Venus Exploration Targets Workshop: A Retrospective

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Lunar and Planetary Institute
Organizing Committee launched 5 Sept. 2013
- Workshop dates set: 19-21 May 2014
- Program designed; announcements circulated
- Invited Venera D project scientists from Russia and US

- Implementation & Science Teams off to the races

Geopolitical tensions mount: March, 2014
- Russian participants unable to attend workshop

Nonetheless, the workshop attracted 51 participants from around the globe.
To identify and evaluate key locations, transects, and regions for future exploration of Venus.

- On the surface or within the atmosphere
- Appropriate candidate targets include those requiring
  - landers,
  - atmospheric probes, gliders, or balloons, and
  - orbital missions.
Day 1:

- AM: Introductory Plenary, including short ‘poster’ talks
  - Opportunity for everyone to present orally
- PM: Poster discussion followed by first breakout session
  - Breakouts organized around where the payload would be located: on the surface, in the atmosphere, from orbit
  - First effort to define targets to meet VEXAG GOI
  - Encouraged participants to circulate between sessions
Workshop Structure

• Day 2:
  – Morning Plenary
    • Session leads summarized Day 1 progress
  – Morning Breakout Session
    • Continue to define targets
    • Consider approaches needed at each target
  – Afternoon Plenary
  – Afternoon Breakout Session
    • Continue discussions; add data requirements
Workshop Structure

- Day 3:
  - Capstone Plenary
    - Extended discussion of workshop progress
  - Adjourned at Noon
  - PM: Organizers convened to discuss results & path forward.
• **Surface:**
  - Significant science achievable from low-risk areas such as plains
    * Meets majority of objectives in VEXAG Goals 2 & 3
    * Improved measurements of crust and lower atmosphere
    * Safest: older plains devoid of ejecta, deformation features
  
  - **Tessera lander site would be scientifically optimal but more risky; risk mitigated by:**
    * High-resolution imaging and topography
    * Autonomous hazard avoidance technologies
• **Atmosphere:**
  
  – Challenged by the complex matrix of ‘domains’:
    • Geographic location \((x, y)\), height, time, duration
    • No single, static ‘target’ is adequate
  
  – Long-term, high spatial and temporal measurement of meteorological parameters is ideal but unrealistic.
    • Group focused on prioritizing among domains.
  
  – Can make remote surface observations from low altitude.
  
  – Many target and approach suggestions would benefit from coincident orbital observations.
• Orbit:
  - Indirect but provide important regional context for in situ measurements
    • Conversely, remote observations benefit from ground truth
  - Technological advances offer vast improvements over current surface observations
    • E.g., SAR image resolution; interferometry, stereogrammetry, IR emissivity.
  - Surface targets were identified and atmospheric approaches were addressed.
• Report is being compiled now (some delay owing to Discovery proposals)
• Report will be vetted by the community (specific reviews and community comment)
• When completed, will be posted on the VEXAG website
• Orbital science, atmospheric payloads, and landers are synergistic and complementary.
  – All are required to address the panoply intriguing questions surrounding the past and current state of Venus.

• A Venus Exploration Program – designed along the lines of MEP – is needed to bring Venus exploration to the level of Earth’s other planetary neighbors.

• Perhaps *Discovery* and/or *New Frontiers* will spearhead this program.