

Status of Mars Express in orbit

1st Mars Express Science Conference

Fred Jansen
MEX Mission Manager

History

□ Mission Chronology

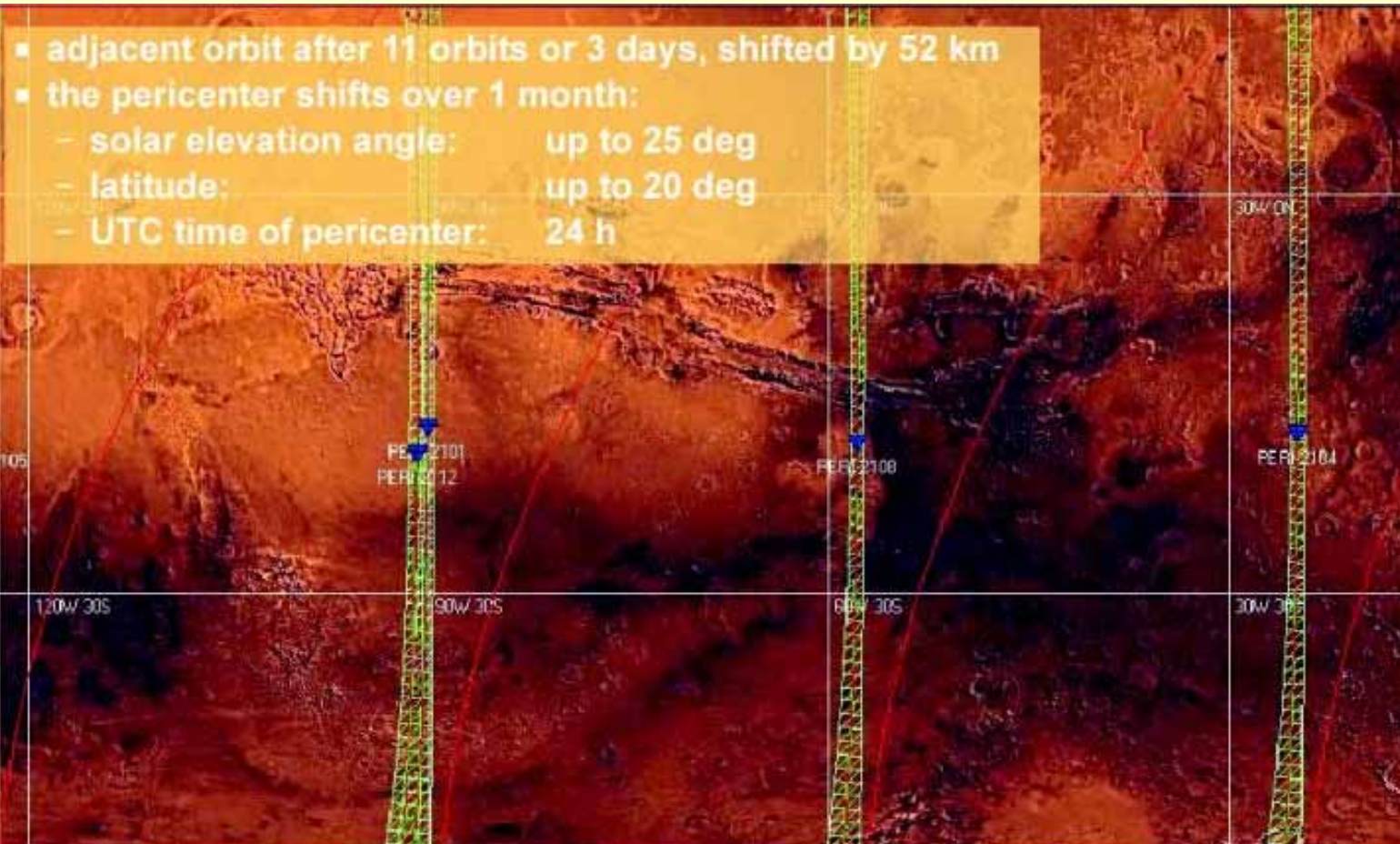
- 2-June 2003 – Launch
- December 2003 – Orbit injection
- January 2004 – Orbit finalisation
- February-August 2004 – Eclipse season
- 5-June 2004 – Commissioning review/start of routine ops.
- September 2004 – Conjunction
- January-June 2005 – Eclipse season
- October 2005 – Eclipse season
- 1-December-2005 onwards – Possibly extended mission



