VEXAG 2022 Report: Findings, Endorsements, and Questions from the 20th VEXAG meeting, November 7-9, 2022; "VEXAG 2022 FEQ"
Delivered to NASA on behalf of the Venus Exploration Analysis Group, January 12, 2023.

Introduction
In recognition that previous in years, AG "Findings" have become ponderous and less effective expressions of community priorities, VEXAG has revamped its Findings into 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 2022 Findings were presented in draft form at the December 2022 PAC meeting.

Endorsements - These are statements of community support, encouragement, and desire for programs, efforts, and other projects at NASA.

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 will be directed to individuals (*e.g.,* the SMD director, the VEXAG liaison, etc.) who can hopefully provide responses in some small number of months. Questions are not requests for action, but rather answers that can guide our further actions.

FINDINGS (3)

VERITAS Finding: **VERITAS needs to be launched as soon as possible, without delay.** VEXAG suggests that VERITAS be prioritized over solicitation of new proposals, particularly for the same mission class. If budget is the final barrier, VEXAG encourages NASA to follow the budget exigency list in the OWL Decadal document.

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. 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 science phase begins).

Technology Finding: A new **"CloudTech" R&A program** to focus on aerial/airborne technologies and implementations applicable to multiple planetary targets, in addition to a **HOTTech 3 program**, in an upcoming ROSES cycle would allow focus on maturing important technologies and integration into platforms and systems. Both of these PESTO programs would serve multiple science and technology communities across multiple planetary targets.

ENDORSEMENTS (10)

New Frontiers 5: **VEXAG endorses the restoration of VISE to the New Frontiers 5 Theme list.** Removing VISE from the NF5 call disadvantages proposed Venus missions from valuable feedback in the competitive mission cycles, and hinders identification and resolution of technology gaps for in-situ exploration in the present decade.

New AOs: **VEXAG endorses that currently selected missions not be delayed or down-funded or modified to support new mission calls.**

Owl Decadal Survey: **VEXAG broadly endorses the 2023-2032 Decadal Survey as representative of the planetary and Venus communities' priorities and goals.** Specific VEXAG endorsements include:

> The Decadal recommendation to increase the R and A budget to 10% of the PSD budget.
>
> The Decadal recommended set of action guidelines for NASA to take in times of financial shortfalls
>
> The decadal survey recommended that NASA PSD create a new strategic plan for technology, with a clear mechanism for the AGs etc. to provide their priorities.

Planetary Mapping: VEXAG endorses the USGS planetary mapping program's statement that **Venus quadrangle geologic mapping continues to be important and does not need to wait for upcoming missions to be completed**. Geologic mapping supplies useful research (and research questions) that can be used to plan or interpret upcoming and future missions. VEXAG is creating a Science/Analysis working group to encourage and improve the standing of quad mapping as an ongoing activity in NASA R&A.

Earth-based Venus Science: VEXAG endorses ground-based/balloon/suborbital observations of Venus, including ground-based radar facilities, and **leveraging cross-division opportunities that can support Venus and non-Venus communities alike**.

LLISSE Technology: **VEXAG endorses the completion of development for the Long Life In-situ Solar System Explorer (LLISSE)** as captured in prior VEXAG findings. VEXAG encourages NASA to consider the potential for contributing LLISSE as a technology demonstration on NASA, commercial, or international partner projects to help mature to full capability.

In-Situ Technologies: **VEXAG endorses a push for in-situ exploration technology** as critical follow-ons to the DAVINCI, VERITAS, and EnVision missions. 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.

Human Spaceflight: **VEXAG recognizes the science, programmatic, and cross-divisional value of human missions to Venus** as described in the recent Keck Institute report.

Student and Early Career Support: **VEXAG endorses and encourages NASA efforts to engage and train/recruit diverse early-stage scientists and engineers in Venus investigations through R&A programs and mission involvement**.

Laboratory/Fundamental Science: **VEXAG endorses lab-based studies and funding opportunities to build and maintain laboratory facilities for Venus-relevant environment simulation**.

QUESTIONS (6)

[To: PDART PO] How can PDART augment its mapping priorities to explicitly include planetary mapping, with whatever caveats necessary to enable completion of the Magellan Quadrangle maps under its auspices? What can the community do to encourage/ensure this change, and can it be implemented, or amended into ROSES 2023?

[To: SSW PO] Can SSW include "generalist" or "fundamental research" options in the call's checkboxes for proposals that do not have a specific planetary target(s)? If yes, what can the community do to encourage/ensure this addition, and can it be implemented, or amended into ROSES 2023?

[To: HQ-VesCoor] International Partners – The Australian Space Agency is hot for Venus. How can NASA fold in our colleagues down under? This question is generalizable to other smaller international Agencies.

[To: PESTO PO] We ask for better clarification of the line between (and the areas of overlap) technologies funded through SMD and those funded through STMD that benefit SMD missions/programs. Other divisions also have overlapping technology development, and we ask for better clarification there as well.

[To: SMD & Other Divisions] How can NASA enable and promote cross divisional synergistic SMD opportunities in the R&A programs (*e.g.*, SIMPLEX, APRA/Pioneers).

[To: HQ] How can NASA provide better transparency into Internal Scientist Funding Model (ISFM) projects? A publicly accessible website of programs and objectives would be extremely useful.

Submitted to NASA and the public by
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