

VEXAG FEQ 2023 Final January 16, 2024

VEXAG 2023 Report: Findings, Endorsements, and Questions from the 21th Venus Exploration Analysis Group meeting, October 30-31, 2023; “VEXAG 2023 FEQ”
Delivered to NASA on behalf of the Venus Exploration Analysis Group, January 16, 2024.

Introduction

VEXAG has streamlined its annual Findings for greater effectiveness and to provide targeted expressions of community priorities. VEXAG Findings comprise 3 categories, each with a specific purpose:

Findings – These are intended specifically for discussion, input, and action at and with the Planetary Advisory Council (PAC) at the meeting(s) following the VEXAG annual meeting. Findings seek to engage the greater planetary science community for discussion and endorsement, with the intent of obtaining PAC feedback, recognition, and endorsement to NASA. The 2023 Findings were presented in draft form at the November 2023 PAC meeting. Final findings are presented in this document.

Endorsements – These are statements of community support, encouragement, and desire for programs, efforts, and other projects at NASA. Endorsements relay the priorities of the Venus science and technology communities represented by VEXAG.

Questions – These are requests for information or communication from the community to NASA that will help us in our strategic thinking and community efforts. They are directed to individuals or small groups (*e.g.*, the SMD director, the VEXAG liaison, the Cross-AG leadership cohort, etc.) for responses in some small number of months. Questions seek answers that can guide AG and community action.

Within each category, Findings, Endorsements, and Questions are equal in importance; order of presentation does not indicate relative priority.

FINDINGS (2)

R&A Finding:

A **“Precursor Science Investigations – Discovery” (PSI-D) R&A program**, focused on ensuring success of and maximum scientific return from upcoming Discovery missions and the EnVision partnership, is in the interests of the planetary community. PSI-D could focus on any selected Discovery mission stages prior to primary Phase E science, and thus would currently specifically include VERITAS and DAVINCI, possibly EnVision, as well as Psyche and Lucy. Proposals could include laboratory studies, development, modeling, planetary mapping, precursor observations, etc. that could affect, augment, or improve late primary mission phases, and/or extended mission phases and/or enhance specific investigations or mission science goals following the model of Precursor Science Investigations for Europa (PSI-E). Proposals to PSI-D could target missions in phases B through D (or part-way through E until a mission’s primary science phase begins).

In-Situ Technologies Finding:

VEXAG finds that a solar-system-wide push for in-situ exploration technology would enable critical follow-ons to the DAVINCI, VERITAS, and EnVision missions, as well as missions to other planetary environments. A next logical step in Venus exploration is for in-situ observations (in-atmosphere, and on-surface), and we need to continue to support technology that will do this. To this end, we encourage a final **HOTTech (HOTTech 3) program** to focus on maturing important technologies and integration into platforms and systems, and the initiation of a new **“CloudTech” program** for technologies and science instruments for the Venus clouds and other planets.

ENDORSEMENTS (12)

VERITAS: VEXAG urges reinstatement of VERITAS engineering development funds and that a launch date be determined ASAP. A launch in FY29 would help retain JPL radar staff and key VERITAS personnel, support the ongoing work of international partners, reduce technical risk, and deconflict VERITAS and EnVision temporal overlap.

IDEA Needs of the Community:

[Inclusion/Access]: VEXAG endorses the rotation of premier planetary science/technology meetings should among a broader set of locations to increase access to more of the community. This includes meetings such as LPSC, the NASA Technology Showcase, and others.

[Inclusion/Diversity/Equity]: VEXAG also urges NASA to support use of multiple pronouns, both in collecting demographic information and in increasing visibility by posting pronouns on all official NASA websites.

International participation: VEXAG recognizes the value of NASA's continued engagement in international missions to Venus, and encourages NASA to identify specific opportunities for US participation. Successful ongoing collaborations with JAXA (Akatsuki), and ESA (EnVision) serve as a template. EnVision represents both a science and technology partnership, with NASA's contribution of the VenSAR radar system. We encourage similar partnerships with future international missions, e.g. with India/ISRO on its upcoming Venus mission. These future missions also may present opportunities for SmallSat shared launches or ride-alongs.

New Frontiers 5: VEXAG endorses the inclusion of the VISE theme (recommended in OWL) to the next New Frontiers competition by the upcoming committee to be convened to make these choices.

