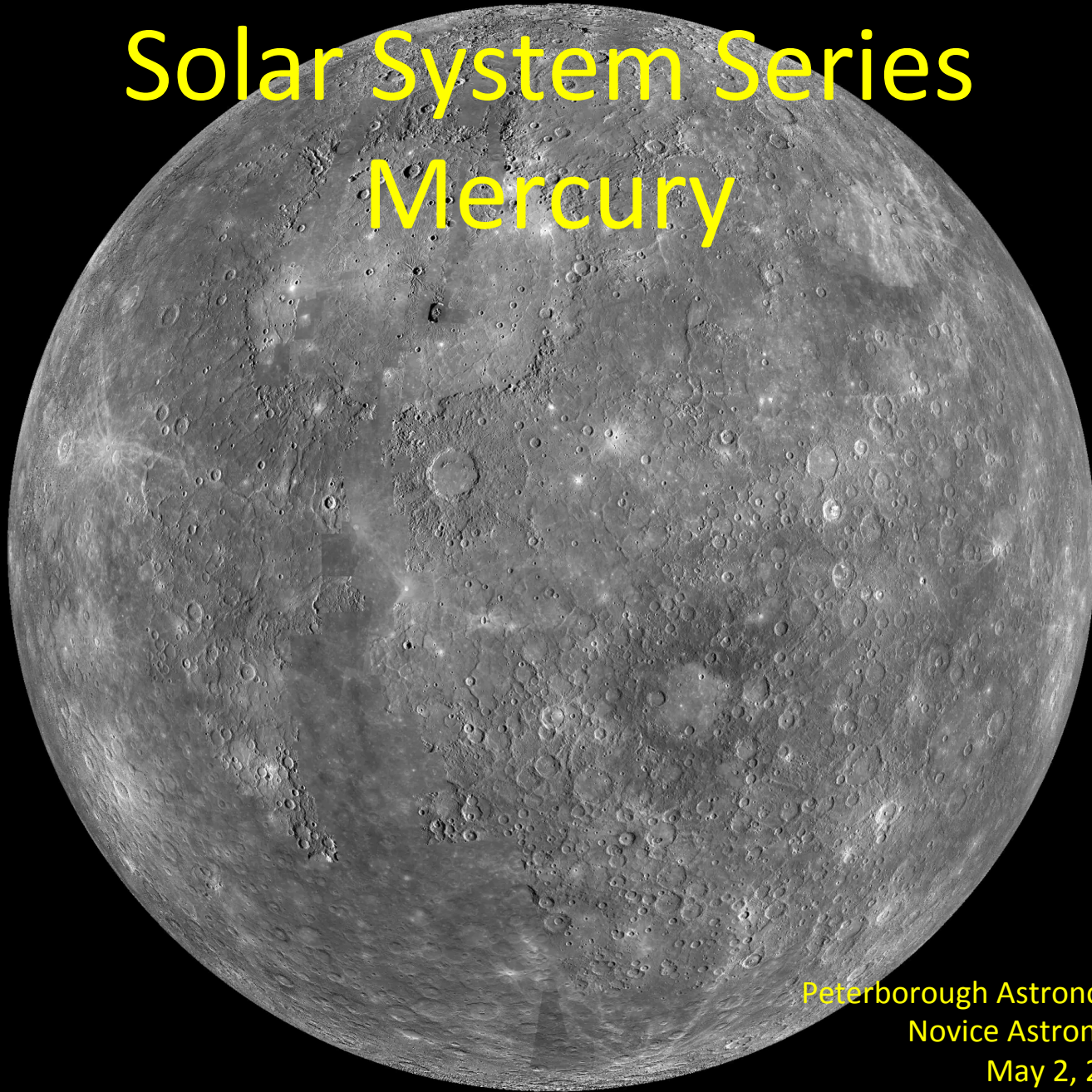


Solar System Series

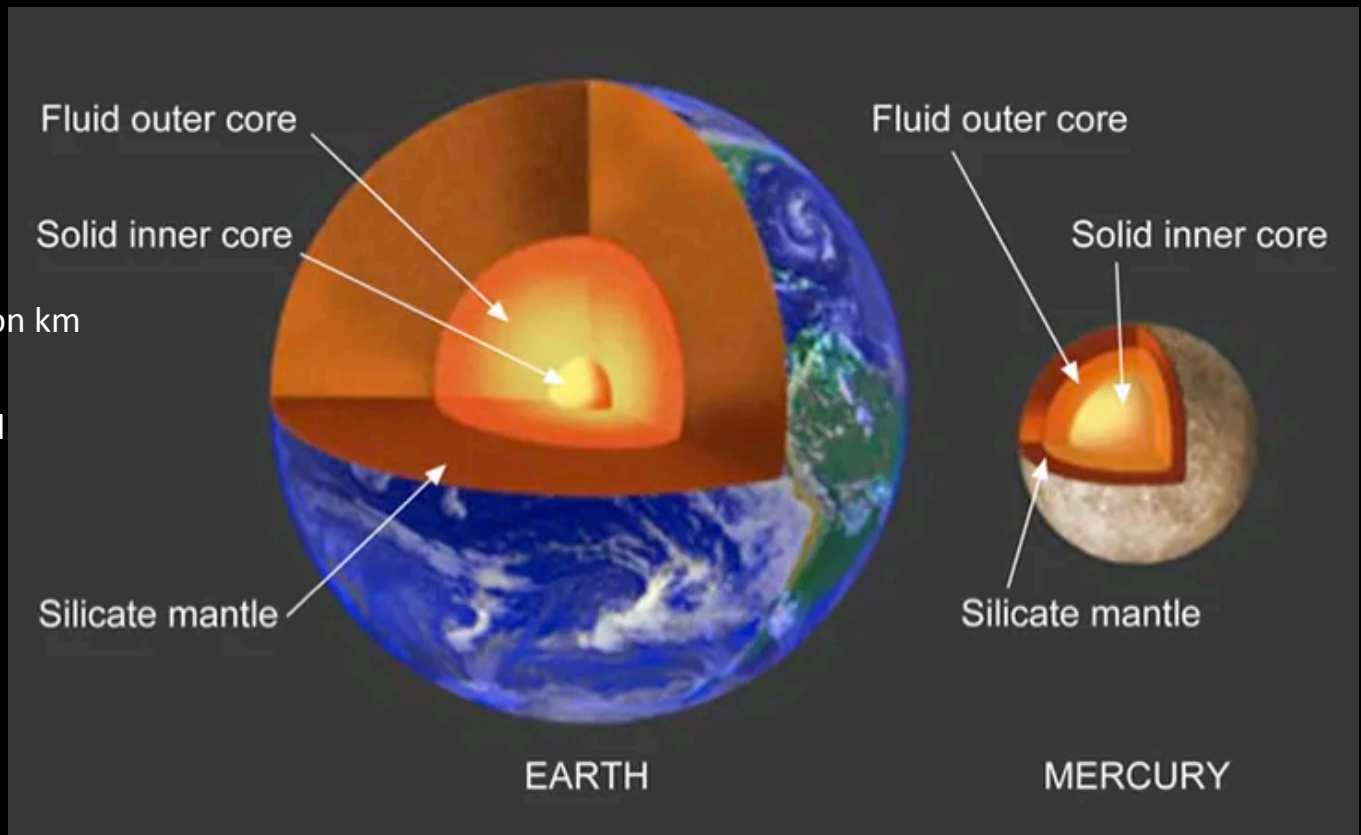
Mercury



Peterborough Astronomical Association
Novice Astronomy Class
May 2, 2025
Brett Hardy

Formation

- 4.5 billion years ago
- Large metallic core (85%) partly molten
- Magnetosphere 1% of Earth's
- 58 million km from Sun
- most eccentric orbit: 47 million km VS 70 million km
- Axial tilt: 0.027°
- Shaped by solar wind and micrometeoroid impacts



