



VEXAG Report to PAC November 16, 2021

On behalf of the VEXAG Steering Committee

Darby Dyar (PSI, Mount Holyoke College, UMass Amherst), Chair

VEXAG Steering Committee



Darby Dyar* (PSI, Mount Holyoke College), Chair

Noam Izenberg* (Applied Physics Laboratory), Deputy

Giada Arney* (NASA GSFC), Early-Career Representative

Jeff Balcerski (Ohio Aerospace Institute)

Paul Byrne (North Carolina State University), Early-Career Representative

Candace Gray* (NM State University), Early-Career Representative

Natasha Johnson (NASA GSFC)

Stephen Kane (University of California at Riverside)

Siddarth Krishnamoorthy (JPL) , Early-Career Representative

Pat McGovern (Lunar & Planetary Institute)

Molly McCanta (University of Tennessee Knoxville)

Joseph O'Rourke* (ASU), Early-Career Representative

Sarah Port (NASA Glenn Research Center) , Early-Career Representative

Emilie Royer* (Planetary Science Institute)

Jason Rabinovitch (Stevens Institute of Technology)

Jennifer Whitten (Tulane), Early-Career Representative

Colin Wilson* (University of Oxford)

Megan Ansdell (NASA HQ) ex officio

*term ends 5/1/21 or 7/1/21

Seeking self-nominations for New VEXAG Steering Committee Members

Self-nominations due December 15, 2021

Submit a c.v. and statement of interest to VEXAG Chair (mdyar@psi.edu)

Applicants are encouraged, but not required, to self-identify gender, whether they are from an underrepresented group in STEM, etc.

Evaluation Rubric - to be released with request for self-nominations for transparency

Scoring Criteria (each category has the same scale) (adapted from SBAG template:

- Participation in VEXAG/Venus community organizations (normalized to career stage)
- Understanding of VEXAG
- Desire to Support Community
- Organizational Experience (normalized to career stage)
- Leadership Experience (normalized to career stage)
- Experience in Community Activities (normalized to career stage)

Sums and standard deviations of scores will be calculated for evaluation.

Representation Criteria (considered after scoring is tallied)

Career stage balance (Early: Post-Bacc-10 years Postdoc; Middle 10-20 years Post EC); Advanced (20+ Years Post EC)

Field (Geology, Atmosphere, Interior, and other science fields; Technology & Engineering)

Institution (Academic, NASA Center/Lab, Industry)

Gender – only if self-identified or common knowledge. No guesswork.

Underrepresented group in STEM – only if self-identified or common knowledge. No guesswork.

Scoring Criteria are used to rank-order candidates based on community contribution and potential, establishing an acceptability cutoff based on the needs and community landscape of the current year. Some applicants may become obvious selections based on these scores alone. The balance of selectable candidates are discussed by the SC, aided by the Representation Criteria, to sort among the qualified candidates for membership balance and diversity.

Steering Committee term of service is nominally three years. Selected SC members begin service staggered over the year. Two begin on the committee in January following the December of their acceptance. Two begin in July.

Steering Committee members who must vacate their positions due to circumstances beyond their control, or choose to for other reasons may be replaced by interim selections offered to qualified candidates from the last solicitation, should they still be available, or through an interim solicitation.

Also seeking self-nominations for a new VEXAG Deputy Chair

Self-nominations due December 15, 2021

Submit a c.v. and statement of interest to VEXAG Chair (mdyar@psi.edu)

Deputy Chair duties include:

- Assist Chair in VEXAG functions (represent VEXAG when chair can't)
- Assist leading SC meetings and annual meetings.
- Maintain and update the VEXAG Organizational document (this document) as needed
- Take and disseminate SC meeting minutes

The current VEXAG Chair may consult with HQ personnel, past VEXAG Chairs, and any other planetary science community members in making this decision. Deputy Chairs may be selected from the SC or externally from the community. Because the Deputy Chair is the presumptive next Chair, decisions on the Deputy Chair are also made in consultation with the PSD Director and will be made final no later than February 1. Term of office begins 5/1/22.

VEXAG Three Year Goals as of 2018

- Build a **Venus program!**
 - **Engage the community** to come together with a common vision
 - **Improve communication** within Venus community and among the general public: listserve has >500 members, **media outreach**
 - Open meetings and **public forums**
 - Expand **visibility of Venus science** at conferences and at NASA: Venus papers at DPS/EPSC, GSA, AGU, Exoplanets in Our Backyard
- Provide **support for the Decadal Survey**
 - 3 strategic planning documents, paper submitted to *Space Science Reviews*
 - Dozens of white papers submitted to Decadal Survey
 - VEXAG representation on Venus Decadal Committee (**Paul Byrne**, Chair, **Giada Arney**, **Jennifer Whitten**, **Joe O'Rourke**, Members)

