

Mars Express



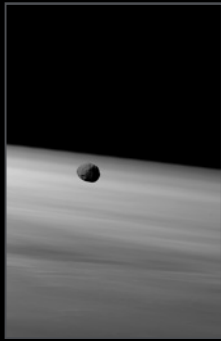
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European Space Agency

ESA/DLR/FU Berlin (G. Neukum)

- **Launch in June 2003, MOI in December 2003**
- ✓ **9500 orbits completed**
- ✓ **The mission is healthy, the operations are smooth**
- ✓ **530 peer-reviewed publications**
- ✓ **The archive is regularly populated and being used**
- ✓ **Operations until 2014**



Mars Express: A broad range of scientific investigations



Study of the Phobos and Deimos moons: Mass, volume and density determination, subsurface structure, surface characterization, interaction with the solar wind, ephemerids, origin.

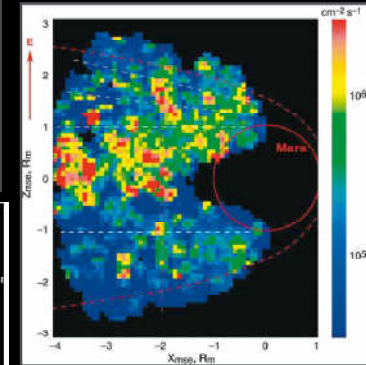
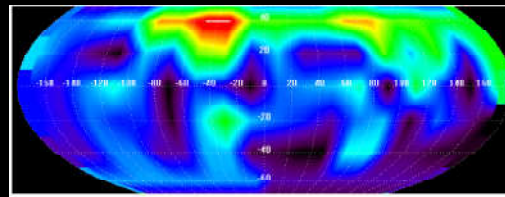
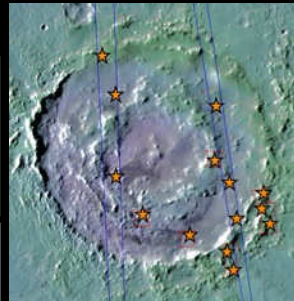
Upper atmosphere: Interaction with the solar wind, escape, exosphere, thermosphere, ionosphere, airglow and aurora

