ExoPAG SIG#2: Exoplanet Demographics

Co-Chairs

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&

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ExoPAG 31 Meeting: 11-Jan-2025

SIG#2's Goals: Building on SAG13

SAG13's Goal:

- **Primary:** Evaluate what we currently know about planet occurrence rates, and especially etaEarth, by consolidating, comparing, and reconciling discrepancies between different studies.
- **Secondary:** To establish a standard set of occurrence rates accepted by as much of our community as possible to be used for mission yield estimates for missions to be considered by the [2010] decadal survey.

SAG13 Final Report

SIG#2 Foundational Goal:

"To extend the SAG#13 work over a wider parameter space, by bringing together groups in the community to discuss their cross-technique and cross-population results, and identify work needed to move forward."

SIG#2 Meta-Studies Report

Enabling Exoplanet Demographics Studies with Standardized Exoplanet Survey Meta-Data

- Report completed April 2023 under the leadership of J. Christiansen and M. Meyer
- The report finds that demographics re-analyses or meta-analyses are stymied by the lack of survey meta-data
- It presents a list of data and products to include when publishing exoplanet survey data that would enable other to better utilize their results

Leadership & Logistical Updates

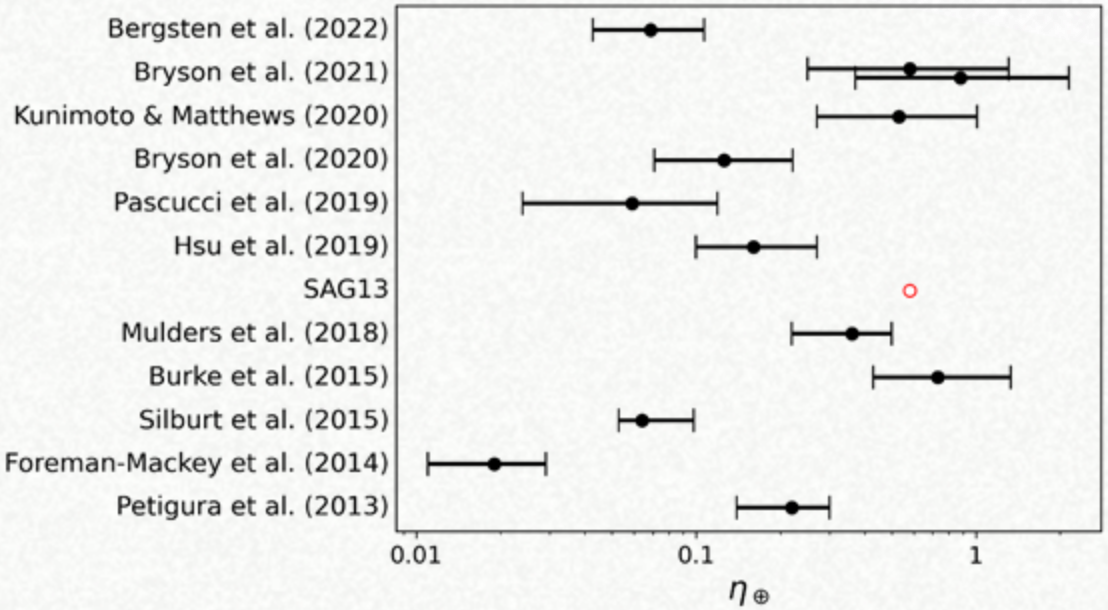
- **June 2023:** R. Fernandes and S. Johnson took over from previous co-chairs J. Christiansen and M. Meyer
  - Jennifer Gregory still keeping the ship righted

- **January 2024:** ExoPAG Executive Committee approved Steering Committee:
  - Natalie Batalha (UCSC)
  - Bertrand Mennesson (JPL)
  - Samuel Quinn (Harvard/CfA)
  - Elisa Quintana (NASA Goddard)

Leadership & Logistical Updates

- Regular meetings on the Second Friday of the Month at 1 pm Eastern time
- Significant recruitment efforts have increased member numbers by 30%
  - Especially focused on recruiting ECRs, which makes up the majority of new members
- Established a short Code of Conduct included in meeting reminder emails focusing on
  - Respectful Communication
  - Active Listening
  - Constructive Critique
  - Harassment-Free Zone
  - Inclusivity
  - Confidentiality
  - Timeliness
  - Tech Etiquette