DAVINCI

will explore past and present Venus

Deep Atmosphere Venus Investigation of Noble Gases, Chemistry, and Imaging

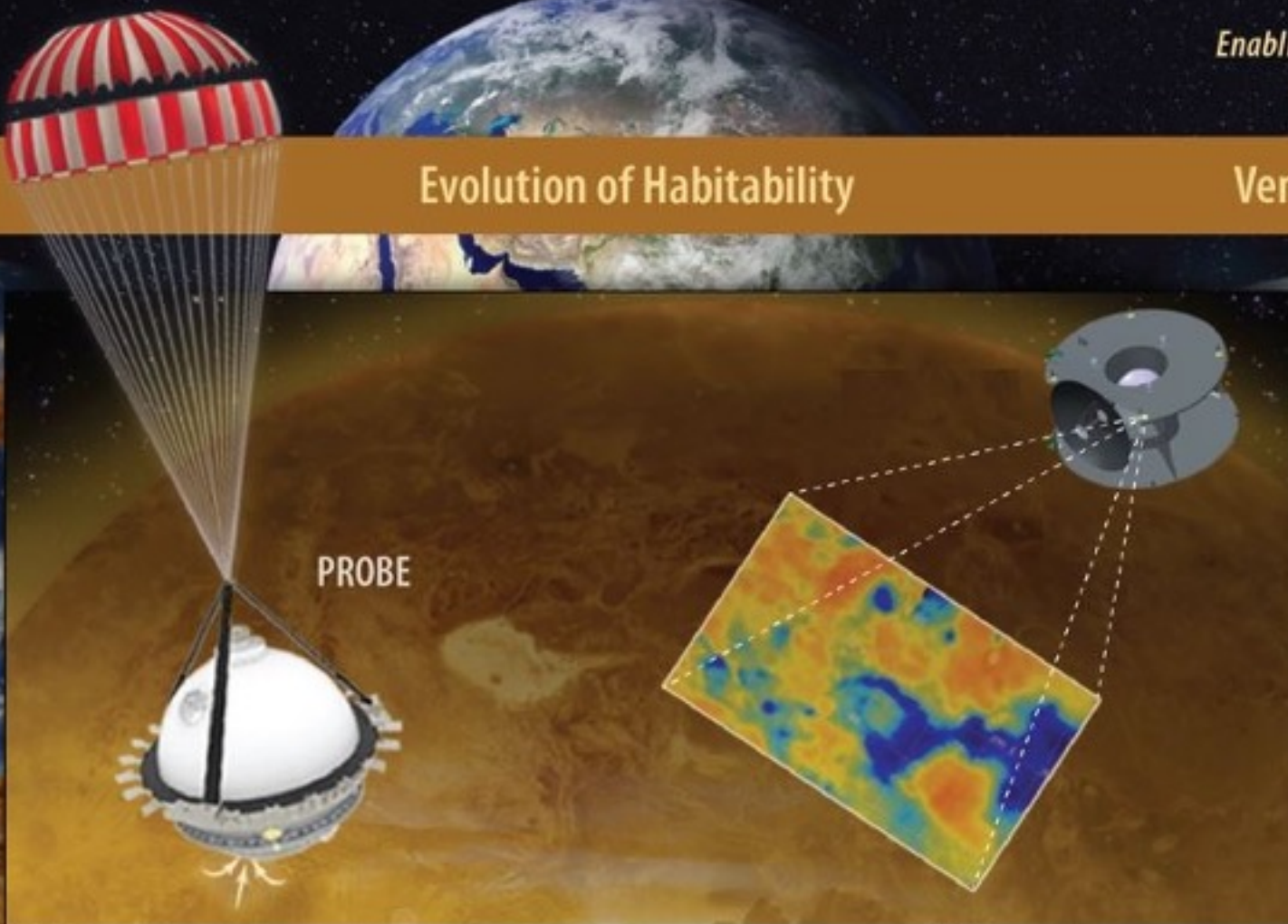
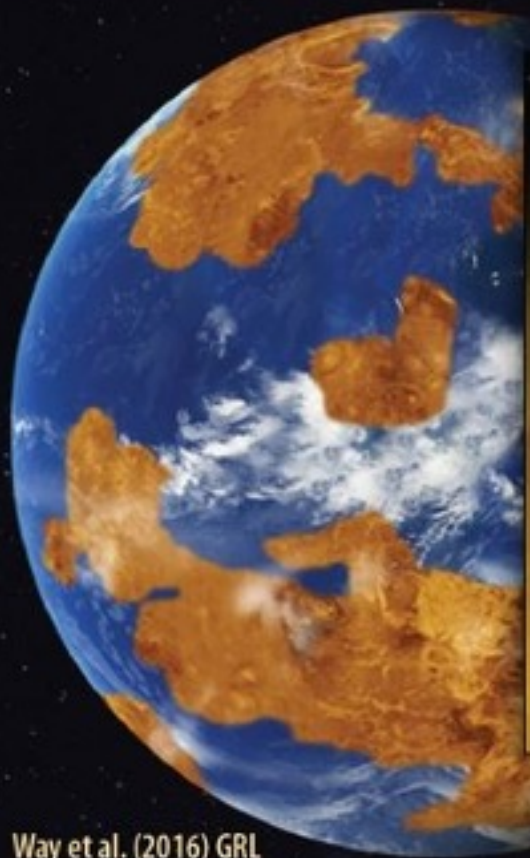
*Establishing Venus' place
in our Solar System*

*Enabling exploration of Venus-like
exoplanets and Earths*

Ancient Oceans on Venus?

