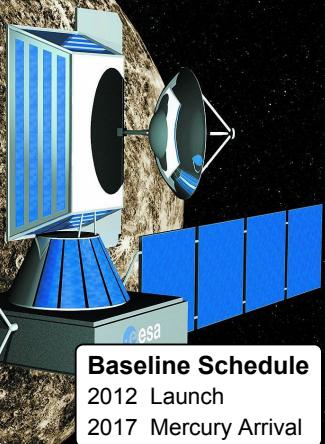


MPO[esa]



Baseline Schedule
2012 Launch
2017 Mercury Arrival

First full-scale Euro-Japan joint mission

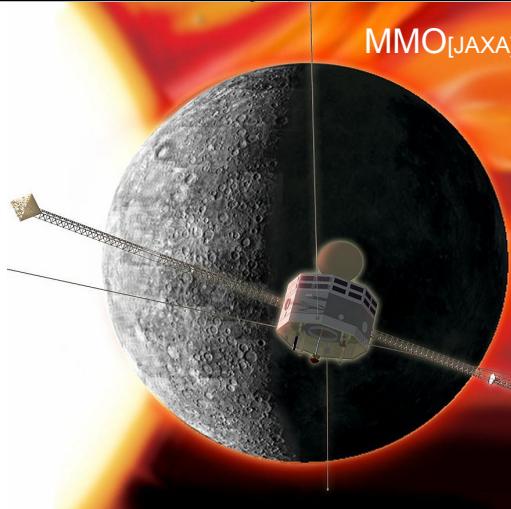
Two orbiters (MPO & MMO) will observe Mercury simultaneously with instruments developed by Euro-Japan joint research teams.

MMO (Mercury Magnetospheric Orbiter)

is a spin-stabilized spacecraft. The MMO will study magnetic field, atmosphere, magnetosphere, and inner interplanetary space. Comparison of magnetic field & Magnetosphere with Earth will provide the new vision for space physics.

MPO (Mercury Planetary Orbiter)

is a three-axis stabilized spacecraft. The MPO will study geology, composition, inner structure and the exosphere. Abnormal structure and composition of Mercury will provide the keys for the planetary formation in the inner solar system.



C. Noshi/RISH, Kyoto Univ.

BepiColombo Science Team

Project Scientist: R. Schulz (ESA/ESTEC)

MPO Science Sub-Group

[Altimeter] BELA (Laser Altimeter)

PI: N. Thomas (U. Bern, Switzerland)

[γ & neutron] MGNS

PI: I. Mitrofanov (IKI, Russia)

[Radio Science] ISA (Accelerometer)

PI: V. Iafolla (CNR/IFSI, Italy)

MORE (Ka-band trans.)

PI: L. Iess (Univ. Rome, Italy)

[X-ray] MIXS (spectrometer)

PI: S. Dunkin (RAL, UK)
Co-PI: K. Muuronen (U. Helsinki, Finland)

SIXS (Solar monitor)

PI: J. Hugelin (Univ. Helsinki, Finland)
Co-PI: M. Grande (RAL, UK)

[UV] PHEBUS (spectrometer)

PI: E. Chassefiere (SAIPSL, France)
Co-PI: S. Okano (Tohoku Univ., Japan)
O. Koralev (IKI, Russia)

[Neutral / Ion particles] SERENA

PI: S. Orsini (CNR-IFSI, Italy)
Co-PI: S. A. Livi (JHU, USA)
S. Barabash (IRF, Sweden)
K. Tokar (SR, Graz, Austria)

[IR] MERTIS-TIS

PI: E.K. Jessberger (U. Munster, Germany)

Complete study of 'unknown planet' near the Sun

The innermost planet Mercury was already known in the ancient days, but it was visited only by the Mariner 10 spacecraft 3 decades ago. Mercury is still "unknown" and provides important keys to the solar system sciences.

History of Inner Solar System

Mercury's high density and composition tell us the initial stage of the innermost solar system.

Origin & Structure of Magnetic Field

Why do planets have magnetic field? Mercury provides the first chance to compare the magnetic field with Earth.

Magnetosphere: Similar or Different?

Mercury's special magnetosphere without thick atmosphere will provide another view of the planetary magnetosphere.

MMO Science Sub-Group

Project Scientist: H. Hayakawa (ISAS/JAXA, Japan)

(Deputy) Y. Kasaba, T. Takashima (ISAS/JAXA, Japan)

MGF Magnetic Field Investigation

(2 sub instruments)
studies magnetic field from the planet, magnetosphere, and interplanetary solar wind.

