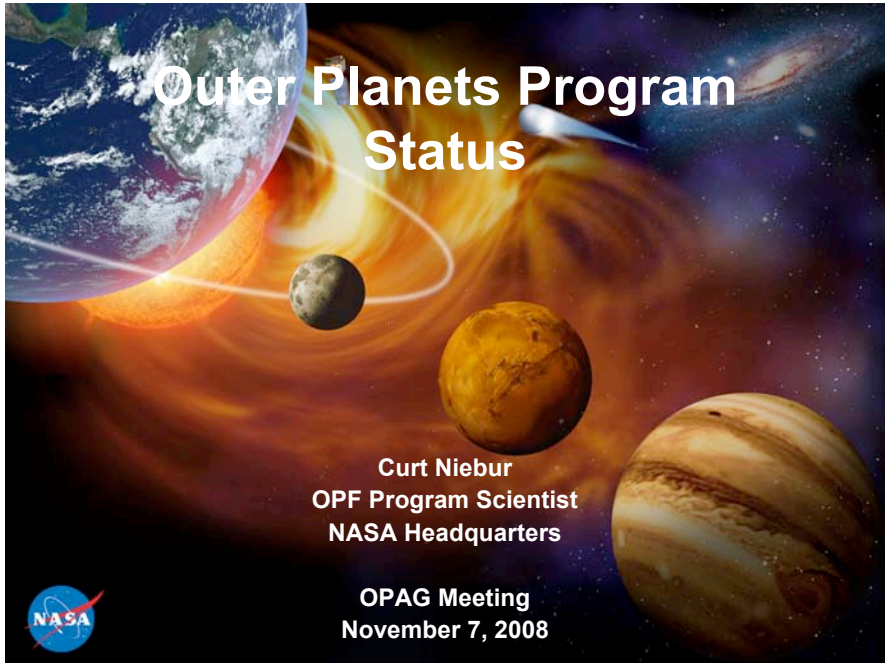


Outer Planets Program Overview

- **The Outer Planets Program is a new administrative/budget grouping consisting of three elements: *Cassini, R&A, OPF***
- **Cassini Mission to Saturn**
  - Recently began first extended mission (Cassini Equinox Mission)
  - Planning underway for XXM mission
    - Strategy to transition Cassini to extended lifetime at reduced operations budget
    - HQ has asked the Project to assess the feasibility and impact of this reduced operations budget for XXM
    - Project XXM plan will undergo Senior Review in February
    - Results of analysis and Senior Review will play a significant role in budget decisions yet to be made
  - Program Scientist Denis Bogan is retiring

Research, Analysis, and Support

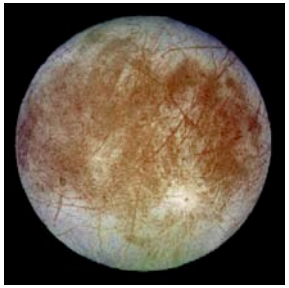
- **Cassini Data Analysis Program**
  - Max Bernstein has replaced Denis Bogan as Discipline Scientist
  - ~$8M budget in FY09
  - 2006: 72 submitted, 27 selected (38%)
  - 2007: 77 submitted, 41 selected (53%)
  - 2008: 61 submitted, expect ~33% selection rate (selections expected to be finalized around Thanksgiving)
- **Jupiter Data Analysis Program**
  - First time program in ROSES 2008; ~42 proposals submitted
  - ~$2M budget in FY09
  - Next year (ROSES 2009) we are considering merging JDAP into OPR
- **Outer Planets Research Program**
  - ~$9M budget in FY09 (~$2.5M available for new selections)
    - Budget not within OPP but will be managed along with other OPP elements
  - 2004: 142 submitted, 53 selected (37%)
  - 2005: 80 submitted, 26 selected (33%)
  - 2006: 53 submitted, 12 selected (23%)
  - 2007: 117 submitted, 44 selected (38%)
  - 2008: proposals due next week!