Investigation of gravity anomalies, and time variations of the gravity field

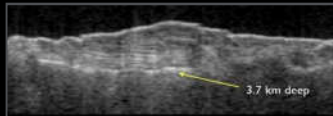
Surface: geology, composition, climate

Atmospheric science: composition, density, dynamics, thermal, clouds, climate

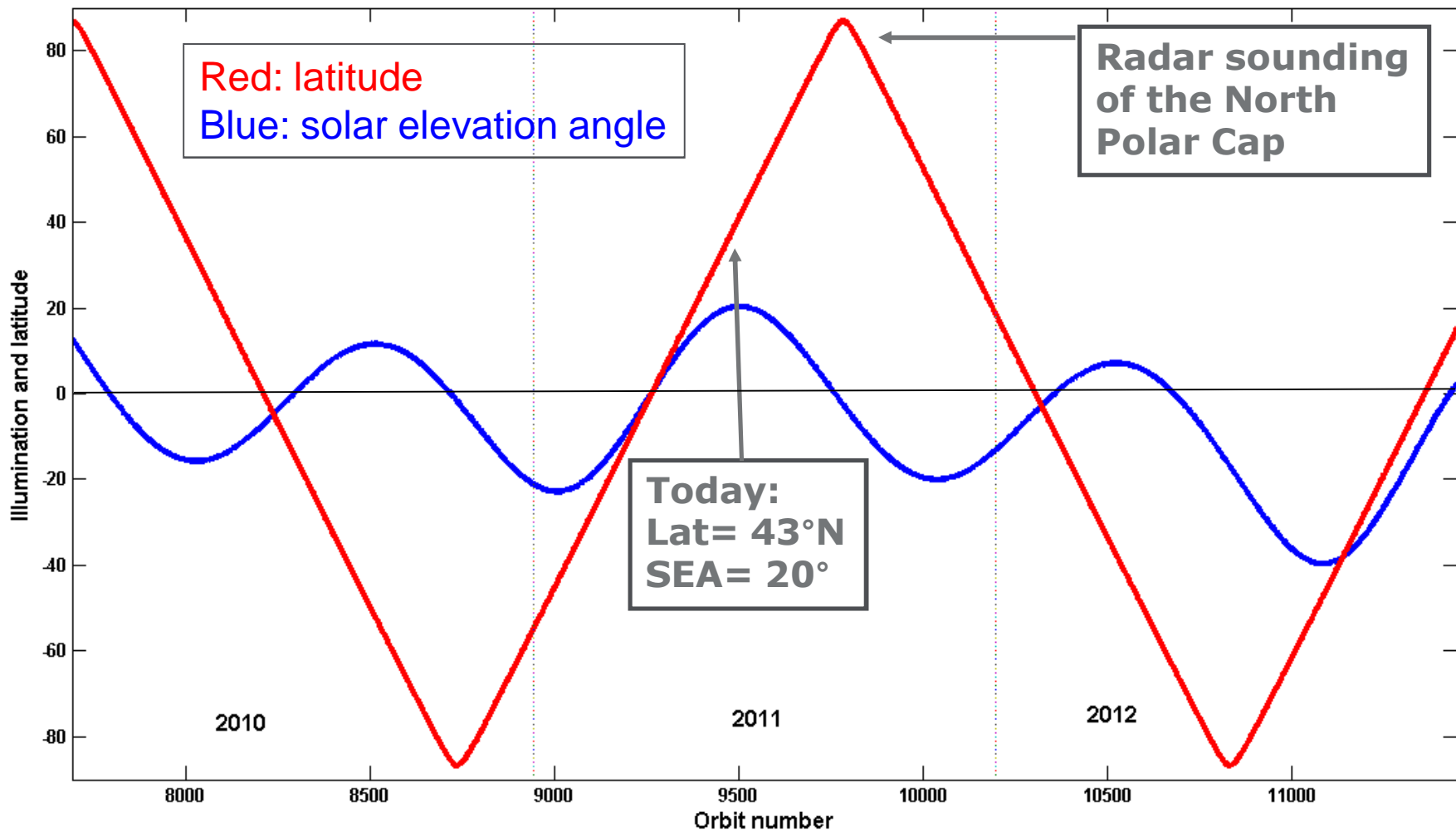
Subsurface studies



MANTLE CONVECTION SIMULATION

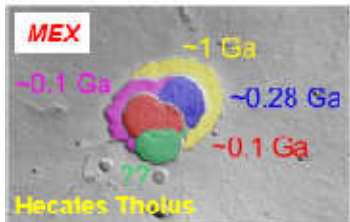


Pericenter evolution in 2010-2012

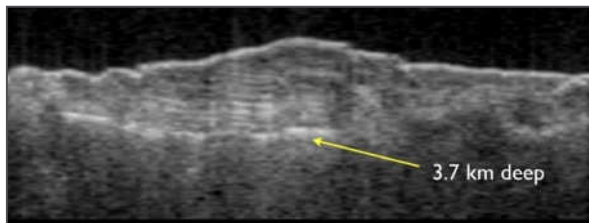


Pericenter latitude and illumination as a function of orbit number