Evolution of Habitability

Venus-like Exoplanets



LAUNCHING in 2029



Venus Emissivity, Radio Science, InSAR,
Topography, & Spectroscopy

Science Goals

1 Rocky planet evolution

- 1a igneous rock type, surface-atmosphere interaction
- 1b ancient geologic processes
- 1c volcanic history
- 1d subduction, origins of plate tectonics

2 Active processes

Active and recent volcanism, tectonics?

3 Past and present water

- 3a continents from a wetter past?
- 3b current water outgassing?

Mission Overview

Launch Date: May 2025

Venus Orbit Insertion: Dec 2025

3 years of science operations from orbit

>40 Tb of science data returned

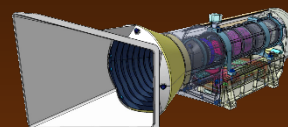
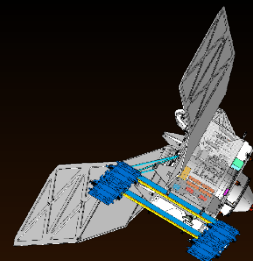
PI: Sue Smrekar, JPL; Managed by JPL

What makes a rocky planet habitable?

*Like Earth, Venus started with all the
building blocks of a habitable world.
How was habitability lost?*

High-Resolution Global Reconnaissance

1. **VISAR** (Venus Interferometric Synthetic Aperture Radar)
 - Highest resolution global topography for terrestrial planets
 - 1st planetary active deformation map
 - Global data sets:
 - Topography: 250 m horiz, 5 m vertical
 - SAR imaging: 30 m
 - Targeted data sets:
 - SAR imaging: 15 m
 - Surface deformation: 1.5 cm vertical
2. **VEM** (Venus Emissivity Mapper)
 - 1st near-global map of igneous rock type, weathering
 - 6 NIR surface bands with robust SNR
 - 8 atmospheric bands for calibration / water vapor
3. **Gravity Science Investigation**
 - 1st global maps of derived elastic thickness & core size