Research, Analysis, and Support

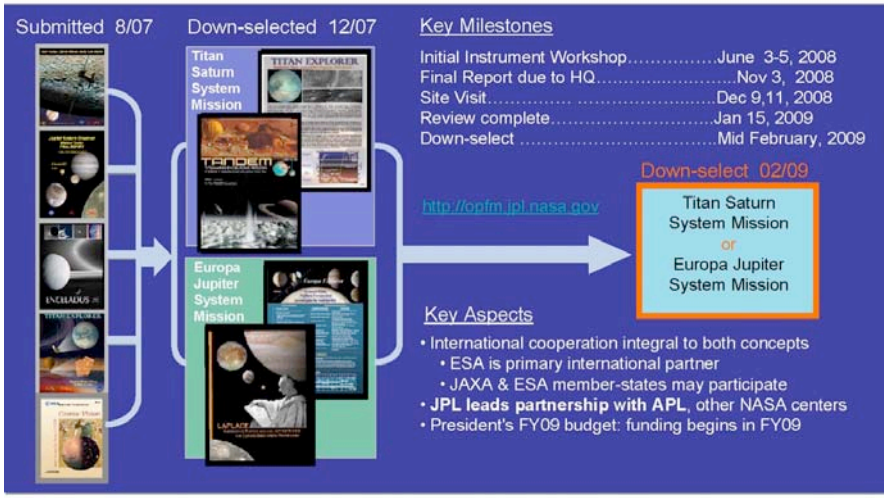
- **Cassini Data Availability/Usability**
  - Joint Community/Cassini effort to assess usability of Cassini data to non-team members
- **Expanding the Cassini Team**
  - Expectation on all sides that Cassini would periodically expand its science base
  - Effort needs to provide benefit to both the Cassini team as well as the Community – What are the goals? What are the challenges?

Outer Planets Flagship

- **NASA is currently finishing a nine month long Outer Planet Flagship mission study which is being conducted jointly with ESA. Two missions are being studied:**
  - Europa Jupiter System Mission (EJSM)
  - Titan Saturn System Mission (TSSM)
- **NASA plans to select a single Outer Planet Flagship mission in February 2009 which will be pursued jointly with ESA and other international partners.**
- **The community owes a**



NASA-ESA 2008 Outer Planet Flagship Studies Decision Process



Initial Ground Rules – Feb 2008

- **Cost Cap: $2.1B ($FY07) with 33% reserves**
- **Power System: only MMRTG's or solar allowed**
- **Launch Vehicle: Atlas 5, Delta IV-H, Ares 5**
- **Launch and Cruise: Launch nlt 2017 and cruise ngt 7 years**
- **DSN: utilize 34 m stations only**
- **Technology: "Rule of One" and missions own necessary technology development**
- **International Contributions: Partnerships are expected and are being pursued, but international contributions must provide capability above the mission science floor and cannot impinge on the ability of NASA to fly a complete mission for $2.1B**

"Sweet Spot" Mission – June 2008

- **In June 2008 NASA changed its strategy**
  - Strict cost cap strategy with science as the only free variable was dropped since the $2.1B cost capped mission was not compelling
  - A new strategy to seek the "sweet spot" was adopted: optimize balance between science and cost to better respond to the Decadal Survey
- **The study teams were directed to identify a "sweet spot" mission consistent with this new strategy**
- **An assessment of science value vs. cost was developed based on science goals set down by the Decadal Survey**
- **Following the second interim briefing to HQ management in June 2008 the study teams were directed to:**
  - Focus the remaining study efforts on the "sweet spot" mission
  - Defer the nominal launch date from nlt 2017 to 2020 (with evaluation of launch options from 2018-2022)
  - Assess the impact of ASRG and MMRTG power sources and select the preferred system
- **This slipped the original schedule and increased study costs**

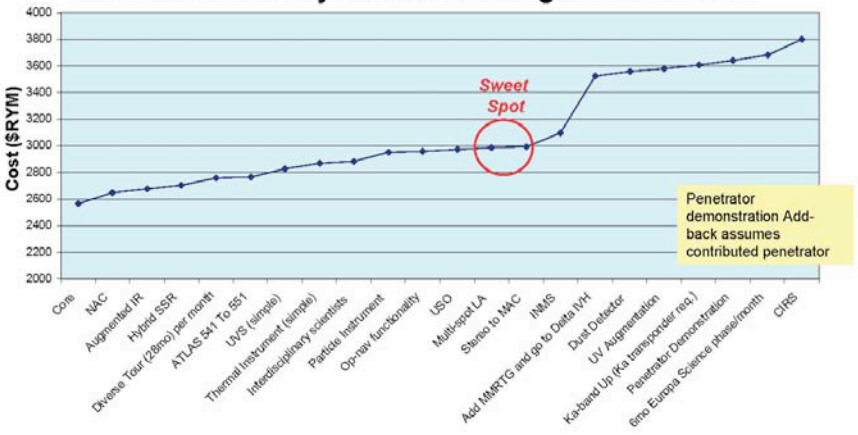
JEO Plus Up Process

- JJSDT identified and prioritized instrument and mission capabilities
- Mass, power and data estimated to determine when additional MMRTG or LV capability was required
- Costs were obtained from estimated raw costs and obtaining fully integrated costs from Project cost estimate

