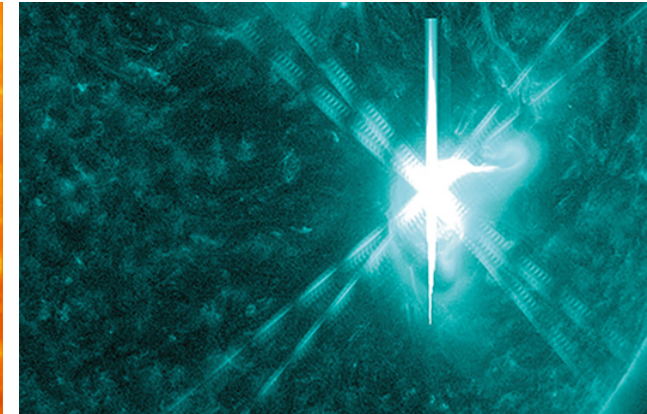
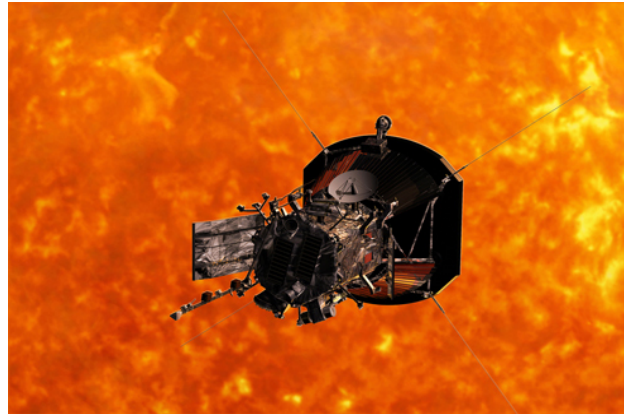
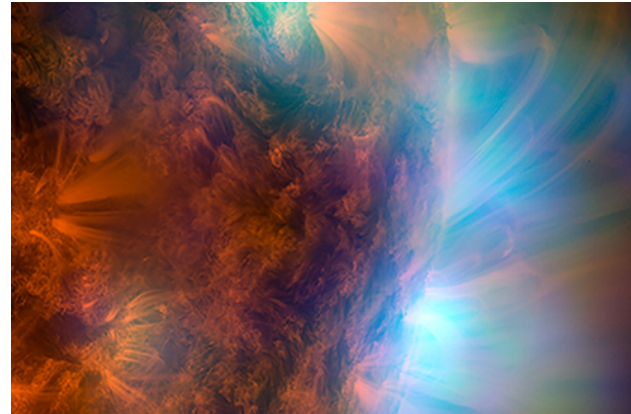
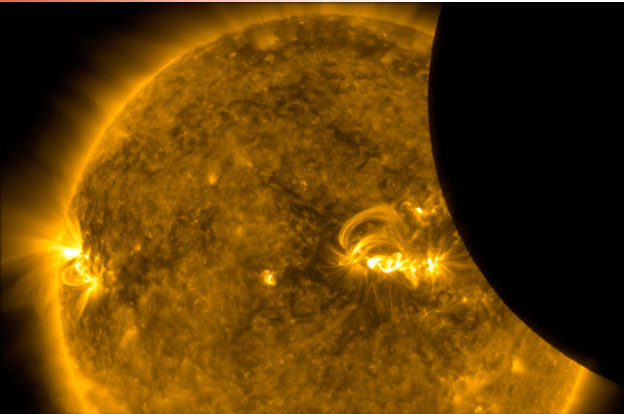


National Aeronautics and
Space Administration



SCIENCE



Heliophysics Division
Next Generation Solar Physics
Mission (NGSPM)

David McKenzie
Heliophysics & Planetary Science Branch
Marshall Space Flight Center

11 September 2018

NGSPM-SOT (Science Objectives Team)

- In June 2016, NASA, JAXA, and ESA chartered a Next Generation Solar Physics Mission (NGSPM) Science Objectives Team (SOT) to study and report on a multilateral solar physics mission concept. The SOT was formed as a means of improving international coordination in solar physics, and in particular developing an NGSPM concept for the next decade. The SOT report was delivered in July 2017.
- Science Recommendation: The study of fundamental physical processes at high spatial and temporal resolution through all temperature regimes of the solar atmosphere.
 - Less complex configurations than larger-scale structures, simpler magnetic topologies
 - Resolution of waves on structures, rather than unresolved ensembles
 - "Resolve the scales on which such mechanisms occur"

NGSPM-SOT Recommendations

- Key required measurements can be met with the following suite of instruments:
 - 1. 0.3" coronal/TR spectrograph
 - 2. 0.2" - 0.6" coronal imager
 - 3. 0.1" - 0.3" chromospheric/photospheric magnetograph/spectrograph
- The SOT recommended these instruments as the highest priority for advancing the science objectives within the next decade. We recommended that the NGSPM consist of the instruments listed above operating simultaneously, in full-Sun orbit(s), with sufficient telemetry coverage.
- We recommended that NGSPM be realized with a single platform, as a JAXA Strategic Large mission with contributions from NASA (SMEX-level), ESA (MoO), and ESA member states. If the single-platform approach is not possible or available, a combination of two or three spacecraft can achieve many of the NGSPM objectives, with some loss of capability and at increased risk.

