

Materials for Panel Discussion
“Planetary Mission Concept Studies Lessons Learned”
OPAG Meeting at JHU/APL
May 3, 2023

- Kunio M. Sayanagi
- NASA Langley Research Center
- Solicitation from ROSES-2018:
<https://nspires.nasaprs.com/external/solicitations/summary!init.do?sollId=%7b5F9A00FC-0359-E588-D345-287621C7D607%7d&path=open>
- Selections:
<https://nspires.nasaprs.com/external/viewrepositorydocument/cmdocumentid=713170/solicitationId=%7B5F9A00FC-0359-E588-D345-287621C7D607%7D/viewSolicitationDocument=1/PMCS18%20Abstracts.pdf>

CHARISMA: Caroline Herschel high-Angular Resolution Imaging & Spectroscopy Multi-Aperture Telescope

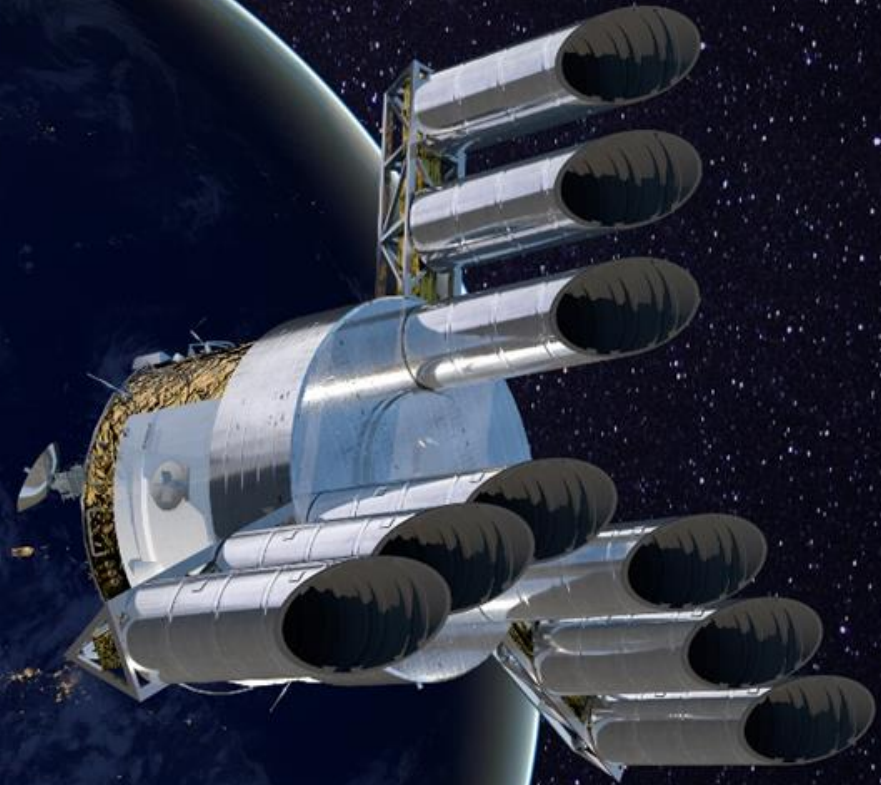
Sayanagi et al. (2019) Mission Concept proposed to NASA Planetary Mission Concept Studies Program

Sayanagi et al., (2020) Mission Concept White Paper Submitted to the 2020 Planetary Science and Astrobiology Decadal Survey

Designed to balance sensitivity and resolution

Notional Architecture

- ~10-meter Effective Aperture
- Equivalent of 2-meter circular aperture area
- Sparse-Aperture Design
- Assembled and/or Deployed in Space
- Designated Design Center: NASA Langley and Goddard
- Proposal was rated “Ex/VG” but not selected.



Recommendations by Recent National Academies Reports

Getting Ready for the Next Planetary Science Decadal Survey (2017):

“Synoptic observations of solar system bodies are limited by two factors, the availability of telescope time and resolution. First, while current (e.g., Hubble Space Telescope and Spitzer Space Telescope) and future (e.g., James Webb Space Telescope and Wide-Field Infrared Space Telescope) space observatories are available to the planetary astronomy community and are not resolution constrained, such assets are in great demand for other astronomical studies. Therefore, the availability of telescope time for long-term monitoring of, for example, Titan, Europa, and Io or for surveys is highly limited. Second, the resolution of such observations is primarily dictated by telescope aperture (the larger the aperture the greater the cost of the mission). Hence, studies to determine the potential scientific return of a space telescope dedicated to the monitoring and studies of solar system bodies that can be achieved within the scope of either the Discovery or the New Frontiers programs would benefit the next planetary science decadal survey.

Visions into Voyages for Planetary Sciences in the Decade 2013-2022: A Midterm Review (2018):

NASA should conduct an assessment of the role and value of space-based astronomy, including newly emerging facilities, for planetary science. This assessment should be finished before the next decadal survey is significantly under way.

NASA Response to the Midterm Review Recommendation (2018):

NASA agrees that it is important to continue to explore the role that space-based astronomy plays in planetary science and will seek community input for an assessment through a mechanism such as a community workshop or study, the planning for which will begin in 2019. Further, NASA recognizes that space-based astronomy has already proven its value for planetary science such as observing the Comet F2 D/1993 Shoemaker-Levy 9 impacts with Jupiter using the HST; discovering approximately fifty of the potentially hazardous asteroids with NEOWISE and characterizing many more with NEOWISE and Spitzer; discovering the New Horizons follow-on target 2014 MU69 in the Kuiper Belt with HST; and assessing the potential hazard to the Mars orbiters posed by Comet C/2013 A1 (Siding Spring) using HST, NEOWISE, Spitzer and Swift.

Solar System Space Telescope Team

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Likes vs Not-Likes

Like:

- Empowered the community to envision future high-priority missions
- Opportunity was accessible; multiple early-career researchers led proposals
- Many proposers saw the opportunity as an entry point to gain mission development experience

Not Like:

- Opportunity was non-recurring one-off program
- Only JPL, APL and GSFC were designated as “Design Laboratories”
- Perhaps the opportunity was not as opened as hoped by proposers (5 of 11 selections were led by PI’s at JPL/APL/GSFC)

How can NASA better prepare for the next decadal?

- Make PMCS a recurring program to identify opportunities well ahead of the next decadal
 - Enable some concepts to be matured ahead of time
- Allow engineering work to be performed at more Design Labs in addition to JPL/APL/GSFC
 - Broaden mission design capabilities at other centers
- (Aside from decadal) Perhaps include development of SIMPLEx and Discovery-class concepts in the call?
 - Make mission development accessible to more proposers
 - Repeating PSDS3 calls would be welcome too!