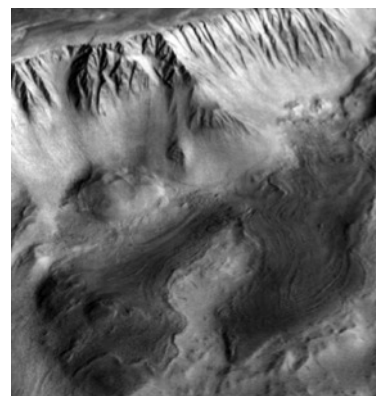
Top 5 discoveries



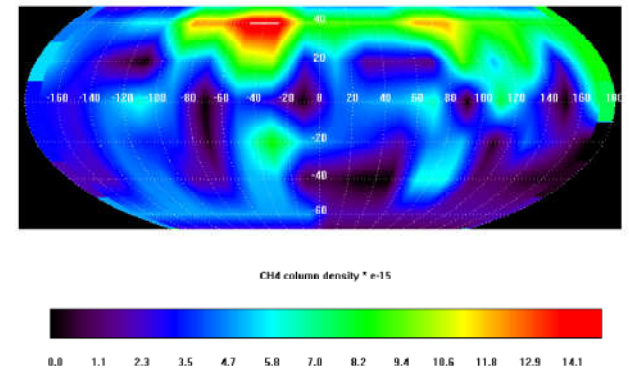
5



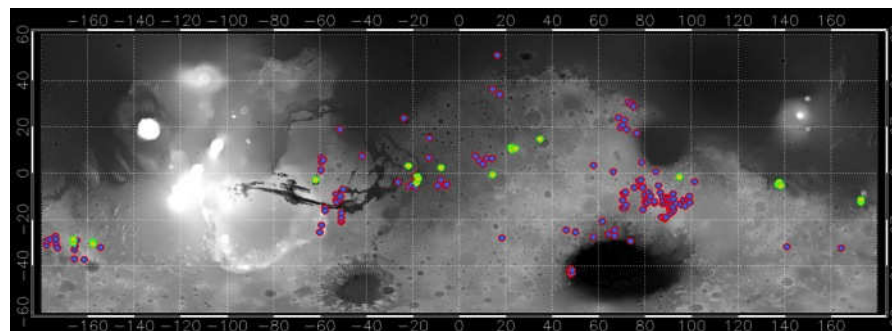
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3



2



1

Mars Express Archive



- ✓ Archive **regularly** populated

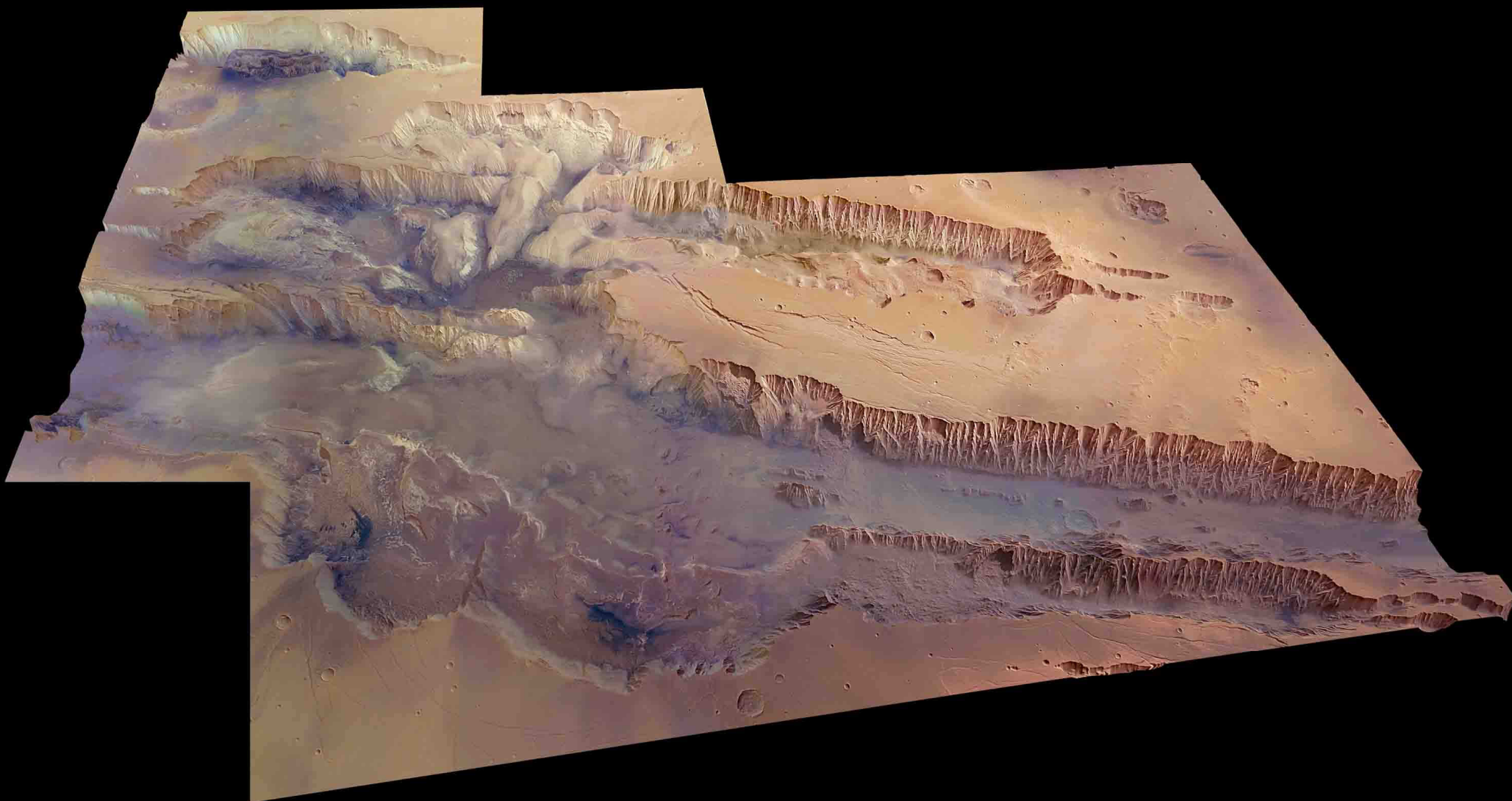
- ✓ Availability of **higher-level** data:
 - ✓ HRSC digital terrain model
 - ✓ Radio science vertical atmospheric profiles
 - ✓ MARSIS Total Electron Content
 - ✓ MARSIS topside sounder data (soon)
 - ✓ Many more data sets under discussion

