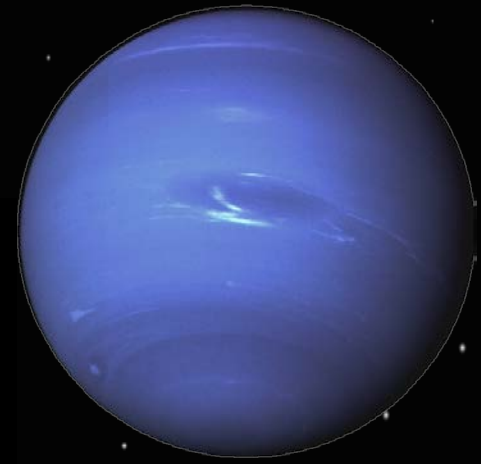
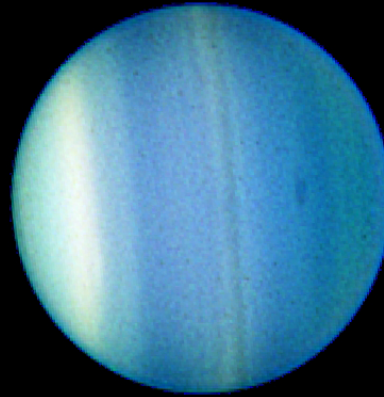
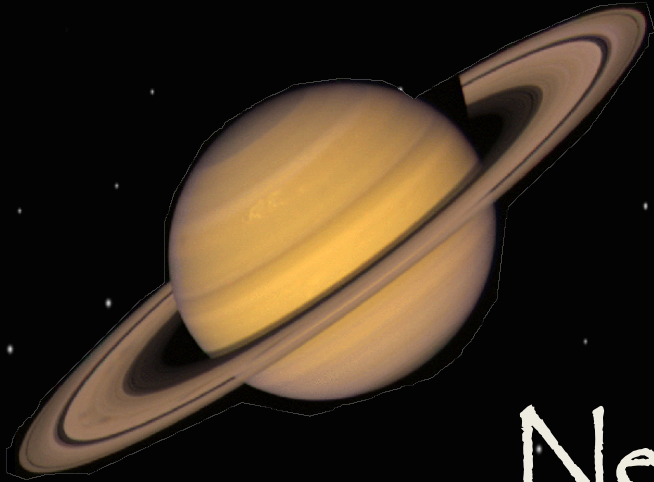


OPAG



New Science Goals
Document

24 July 2014

Science Goals articulated by OPAG

- Last full document was in 2006
 - “Scientific Goals and Pathways for Exploration of the Outer Solar System”: A Report of the Outer Planets Assessment Group (OPAG) 2006
 - Plus the Decadal Survey white paper 2009
 - Plus the Technology Recommendations 2009
- Visions & Voyages is written and the effort is complete
- Going forward, we decided it was time to update the OPAG Scientific Goals and Pathways report

OPAG's New Science Goals Document

Motivation

The “Visions and Voyages” writers are done – OPAG is the voice of the outer planets community until the next decadal survey – this needs to be a living document

- React to new discoveries
- Focus on science rather than missions

Because

- A new possibility for Discovery missions to the outer solar system (such as IVO, TIME)
- Need to constructively confront new budget realities
 - Europa Clipper is responsive to the new reality
- Identify *questions* that can be addressed with New Frontiers and Discovery size missions
 - Like Juno – Juno addresses an important set of questions identified in the 2003 decadal survey with a mission approach completely unlike the mission described in the 2003 DS
- *Prepare* for the next decadal survey
 - What to do about our target-rich dilemma?

New OPAG Science Goals Document

Approach

- Identify broad scientific goals
- Generally consistent with Visions & Voyages – each objective is referenced to a V&V over-arching theme
- Use existing content from previous work done by the community, for example:
 - TSSM flagship study
 - EJSM flagship study
 - Decadal survey white papers
- Currently target-body-based, but we'll compare and contrast, and **place within context of over-arching science themes**
- *Want to get to the point that we specify a science question, then say what destination addresses that question*
- Use Visions and Voyages initially for the high level themes
- No references (for readability)

New OPAG Science Goals Document

Status

- Initial draft has been written by OPAG Steering Committee
 - Organized by targets
 - Top 5 – 6 goals, not a lengthy laundry list
- Will distribute this draft and invite the community to give us feedback and provide more content today
 - At this moment we're working on making sure content is complete
- Concurrently we'll look at **unifying science objectives**
- Incorporate community feedback between now and the January 2015 OPAG meeting
- Will “publish” on our website, but will continually update in response to new discoveries as needed

Assignments

	Interest / Expertise
Heidi Hammel	Gas / Ice Giants
Mark Hofstadter	Gas / Ice Giants
Kevin Baines	Gas / Ice Giants
Linda Spilker	Rings
Jack Connerney	Magnetospheres
Zibi Turtle	Icy satellites
Jeff Moore	Icy sat's geology
Bill McKinnon	Icy sat interiors, Enceladus
Candy Hansen	Triton
Britney Schmidt	Europa
Julie Rathbun	Io
Jani Radebaugh	Titan, Io
Jason Barnes	Titan
Pat Beauchamp	Technology, Titan

Working Table of Contents

Giant Planet Objectives, incl. Magnetospheres

Rings

Moons roughly in order of degree of evolution and complexity:

Mid-size satellites

- a. Least evolved [e.g. Umbriel, Mimas]: no differentiation; surface cratered
- b. Some volatile mobility [Callisto, Iapetus]: Frost moved around on surface; Sputtered atmosphere
- c. Some surface evolution due to tectonics [Tethys, Ariel, Miranda]
- d. Evolved, differentiated interiors but moderately old surface [Ganymede]

Triton

- e. Highly evolved interior, youthful surface, atmosphere with seasons

Io, Enceladus

- f. Ongoing active eruptions and re-surfacing due to tides

Titan

- g. All of e plus a real atmosphere with weather and surface erosion

Europa

- h. All of the above plus possible astrobiology

Our Dilemma of Destinations

Do we attack this like a Michelin guide?

Worth a journey

Worth a detour

Interesting

Or should we recommend a decadal survey with science goals and no particular mission recommendations?

Juno was selected because it met the science goals, not the mission description, in the 2003 decadal survey

Or we could recommend no flagships at all – just a New Frontiers free-for-all

As many as possible

Classic free enterprise competition

Most responsive to new discoveries

Need an over-arching vision

Visions and Voyages' Themes

- A. Building new worlds – understanding solar system beginnings
- B. Workings of solar systems – revealing planetary processes through time
- C. Planetary habitats – searching for the requirements for life

Backup

OPAG Path forward

- We need a strategic plan to explore our target-rich field
 - A new roadmap?
- Consider a **multi-decadal** strategic vision
 - How do we get to all the 5-star destinations in the outer solar system?
 - Is the flyby-orbit-sample paradigm valid?
 - What is a possible timeline?
 - How rigid / how flexible should such a plan be?
 - Want to incorporate new discoveries and thinking without being completely helter-skelter