

15 August 2007

Fran Bagenal
Chair
Outer Planets Analysis Group

Dear Fran,

We need your help.

The National Research Council (NRC) has convened the Committee to Review New Opportunities in Solar System Exploration (NOSSE) on which we serve. Our basic charge is to make recommendations to NASA on its next New Frontiers Announcement of Opportunity (AO). We are seeking as broad of a view from the community as possible and thus we are asking for your opinions to join with many others. In the timeframe available to us it is not possible to ask you to present your opinions before our Committee face-to-face, so we would appreciate a written response.

We would like to solicit the opinions of the Outer Planets exploration community and the Small Bodies community, on the important science goals that can be addressed by the upcoming New Frontiers class mission. With that in mind, we would be highly appreciative if you would communicate the following questions to your community and collate/summarize the responses into a brief summary for the NRC-NOSSE community to use in its deliberations:

1-What are the key science goals that should be addressed by a New Frontiers((approx. \$800M)) mission to Outer Planets targets or Small Solar System Bodies (in the inner or outer Solar System)?

2-Are there critical measurements that must be part of a New Frontiers mission to Outer Planets targets or Small Solar System Bodies? In general, these measurements should not be attainable under Discovery class missions, but be feasible under the New Frontiers cost cap.

3-Can the comet mission described in the last AO (below) be achieved or should it be reformulated? If so, how?

2.1.5 Comet Surface Sample Return

Detailed study of comets promise the possibility of understanding the physical condition and constituents of the very early solar system, including the early history of water and the biogenic elements and the compounds containing them. Therefore, a mission that will sample and return the dust and organics from at least one if not several locations on the surface of a comet nucleus,

including one in the vicinity of an active vent, is of prime interest in order to achieve most or all of the following science objectives:

- Understand the structure and composition of a comet through measurement of its chemical complexity, grain micro texture and its cohesive forces, age of compositional grains, and organic and silicate components;
- Understand the real time dynamics and evolution of a comet's surface under the influence of sunlight by study of the diurnal conditions of its atmosphere and surface;
 - Investigate a comet's overall physical structure through gravity modeling in order to assess its internal heterogeneity; and
 - Map surface structures, composition, and mineralogy.

The strawman mission envisioned "touch and go" sampling and an extensively instrumented platform including cameras, an IR spectrometer, and mass spectrometers, as well as a simple sample collection and storage mechanism. The return to Earth of samples might rely on the techniques developed for NASA's Stardust and Genesis missions. However, any mission architecture that achieves most or all of the science objectives stated above for a cost within the New Frontiers cost cap will be considered responsive to this AO.

4-Should mid-sized Mars missions be included in the New Frontiers line?

Finally, are there any science objectives that you believe are high priority that are not part of the Decadal Survey?

Thank you in advance for your quick response to our query.

Sincerely,

Reta Beebe
Warren Buck

Co-chairs,
Committee to Review New Opportunities in Solar System Exploration