EnVision: Activity-Climate-History



UNDERSTANDING
WHY OUR CLOSEST
NEIGHBOUR IS SO
DIFFERENT

Crust, Lithosphere,
Mantle and Core

Radio Science

Morphology
and Geology

VenSAR

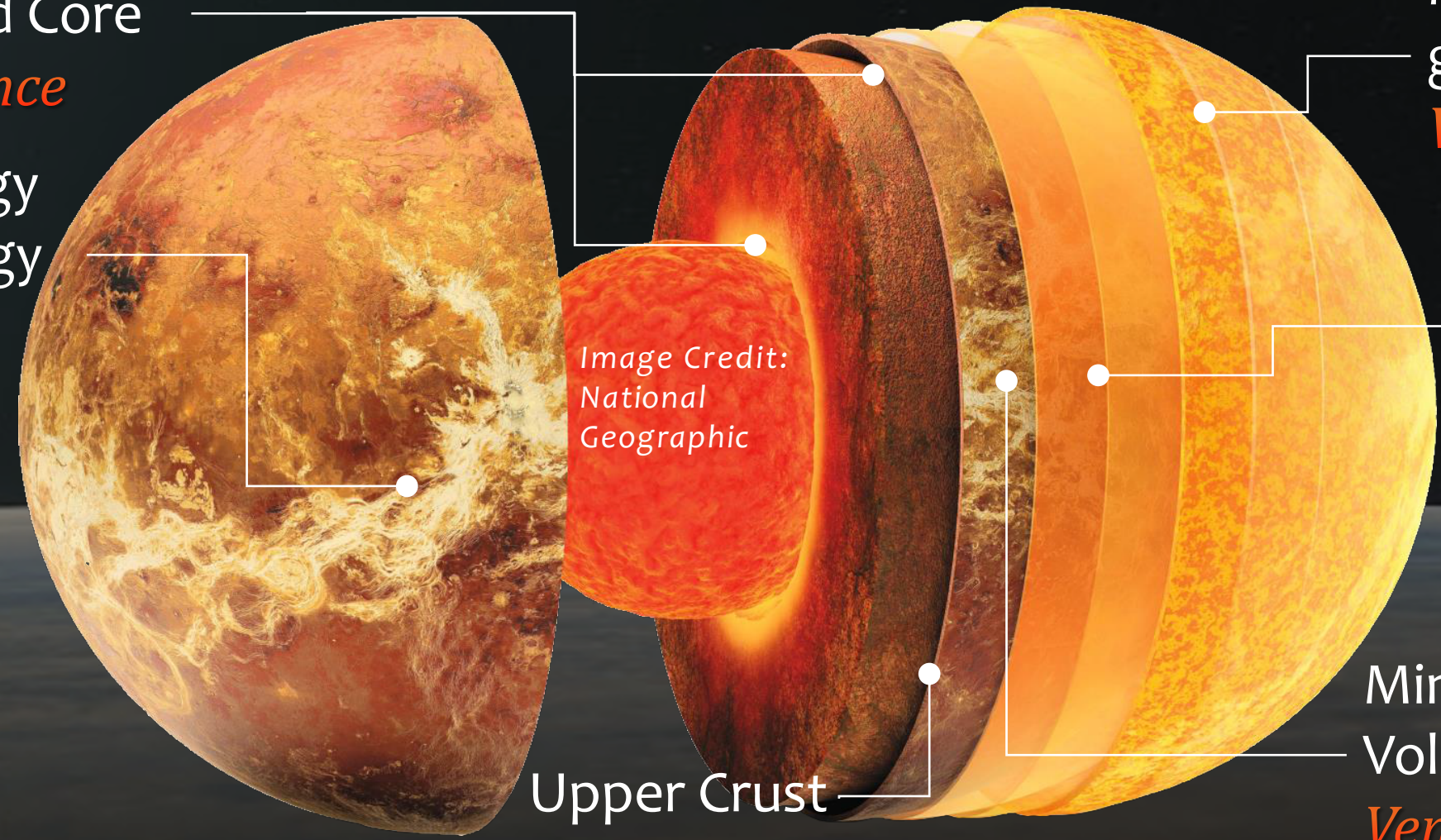


Image Credit:
National
Geographic

Mesospheric
gases

VenSpec-U

Volcanic
gases

VenSpec-H

Mineralogy and
Volcanic Activity

VenSpec-M

Upper Crust

Subsurface Radar Sounder

Specific Activities in 2021

1. Yearly planning structure
2. Governance documents
3. VEXAG Inclusion Diversity, Equity, and Accessibility (IDEA) policy and Code of Conduct
4. Website rebuild
5. Reconfigure Goals, Investigations, and Objectives document to reflect three new mission selections
6. SAW activities

Ongoing Reorganization to Streamline VEXAG Management

VEXAG Monthly Meeting Schedule	
Month	Activities*
January	Review and approve Findings, submit to HQ. Two new SC members begin. SAW membership update
February	Plans for annual interAG meeting
March	Prepare for LPSC
April	Committee updates. Refresh SAW goals. Revise or retire existing SAWs.
May	Committee updates
June	Committee updates
July	Two new members begin. Committee updates. SAW membership update.
August	Plan for annual meeting(s). Committee updates.
September	Plan for annual meeting(s). Committee updates.
October	Review CAPS and PAC presentations from Fall meetings; finalize planning for annual meeting; assign tasks for SC members at meeting
November	Annual meeting in person. Advertise for new members.
December	Review and vote on new Steering Committee members and committee assignment for the coming year. Plan for AGU Town Hall, if any.

*Each month will begin with reports HQ Liaison (if any) and from the standing Study Analysis Workgroups and other current Venus-related bodies.

VEXAG Science and Assessment Workgroups (SAWs)

SAW 1: Organization Documentation

SAW 2: VEXAG 2022

SAW 3: Bi-annual meeting Exoplanets in our Backyard 2

SAW 4: Flyby Opportunities/Exploration Targets - evolved

SAW 5: Venus Science Nuggets

SAW 6: Surface Platform Study – just concluded!

SAW 7: Technology & Laboratory Studies

SAW 8: Outreach

SAW 9: Venus Social Media

SAW 10: VEXAG website update

SAW 11: IDEA: Inclusion Diversity Equity Access

SAW 12: Aerial platforms

SAW 1: VEXAG Organization Documentation

Goal: Codify and simplify regular VEXAG procedures and calendar events to help future iterations of the VEXAG steering committee draw on past experience to plan recurring activities.

Products: A single document with calendars, procedures and recommendations to be updated with experience

Members: Darby Dyar, Noam Izenberg, Colin Wilson

Timeline: Completed for this year; to be reviewed yearly

Status: Complete; Up to date

SAW 2: VEXAG 2022 Meeting

Goal: Prepare for 2022 VEXAG at Caltech (hybrid?)

Products: VEXAG 2022 meeting

Members: VEXAG 2022 Organizing committee: Jim Cutts, Jennifer Jackson, Tim Brice, Natasha Johnson, Tim Brice, Megan Ansdell, and TBD

Timeline: November 7-9, 2022, followed by Exoplanets in our Backyard 2

VEXAG 2022 and 2023 Annual Meetings will be hosted by **Caltech**
2022 will return to 2-1/2 day format with a field trip to Griffith Observatory

SAW 3: VEXAG bi-annual meeting

Exoplanets in our Backyard 2

Goal: Prepare for 2022 VEXAG off-season meeting

Products: The VEXAG off season meeting: Exoplanets in our Backyard 2

Members: VEXAG: Giada Arney, Stephen Kane, Noam Izenberg. The overall leads of EioB 2's organizing committee are Ravi Kopparapu and Stephen Kane.

Timeline: Nov. 10-11, 2022 at Caltech following VEXAG

Status: In progress

SAW 4: Flyby Opportunities and Exploration Targets

Goal: Determine if VEGASO document needs updating or replacement, and update or replace. Review 2014 Exploration Target workshop report in current context and determine if a new workshop is warranted.

Products: Upkeep on VEGASO document. Recommendation(s) for new landing site workshop(s)

Members: Joe O'Rourke, Candace Gray, Emilie Royer, Paul Byrne

Status: Group is evolving to periodic review of new flyby opportunities.