Mission Orbit

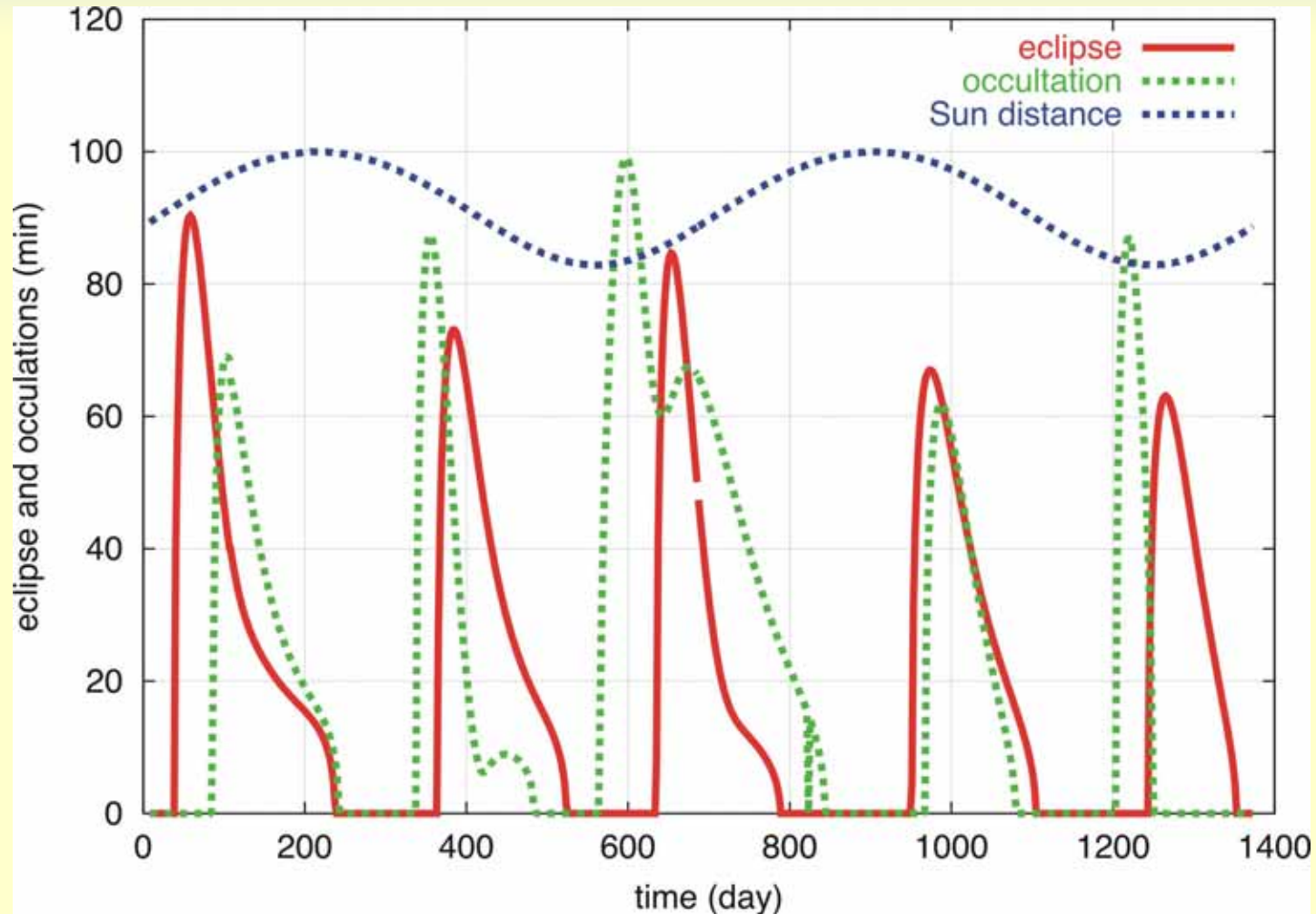
- ❑ Since May 2004 the mission is on a frozen orbit
 - Orbit maintained through momentum wheel offloads only
 - Fuel remaining 39.5 kgs (estimate); useage 2.3 kg/yr
 - Orbit change opportunity exists later this year
 - Eccentric orbit provides for low altitude high resolution passes over martian surface – support requires interleaving downlink windows between perigee science passes (and other science windows)

Mission Orbit



- adjacent orbit after 11 orbits or 3 days, shifted by 52 km
- the pericenter shifts over 1 month:
 - solar elevation angle: up to 25 deg
 - latitude: up to 20 deg
 - UTC time of pericenter: 24 h

Eclipses and Occultations



Mission Groundstations

- ❑ Mission uses miscellaneous groundstations
 - ESA: New Norcia
 - DSN: Goldstone, Madrid, Canberra (provided by NASA)

