Titan

First image
http://photojournal.jpl.nasa.gov/jpeg/PIA06081.jpg
optical image from Cassini; combination of 3 filters
- 13.1 million km from surface
- 79 km per pixel

Background.
- largest of Saturn's moons
- discovered by Christiaan Huygens (Dutch) in 1655.
- believed to be largest satellite in the solar system, but it was discovered that Ganymede is larger (Titan's atmosphere made it seem larger than it is)
- about half water ice and half rocky material
- rocky core w/several layers of different phases of ice? liquid water underneath crust?
- only known satellite w/significant atmosphere; 1.5 atm. Mostly nitrogen (like Earth). Trace amounts of organic compounds. Upper atmosphere = methane, which produces smog similar to that on Earth.
- surface temperature = -290 deg F; no liquid water at surface.

Voyager I mission:
- came within 4000 km of Titan's surface
- discovered smoggy atmosphere

Hubble Space Telescope
- near infrared images show bright and dark regions on surface.

Cassini mission (current status)
- launched in October 1997
- began tour of Saturn in July

Main image
http://photojournal.jpl.nasa.gov/jpeg/PIA06993.jpg
- Radar image (from Cassini); one of first ever
    - 150 km square in Northern hemisphere
    - no visual range photos yet
- 2500 km above surface
- dark areas = smooth; radar-absorbing materials; or sloped away from direction of illumination
- large bright feature; probably topographically high compared to surrounding region
- possible cause: cryovolcanic flow. Water-rich liquid wells up from Titan's warmer interior; like ridge spreading perhaps?

Future of Cassini mission
- Huygens probe will be released on Dec 25, 2004 and take 21 days to reach Titan's surface.

- will sample and study Titan's atmosphere during descent and take photos
- will collect data and images on the surface, though not for very long (at least 3 minutes on surface and possibly up to 30 or more)

Animation:
http://news.bbc.co.uk/1/shared/spl/hi/sci_nat/04/cassini/html/titan.stm

Open issues:
- surface liquids?
- hot interior?
- reason for dense atmosphere?
- possiblity for life? Organic compounds and possible liquid environment, but really cold...