SAW 5: Venus Science Nuggets

Goal: Identify, pursue, and aid creation of Venus Science Nuggets for NASA and VEXAG

Products: 1-slide Venus Science Nuggets

Members: Jenny Whitten and Jason Rabinovich

Timeline: Ongoing, status reports at each SC meeting



Composing Science Nuggets

J.L. Whitten and J. Rabinovich



Venus Exploration Analysis Group Science Nugget

Preparing Your Nugget Slide

- VEXAG Nugget Officers are scanning the literature and do our best to contact authors of NASA-funded Venus-related publications.
 - We will coordinate with you and send your Nugget to NASA.
 - If you don't hear from us, please create your own Nugget or contact us (jwhitten1@tulane.edu, mcgovern@lpi.usra.edu). The more Venus Nuggets the better!
 - NASA POC: Lindsay Hays (Lindsay.hays@nasa.gov)
 - Nuggets are being accepting again (there was a pause earlier this year).

- This template can be found on the VEXAG website:

https://www.lpi.usra.edu/vexag/reports/science_nuggets/Nugget-Template-2016.pptx

- Font size should be no smaller than 14 (website link ^ is too small)
- Use bullet points if possible
- Extend and add boxes as needed

Figures and Text Box 2

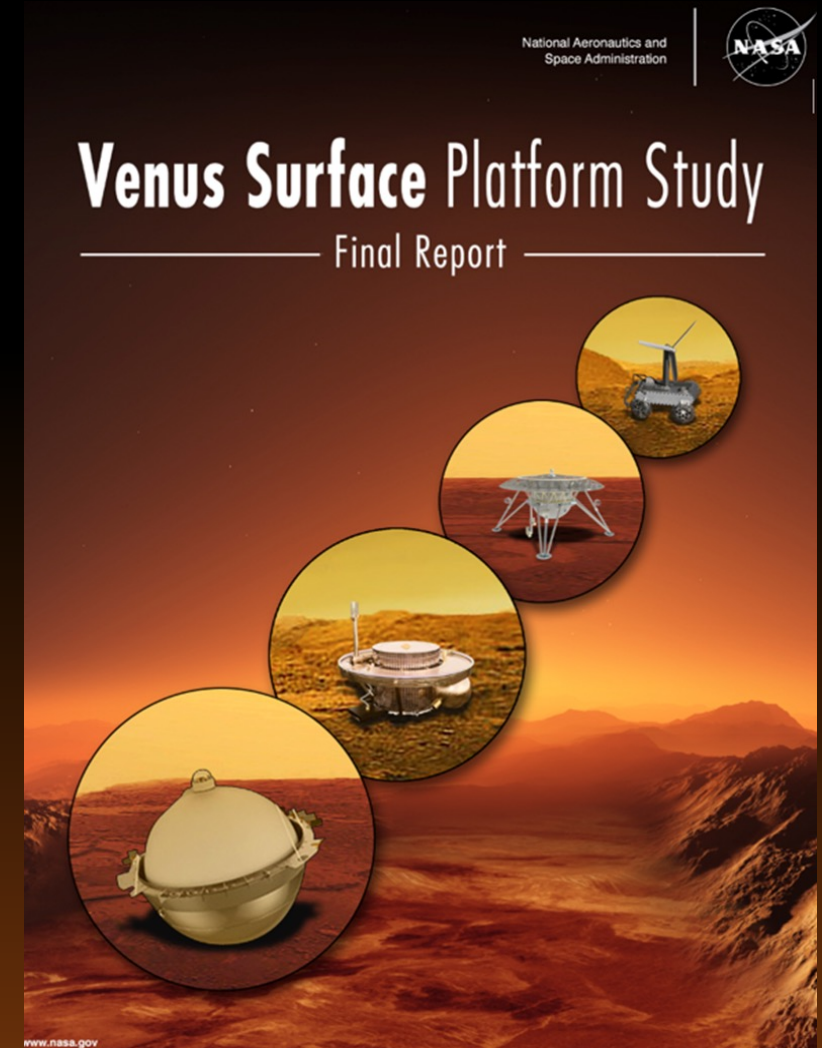
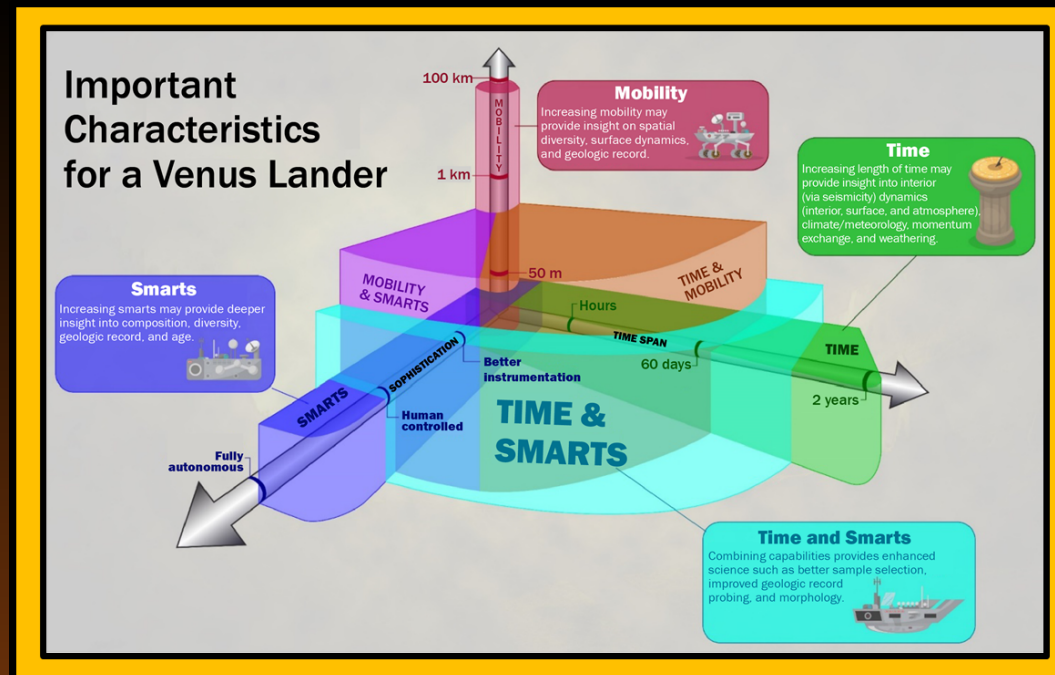
Why We Care Statement