PI: W. Baumjohann (WFF, Austria)

Co-PI: S. Matsukawa (ISAS/JAXA, Japan)

Members: Japan, Austria, Germany, UK, USA

MPPE Mercury Plasma Particle Experiment

(7 sub-instruments)
studies plasma & neutral particles from the planet, magnetosphere, and interplanetary solar wind.

PI: Y. Saito (ISAS/JAXA, Japan)

Co-PI: J.-J. Sauvage (CESR-CNRS, France), M. Hirahara (Rikkyo Univ., Japan), S. Barabash (IRF, Sweden)

Members: Japan, France, Sweden, UK, Italy, Czech, Belgium, Germany, Switzerland, USA, Taiwan

PWI Plasma Wave Investigation

(7 sub-instruments)
studies electric field, electromagnetic waves, and radio waves from magnetosphere and solar wind.

PI: H. Matsumoto (RISH, Kyoto Univ., Japan)

Co-PI: J.-L. Bougeret (LESIA, France), L. Blomberg (KTH, Sweden), H. Kojima (RISH, Kyoto Univ.), S. Yagihara (Kanazawa Univ., Japan)

Members: Japan, France, Sweden, Norway, Finland, Hungary, USA

MSASI Sodium Atmosphere Spectral Imager

studies thin sodium atmosphere of Mercury.

PI: I. Yoshikawa (Univ. Tokyo, Japan)

Co-PI: O. Koralev (IKI, Russia)

Members: Japan, Russia, Italy, USA

MDM Mercury Dust Monitor

studies dust from the planet and interplanetary & interstellar space.

PI: K. Nagami (Dokkyo Univ., Japan)

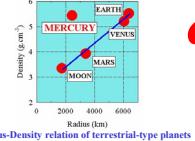
Members: Japan, Germany

Science

Magnetic Field & Internal structure

Internal structure

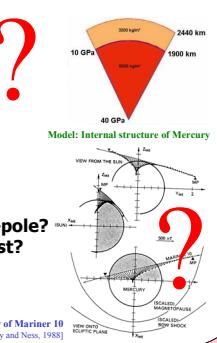
What does internal structure look like?
Why does Mercury have large core?



Magnetic field

Structure: Dipole or Multi-pole?

Origin: Dynamo or Crust?

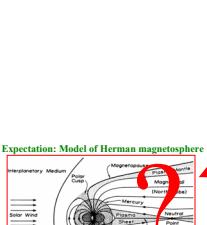


Global view

Is "analogical view" true?

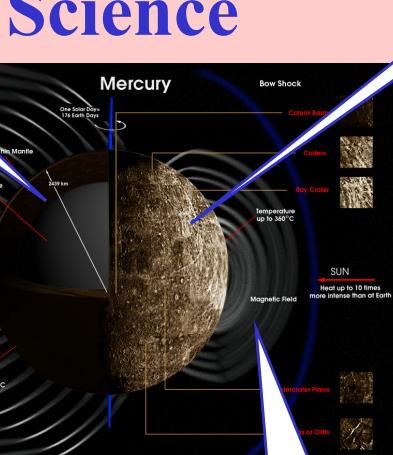
- How is "the small-scale magnetosphere"?

- How is "the current system" without ionosphere?



Energetic process

How is the acceleration / heating process ?
How is the scale effects?

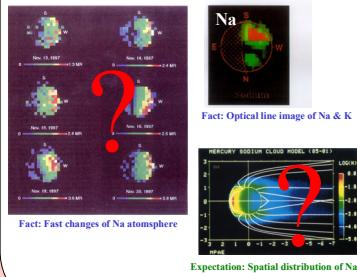


Exosphere

Structure & Composition

What is the origin?

How and why is the fast variability?

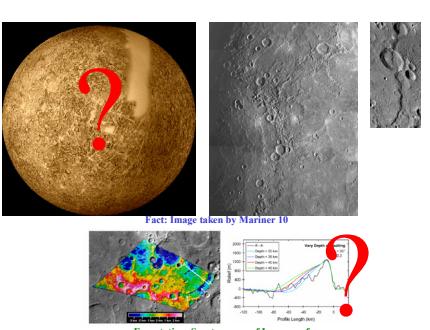


Surface

Structure & Composition

When and how did the crust form?

Unknown region: Ice on the pole? Volcano?



Surface / Exosphere / Magnetosphere / Heliosphere interactions

How are the relationship between them through photon, fields, particles, dusts, etc.?

Mission Scenario

