Red Giant
Betelgeuse

Size of the star
Orbit of Earth
Orbit of Jupiter
Egg Nebula
Hourglass Nebula
Eagle Nebula
Helix Nebula
Helix Nebula – cometary knots
Orion Nebula
Protoplanetary Disks
Orion Nebula

HST • WFPC2

PRC95-45b • ST ScI OPO • November 20, 1995
M. J. McCaughrean (MPIA), C. R. O’Dell (Rice University), NASA
Disk of gas and dust spinning around young Sun

Dust grains

Dust grains clump into planetesimals

Planetesimals collide and collect into planets
FIGURE OV4.6
Heat from the young Sun prevented ice from condensing in the inner parts of the Solar Nebula. The planetesimals—and ultimately the planets—that formed there are therefore composed mainly of rock and iron.
View looking down from above the Sun

View looking from the edge of the solar system

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STRUCTURE OF MERCURY
MARS
Mars Rovers: Spirit and Opportunity

- Mars Exploration Rover

![Mars Rover Diagram](image)

- Navcam
- Pancam
- Mini-TES
- Low Gain Antenna
- High Gain Antenna
- Solar Panels
- APXS
- RAT
- MB
- MI
- 25cm high wheels
- Instrument Deployment Device w/ 5 Degrees of Freedom
Opportunity lands in Eagle Crater

22 m diameter, 3 m deep
Sol 14 Layering and In-Place Spherules
Cross Bedding Indicates Surface Water

Last Chance

Crossbeds
Heat Shield Impact Site

Flank Piece

Debris field

Rippled Plains

Impact site
Spirit Landed in Gusev Crater

“Deltaic Deposits”

Spirit landing site
Mars Once Had Flowing Water
....and this is what Gusev Crater may have used to look like.
Spirit Rover Tracks Seen From Orbit

Backshell
Parachute
Heat Shield Impact
Bonneville Crater
Rover
Track
Lander
Mazatzal

100 m
Evidence of Weathering

Broken Towers
Thanksgiving Pan (Looking Back)
MT. EVEREST, Earth

NOTE: OLYMPUS MCNS IS ACTUALLY THREE TIMES AS TALL AS MT. EVEREST!

OLYMPUS MCNS, Mars

Arizona, USA
ASTEROIDS

Gaspra
(Asteroid)

Deimos
(Moon)

Phobos
(Moon)
Io (a moon of Jupiter)
Europa (a moon of Jupiter)
Saturn
Saturn as seen from Titan?
Titan (a moon of Saturn)
A 360-deg panoramic view of the terrain around Huygens' landing site. The white streaks might be a ground 'fog' of methane or ethane vapor.

The temperature of the landing site itself was minus 291 degrees F. The soil has the consistency of wet sand or clay and is covered by a thin crust ... of something.
From an altitude of 16 km, Huygens photographed these drainage channels leading to a shoreline.
URANUS
NEPTUNE

- Upper atmosphere, cloud tops
- Atmosphere (hydrogen, helium, methane gas)
- Mantle (water, ammonia, methane ices)
- Core (rock, ice)
Neptune's moon Triton. The surface is so cold (minus -391°F) that it is mainly nitrogen ice.
Pluto and its satellite, Charon
PLUTO