Time to try a new direction? Suggestions for the Goals/ Objectives/Measurements Document

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Primary idea: Follow the lead of MEPAG

Their Goals are basic and each dominated by a single discipline:

1. Did life ever arise on Mars? – oriented to astrobiology
2. Understand current and past climate – atmospheric science
3. Surface and interiors – geosciences
4. Future human exploration – engineers

Goals are not prioritized; Objectives and Investigations are.

The current Venus Goals/Objectives/ Measurements do not have wide support because they are interdisciplinary, and we have endless discussions about the relative importance of atmospheric vs. geological science.

I. Introduction

A few points:

1. The overarching theme and why Venus is so important – What determines whether an Earth-sized planet is Earth-like (exoplanet implications)?
2. Note that current technology is a major impediment to desired extended-stay missions in the atmosphere and especially at the surface.
3. Introduction is where to stress interdisciplinary themes.

II. Goals

1. Understand the processes and history of climate on Venus.
2. Determine the evolution of the surface and interior of Venus.
3. Understand the current interaction between the surface and atmosphere on Venus.
4. Develop capability for long-lived surface instruments on Venus.

Goal 2 – Surface and Interior
Objectives and Measurements

A. Determine nature and evolution of processes that have created and modified the crust.
   i. Relative timing of tectonic and igneous processes.
   ii. Detailed nature of past volcanic (e.g., explosive vs. effusive eruptions) and tectonic activity.
   iii. Current locations and rates of tectonic and volcanic activity.
   iv. Regional variations in surface composition.

Goal 2 – Surface and Interior
Objectives and Measurements (cont.)

B. Relationship of surface features to interior evolution
   i. Determine primary compositional and mechanical layers on Venus (core, mantle, etc.)
   ii. Evaluate current heat flow.
   iii. Determine regional variations in subsurface structure.

Goal 2 – Surface and Interior
Objectives and Measurements (cont.)

C. Evaluate whether water ever flowed on the surface of Venus.
   i. Look for geomorphic evidence of past fluvial features.
   ii. Look for geochemical signatures in the rock record of previous surface water.
   iii. Atmospheric evidence of past oceans (could be put in Goal 1).

III. Advocacy for an exploration program (even if we don't get one)

Venus is an important target that has been neglected for a long time. Directed mission are warranted. However,

- Current technology does not exist for long-term surface or in-atmosphere missions.
- Our large flagship mission could be done with smaller missions.

In other words, we're going to keep losing in the Flagship / New Frontiers game.

Advocacy for an exploration program (cont.)

So, I suggest advocating for a program that starts with 2-3 competed Discovery (or slightly larger) class missions. These would collect the necessary data for later potential larger missions that could utilize the advanced technology that we want developed.

Advocacy for an exploration program (cont.)

Fallback Position 1 - $50M - $100M technology incentive for Venus as a target in the next Discovery round.

Precedents for favoring/disfavoring targets in Discovery:

- Mars has been specifically excluded.
- Reason for technology incentives: "enables access to solar system destinations that would not otherwise be accessible within a Discovery budget".

Advocacy for an exploration program (cont.)

- Fallback Position 2 – Try to get mid-course corrections to New Frontiers that makes long-duration (orbital) components more likely.
- Fallback Position 3 – NASA puts up money towards an international mission.