Exoplanets in Our Backyard
Solar System and Exoplanet Synergies on
Planetary Formation, Evolution, and Habitability

Feb 5-7
2020 Houston, Texas
A joint Assessment Group meeting by VERAG, OPAG, and ExoPAG

The following document enumerates five Findings from the Exoplanets in Our Backyard workshop, conducted February 5-7, 2020 at the Lunar and Planetary Institute. Findings were consolidated from workshop proceedings and feedback by the Organizing Committee for presentation to NASA Headquarters.

Exoplanets in our Backyard Findings

1. Continuing Cross-Divisional Cooperation
The Exoplanets in our Backyard Workshop, as the first-ever inter-AG workshop, successfully brought together Solar System and Exoplanetary scientists from different backgrounds and NASA divisions, engendered new communication, and spurred understanding and new collaboration between intimately related, yet usually separated disciplines. The success of this workshop and the strong cross-community support determined by post-conference survey, has resulted in a new cross-community Slack channel and upcoming AGU special session. This momentum should be carried forward and capitalized upon to promote science and programmatic discussion and partnerships; planetary scientists informing exoplanetary research, modeling and observations, and exoplanetary scientists informing planetary research and missions. The inter-AG, inter-division participation and cooperation of the community and support from NASA headquarters was essential to the meeting’s success and will continue to be so going forward.

2. Enhancing Communication Between Our Communities
Communication between the planetary and exoplanetary communities is essential to scientific progress in both disciplines and needs to be enabled, encouraged, and facilitated. NASA should explicitly support efforts in this direction including soliciting and encouraging review papers from one field targeting the other. To provide a gateway between the communities and enhance quality cross-disciplinary research, additional support is required for communications and documents educating about measurement limitations, guidance on available essential databases and reliability criteria, bridging planetary and exoplanetary models, and the potentials for improvement and modification to serve additional communities. Outlets for supporting this (e.g. the NExSS website) could host a location serving as a resource page for both communities. NASA should encourage and support better open access and archiving of Solar System papers across disciplines. We encourage the planetary science community to post their work to astro-ph.EP (Earth & Planetary Sciences).
3. Inter-Community Participation in NASA Missions
The community supports the development of opportunities for participation by exoplanet scientists in heliophysics, Earth and solar system exploration missions and the corresponding participation of planetary scientists, Earth scientists and heliophysicists in exoplanet-relevant missions. These opportunities are currently exceptional or do not exist, but could include the routine addition of cross-discipline members of Science and Technology Development Teams for mission concept development, and as Participating Scientists on active missions. NASA should enable and normalize cross-disciplinary participating scientist opportunities to provide additional insights into synergistic science for astrophysics and planetary exploration platforms, to greatly enhance the overall science return from NASA missions.

4. Growing the Interdisciplinary Early Career Community
Students and other early career researchers (postdocs, post bacs) were essential to the success of the meeting (representing 40% of submitted abstracts) and are vital to the future success and growth of the cross-disciplinary community fostered by Exoplanets in our Backyard. Through generous funding from both NASA’s Planetary Science Division and the Astrophysics Division’s Exoplanets Exploration Office, Exoplanets in our Backyard was able to provide travel grants to 26 students and early career scientists. Growing a community of scientists who learn to participate in interdisciplinary, cross-divisional research in early stages of their careers will help establish the power of interdisciplinary research as a norm rather than the exception in the future. Involvement of the student and early career community in future interdisciplinary meetings such as Exoplanets in our Backyard should be supported by NASA to foster the next generation of interdisciplinary scientists.

5. Cross-Divisional Research Opportunities
The Exoplanets in our Backyard Workshop identified several avenues for ongoing research cooperation. We encourage NASA cross-divisional R&A support to fill the following planetary/exoplanetary research gaps:

i. Supporting and connecting laboratory research with the observing communities (solar system and exoplanetary) through study of fundamentals and basic research (e.g. equations of state for H2O, He, H, and mixtures, atmospheric dynamics experiments, thermal experiments, molecular opacities, optical constants, aerosol properties, etc.).

ii. Supporting comparative planetology research with modeling and data analysis efforts by e.g., improving fidelity, complexity, and parameter space in solar system/planetary models (atmosphere, thermal, surface, interior, processes and evolution, star/planet interaction, etc.) and encouraging cross-community comparison of models and data.

iii. Supporting improved understanding of the characteristics of planetary host stars including our Sun, and star-planet interactions, e.g., stellar system metallicity, age, atmospheric escape processes, planetary and stellar magnetic fields, etc.
The Exoplanets in Our Backyard Organizing Committee and Conveners comprised:

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