A Planet by the Numbers

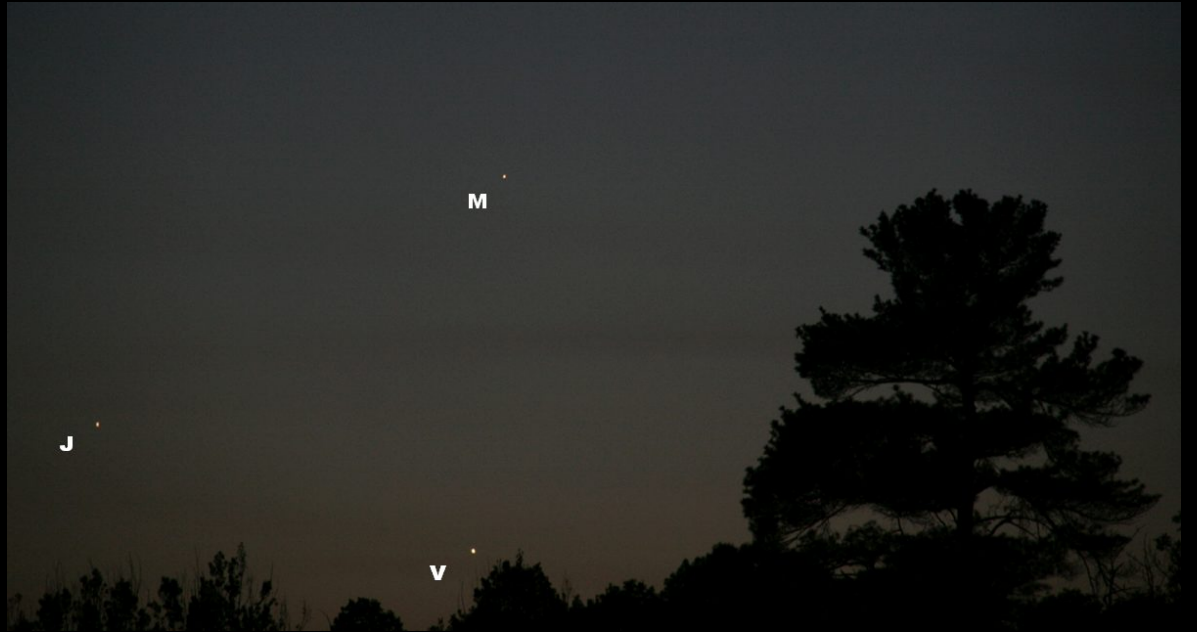
- Smallest planet - slightly larger than Earth's Moon
- Second hottest planet
- Rotates once in 176 Earth days
- Year: 88 Earth days
- Day is 58.65
- Rotates slightly faster than it orbits



Rick Stankiewicz – May 9, 2016

Exploration

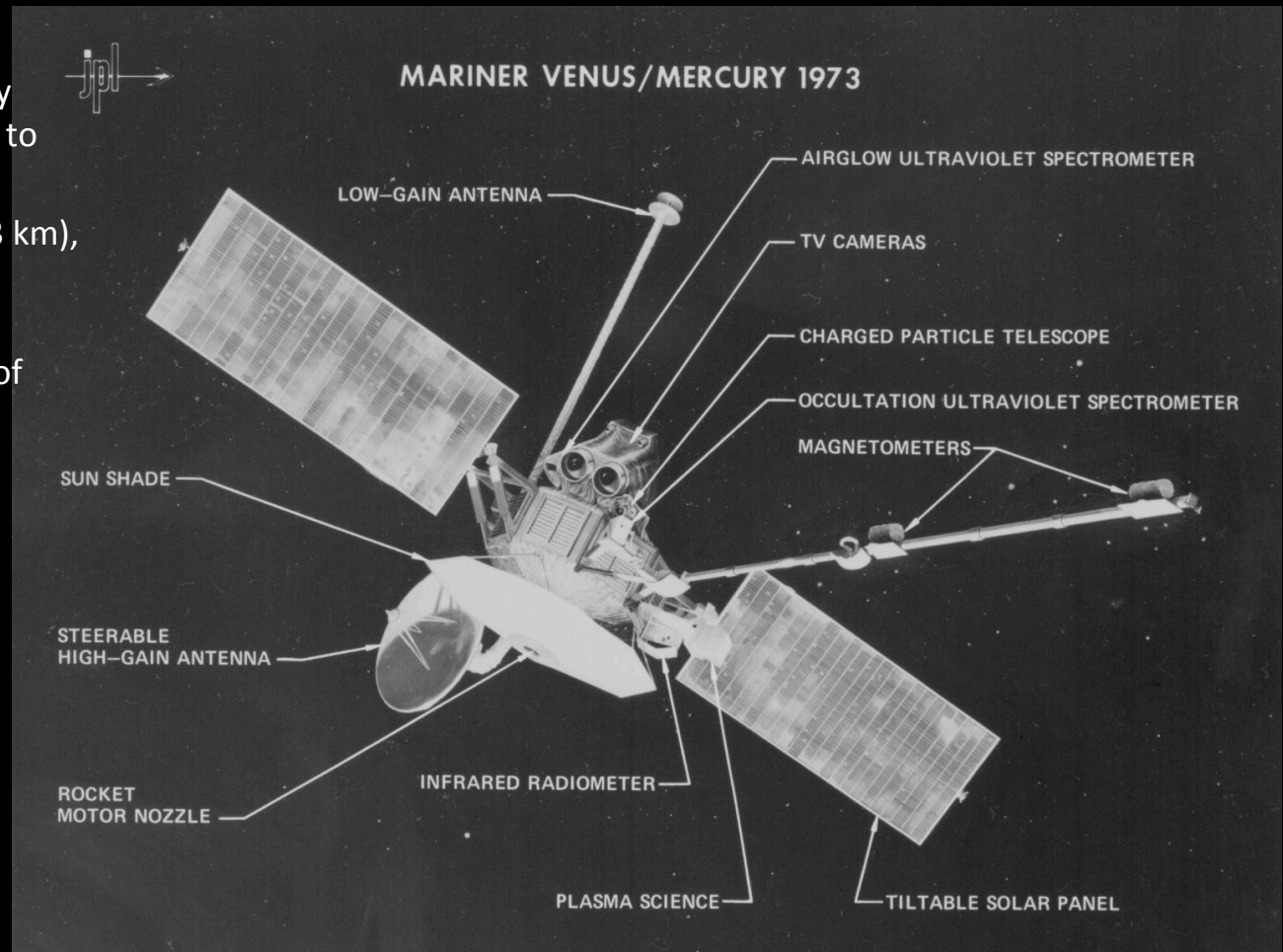
- Least explored terrestrial planet
- Only visited by two spacecraft