Publication and Citations Here

SAW 6: Venus Surface Platform Study – COMPLETED!

- Assessed science needs (accomplished via 3 sub-groups: interior, surface, surface/atmosphere interactions)
- Identified the capabilities that are required to collect needed data
- Identified the technologies required to realize the needed capabilities

Many thanks to the team and especially the sub-group leads !



SAW 7: Exploration and Instrument Technology

Current chairperson: J. Balcerski (jeffreybalterski@oai.org)

- **Purpose:** To create a community-maintained database of tools and technology for Venus studies and exploration.
- **Topics:** Exploration platforms and infrastructure, instruments, software, test facilities and laboratories.
- **Access:** Publicly viewable, with updates by the VEXAG SAW.
 - Eventually, contributors will be able to update their own entries.

Requested:

Technology overviews (i.e. quad-chart) with: Name of project, Contact info, capabilities, status/TRL, and 1-2 paragraph description (a.k.a., elevator pitch).

This is intended to increase visibility of new technologies and capabilities, and to give mission planners a catalog of options for infusion.

SAW 8, Outreach: Seminar Series

Current chairperson: J. Balcerski (jeffreybalcerski@oai.org)

- **Purpose:** To establish a monthly seminar to highlight new Venus science, educate and reach out to the public, and elevate the visibility of early career individuals.
- **Current Members:**
K. L. Jessup, J. Knicely, S. Port, B. Cogan, A. Santos, E. Kohler, J. Elston
- **Details** (based on poll feedback from community): 30 minute presentations, rotation of topics and target audience, 2:1 ratio of early to established career

First presentation:

December 10, 11 am ET

“The Enduring Mysteries of Venus, and Why It's Time to Go Back”

Presentations will occur on the 2nd Tuesday of each month.

SAW is open to new members and suggestions for topics/speakers. Graduate and post-doc advisors are especially encouraged to nominate undergrad, graduate, and post-docs as speakers.

SAW 9: Venus Social Media

Goal: Improving outreach of VEXAG through social media and mailing lists.

Products: Tweets / Posts / Listserve News / PEN announcements

Members: IN SEARCH OF :

Marty Gilmore has been doing the automated paper collection and posting to Twitter. Sara Port, Candace Gray, and Serina Diniega Admins of the VEXAG Early Career Venus Scholars FB page.

Lawrence Klaes, Ellen Stofan, and David Grinspoon are admins of the Venus Exploration FB page. Noam Izenberg creates and distributes the Venus Listserve News. Paul Byrne offers to help but not lead.

Timeline: Ongoing; policies to be reviewed yearly

Status: Complete; Up to date

SAW 10: VEXAG website update

HOME

ABOUT US

DOCUMENTS

MEETINGS

EARLY CAREER SCHOLARS

VENUS RESOURCES

VENUS NEWSLETTERS

MISSIONS

VENUS SCIENCE NUGGETS

VEXAG INTERNAL LINK

Connect With Us

✉ Venus Listserve News

🐦 @UnveilVenus

📘 Facebook



VENUS EXPLORATION
VEXAG
ANALYSIS GROUP

Venus Exploration Analysis Group (VEXAG)

The Venus Exploration Analysis Group

Breaking News



Discovery Selections, June 2021

[NASA Selects 2 Missions to Study 'Lost Habitable' World of Venus >](#)

The Decade of Venus has arrived! Both DAVINCI+, a Venus atmosphere probe, and VERITAS, a radar mapper, were selected as the next Discovery Missions. VERITAS will launch in 2028; DAVINCI+ will launch in 2029. The advent of these two major missions to Venus enables opportunities for ride-along Smallsats and Cubesats missions.