Priority	Add-backs	Science Benefit
	Core	
1	NAC	Detailed local geology; System Satellite, Ring & Jupiter Science
2	Augmented IR	Europa Surface Composition & System satellite Science
3	Hybrid SSR	System science--increased data volume return
4	Diverse Tour (28 mo)	Added satellite surface coverage; discovery follow-up
	ATLAS 541 to 551	
5	Simple UVS	Europa Surface Composition & System Science; Satellite Atmospheres
6	Simple Thermal Instrument	Europa & Satellite Thermal Anomalies; Space physics--sublimation and Sputtering
7	Interdisciplinary scientists	Multi-facetted/crosscutting science investigations
8	Particle Instrument	Space Physics--system interactions
9	Op-Nav functionality	Closer satellites flybys
10	USO	Atmospheric Science--Occultations
11	Multi-spot Laser Altimeter	Improved Lateral topographic resolution--quantitative morphology
12	Stereo to MAC	Improved Lateral topographic resolution--quantitative morphology
13	INMS	Composition of sputter material
	Add MMRTG and go to Delta IVH	
14	Dust Detector	Composition of sputter material
15	Augmented UV	Enhanced Europa Surface Composition studies & System Science
16	Ka-band Uplink	High fidelity Gravity data
17	Penetrator Demonstration	In situ assessment of organics
18	6 mo. Europa Science phase	Greater ability to follow-up on discoveries
19	CIRS	Jupiter Atmospheric Structure

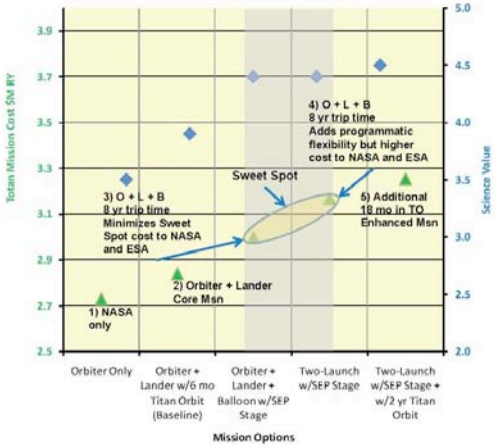
JEO Sweet Spot Determination

- Stay on Atlas launch vehicle and within capability of 5 MMRTGs including 33% margin
- Increase resiliency to future changes in direction



STO Sweet Spot Determination

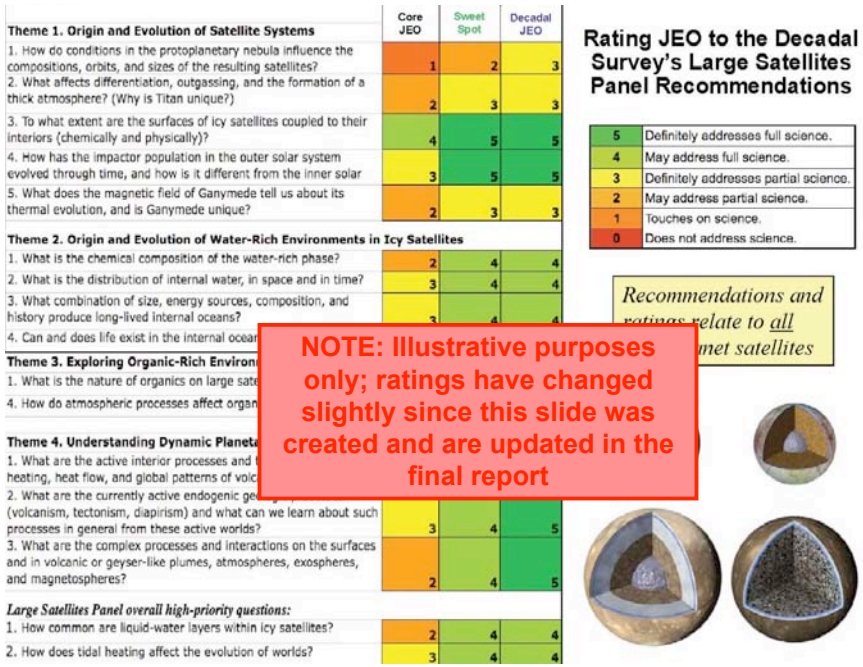
- Prioritization driven by decadal science
- Includes ESA full complement in situ payload
- In situ elements add considerable science value at limited accommodation cost to NASA
- Sweet Spot and enhanced decadal for NASA-only mission not shown in these charts