Rick Stankiewicz

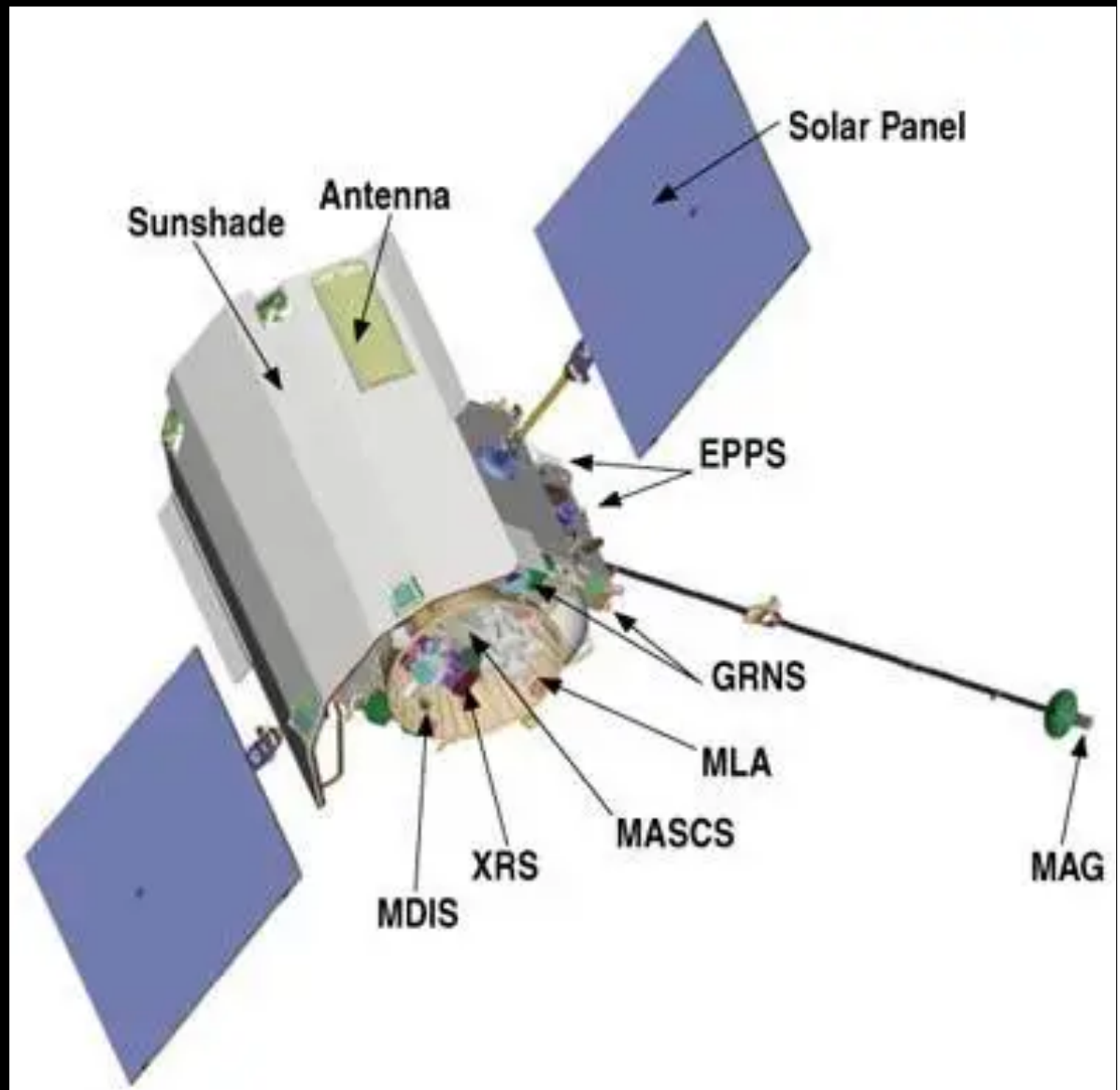
Exploration

- Mariner 10
- Launched November 3, 1973
- Slowing down to be caught by Mercury's orbit different due to weight/fuel and Sun's gravity
- 3 flybys: March 29, 1974 (703 km), September 21 (48,069 km) & March 16, 1975 (327 km)
- Returned over 2,700 images of almost half of its surface