- ✓ **Data workshops**
 - ✓ Regularly organised
 - ✓ Tutorials, exercises, software online



Mars Express OMEGA data workshop, June 2007,
ESA/ESAC (Spain)

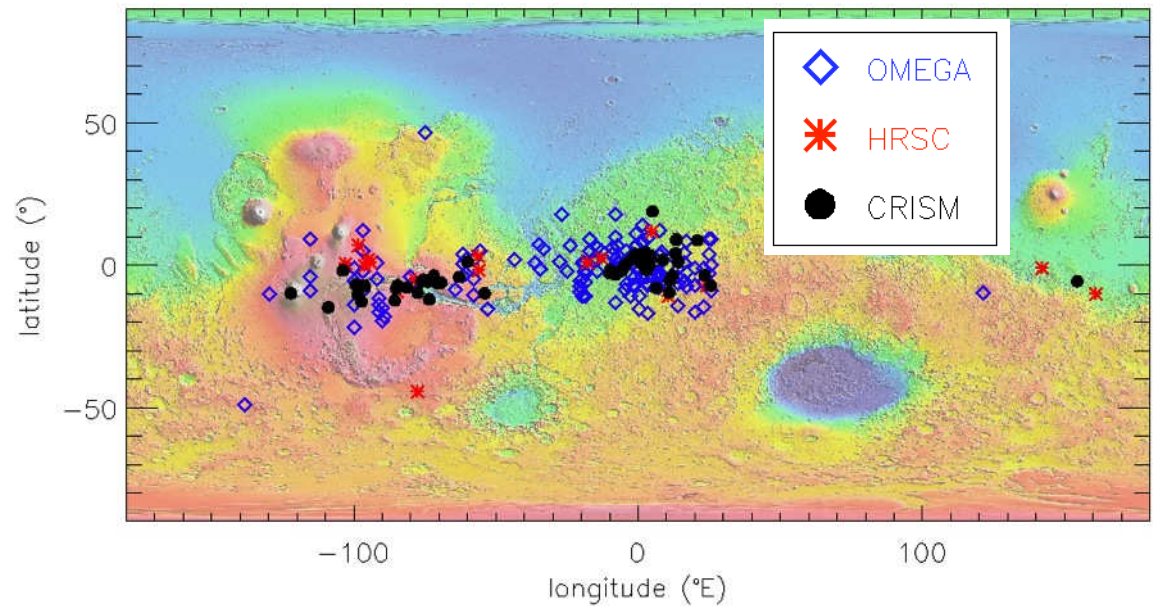
Mars in 3D, high-resolution and in color



