

14 October, 2022

**TO:** Venus Science Community  
**FROM:** VEXAG Steering Committee\*  
**SUBJECT:** NASA R&A Advisory White Paper

*Executive Summary: The low number of funded Venus R&A projects does not appear to be due to under-selection. Selection rates for Venus proposals in NASA R&A programs are on par with or better than overall program selection rates, indicating that Venus topics are currently under-proposed.*

As we enter a multi-decadal period within which new Venus missions are expected to provide exciting new opportunities for enhanced exploration, it behooves us as a community to assess existing avenues to fund our research activities beyond the scope of the funds provided to the mission teams. While funding can come from sources other than NASA (e.g., NSF, private institutions), we focus here upon six NASA R&A programs<sup>†</sup> that have a history or programmatic possibility of supporting Venus-focused research efforts (note that this is by no means an exhaustive list). The key take away is that most of these programs are “under-proposed” by the Venus community at present. Indeed, **Table 1** reveals that 89% of the Venus research proposals being considered here (109 of 123) were submitted to a single program from 2017-2020. This may simply reflect the subject matter of the proposals; however, for those with a suitable research focus, applying to programs currently less utilized by the Venus community is worth careful consideration.

A quick review of Table 1 is encouraging, revealing that the two top targets for proposal submission, SSO and SSW, consistently yielded higher funding rates for Venus proposals over the four year period than the norm for each program overall. The data for SSW are particularly encouraging as on the order of 10% of the proposals each year focused on Venus research, of which ~20-35% (~7 proposals per year) were typically funded. The statistics for SSO are better than SSW, but it is important to note that only 2-3 Venus research proposals were funded by this program each year. The other four programs had even fewer Venus submissions, and thus suffer even more from small number statistics.

A logical question would be “If Venus proposals are funded well via SSW, why apply elsewhere?” The answer to this question is complex, because for some topical areas SSW may be the only appropriate program to target. A simplistic way of thinking about this is that 75-80% of Venus proposals submitted to SSW do *not* receive funding at present. Put another way, looking at the programmatic funding rates for SSW, as the total number of Venus proposals increases in years ahead—a trajectory that seems reasonable to anticipate as new missions ramp up and come online and new Venus data become available—success rates will decline in response to the enhanced

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† The six NASA programs are: **EXO** (Exobiology), **EW** (Emerging Worlds), **HW** (Habitable Worlds), **XRP** (Exoplanet Research Program), **SSO** (Solar System Observations) and **SSW** (Solar System Workings).

pressure on SSW unless the total number of proposals received by the program overall remains steady or funding for the program is increased (e.g. recommendation from NAS Origins, Worlds and Life Planetary Decadal Survey 2023-2032, p17-22).

Program	Year	Program, # submissions	Venus, # submissions	Program, % selection	Venus, % selection
EXO	2017	150	0	20	-
EXO	2018	156	0	15	-
EXO	2019	159	0	11	-
EXO	2020	156	0	15	-
EW	2017	128	0	24	-
EW	2018	111	1	26	100
EW	2019	101	2	20	0
EW	2020	125	1	16	0
HW	2017	46	3	11	33
HW	2018	60	2	17	0
HW	2019	65	2	11	0
HW	2020	71	1	10	0
XRP	2017	113	0	14	-
XRP	2018	117	0	14	-
XRP	2019	139	2	13	0
XRP	2020	153	0	17	-
SSO	2017	71	2	28	50
SSO	2018	66	3	15	33
SSO	2019	49	3	18	67
SSO	2020	47	2	23	50
SSW	2017	365	29	20	34
SSW	2018	337	31	22	26
SSW	2019	374	32	11	19
SSW	2020	253	17	18	18

**Table 1.** Total number of proposals and % selection rate per program, by year, compared with total number of Venus proposals submitted and % selection rate for these per program, by year. Dark gray cell shading indicates Venus % funding success rate matched or exceeded program % success rate.

Program acronyms: **EXO** (Exobiology), **EW** (Emerging Worlds), **HW** (Habitable Worlds), **XRP** (Exoplanet Research Program), **SSO** (Solar System Observations) and **SSW** (Solar System Workings).

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Assuming the snapshot of data in Table 1 holds and is representative, the Venus community can continue to send the vast majority of its research proposals to SSW and simply accept that only a handful—currently on the order of <20% per year—are likely to be funded barring significant changes to existing funding infrastructure. Alternatively, those whose research is suitable could explore submitting instead to the other NASA programs listed, thereby expanding the opportunities for Venus proposals to receive funding. Looking at the data it is clear that these would be uncharted waters initially because so few Venus proposals have been submitted to most other programs that patterns are difficult to assess, but three of the programs—EXO, EW and SSO—have overall funding rates comparable to or better than SSW. This suggests that greater Venus proposal submission rates to these three programs have the potential to yield success rates comparable to what Venus proposals have enjoyed at SSW. Put simply, this means that a greater percentage of the total pool of Venus proposals submitted each year could be funded if the concentration of proposals in SSW is diluted in favor of submission to several other NASA programs. Recent R&A status reports from NASA indicate that the burden of late fulfillment of past selections is easing, which may allow increased selection rates in this and coming years.

