Survey of the Solar System

The Sun

Giant Planets

Terrestrial Planets

Minor Planets

Satellite/Ring Systems
Mercury

Mass ~ 3.3 x 10^{23} kg
Radius ~ 2440 km
Orbit ~ 0.39 AU
Rotation ~ 58.6 days

Terrestrial Planets

New false color image from the Messenger mission
Terrestrial Planets

**Mercury**
Rocky surface → 4-5x higher density than giant planets, iron rich
Diffuse ‘heavy’ Atmosphere
No satellites
Internal magnetic field
Slow rotation
No Rings
Aurora ??

Messenger image of volcanic vent
Venus

- Mass: $\approx 4.9 \times 10^{24}$ kg
- Radius: $\approx 6052$ km
- Orbit: $\approx .72$ AU
- Rotation: $\approx -243$ days

Recent false color image of Venus’ surface structure from Magellan

From the Pioneer Venus Orbiter, 1979
Terrestrial Planets

Venus

Dense dynamic atmosphere, mostly CO$_2$ (~96%)
Strongest Greenhouse effect in the S.S. (733 K)
No satellites
No magnetic field
Retrograde rotation
No Rings
Aurora ??

Venera 14
Terrestrial Planets

Earth

Mass \( \sim 6.0 \times 10^{24} \) kg
Radius \( \sim 6371 \) km
Orbit \( \sim 1 \) AU
Rotation \( \sim 23.9 \) hr
Terrestrial Planets

Earth
Composed mostly of iron, oxygen & silicon by mass
Atmosphere is N₂ & O₂ (78%, 21%), dynamic
Internal magnetic field
1 Satellite: Moon
No Rings
Aurora

Aurora observed from the space shuttle, and cloud vortices over Madeira Island from MODIS.
Terrestrial Planets

Mars

Mass \( \sim 6.4 \times 10^{23} \) kg

Radius \( \sim 3390 \) km

Orbit \( \sim 1.5 \) AU

Rotation \( \sim 24.6 \) hrs

Viking mosaic of Olympus Mons

Slope flows on crater wall
Terrestrial Planets

Mars
Dynamic surface, extreme geologic features
Thin atmosphere (~7 mbar)
Active weather/seasons
2 satellites
Remnant magnetic field
No rings
Aurora
History of water

Dust devil viewed by Spirit
MRO: polar avalanche seen from orbit
Terrestrial Planets

Mars

*Spirit dust devil movie*
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Pluto

NH LORRI OPNAV CAMPAIGN 1
2014-07-19 02:30:00 UTC
Distance to Pluto: 429375336 Km
(Proper Motion)
Pluto

Pluto • July 7, 2012
HST WFC3/UVIS F350LP

Nix
Styx
Hydra
Pluto
Charon
Kerberos

50,000 miles
80,500 kilometers

N
E
What Happened to Pluto?

A planet as defined in 2006 by the IAU (International Astronomical Union):

1. Orbits the sun
2. Is large enough to have become round due to the force of its own gravity
3. Is not a satellite
4. Must dominate the neighborhood around its orbit (cleared its orbital path)
What Happened to Pluto?

Recognized planets

Year