

29:52 Exploration of the Solar System
Class Notes for March 28, 2008
Robot Exploration of Mars II

Key Features of the Martian Surface

Observations from orbiting spacecraft show the following interesting characteristics of Mars.

1. The north-south asymmetry, i.e. a major difference in the terrain in the north and south hemispheres.
2. The presence of large shield volcanos of the surface. Look at the figure in the book comparing the largest of the Martian volcanos, Olympus Mons, with the volcanos of the Hawaiian islands.
3. Valles Marineris . . . a huge crack in the crust of Mars.

The New “Canals of Mars”

Probably the most interesting discovery by spacecraft in the 1970s, and extended by later spacecraft missions, has been that of water channels on Mars. These may be referred to as the “news canals of Mars”, in contrast to the nonexistent ones discussed generations ago. There are two types of water channels.

- Valley Networks, or “runoff channels” which are roughly comparable in size to river beds on Earth. They are mostly found in the oldest terrain on Mars, which indicates that these rivers (if that is what they are) flowed billions of years ago.
- Outflow channels. These are huge outflow plains, unlike anything seen on Earth. Scientists estimate that the flowrates in some of the large outflow channels would be have ten thousand times the flow rate of the Mississippi. We still don’t know what was happening when these channels formed. Outflow channels were produced over a longer period of time in the geological history of Mars, from very early (around 4 Gyr ago) to as recently as 2 Gyr ago, or even more recently. Furthermore, there is some evidence that repeated flows occurred in the same channel.

The existence of flow channels of both sorts suggests (although does not prove) that the atmosphere of Mars early in the history of the solar system was denser (i.e. had higher pressure and produced warmer surface conditions) than is the case now.