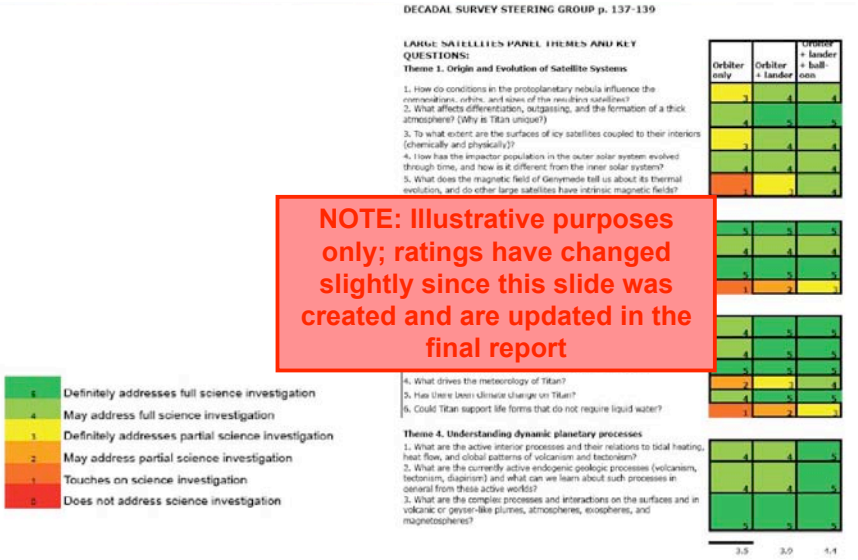
Rating JEO to the Decadal Survey's Steering Group Recommendations

DECADAL SURVEY STEERING GROUP "EUROPA GEOPHYSICAL EXPLORER" SCIENCE	Core JEO	Sweet Spot	Decadal JEO
Determine the presence or absence of an ocean.	5	5	5
Characterize the three-dimensional distribution of any subsurface liquid water and its overlying ice layer.	4	5	5
Understand the formation of surface features, including sites of recent or current activity, and identify candidate landing sites for future lander missions.	3	5	5
Characterize the surface composition, especially compounds of interest to prebiotic chemistry.	3	4	4
Map the distribution of important constituents on the surface.	3	5	5
Characterize the radiation environment in order to reduce the uncertainty for future missions, especially landers.	2	5	5

5	Definitely addresses full science.
4	May address full science.
3	Definitely addresses partial science.
2	May address partial science.
1	Touches on science.
0	Does not address science.



Rating TSSM to the DS Large Satellite Panel Recommendations



Reporting Requirements and Review Process

- **For each mission concept, the NASA-ESA study teams will produce three reports:**
  - NASA Study Report: a technical report prepared by the NASA study team and JSDT and focused on the NASA contribution
  - ESA Assessment Report: a technical report prepared by ESTEC and the JSDT and focused on the ESA contribution
  - NASA-ESA Joint Summary Report: a less technical summary report describing the joint mission and linkages between NASA and ESA contributions
- **NASA and ESA will each conduct independent reviews of the results of their own studies**
  - NASA will conduct a standard independent STMC review of the NASA Study Reports for EJSM and TSSM
    - Site visits are scheduled for Dec. 9-12 and results will be briefed to HQ in Jan. 2009
  - ESA will conduct review of the ESA Assessment reports tailored to the level of technical detail that is available on the ESA contributions
    - Science will be reviewed by ESA's Solar System Working Group
    - Technical feasibility, cost and risk will be independently reviewed by a team of ESA project managers
- **NASA and ESA management will meet in early 2009 to discuss study results of studies and reviews and select a mission**

The Road Ahead

- **NASA and ESA have made tremendous progress but many hurdles remain (budgetary, technical, political)**
- **Keep in mind that OPF is a complex international mission that is currently in pre-phase A**
  - We should expect some changes as we move toward and through Phase A (programmatics, schedules, unforeseen technical issues)
  - But the important things will not change (Europa radiation environment, Titan surface conditions, key science objectives)