Cosmic Vision Selection, June 2021

[ESA Selects the EnVision Mission To Provide a Holistic View of Venus >](#)

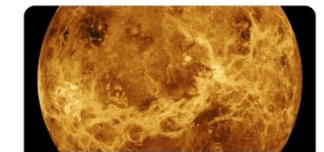
And the hits keep coming! Venus wins the Trifecta with ESA's selection of EnVision as the next Medium-class mission in the agency's Cosmic Vision plan, for launch in the early 2030s. The mission's instruments include imaging and sounding radars, spectrometers, and a radio science experiment to probe the planet's interior via gravity measurements.

Tweets by @unveilvenus



VEXAG Venus
@unveilvenus

Ten mysteries of Venus phys.org/news/2021-10-ten-mysteries-of-venus via [@physorg_com](#) [@unveilvenus](#)



Ten mysteries of Venus
The surface of Venus is completely inhosp...
phys.org



Oct 21, 2021



VEXAG Venus
@unveilvenus

Mantle convection, lithosphere evolution and resurfacing of Venus - goo.gl/scholar/aohSvx
[@unveilvenus](#)



Oct 19, 2021



VEXAG Venus
@unveilvenus

SAW 11: IDEA – Inclusion Diversity, Equity, Access

Goal: Support, create, promote IDEA goals and initiatives within VEXAG and the Venus community at large. Represent VEXAG in IDEA inter-AG workgroup.

Products: : Code of conduct, IDEA policy (adopted, summer 2021), SC membership search/review policy (adopted, summer 2021)

Members: Noam Izenberg, Emilie Royer, Molly McCanta

Timeline: Ongoing; policies to be reviewed yearly

Status: Complete; Up to date

Policies Adopted by VEXAG

VEXAG IDEA Policy

- VEXAG seeks to reflect the increasingly diverse community in the Venus-related sciences and technological enterprises by promoting awareness, understanding, and appreciation of diversity throughout the community from steering committee to active members, to incoming and early career members. VEXAG values inclusion, diversity, equity, and accessibility as this increases the quality and satisfaction of the community and brings diverse opinions, life experiences, and points of view to research, policy, and decision-making processes.
- The purpose of the Inclusion, Diversity, Equity, and Accessibility effort in VEXAG (organized through SAW 11) is to:
- Assist, help develop, recommend, plan, and implement initiatives that support IDEA in VEXAG and in the Venus Community
- Strengthen the sensitivity of the Steering Committee and community members to diverse races, cultures, ethnicities, nationalities, sexual orientations, genders, and ages
- Promote and actively increase opportunities for underrepresented groups to work with and become part of VEXAG (Steering Committee and SAWs)
- Increase understanding of working within a diverse workforce, to include managing a diverse workforce
- Represent VEXAG in the IDEA Inter-AG workgroup

