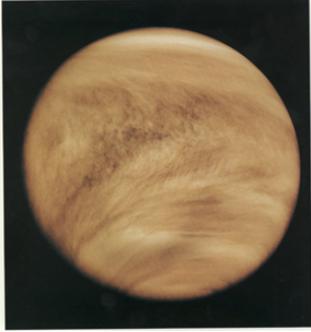




# VEXAG Meeting 6

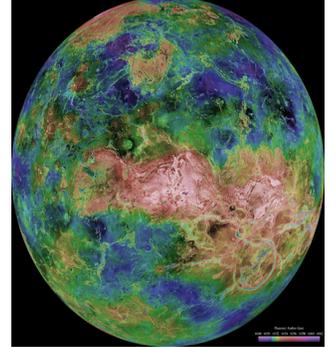
25 February, 2009

Ellen Stofan



# VEXAG 6

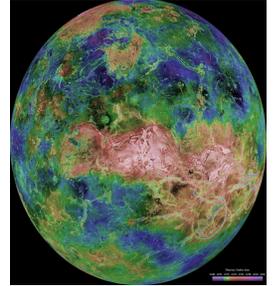
## Meeting Goals



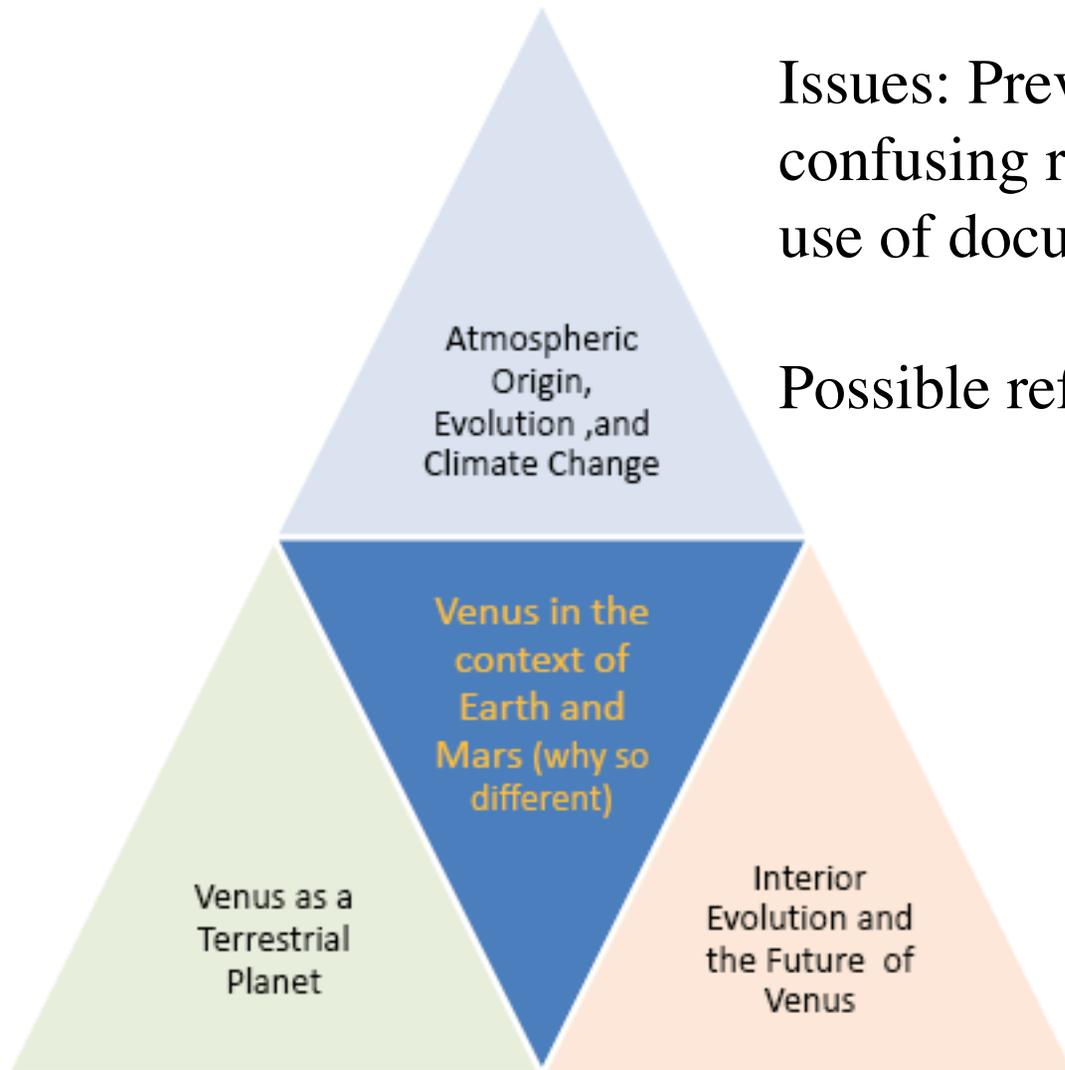
- Last met in May, 2008
  - Provided valuable feedback to the Venus Flagship Mission Science and Technology Definition Team (STDT)
  - Increased focus on importance of Comparative Climatology research, Laboratory Research initiative
  - Led to Comparative Climatology session at Fall AGU, Geochemistry Workshop this week
- This meeting
  - Final review of STDT results (published end April)
  - Update White paper in preparation for Decadal Survey
    - On the table: Findings, Goals, Objectives, Investigations, **Priorities**