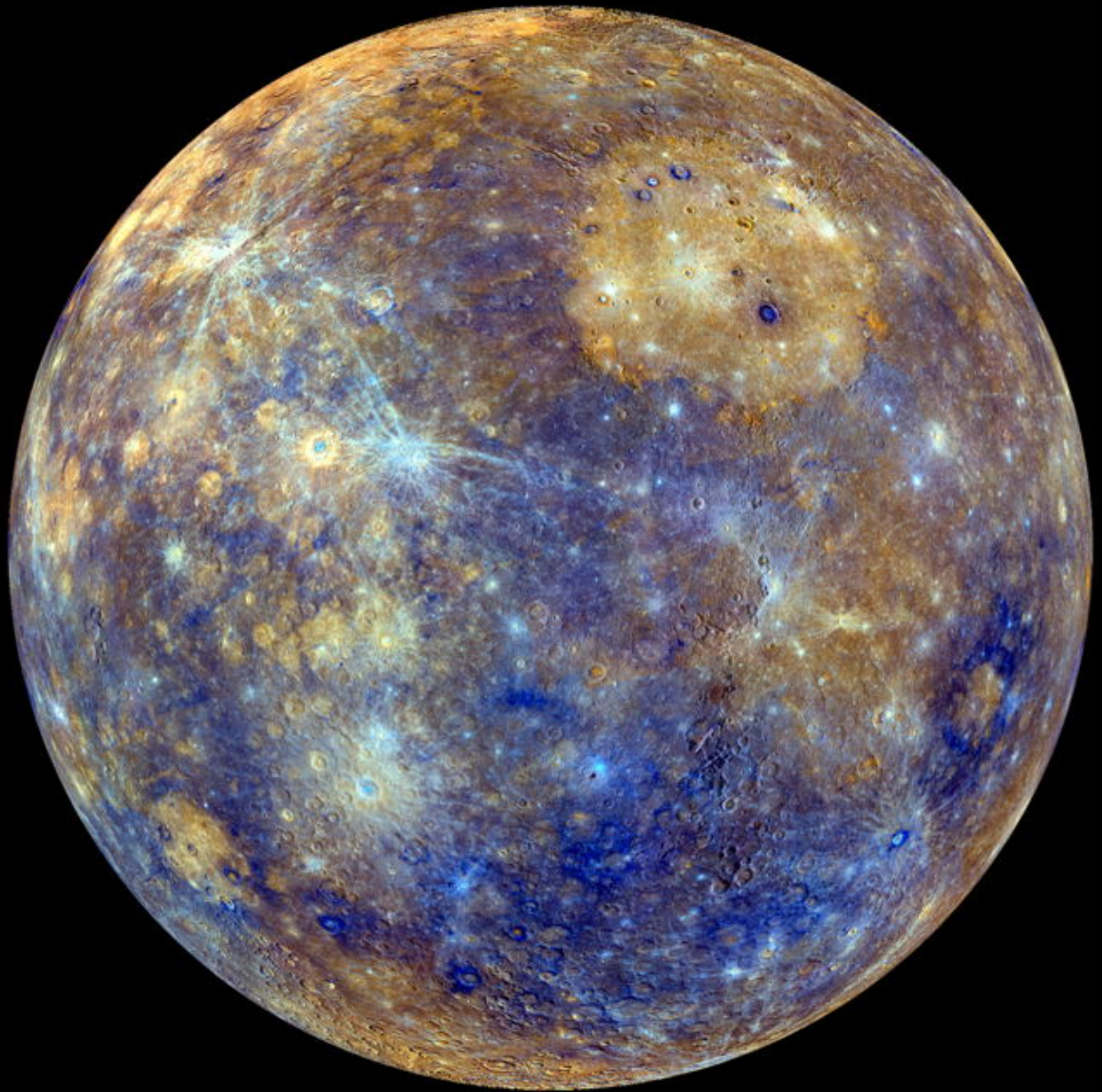
Exploration

- Messenger
- Launched August 3, 2004
- Orbit Sun about 15 times to slow down enough to be caught by Mercury's gravity: past Earth once, Venus twice and Mercury three times – 7.9 billion km and 6.5 years
- Also used solar panels to catch solar radiation to help slow down
- Entered orbit March 11, 2011
- Elliptical orbit: 200 km – 15,000 km
- Even with heat shield, Mercury radiates too much heat – elliptical orbit allows spacecraft to cool down
- Completely mapped surface in high resolution and colour
- Instruments: magnetometer & spectrometers
- Spent 4 years in orbit
- Crashed into planet April 30, 2015



Discoveries

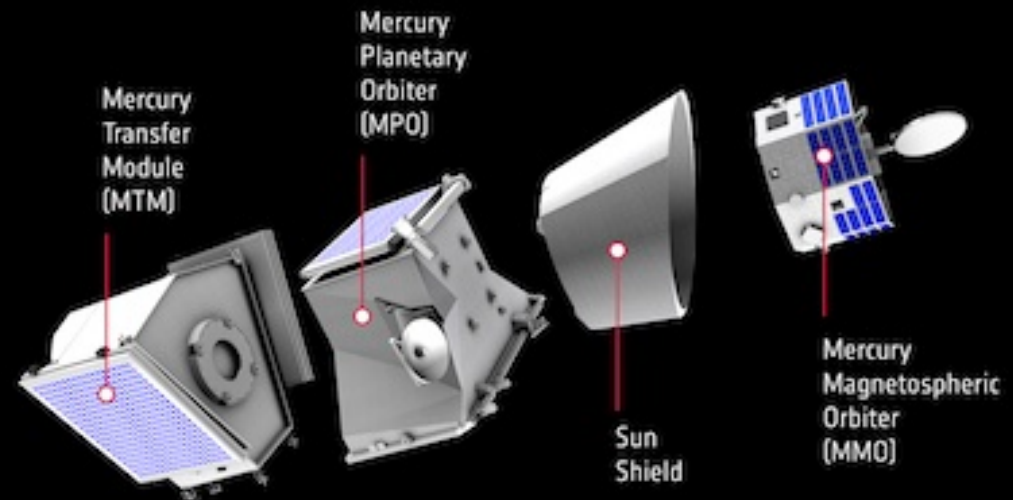
- Thin atmosphere (exosphere) composed of oxygen, sodium, hydrogen, helium and potassium
- Water ice in deep creators at north and south poles
- Second highest density in the solar system (5.427 g/cm^3) behind Earth (5.515 g/cm^3)
- Diameter: 4,878 km
- Circumference: 15,000 km
- Temperature ranges: low – 173° C – 426° C
- Poles never above – 93° C
- Ancient dried lava flows, water vapour in atmosphere, hollows all over surface unique to Mercury – sublimation of volatiles ?
- An active geological process
- Craters from massive impacts
- Dark grey colouration indicates high concentrations of graphite
- Not monochrome



NASA: Messenger space probe

Future Exploration

- ESA-JAXA BepiColombo mission launched October 20, 2018 and arrives November 2026
- Will study the internal structure, nature of the surface, evolution of geologic features and solar wind impact



Observation Opportunities

- March was a great opportunity just after sunset
- April 21 greatest elongation
- Morning apparition before sunrise
- August 20 - morning
- Mid-November - morning



Rick Stankiewicz

Novice Astronomy Class

Stellarium 101

June 6, 2025