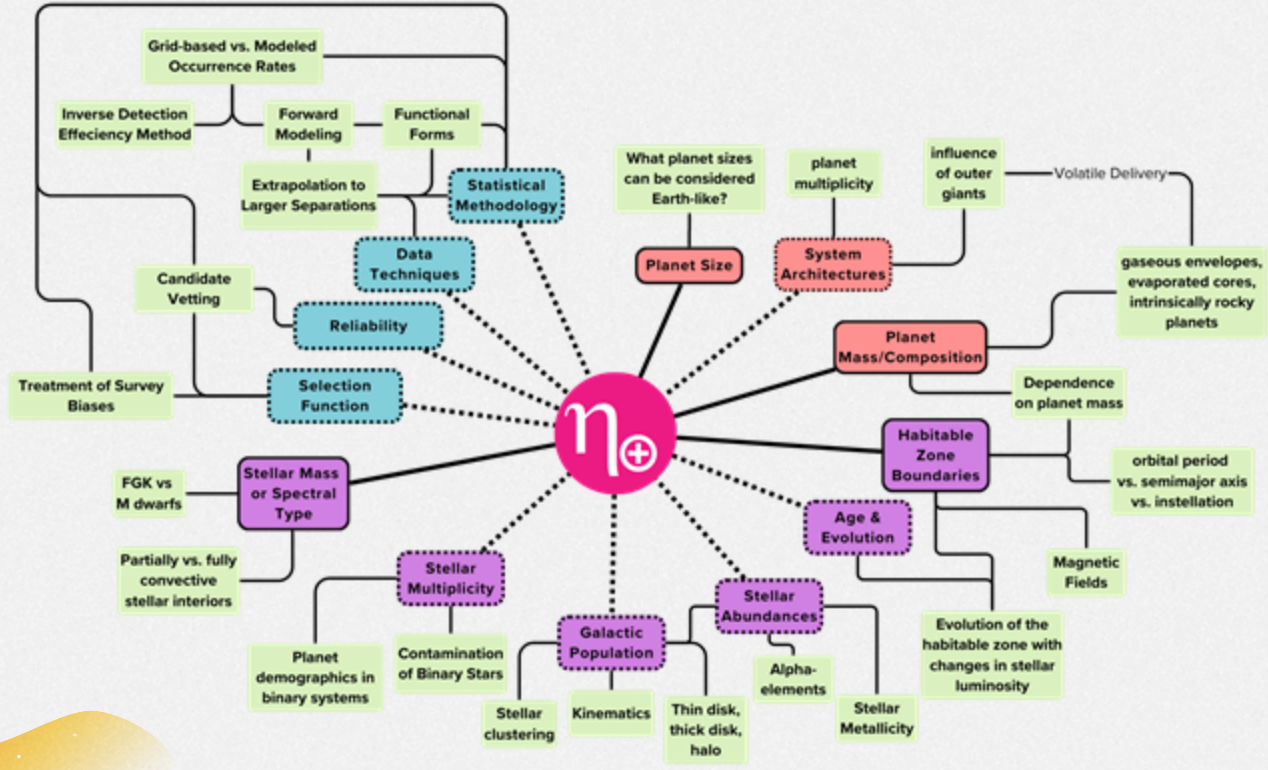
Current Focus: A Review of etaEarth



- We are curating a review of past efforts to determine eta-Earth, and have a first order discussion of how different approaches/assumptions can affect eta-Earth and its error bars
- We don't have the scope to duplicate SAG13, but want to shed some light on the problem

Are We There Yet? Challenges in Quantifying Earth Analogues in the Habitable Zone

Rachel B. Fernandes,[1,2,*] Samson Johnson,[3,†] Galen J. Bergsten,[4] Sakhee Bhure,[5] Kiersten M. Boley,[6,‡] Alan P. Boss,[6] Steve Bryson,[7] Jamie Dietrich,[8] Alison Duck,[9] Steven Giacalone,[10,§] Arvind F. Gupta,[11] Matthias Y. He,[7,†] Michelle Kunimoto,[12] Kristo Ment,[1,2] Gijs D. Mulders,[13] Sheila Sagear,[14] Michele L. Silverstein,[15,¶] Kendall Sullivan,[16] Eliot Halley Vrijmoet,[17,18] Kevin Wagner,[19] and Robert Wilson[20]



Current Focus: A Review of etaEarth

- First sections dedicated to consolidating definitions and summarizing past efforts to measure frequency of Earth-analogs
  - Identify cause of chronological changes and (attempt) to collate results in an “apples-to-apples” comparison

- Latter sections will identify pathways forward
  - Identify sources of systematics that are not fully accounted for
    - E.g., planet multiplicity, stellar multiplicity, stellar metallicity, etc.
  - Future constraints on eta-Earth from different detection techniques
    - How close are each of the detection techniques (current + upcoming missions) to finding Earth and/or placing constraints on eta-Earth

To be submitted May 2025 to AAS Journals

Looking Forward

- White paper highlighting exoplanet demographic opportunities with Roman Space Telescope
- White paper synthesizing exoplanet demographics using multiple detection techniques

If you are interested in joining SIG#2, email us:

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