

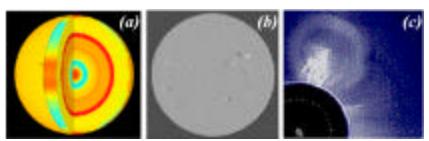
Multi-Angle Solar Sources Explorer

JPL
Goddard Space Flight Center

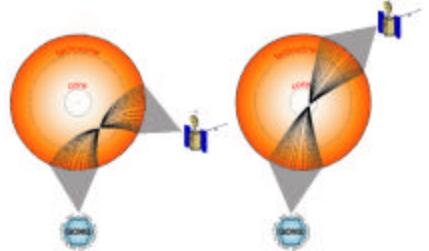
Orbital

Science Themes: Sun-Earth Connection, Living With a Star (Farside Sentinel). MASSÉ's goal is to address key SEC and LWS themes: understanding mechanisms of solar variability and providing a scientific basis for predicting space weather.

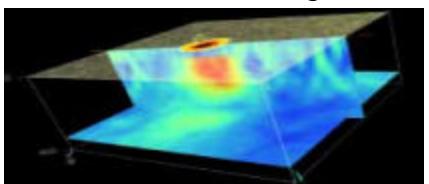
Science Objectives: MASSÉ uses helioseismology to study the solar interior (a), global magnetic imaging to view the photosphere (b), and in situ measurements to study CMEs and solar energetic particles (c), augmenting Earth-side views.



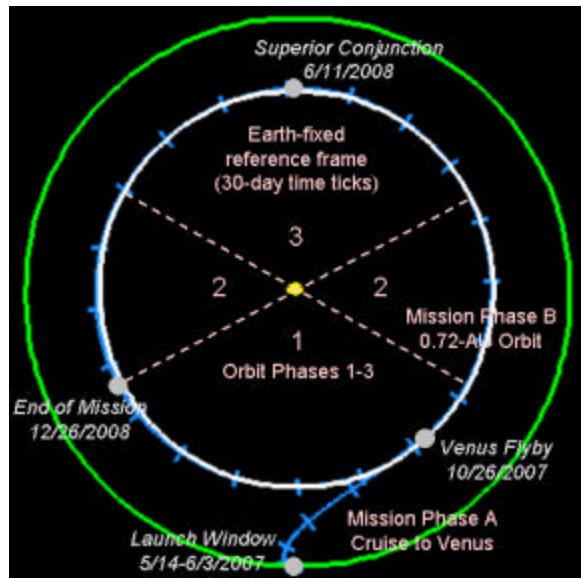
This is the first mission to directly image the Sun's far side and probe the deep interior



The Sun's convection zone and radiative core are probed with helioseismology, while magnetic imaging studies the evolution of active regions

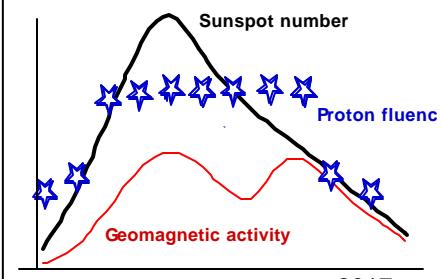
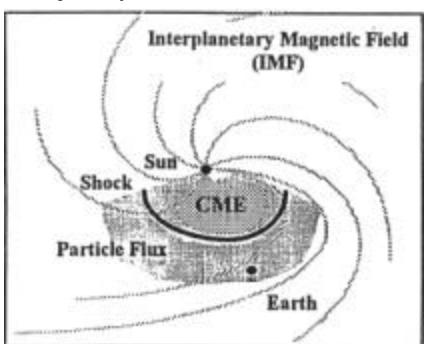
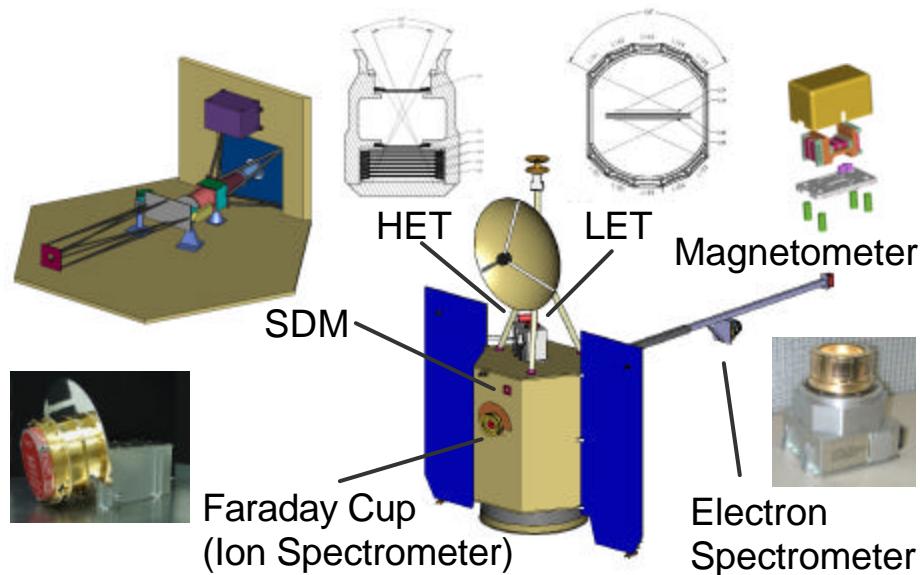


