

Introduction: Curiosity

- The Terrestrial Planets
 - Mercury, Venus, Earth, Mars
 - Orbit closest to the Sun
 - Made of rocky material
 - Large core/atmosphere ratio
- The Jovian Planets
 - Jupiter, Saturn, Uranus (1781), Neptune (1846)
 - Orbit the sun beyond the frost line
 - Small core/atmosphere ratio
 - Comprised mostly of hydrogen and helium
 - Uranus and Neptune discovered “recently”
- Mars vs. Earth

Planet	Earth	Mars
Radius (km)	6378	3397
Mass (Earth Units)	1	0.107
Distance from Sun (AU)	1	1.5
Orbital Period (Earth years)	1	1.88
Atmosphere	Nitrogen and oxygen	Carbon dioxide
Clouds, hazes	Water, pollution	Water + carbon dioxide, dust
Surface Temp (F)	59 degrees	-58 degrees
Winds	Winds, rain, snow	Winds, dust storms

- 1877: **Schiaparelli** observed a network of linear markings that he termed “canali,” or grooves
 - translated into English → canals

- **Percival Lowell** → mars is drying up, so “Martians” have to transport water from wet poles to arid equatorial deserts
 - Note that the canals were just an illusion
 - Orsen Welles—“War of the Worlds” radio broadcast
- Evidence of past water on mars
- Mars has large equatorial canyons
 - They are tectonic in origin (i.e., huge cracks), and not due to water
 - Note, however, that the floors of the canyons may have been eroded by water
- Evidence of condensation
- Rocks = iron oxide
 - Note the blue sky (like Earth)
- Martian Sunrise
- Taken with the rover spirit on May 19, 2006 with 3 color filters
 - The sun is 2/3 the angular size as seen from earth
- Mars Science Lab (Curiosity Rover)
- Launched November 26, 2011; total journey time was 8.5 months
 - Mission: *to search areas of Mars for past or present conditions favorable for life, and conditions capable of preserving a record of life*
 - Instruments onboard to hunt for organic compounds and to monitor weather
 - Weight = 1 ton rover
 - Power source = 10.6 lbs of radioactive plutonium
 - landing site: evidence of a past or present habitable environment
 - o the center of the crater contains a mound comprised of different layers of material (clay, sulfur and oxygen)
 - o the mound may have formed sedimentary deposits from a lakebed
 - o channels in the mound and crater waters likely carved by flowing water
 - o landing target area = 12 miles long

- landing method - jet pack and tether system
- the spacecraft
 - rover mass = 899 kg (1982 lbs)
 - spacecraft mass = 3893 kg (8464 lbs)
 - launch mass = 531000 kg (1.17 million lbs)
- communications
 - curiosity uses satellites orbiting mars to relay data to earth
- NASA is good at advertising
- Other good targets for exploration
 - Europa—moon orbiting Jupiter
 - Similar to the earth in having a surface covered mostly in water and ice
 - Titan—moon orbiting Saturn
 - Similar to the earth in having an atmosphere comprise primarily of nitrogen and a surface pressure of ~1 atm
 - The atmosphere has the right composition to form amino acids (the chief component of proteins)
 - The surface has dendritic structures and a “shoreline”
- Exploring the solar system
 - There have been many robotic missions to the planets in our solar system
 - Much of the material in this class is based on data sent back to earth by these missions