Planetary Mapping: VEXAG endorses the USGS planetary mapping program's statement that Venus quadrangle geologic mapping continues to be important and is needed now for upcoming missions. Geologic mapping provides vital research (and research questions) that can be used to plan and interpret upcoming and future missions. VEXAG has created a Science/Analysis working group to encourage and improve the standing of quad mapping as an ongoing activity in NASA R&A. The USGS should be encouraged to publish Venus maps in a timely fashion.

Earth-based Venus Science: VEXAG endorses support of Venus-analog field campaigns, field and equipment tests, and ground-based as well as balloon & suborbital observations of Venus. This includes ground-based radar facilities (e.g. radar speckle observations), and leveraging cross-division opportunities that can support Venus and non-Venus communities alike.

Laboratory/Fundamental Science: VEXAG endorses lab-based studies and funding opportunities to build and maintain laboratory facilities for Venus-relevant environment simulation to prepare for upcoming missions, and enable further technology maturation.

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Community tests in GEER and the JPL Venus atmosphere chamber with low cost or free access for early career and underrepresented groups are one way to enable this.

Technology Maturation and Maintenance: VEXAG endorses the maturation of Venus-relevant technologies that have not yet completed their development cycle, and maintenance of those that have. An example of the former is the Long Life In-situ Solar System Explorer (LLISSE), currently on the path to an originally intended TRL 6. Examples of the latter are ADEPT and HEEET advanced atmospheric entry systems. VEXAG encourages NASA to consider the potential for contributing maturing technologies such as LLISSE as technology demonstrations on NASA, commercial, or international partner projects.

Student and Early Career Support: VEXAG encourages NASA to continue efforts to support, engage and train/recruit diverse early-stage scientists and engineers in Venus investigations through R&A programs and mission team diversity requirements. This should include calls for guest or participating scientists for the upcoming Venus missions well before launch. NASA should also consider implementing its own equivalent of existing federal early-stage researcher R&A programs such as the NSF CAREER or Young Investigator DoD Awards; open solicitations for early-stage researchers that not require the PI to have previously won an award.

SIMPLEx Opportunities: VEXAG endorses giving high priority to competing and selecting one or more Venus SIMPLEx missions in time to rideshare with DAVINCI and/or VERITAS, provided this has no detrimental impact on the primary mission efforts. DAVINCI, VERITAS, and EnVision could be significantly enhanced by small missions in the SIMPLEx category. Given the high synergy in launch requirements with the selected Venus Discovery missions and NASA's stated preference to have SIMPLEx missions co-destined with the primary target of a given launch, Venus-focused SIMPLEx missions would enable transformative Venus science at low cost and low programmatic risk.

Endorsement of ExMAG IDEA Location Finding: VEXAG endorses ExMAG's recommendation that NASA add a criterion to the site selection process for new facilities (such as the Mars Sample Receiving Project (SRP)'s Mars Sample biohazard facility) that is consistent with the NASA principles of Inclusion, Diversity, Equity, and Accessibility (IDEA). Site selections in locations that are legislatively hostile to already marginalized and underrecognized communities pose risks of losing members from the NASA workforce.

Endorsement of PAC November 2023 Findings: The VEXAG Steering Committee broadly endorses the November 2023 findings of the Planetary Science Advisory Council (<https://smd-cms.nasa.gov/wp-content/uploads/2023/12/pac-findings-nov-2023-final.pdf>). We endorse Findings 1, 3, 4, 5, & 7 and the concomitant recommendations as written, and strongly endorse Finding 6 (Accessibility and Inclusion for NASA-Supported Meetings and Facilities). We endorse Finding 2 (MSR and NASA Budget), but find the recommendations are not conditional enough to address budget concerns.

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QUESTIONS (2)

[To: HQ - Lang] *Strategic Documents*: How will HQ support creation of the Strategic Documents called for by the OWL Decadal through either salary or editorial support or both, and how will AGs access those resources?

[To: Inter-AG Caucus] *Inter-AG Findings support*: What Findings can Multiple AGs Endorse? Will the other AGs support a running document of AG findings, that can be discussed in the caucus and or brought up within AG meetings? Not all AGs need to endorse all Findings, but Findings that do have broad impact across AGs can gain traction and support this way. Similar possibilities for Endorsement level items.

Submitted to NASA and the public by
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