



## OPAG - New Frontiers Discussion

March 31, 2008

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## Committee on New Opportunities in Solar System Exploration (the NOSSE report)

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## Statement of Task

Provide criteria and guiding principles to NASA for determining the list of candidate missions. These issues include the following:

- Should the next New Frontiers solicitation be completely open relative to any planetary mission (not including Mars), or should it state a candidate list of missions as was done in the previous AO?
- If a candidate list of missions is preferred, what is the process by which candidate missions should be determined? Specifically, there is a need to review the mission categories identified in the previous AO and see if the list needs to be revised or augmented in light of developments since the release of the last AO. Should consideration be made to a candidate list of appropriate science themes from the NRC decadal survey on solar system exploration rather than specific missions?<sup>[1]</sup>

Note: words “not including Mars” removed in summer/fall 2007, requiring an additional meeting and additional member.

[1] Colleen N. Hartman, Acting Associate Administrator for Science Mission Directorate, letter to Lennard A. Fisk, Chair, Space Studies Board, March 21, 2007.

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## Our report’s philosophy

The committee accepted the charge and assumed that this report would impact the selection of New Frontiers 3 but would also lay the groundwork for serious decadal report revisions and could impact the future health of the New Frontiers program .

The committee strongly believes that the New Frontiers Program is a valuable and vital part of NASA’s solar system exploration program. The health of the New Frontiers Program was an overriding priority for the committee.

The committee recognized that missions that are mature enough to pass through Phase A have undergone extensive development and review; thus it concluded that endorsing the 3 remaining prioritized missions was not in the best interest of the community.

On the other hand, the committee did not assume that their insights were superior to the structure laid down in the Decadal Report.

The committee’s philosophy was to provide NASA with sufficient options and to provide potential proposers with sufficient flexibility in their proposals to enable NASA to select a mission that can be done within the constraints of the New Frontiers Program, 3-way constraint -- the cost cap, launch date and funding profile .

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## Our report's philosophy (part 2)

We took the decadal survey as gospel. The missions come from the decadal survey.

The committee did not recommend any mission suggestions that were not in the decadal survey.

As has been demonstrated by the Astrophysics community adhering to the decadal survey provides a documented creditability and enhances the community's success rate in the long term.

The health of PI mission process needs an ongoing process for training new cadre.

The committee recognized that cost estimates that were integrated into the development of the Decadal Report are not currently applicable.

The announcement that New Frontiers 3 would not have nuclear power came late in our deliberations.

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## New Frontiers Program First Established in the 2002 Solar System Decadal Survey

The decadal survey specified five mission candidates and ranked them according to priority:

- **Kuiper Belt Pluto Explorer,**
- **South Pole-Aitken Basin Sample Return,**
- **Jupiter Polar Orbiter with Probes,**
- **Venus In Situ Explorer, and**
- **Comet Surface Sample Return.**

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## New Frontiers Program First Established in the 2002 Solar System Decadal Survey

The decadal survey listed five additional missions that were not recommended for reasons of “mission sequencing, technological readiness, or budget.”<sup>[1]</sup> These missions were listed in the following order in the decadal survey, which also stated that this list was not ranked according to scientific priority:

- **Network Science**
- **Trojan/Centaur Reconnaissance**
- **Asteroid Rover/Sample Return**
- **Io Observer**
- **Ganymede Observer**

• <sup>[1]</sup> *New Frontiers in the Solar System*, p. 197.

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## Three meetings

- August 6-8, 2007, Washington, D.C.
- October 1-3, 2007, Irvine, California
- November 14-16, 2007, Lunar and Planetary Institute, Houston, Texas
  
- Report delivered March 3—nearly two months before NASA's deadline.