MEX-MRO collaboration: study of CO₂ clouds

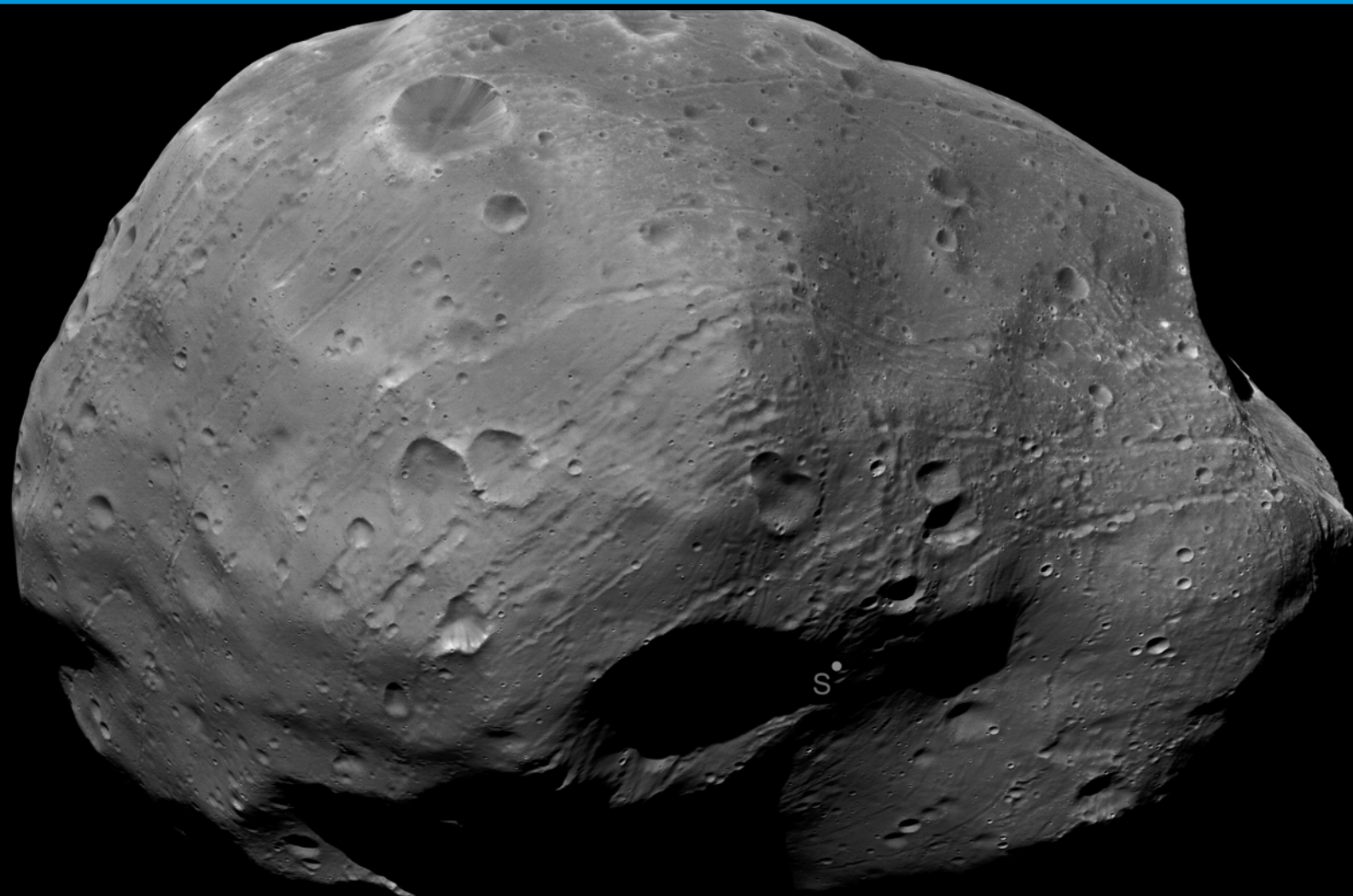


- ✓ MEX/OMEGA unambiguously detects clouds with the 4.26 μm feature. This is one of the top 10 MEX discoveries. Complemented by MEX-SPICAM/HRSC/PFS instruments.
- ✓ MRO/CRISM measured clouds in the visible range with an excellent spatial resolution