Solar-C vs Ground based Spectropolarimetry Capability

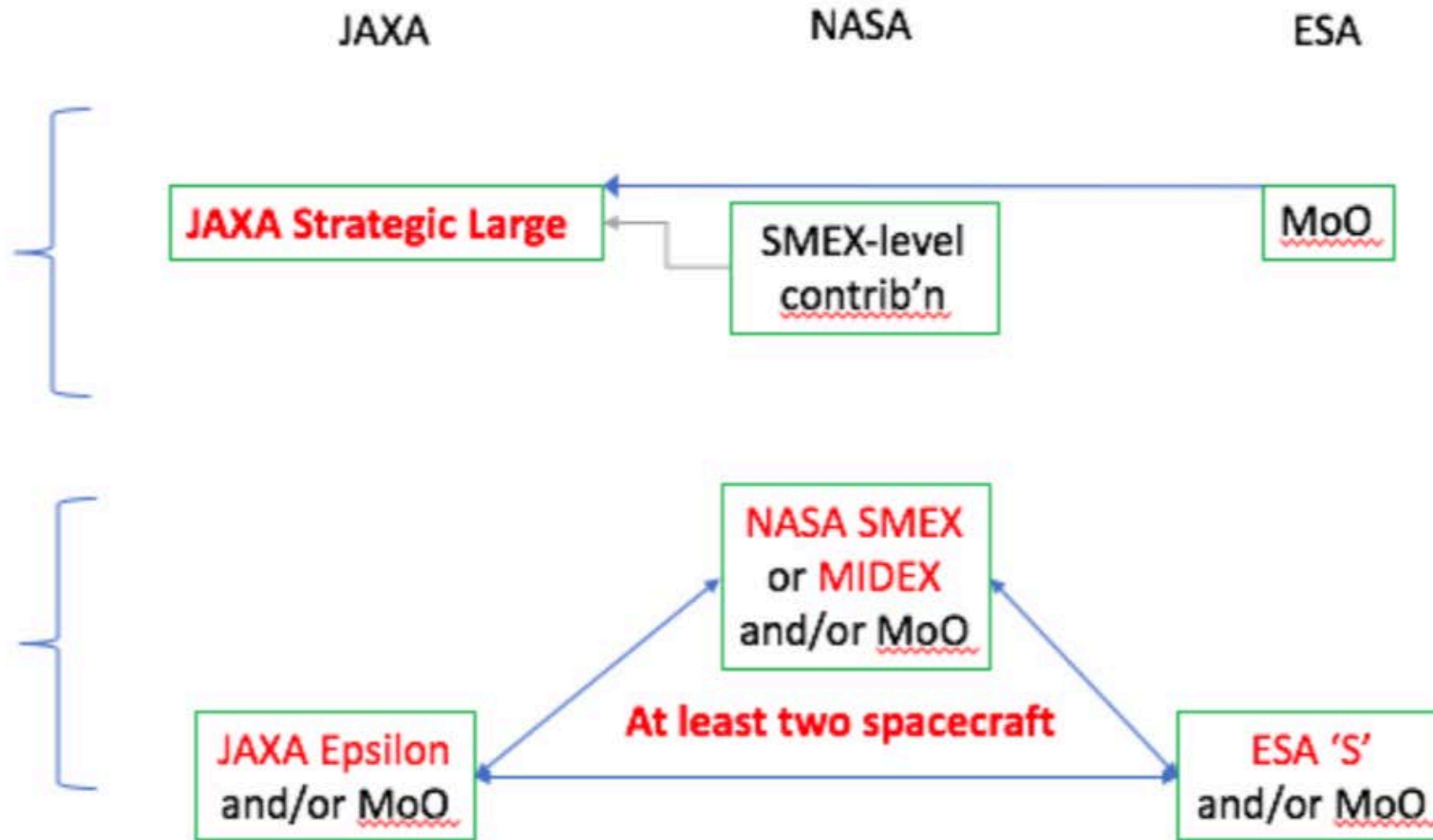


Figure 4-1: Possible configurations for collaborative NGSPM mission

NGSPM – Current Status

- NASA: Ongoing SMEX Competition. 2 missions related to the NGSPM science.
 - JAXA: Ongoing Epsilon Competition.
 - DLR: Internal competition: 1 possible mission related to NGSPM science.
- ⇒ Note, overlapping measurements in both the JAXA and NASA competitions:
- ⇒ EUV imaging spectroscopy;
 - ⇒ X-ray imaging spectroscopy; and
 - ⇒ EUV imaging spectroscopy for the DLR opportunity.
- ⇒ Missing: KEY measurements as described in NGSPM-SOT report requires a 1-meter class chromospheric/photospheric magnetograph/spectrograph. No current proposal for this instrument.

NGSPM – Possible avenues to contribute

- NASA: Options for US to be involved in another Agency's mission
 - Heliophysics Explorer US Participating Investigator (H-USPI) in ROSES. Be a Co-I, work with the team. No hardware contribution. Will be SALMON PEA-*tbd*. *Due dates are TBD.*
 - + - Partner Mission of Opportunity (PMO), part of SALMON-3 PEA-M. Also known as the "Science MoO". Be a Co-I, or even provide some hardware. *Due dates: NOI = 10/01/2018; full proposal = 11/30/2018.*

NGSPM – Future

- Near Term: The NASA, JAXA, DLR missions currently in the proposal evaluation phase all address extremely relevant and important questions in Solar Physics. Note, no combination fulfills the complete NGSPM-SOT report requirements.
 - However advances in ground-based and suborbital observations (e.g., DKIST, Sunrise balloon, Swedish Solar Telescope, etc.), when combined with possible space based investigations could address significant NGSPM science objectives, particularly via focused campaigns.
- Future Options:
 - NASA Heliophysics MDEX opportunities (2019, ~2024): A competitive approach for combining existing and/or new instrument complements toward achieving the necessary science. Large scale mission within a MDEX budget is greatly facilitated by the cost profile of the Falcon 9 – class launch vehicles.
 - 2023 Solar and Space Physics Decadal Survey science prioritization.
 - Coordinated (NASA, JAXA, ESA/member states) mission utilizing the JAXA Large mission opportunity for a launch in the early 2030s.