VEXAG Code of Conduct

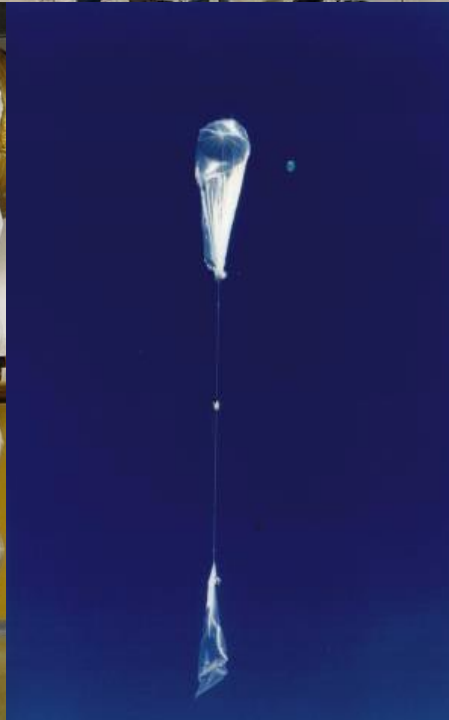
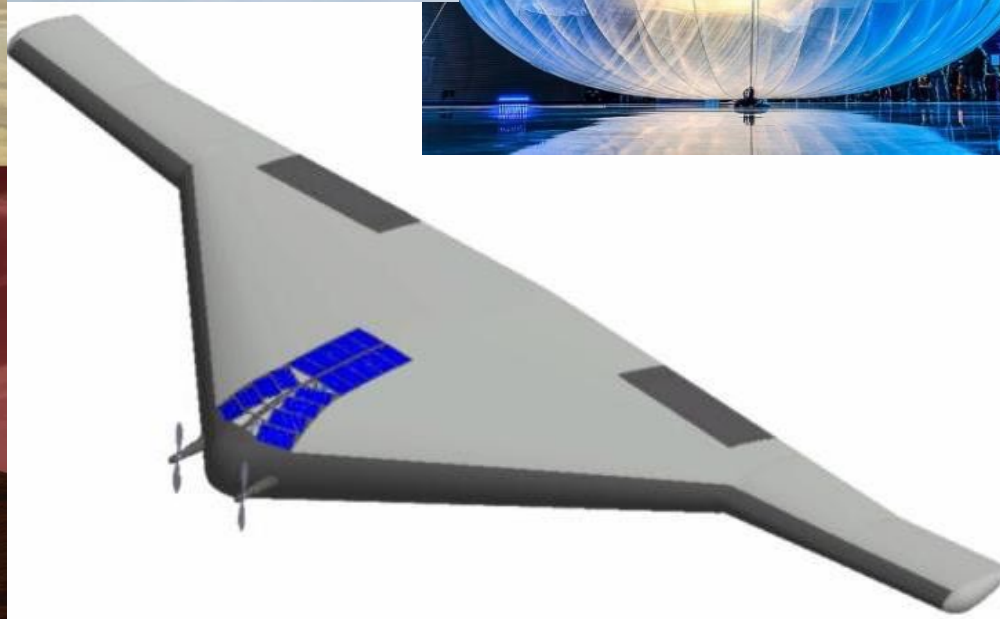
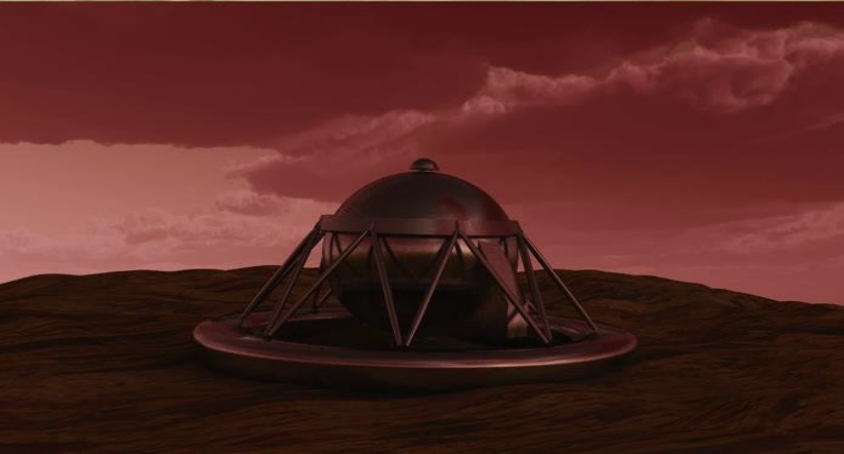
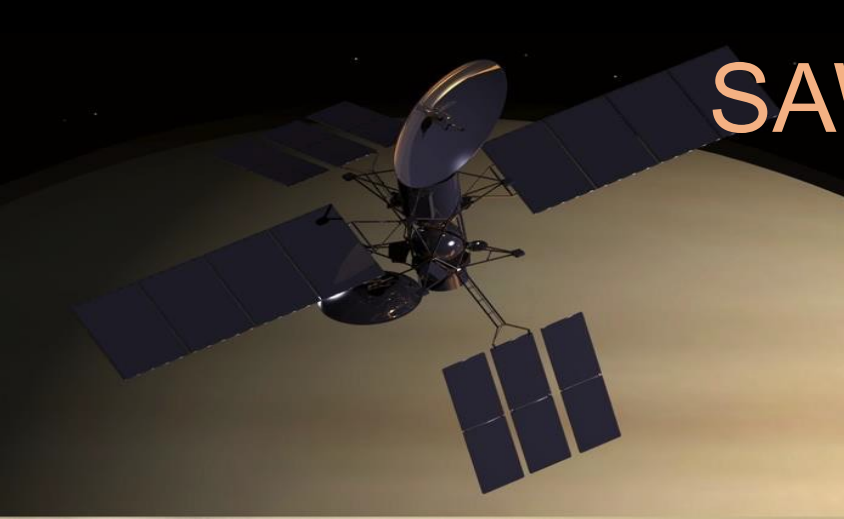
Summary: VEXAG is committed to providing a harassment-free experience for Steering Committee members, participants in our meetings, and other activities VEXAG sponsors or participates in, regardless of gender, age, sexual orientation, disability, physical appearance, race, religion, or other protected status.

While attending a VEXAG meeting or any related ancillary or social events, participants should not engage in harassment in any form. All participants are expected to behave according to professional standards and in accordance with their employers' policies on appropriate workplace behavior.

Conduct or harassment concerns should be reported to the VEXAG Chair, Deputy Chair, and/ or IDEA representatives (SAW 11 group leads).

Detailed VEXAG Code of Conduct is adapted (very closely) from, and with credit and thanks to the creators of the MeXAG CoC V1.

SAW 12: Aerial Platforms



Other VEXAG Commitments:

- **NExSS, Nexus for Exoplanet System Science**, is a NASA research coordination network dedicated to the study of planetary habitability. The goals of NExSS are to investigate the diversity of exoplanets and to learn how their history, geology, and climate interact to create the conditions for life.
- **ExoPAG Science Interest Group #3**: Exoplanet / Solar System, coordinates joint activities and an ongoing discussion on how Exoplanet and Solar System science and missions can benefit from each other. This SIG will endeavor to identify multiple initiatives that could be mutually beneficial for both communities and will encourage cross-disciplinary interaction between ExoPAGs and the Planetary AGs.
- **Equity, Diversity, and Inclusion Working Group**
- **AG Chair Caucus**: New group of AG Chairs, meets monthly, serves to support inter-AG topics of interest, transparency with HQ

Redefining the Obtainable



VERITAS

 **VERITAS**

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