Spatial distribution from multi-instrument data

Phobos flybys



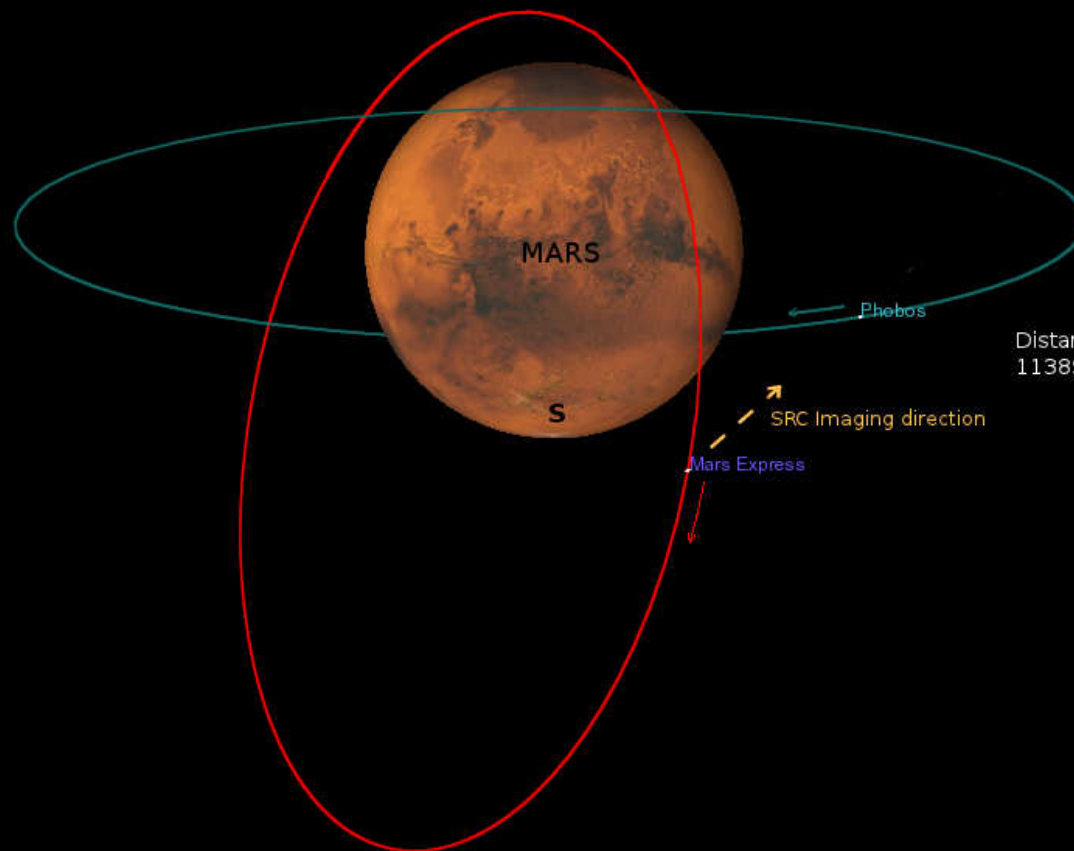
Imaging Phobos and Jupiter



MEx Orbit 9463
June 1, 2011 01:35 UTC

Distance Jupiter - MEx Spacecraft:
529 Mio km (3.54 AU)

Jupiter



Distance Phobos - MEx Spacecraft:
11389 km

SRC Imaging direction

Mars Express

Phobos

- ❖ **Spacecraft healthy, operations at least until end of 2014**
- ❖ **Science at full speed, major discoveries**
- ❖ **Good archive**
- ❖ **Fruitful collaborations across missions (MRO, MSL, Phobos Sample Return, ...)**
 - ❖ **Support to MSL EDL and surface operations**
- ❖ **Support to landing site characterization (Mars, Phobos moon)**