# White Paper Goals



- Past: Origin and Early Evolution of Venus: How did Venus originate and evolve, and what are the implications for the characteristic lifetimes and conditions of habitable environments on Venus and similar extrasolar systems?
- Present: Venus as a Terrestrial Planet: What are the processes that have shaped and still shape the planet?
- Future: Implications for Earth: What does Venus tell us about the fate of Earth's environment?



Issues: Previous document had confusing repetition of I/O making use of document in traceability messy

Possible reformatting of old Goals

# Previous Findings

- *Finding: Without additional resources, the U.S. Venus science community will fall further behind in Venus exploration leadership. There will be no opportunity to fully take advantage of the results of either the Venus Express mission or the MESSENGER flyby in our future plans for Venus exploration, or to train the next generation of Venus scientists.*
- Action: NASA will amend the NASA Research Announcement to include a Venus Data Analysis Program in order to fully exploit the Venus Express and MESSENGER Fly-by at Venus data made available via the Planetary Data System.
- *Finding: V EXAG considers that the Venus In Situ Explorer (VISE) continues to be a vital mission in the exploration of Venus, and is included in the FY08 New Frontiers Draft AO. The scientific goals, based on NRC DS recommendations, and stipulated in the FY03 NF AO remain valid. In addition to its scientific value, the VISE mission offers a unique opportunity to validate capabilities that would be important to a future Flagship mission.*
- Proposed Action: The Venus In Situ Explorer (VISE) concept should be included in the finalized New Frontiers AO for 2009. NASA should consider implementing a technology validation element to VISE in particular that would permit demonstration of technologies needed for a long duration mobile mission, but not necessary to the success of VISE itself.

# STDT Finding Proposed Update

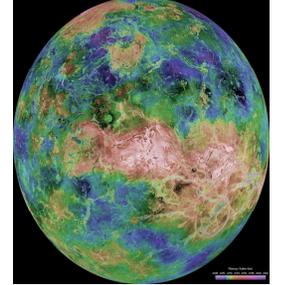
- Finding: As part of the Venus Flagship study, the NASA appointed Science and Technology Definition Team reviewed the science goals and priorities by the VEXAG community, and with the support from a JPL Engineering Team, recommended a suitable mission architecture that resulted in the highest science return. The study identified technology development needs, that requires further assessments and refinements.
- Proposed Action: The Planetary Science Division should continue funding for a second phase of the Venus DRM, which should assess: Key technologies, such as sample acquisition and handling; instrument development for the in situ exploration elements; Alternative mission architectures; Precursor scientific measurements and technology validation that might be implemented with prior Discovery and New Frontiers missions; Technology investments needed to enable the Venus Flagship mission emphasizing the long-lead time technologies needing early investment; Requirements for a Venus Environment Testing Facility, allowing to model relevant pressure and temperature conditions, and atmospheric composition as a function of simulated altitude, to be used for instrument and subsystem development and testing.

# Findings ctd.

- *Findings: There are credible-technical approaches, leveraging from technologies developed in industry to achieving extended operation in the Venus environment. High T electronics can enable systems to operate for extended periods in the corrosive, high-pressure on Venus' surface. Advanced radioisotope-power systems and active thermal-control systems could enable conventional components such as microprocessors or imaging sensors to operate for extended periods on Venus' surface. While further work on mission architectures will be needed to define specific performance goals and the technology focus, technology work can and should begin now. Without NASA's direct involvement, it will not be possible to apply the results from industry to the specific needs of in situ and near-surface exploration.*
- Proposed Action: NASA should initiate a program to develop technologies for operation in the extreme environment of Venus, reflecting the priorities identified in the Venus Design Reference Mission.
- *Finding: A useful dialogue between Venus and Earth scientists is lacking.*
- Proposed Action: A research program, encouraging conferences and/or workshops, should be initiated that brings together Earth scientists and Venus scientists for a focused study of the evolutionary aspects (past and future) of these terrestrial-planet twins. Areas of mutual interest could include extreme climate scenarios, and/or the role of volcanism, tectonics, and the presence/absence of a planetary dynamo in determining the fate of a planet and its atmosphere.



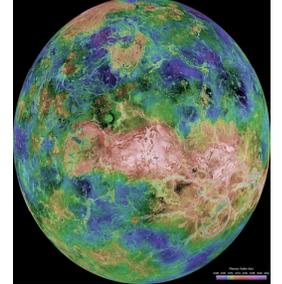
# Other findings?



- Laboratory Measurements, other research initiatives



## Charge to Focus Groups



- Reaffirm/Revise/Prioritize Objectives and Investigations
- Use Laboratory Measurements matrix and highlight needs
- Suggest/revise Findings