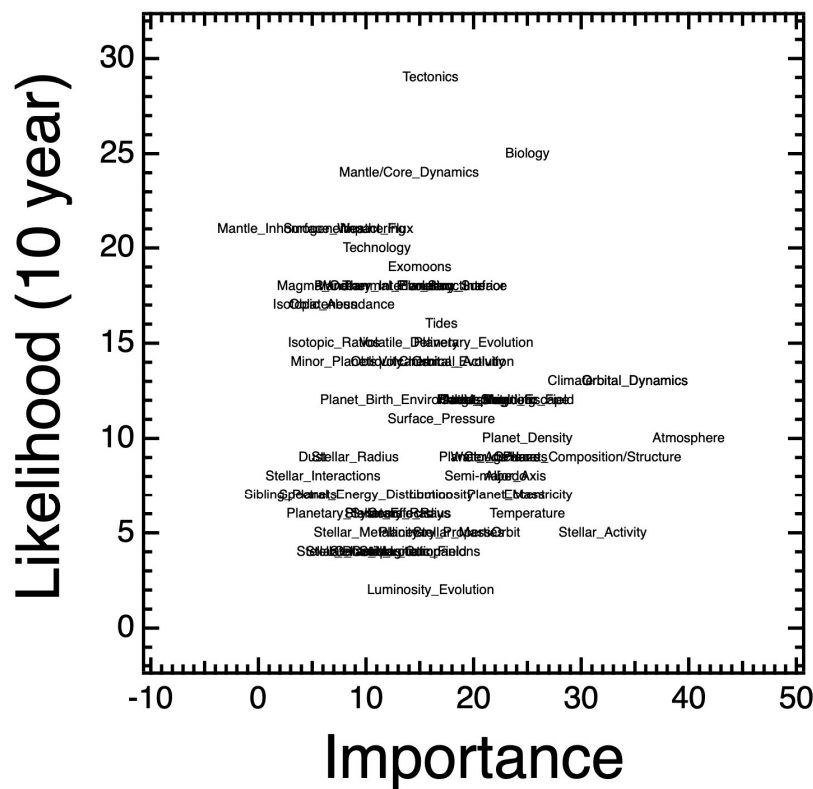
Items	High Impact	Medium Impact	Low Impact	Unsure
Stellar Activity				
Chemical Activity				
Planet Age				
Albedo				
Atmosphere				
Biology				
Planet Birth Environment				

# Results Astronomers

Astronomy/Astrophysics (N = 13)

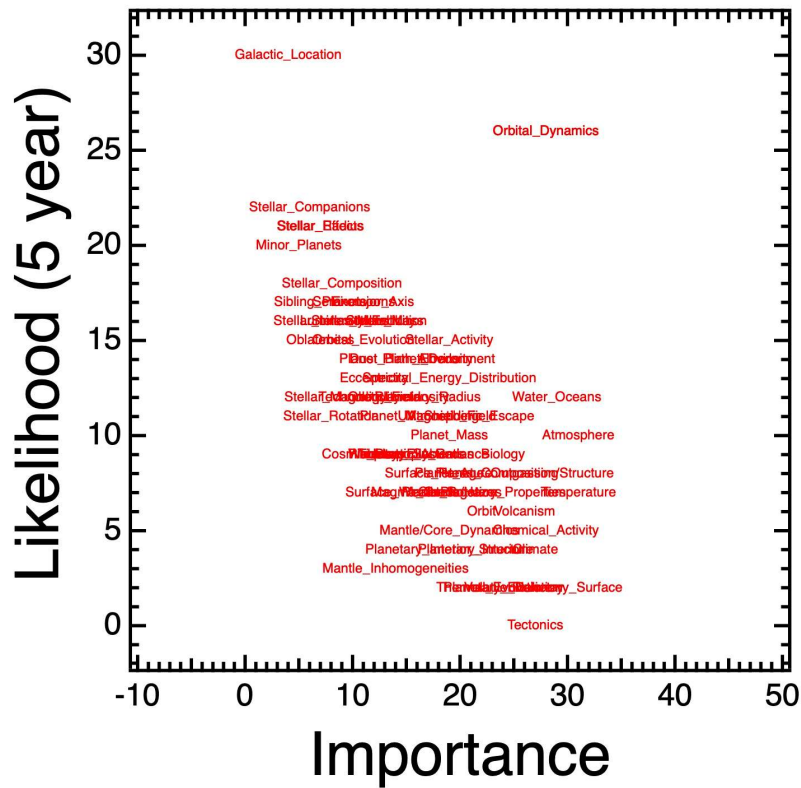


Astronomy/Astrophysics (N = 13)

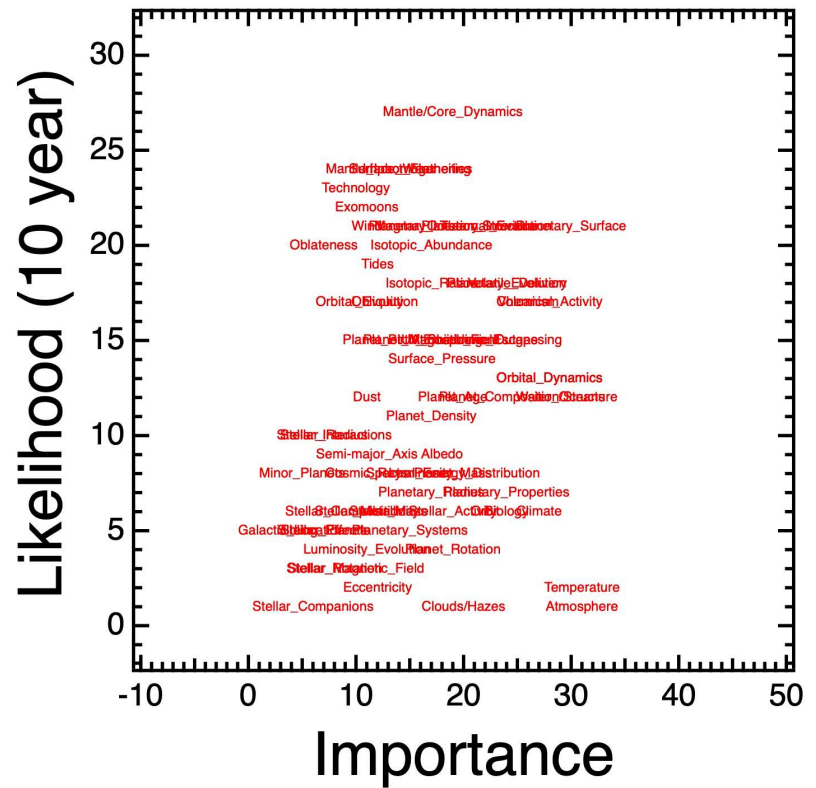


# Results Non-Astronomers

Non Astronomers (N = 9)



Non Astronomers (N = 9)



## Overall Results

- All Fields found these important: **mantle / core dynamics; volatile cycling; and orbital dynamics**
- Important to Astronomy but not to planetary/Earth Science: **stellar activity**
- Important to planetary/Earth scientists but not to astronomers: **tectonics, thermal evolution, and magma oceans**
- Generally agreed on feasibility in 5/10 year timescales w/ exception of “Biology”
  - Astronomers:** VERY feasible in 10 years
  - Non-Astronomers:** Not at all in 10 years

## Next Steps

- Wiki-ify definitions for online distribution
- Repeat survey before and after workshop
- Publish results of survey in the literature