It is important to note as well that if more proposals are submitted to any given program then the associated NASA Program Officers will have increasing reason to add capable Venus researchers to their review panels. Having Venus researchers on more different program panels gives the Venus community a broader voice and can help ensure that each program has the expertise in place needed to identify and fund strong Venus proposals—something that may not occur when proposal submission numbers fall below some minimum threshold. The possibility of more Venus proposals also creates the opportunity and need for Venus community members to *be* reviewers. If we want our proposals to receive adequate evaluations, we need to lend our own expertise in evaluating other proposals (when we are not conflicted) in an informed manner.

Choosing where to submit a Venus proposal for NASA R&A funding depends primarily on its science goals, and for that reason SSW may well remain the primary target in the coming years unless a Venus Data Analysis Program (VDAP) is at some stage initiated in response to the influx of new mission data. However, for reasons articulated above, careful examination of other programs listed within NASA’s Research Opportunities in Space and Earth Science (ROSES) solicitation is worth considering in the coming years. As a starting point, Table 2 provides brief descriptions of six NASA R&A programs and potential examples of how a Venus proposal could fit into each.

Program	Description & Venus Connection
EXO Exobiology	EXO funds research centered on the origin and early evolution of life, the potential of life to adapt to different environments, and the implications for life elsewhere. Laboratory, theoretical, and related data analysis studies are considered. This could include studies of the formation of prebiotic organic molecules in Venus environments as a way to understand early life processes, and/or the formation, preservation, and potential for characterization of biosignatures in Venus environments. EXO is currently a No-Due-Date program within the Planetary Science Division (PSD).
EW Emerging Worlds	EW supports research on the formation and early evolution of our Solar System (e.g., onset of molecular cloud collapse, accretion of Solar System bodies) through observational, laboratory, modeling, theoretical, data analysis, and sample-based studies. Such investigations that use studies of Venus to improve understanding of the formation and/or early evolution of our overall Solar System are applicable. EW is currently a No-Due-Date program within the Planetary Science Division.
HW Habitable Worlds	HW accepts theoretical and experimental proposals that improve understanding of the processes and conditions that create and maintain habitable environments, search for ancient and contemporary habitable environments, and explore the possibility of extant life beyond the Earth. In particular, investigations that assess the history of habitability on Venus would be applicable. HW has mandatory Step-1 proposals, which are typically due in early November. HW is a Cross-Divisional ROSES call.
XRP Exoplanet Research Program	XRP funds observational, data analysis, laboratory, modeling, and theoretical research focused on improving understanding of exoplanets and exoplanet formation. This could include studies that use Venus as an exoplanet analogue (i.e., comparative planetology) or that otherwise use Venus to help better understand exoplanets and their formation. XRP is a cross-Divisional program (Planetary, Astrophysics, Earth Science, and Heliophysics Divisions) and proposals must facilitate the interpretation of NASA space missions' data and/or lead to predictions that can be tested with NASA space mission observations. XRP has mandatory Step-1 proposals, which are typically due in late March. XRP is a Cross-Divisional research call.
SSO Solar System Observations	SSO supports planetary science investigations that use primarily Earth-based observations, both new and archival, of bodies in our Solar System, including Venus. SSO is currently a No-Due-Date program within PSD and submitted proposals must be relevant to the strategic objectives of the Planetary Science Division, which can be found in the latest Decadal Survey and NASA Strategic Plan.
SSW Solar System Workings	SSW accepts a broad range of planetary science investigations (including observational, theoretical, modeling, laboratory, sample-based, analog, and field studies) that are not better suited to more specific programs like those described above. Eligible SSW proposals could cover research into the atmospheric, climatological, dynamical, geologic, geophysical and geochemical processes occurring on and affecting the surface, interior, atmosphere, exosphere, and/or magnetosphere of Venus. SSW also welcomes comparative planetology studies. SSW is currently a No-Due-Date program within the Planetary Science Division.

**Table 2.** Abbreviated descriptions intended to help highlight the connections between the six NASA programs listed and some of their potential connections to Venus research as of the date this document was prepared. *To assess suitability in detail, researchers are strongly advised to carefully review the scope clarifications and exclusions of each program element in the most recent ROSES announcement of funding opportunities, cf. <https://science.nasa.gov/researchers/sara/grant-solicitations>, and to reach out to the designated NASA Program Officer point of contact to discuss eligibility.* All current and past NSPIRES solicitations can also be found here: <https://nspires.nasaprs.com/external/solicitations/solicitations!init.do>.

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