

## FINDINGS 2019

1. NASA is currently considering support of U.S. scientists and instruments for international missions, including Venera-D, EnVision, and the ISRO Venus mission. VEXAG is concerned that such financial support may come at the cost of compromising or detracting from U.S.-led technology development, research, and/or mission selection. **VEXAG urges NASA to carefully evaluate U.S. funding commitments to international missions, and to prioritize U.S.-led missions. VEXAG and the entire Venus community ask to be kept informed as commitments to international partners are considered and selected.**
2. Both Venus- and Earth-gravity assist trajectories (e.g., Lucy and one of the proposed Dragonfly trajectories) enable low-delta- $V$  transfers to Venus. In light of the recent selection of missions that (may) use a Venus gravity assist, **VEXAG requests that ride-along opportunities for those launches be prioritized for competed small Venus spacecraft, as long as those opportunities do not compromise selection of U.S.-led Discovery, New Frontiers, or Flagship missions to Venus.**
3. The National Academies Midterm Report recommended balance across the Solar System and among mission classes, which has not been fully achieved. VEXAG endorses this finding and supports programmatic balance among mission selections. **VEXAG requests that NASA take steps to ensure that the mission balance, cadence, and schedule as proposed in the current Decadal Report are maintained.**
4. The HOTTech program has been both cohesively organized and highly successful. It should be continued, with increased support and with emphasis on integration so that its technologies can be infused into missions. Support from the MATISSE and PICASSO programs also provide essential pathways for bringing the next generation of instruments and technologies on line for Venus exploration. **VEXAG requests that NASA renew HOTTech, and provide additional funding to increase the selection rates for MATISSE and PICASSO.**
5. Recently developed entry technologies like HEEET and ADEPT are critical for Venus and other hostile environment exploration. In the current absence of a program of spacecraft exploration of Venus, VEXAG is concerned that the expertise and manufacturing capabilities for these technologies may evaporate. **VEXAG requests that NASA take steps to ensure that such high-energy entry capabilities be fostered and maintained over time.**
6. The problem of providing long-term power to Venus surface assets has been studied extensively (including that in the Venus Surface Platform Study). However, there is still no clear long-term solution (other than radioisotope/nuclear power) for providing months or more of power for mobility and/or temperature control. This capability will be needed to answer key science questions (see the VEXAG GOI). **Given that the development of such capability is expected to take a decade at least, VEXAG encourages NASA to restart the assessment and development of long-duration power systems for Venus surface applications.**

7. Attendance and participation at AG meetings are critically important in fostering a cohesive and collegial Venus research community and building collaborative research across institutions. However, the lack of a current U.S. Venus mission and the relatively small numbers of Venus R&A PIs mean that only a subset of the community is financially able to attend the Venus AG. VEXAG functions are significantly limited by an opaque budget and lack of support for critical functions. Examples include:

- a. Lack of on-site support for VEXAG meetings (e.g., coffee, printing of programs, A/V support, registration coordination, venue use fees, field trip costs).
- b. Lack of editorial and printing support for important documents such as the Strategic Plan.
- c. Lack of travel funding for the community as a whole, including mid-career and older scientists to attend AG meetings.
- d. Lack of access to the email list for conference participants for timely dissemination of logistical information, etc.

**VEXAG asks for increased funding to enable increased attendance of scientists to AG meetings. In addition, VEXAG asks for open reporting of all AG budgets and establishment of equity across the AGs.**

8. There is a perception that Venus science is underrepresented in R&A funding. It is critical that fundamental and underlying Venus science be supported and developed to enable mission development. **VEXAG asks for detailed statistics and more specifics on proposal submission and selection rates in R&A programs that are related to Venus.**

9. Many fundamental questions about Venus's surface and atmosphere could be addressed by ground-based and suborbital observing campaigns. At present, NASA has only one small program to fund solar system observations (SSO), and no program to support suborbital observations. Venus investigations are starving from a lack of new data that could provide exciting new data streams, such as infrared imaging programs that could surpass the Venus Express mission in spatial resolution. **Augmentation to the SSO budget is needed to support more solar system observations, expanding technology advancement programs to include proposals to develop new capabilities for suborbital and ground-based observatories.**