In situ measurements at 0.72 AU reveal the sites and acceleration mechanisms of solar energetic particles, a major space weather hazard



Payload: [developers: JPL, Caltech, and GSFC, respectively]

- * Solar imaging: Simultaneous Doppler-Magnetograph (**SDM**)
- * Energetic particles: Low/High-Energy Telescopes (**HET/LET**)
- * Solar wind: Ion/e⁻ Spectrometers, Magnetometer (**PlasMag**)



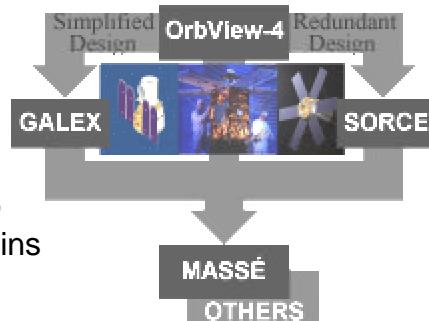
2007 2009 2011 2013 2015 2017
MIDEX 2001: Alexander Ruzmaikin, PI

Multi-Angle Solar Sources Explorer



Spacecraft: [Orbital Sciences]

- * High-heritage LEOStar-2 bus design
- * Meets all instrument requirements
- * Significant component redundancy
- * Comfortable mass, power, propellant, telecom link, and radiation dose margins
- * Designed for 0.72-AU thermal environment
- * 3-axis control, Sun-pointed, stable
- * 250 m/s ΔV
- * Fixed solar arrays
- * Gimbaled HGA
- * X-band, ≥ 52 kbps
- * 24-Gbit SSR
- * Weekly downlinks to DSN



Launch Vehicle:

- * Delta 2326-9.5
- * Reliable, ample mass margin



Science Team

| | | |
|---------------------|---------|---|
| Alexander Ruzmaikin | JPL | Solar Dynamo Lead |
| Ed Stone | Caltech | Energetic Particles Lead |
| John Harvey | NSO | Photospheric Magnetic Fields Lead |
| Keith Ogilvie | GSFC | Solar Wind Plasma and Magnetic Field Lead |
| Roger Ulrich | UCLA | Helioseismology Lead |

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|----------------------|---------------------------|--|
| Mario Acuña | GSFC | Magnetometer |
| Alan Cummings | Caltech | LET and HET |
| Joan Feynman | JPL | Space Weather |
| Bruce Goldstein | JPL | PlasMag |
| David Gough | Cambridge University (UK) | Helioseismology |
| Karen Harvey | SPRC | Collaborator, Photospheric Magnetic Fields |
| Alexander Kosovichev | Stanford | Helioseismology |
| Alan Lazarus | MIT | Faraday Cup |
| Charles Lindsey | SPRC | Helioseismology |
| Dick Mewaldt | Caltech | LET and HET |
| Chee Ng | GSFC | Particle Acceleration |
| Don Reames | GSFC | LET and HET |
| Phil Scherrer | Stanford | Helioseismology |
| Steve Tomczyk | HAO | Helioseismology and SDM |
| Juri Toomre | LASP | Helioseismology |
| Tycho von Rosenvinge | GSFC | LET and HET |
| Mark Wiedenbeck | JPL | LET and HET |
| Gary Zank | UCR | Particle Acceleration |

Mission Design:

Systems Engineering & Management:

P. Penzo and G. Bonfiglio (JPL)

S. Stephens, M. Johnson (JPL), H. Runge (Orbital)