

2011 Decadal Survey: Process and Lessons Learned (From a Satellites Perspective)

John Spencer, Southwest Research Institute
Chair, 2011 Decadal Survey
Satellites Panel

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Satellite and Giant Planets Panels

Giant Planets Panel

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HUNTER WAITE, University of Michigan

Philosophy

- Panels set science priorities, based on community input via white papers and town hall meetings
- Panels lead mission studies intended to determine the feasibility and cost of meeting these science goals
 - “Rapid mission architecture” studies, as needed, to evaluate the relative cost, risk, and science value of a range of possible mission architectures
 - E.g., Enceladus flybys, orbiters, sample return
 - Higher-fidelity point studies of specific mission concepts
 - Independent cost evaluation of these concepts
- Panels also evaluate needs for supporting research and facilities (R&A, laboratory studies, ground-based telescopes such as IRTF)
- Panels write chapters for the Decadal report, summarizing the state of knowledge and their recommendations
- Steering committee uses input from panels to set mission priorities, balance of large and small missions, within a constrained budget profile

Process

- Early 2009: Panels and steering committee formed, community white papers solicited
- Satellites panel meetings July 2009, September 2009, April 2010
- September 2009: Community white paper deadline (~250 white papers submitted)
- Fall 2009 – Spring 2010: High-level rapid mission architecture and more in-depth “Team X” studies, including for the Satellites panel
 - Io Observer (New Frontier class)
 - Titan lake lander (New Frontier class)
 - Enceladus orbiter (small Flagship class)
 - Ganymede orbiter (small Flagship class)
 - Input into Giant Planets Panel Uranus orbiter study

Process, Continued

- Jan – July 2010: Decadal chapter written and reviewed
- Spring 2010: Enceladus study results sent to Aerospace Corp for independent cost estimates, along with 2008 Titan Orbiter/Balloon/Lander and Jupiter Europa Orbiter missions (and later, Io Observer)
 - Titan lake lander deemed to be best pursued as part of the Titan Flagship mission
 - Enceladus favored over Ganymede for small Flagship
- June 24th: final CATE evaluations provided by Aerospace (with some subsequent adjustments)
 - Europa and Titan flagship estimates \$1B - \$2B more expensive than earlier independent cost estimates
- July 2nd: Final satellite panel telecon
 - Panels (other than chair and co-chair) excluded from subsequent discussions

Process, Continued

- July – September 2016: Decisions on mission priorities by the steering committee (with some subsequent adjustments)
 - Descoped Mars Sample Return sample collection rover prioritized over Europa Orbiter (budget profile did not have room for both)
 - Further study of descoped Europa missions recommended
 - Titan flagship deferred till following decade
 - Uranus orbiter and probe prioritized over Enceladus orbiter
 - Saturn Probe, Io Observer (NF5 only) included in New Frontiers list
 - Strong endorsement for Cassini extended mission

Summary of Final Mission Cost Estimates

FY2015 dollars, including launch vehicle:

- Saturn Probe: \$1.3B
- Io Observer \$1.4B
- Enceladus Orbiter: \$1.9B
- Uranus Orbiter and Probe (chemical): \$2.7B
- Jupiter Europa Orbiter: \$4.7B
 - Project estimate \$3.4B
- Titan Saturn System Mission: \$6.7B
 - Project estimate \$4.5B

For comparison, Cassini prime mission: \$5.8 B FY2015

(Personal) Recommendations for the Next Decadal

- Think smaller!
 - Large missions have better science/cost ratio but are less likely to happen
- Mission studies and independent cost estimates should be completed soon enough to guide panel recommendations
 - Largest missions have the most influence on the “landscape” and should be highest priority for early completion and costing
- Panels should not be excluded from (indirect) input during final decision process
- Less reliance on high fidelity (but expensive) studies of point mission designs?
 - Fidelity commensurate with the likely fidelity of execution of the Decadal recommendations?