

Topics

- ◆ today, Venus, Chapter 9
- ◆ next time Mars, Chapter 9
- ◆ Course grades to be posted on web site Tuesday or Wednesday
 - Grades there now are from Oct 15
- ◆ **Optional extra credit**
 - How should NASA be governed?
 - Up to 5 points extra credit
 - Due on web site before Saturday Nov 24
 - Will be posted after 5PM today

Mars* - The God of War

- ◆ **Diameter** 4200 mi, 1/2 Earth
- ◆ **Density** 3.9x water (less iron)
- ◆ **Day** 24hr 37min
- ◆ **Summary:** Earth-like planet within our zone of life

*text pp Chap 9

The View from Earth

- ◆ surface mostly orange
- ◆ dark areas come and go
- ◆ ice caps near poles
 - large in winter, small in summer
- ◆ “canals” visible to some
- ◆ two small moons:
 - Phobos (“fear”), Deimos (“panic”)

Topography of Mars

- ◆ **Southern Hemisphere**
 - heavily cratered terrain
 - oldest terrain on Mars, age similar to lunar highlands
- ◆ **Northern Plains**
 - very few craters
 - so, younger

A planet of tectonic extremes

- ◆ **Tharsis Bulge**
 - volcanic continent near equator
 - » size of North America
 - huge shield volcanoes
 - » largest 15 miles high
 - » active within last half billion years
- ◆ **Valley of the Mariners**
 - large crack in lithosphere
 - 4000 miles long, 5 miles deep, 75 miles wide
 - attempt to form plates, but planet cooled before well developed

Mars’ Climate Today

- ◆ rotation axis tilted 25°, so seasons like Earth
- ◆ low temp because little greenhouse effect
 - atmosphere mostly CO₂, 100x thinner than Earth's
- ◆ Mars' orbit is more eccentric than Earth's
 - weather also depends on distance from sun
- ◆ **surface temperature: -200F to 70F**
 - depends on season, distance from sun

CO₂ and water on Mars

- ◆ **most CO₂ is dry ice**
 - frozen (dry ice) in polar caps during winter, vapor during summer
 - CO₂ goes from solid to gas at -110F, so called "dry ice"
- ◆ **most water is now permafrost underground**
 - liquid water boils because of low atmospheric pressure
 - could exist underground as permafrost
 - "flash floods" occur near volcanoes and impact craters, due to permafrost melting

Mars' Middle Period

- ◆ **near equator:**
 - networks of channels with tributaries
 - long rivers with switchbacks
 - due to rainfall from denser atmosphere
- ◆ **Northern Plains, Valley of the Mariners, once covered by deep ocean**
- ◆ **Mars was once warm and wet**
 - had Earth-like atmosphere when volcanoes were active
- ◆ **duration of middle period, why it ended, now unknown**