ExoPAG 27 Business Meeting Discussion Jan. 8, 2023

The meeting included two structured discussions on topics proposed by community members via the online ExoPAG *Suggestion* form. Both discussions were moderated by ExoPAG members.

Summary of Exopag discussion on open science policy

The ExoPAG 27 business meeting discussion included an open forum to comment on NASA's open access initiative. Jason Wright gave a presentation to motivate the discussion, beginning by summarizing support, and including concerns reported to him by community members. The full presentation can be found here:
https://drive.google.com/drive/folders/1fDJp-fT61-eq3tVBCz9k9oqfTH6dvAGB
A period of community input followed, which is summarized below.

An opening discussion topic was the question of zero-proprietary periods for survey data, which is broadly useful to the community, and may be less controversial than for targeted observations. However, one scientist who worked on a major survey telescope noted that their data had a delayed release due to the challenge of correcting for systematics, and an early release of raw (or partially corrected) data could be harmful due to the opportunity costs of scientists working with uncorrected data. Another community member stated that something similar had just happened for JWST, where several of the flux corrections were updated recently and could potentially invalidate early-release science results. Another member, on a science team working on such data, testified how challenging it was to work under the early-release (eg, zero proprietary period) conditions, as there was a rapid release of data without the appropriate calibration files.

A junior scientist noted a potential hazard for graduate students working for unscrupulous advisors–a particular example was given of an advisor giving data to a graduate student to analyze and publish without context that the data was zero-proprietary period from another PI's proposal. Such actions could violate community norms and the graduate student–in a position of minimal power to say no, or with limited knowledge of these community norms–-could suffer career harm. Another junior scientist pointed out the particular controversy surrounding the discovery of Haumea, which could have resulted from a zero proprietary period as well.

A member pointed out that many proposals were awarded to observe an intermediate number of objects, but the most compelling science results are from a smaller subsets of such objects. A zero proprietary period would create an incentive for competing groups to analyze the most compelling objects–which, all things being equal, would take less time than analyzing the full dataset–and publish these results before the PI's delivered the full analysis.

Two members of the radial velocity community discussed how radial velocity results took a long time to validate, and without proprietary periods there would be a push to publish without doing

the due diligence that is standard, and viewed by the community as being best for science. Graduate students would also feel long-term impacts from being scooped.

Requests for proprietary periods (eg, as exceptions to the zero-proprietary periods) as a solution were considered by a number of participants. A senior scientist at Keck observatory stated that reducing the proprietary period on Keck from 18 to 12 months had already resulted in a number of requests for extensions from users. Another member noted that even requesting the exception may place an undue burden on the PIs. For example, this could require PIs to disclose information that they may prefer to keep private (eg, change in institution, group staffing, family or health information).

A senior member commented on the underlying motivations for the rules in the TESS mission, which were “what produces the best science?” and “what produces the best new scientists?”, and stated that members of the TESS Follow-up Working Group have bought into these philosophies and policies. More generally, a junior scientist pointed out that the proprietary periods were addressing symptoms, not the underlying problems in research ethics.

A senior scientist agreed that proprietary periods were “band-aids,” and commented that they felt a lot of the discussion was fear-based, and there was some obsession with being first, whereas when considering Kepler, “who was first” is not really remembered. The scientist asked that the community look at the NIH standards of conduct for ethical research, and that it may be worth implementing similar practices and policies. Additionally, they suggested equitable treatment includes considering proposers who did not get selected and those who might not have had the ability to propose in the first place.

Another senior member amplified the previous commenter’s points, and added that there were senior people in the room who can use other measuring sticks - e.g. tenure decisions - to address these problems, beyond just NASA policies. However, other senior scientists pointed out that professional standards developed in the US, including those from AAS, do not have control over international standards, the case of Haumea discussed above illustrating the point. Finally, it was pointed out that proprietary periods, if not too long, are also a useful incentive to carry out the proposed research and communicate the results in a timely manner.

Summary of Exopag discussion on Biosignature Assessment standards

A discussion of Biosignature assessment standards was led by Dr. Shawn Domagal-Goldman of NASA. A future workshop on public communication on life detection will come up, but was beyond the scope of the discussion. People interested in contributing to these decisions through NEXSS (https://nexss.info/about/about-nexss/) were urged to contact Shawn.

The overarching discussion was motivated by the question of what the community was going to do in the case of biosignature detections by Habitable Worlds Observatory, and also potentially JWST. The framework outlined by the discussion leader was:

1. Have you detected an authentic signal?
2. Have you adequately identified the signal?
3. Are there abiotic sources for your detection?
4. Is it likely that life would produce this expression in this environment?
5. Are there independent lines of evidence for biological and nonbiological causes of the signal?

Making a publication checking off 1 or 2 of these is great, you don't need to check off all the boxes.

An audience discussion followed, with the following points raised and summarized below:

First, a community member noted that the answers to these questions should not be confined to the exoplanet community–chemists, biologists, etc should also be involved.

Another question that was raised was whether this was only related to HWO or was community wide. The answer from the discussion leader was that the most pressing issues are related to HWO, but the larger community standards are needed as well. An exoplanet community standardized document outlining metrics and guidelines for biosignature detection would be the output. Astrobiology has set the standard for the time being, but we need standards now for JWST and HWO.

Another commenter gave the example of the phosphine detection on Venus, which was claimed to be of potentially biogenic origin. It appeared to the commenter that the standards the discovery team followed were close to the framework outlined in the previous motivating questions, where they felt they detected an authentic signal that was adequately identified, ruled out known abiotic sources, discussed possibilities of life in the upper atmosphere of the planet, etc. Yet a lot of skepticism follows big claims.

Another senior scientist pointed out the difference between validations and confirmations when it came to exoplanet detections. Were there any lessons that could apply to biosignature detections? The discussion leader said that was part of developing the framework. Best practices and recommendations were a good idea.

Finally, a community member pointed out that as the guidelines were described, it appeared there was an underlying assumption of individual molecules as biosignatures, even though in every known case, life operated in an ecosystem, metabolisms change depending on the environmental conditions, and thus biosignatures would be different. The commenter believed the set of discussion points was a great beginning, but cautioned against setting rigid rules in place too early, as there wouldn't be a "one size fits all" standard–it would depend on the planetary target. The discussion leader responded that the hope was that the framework was generic enough to cover these things and would be discussed with the working group going forward.