Venus STDT Overview

- Venus STDT formed on 1/8/08 by NASA to define a Flagship-class mission to Venus.

- NASA is looking for a high science-return inner solar system Flagship mission in addition to Mars Sample Return. **Launch 2020 – 2025.**

- The combined team of scientists, engineers and technologists will determine prioritized science objectives, mission architectures, cost, and other mission elements for a Venus Flagship mission.

- Final report due to NASA by late November 2008.
Venus STDT Membership

Chair: Mark Bullock (SwRI)

- **Atmosphere**
  - David Grinspoon (DMNS)
  - Anthony Colaprete (NASA Ames)
  - Sanjay Limaye (U. Wisconsin)
  - George Hashimoto (Kobe U.)
  - Dimitri Titov (ESA)
  - Eric Chassefiere (U. of Nantes--France)
  - Hakan Svedhem (ESA)

- **Geochemistry**
  - Allan Treiman (LPI)
  - Steve Mackwell (LPI)
  - Natasha Johnson (NASA)

- **Geology and Geophysics**
  - Dave Senske (JPL)
  - Jim Head (Brown University)
  - Bruce Campbell (Smithsonian)
  - Gerald Schubert (UCLA)
  - Walter Kieffer (LPI)
  - Lori Glaze (GSFC)

- **Technology**
  - Elizabeth Kolawa (JPL)
  - Viktor Kerzhanovich (JPL)
  - Gary Hunter (GRC)
  - Steve Gorevan (HoneyBee)

- **Ex Officio**
  - Ellen Stofan (VEXAG Chair)
  - Tibor Kremic (Glenn)

- **JPL Venus Flagship Mission Architecture Study**
  - Study Lead: Johnny Kwok
  - Tibor Balint

- **NASA and JPL**
  - Jim Cutts (JPL)
  - Adriana Ocampo (NASA HQ)
The architecture that meets all the highest science priorities of the 3 subgroups: atmospheres, geology & geophysics, and geochemistry, and has the highest science Figure of Merit consists of:

- A capable orbiter with high resolution radar imaging and topography
- 2 instrumented balloons between 52 and 70 km
- 2 short-lived landers that also acquire detailed atmospheric data on descent.

This architecture has a low technology development needs making it more likely that technology challenges can be solved and all instruments can be brought to TRL 6 by 2015.

Individual elements alone cannot answer the pressing science questions posed by VEXAG. An integrated, multi-element architecture is necessary. Other architectures with additional elements should not be excluded at this point. The advantages of a low-level (0-15 km) balloon traverse, for photogeology and atmospheric sampling, for example.
VEXAG 5:
7-8 May, 2008

• Well attended meeting (~60 attendees)
• Update on recent Venus Express results
• Science talks illustrated necessity to study Venus to understand terrestrial planet evolution
  – Climate is key
  – System Science: Interior-Surface-Atmosphere system
• Enthusiasm for new avenues of Venus research and exploration
• STDT: Science goals and process strongly endorsed
  – Received valuable input and support from community
  – Additional input via web and at DPS
• Technology Focus Group Assessment: Endorsed needs identified by STDT, advocated need for prioritization and near-term technology investment
  – System-level technology: High temperature sample acquisition and handling; P, T mitigation; Environmental testing
  – Instruments (highest priority InSAR)
  – Long lived seismic package
  – Long traverse floater
  – Aerocapture
  – Venus environmental testing facility
VEXAG Assessments

- Comparative Climatology research program strongly endorsed by science focus groups
  - ROSES 2009 amendment endorsed
  - Fall AGU Union session proposed (7/10)
  - Late May Venus-Earth-Mars meeting, ESTEC
  - Timing of Chapman conference under discussion
  - Continued outreach to community

- **Venus Laboratory Research Initiative endorsed** by both atmospheres and surface/interior communities
  - Significant list of needed measurements
  - Geochemistry Workshop February 23-25, 2009
  - International coordination needed

- Venus research community would benefit from renewed emphasis in R&A programs

- Next VEXAG meeting February 25-27, 2009
Aerocapture

• Statement needed to move this critical technology forward

• Draft statement:
  – Aerocapture could be used to enhance the science return of future missions to Venus, Mars, Titan as well as flybys of Uranus and Neptune, allowing more payload mass to be delivered to the target body, as demonstrated by Titan mission concept studies as well as prior work by the In-Space Propulsion Technology Program (NASA Glen/ Langley). Aerocapture could also enable orbiter missions to Uranus and Neptune. Aerocapture risks are essentially equivalent to those already embraced for MSL and CEV: its flight system elements have strong heritage (planetary entry vehicles, Apollo) and a firm computational basis. We urge SMD to continue to invest in aerocapture system technologies, and to consider a near-term flight validation.