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## We sought broad input on a limited timeframe

- Speakers Before the Committee
- August 6-8, 2007, Washington, D.C.
- Michael A'Hearn, University of Maryland
  - Comet Science and the New Frontiers Program
- Fran Bagenal, Laboratory of Atmospheric and Space Physics, University of Colorado
  - OPAG Perspectives on the New Frontiers Program
- Richard P. Binzel, Massachusetts Institute of Technology
  - New Horizon Competition Experience
- Scott Bolton, Southwest Research Institute
  - Juno and the First Announcement of Opportunity
- Glen Fountain, Applied Physics Laboratory
  - Programmatic and Managerial Lessons
- Jim Green, NASA
  - NASA Perspectives on the New Frontiers Program
- Janet Luhman, University of California, Berkeley and Jim Cutts, Jet Propulsion Laboratory\*
  - VEXAG Perspectives on the New Frontiers Program
- John Mustard, Brown University
  - MEPAG Perspectives on the New Frontiers Program
- Paul Spudis, Applied Physics Laboratory
  - Lunar Science in the New Frontiers Program
- Greg Vane, Jet Propulsion Laboratory
  - JPL Perspective on New Frontiers Based on First Pluto Announcement of Opportunity and
  - First New Frontiers Announcement of Opportunity Experience
- Joseph F. Veverka, Cornell University
  - COMPLEX Perspective on the New Frontiers Program
- Rich Vondrak, NASA Goddard Space Flight Center
  - Center Perspectives on the New Frontiers Program
- October 1-3, 2007, Irvine, California
  - Ray Arvidson, Washington University, St. Louis\*
    - Adding Mars to the New Frontiers Program
  - Bruce Banerdt, Jet Propulsion Laboratory
    - Planetary Networks and New Frontiers
  - John Elliott, Jet Propulsion Laboratory
    - Flight System Options and Descriptions
  - Larry Esposito, Laboratory of Atmospheric and Space Physics, University of Colorado
    - Venus in the New Frontiers Program
  - Kimberly Lichtenberg, Washington University, St. Louis
    - Venus Missions and the Planetary Science Summer School
  - Doug McCuiston, NASA\*
    - NASA Mars Plans for New Frontiers
  - Curt Niebur, NASA\*
    - Outer Solar System Flagship Study Overview
  - John Niehoff, SAIC
    - Cost Issues for the New Frontiers Program
  - Kim Reh, Jet Propulsion Laboratory\*
    - Billion Dollar Mission Study Overview
  - Thomas Spilker, Jet Propulsion Laboratory
    - Science Objectives and Science Definition Team Procedures
    - Saturn Shallow Probe Missions
- November 14-16, 2007, Lunar and Planetary Institute, Houston, Texas
  - Sushil Atreya, University of Michigan\*
    - Science of Shallow Probe Missions
  - Dave Crisp, Jet Propulsion Laboratory
    - Science Objectives for Venus Missions
  - Mike Drake, University of Arizona
    - Asteroid Sample Return
  - Carle Pieters, Brown University\*
    - Lunar Science and the New Frontiers Program
  - Bruce Runnegar, University of California at Los Angeles\*
    - Astrobiology Objectives of the New Frontiers Program
  - Tom Spilker, Jet Propulsion Laboratory, and Heidi Hammel, Space Science Institute Neptune and the New Frontiers Program

ALSO OBTAINED WRITTEN INPUT FROM THE VARIOUS AGS.

## Recommendation 1:

- In drafting the rules for the next New Frontiers announcement of opportunity, NASA should emphasize the science objectives and questions to be addressed, not specify measurements or techniques for the implementation.

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## Recommendation 2:

- NASA should expand the list of potential missions in the next New Frontiers announcement of opportunity to include the three remaining candidate missions: South Pole-Aitken Basin Sample Return, Venus In Situ Explorer, and the Comet Surface Sample Return, and also the five additional medium-size missions mentioned in the decadal survey: Network Science, Trojan/Centaur Reconnaissance, Asteroid Rover/Sample Return, Io Observer, and Ganymede Observer. There is no recommended priority for these missions. NASA should select from this set of missions based both on science priority and overall mission viability.

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## Recommendation 3:

- NASA should consider mission options that are outside the 3 remaining and 5 additional medium-size missions from the decadal survey but are spurred by major scientific and technological developments made since the decadal survey. As with any New Frontiers mission, these proposals must offer the potential to dramatically advance fundamental scientific goals of the decadal survey and should accomplish scientific investigations well beyond the scope of the smaller Discovery program. Both mission-enabling technological advances or novel applications of current technology could be considered. However, NASA should limit its choices to the eight specific candidate missions unless a highly compelling argument can be made for an outside proposal.

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## **NASA has endorsed all of the NRC report's recommendations**

- Jim Green made this announcement at LPSC on March 12
- Apparently draft New Frontiers AO due soon, final version by June