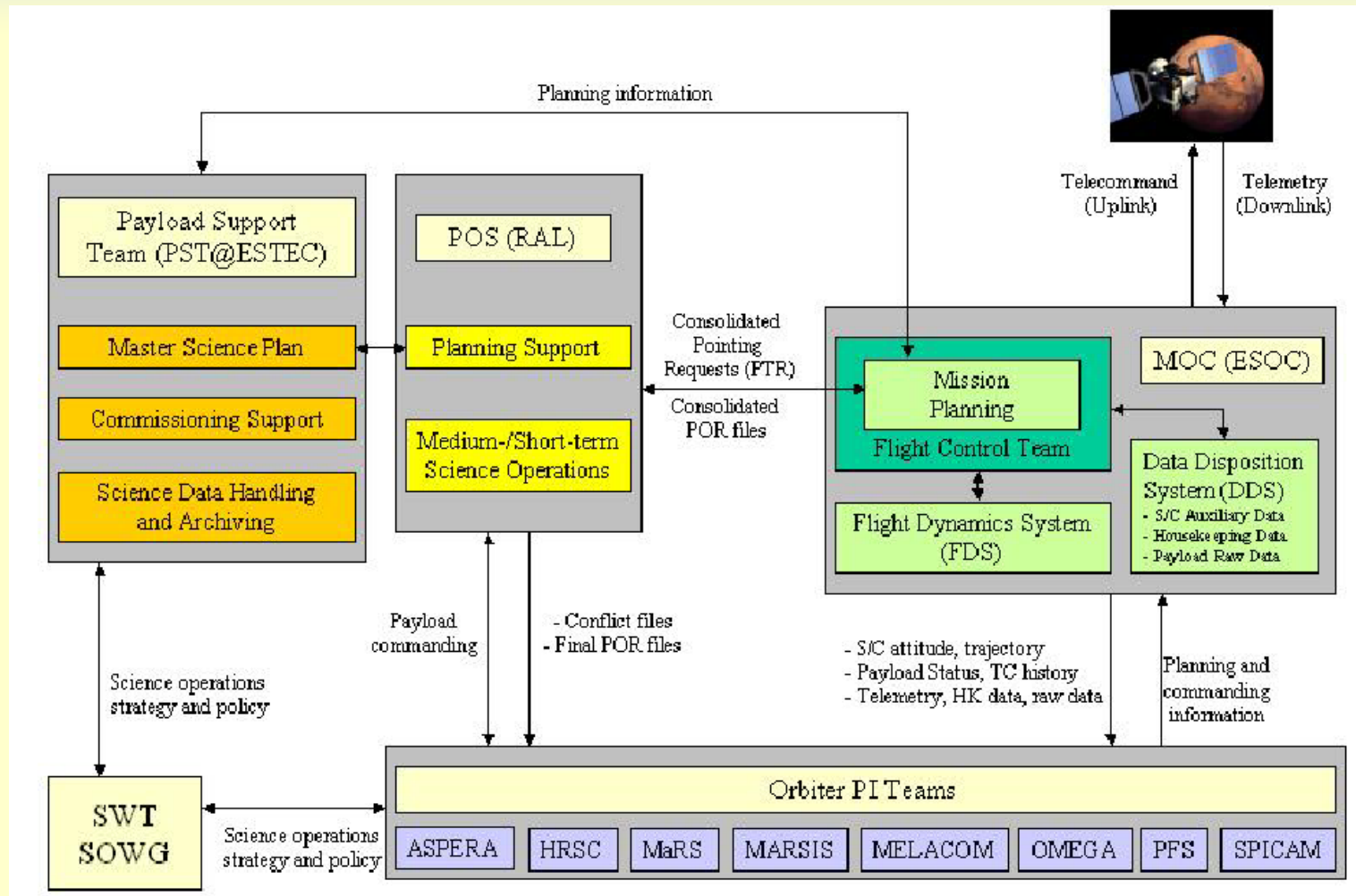
Groundstation statistics

	Kourou	Maspalomas	Villafraanca	Redu	Kiruna	Perth	New Norcia	Santiago	Svalbard	Canberra	Goldstone	Madrid	Total
Artemis				100.00%									100.00%
Cluster		99.66%	99.96%			100.00%							99.81%
DSP1			99.50%										99.50%
DSP2			98.57%										98.57%
Envisat	100.00%		100.00%		99.41%	100.00%		100.00%	99.26%				99.37%
ERS 2	100.00%		100.00%		99.96%	100.00%		100.00%	99.66%				99.92%
Helios-2A						100.00%		100.00%					100.00%
Integral			100.00%	99.92%							97.41%		99.62%
Mex1							97.79%			100.00%	98.55%	98.40%	98.15%
Proba				100.00%									100.00%
Rosetta							99.93%				100.00%		99.93%
Smart-1	99.22%	99.16%	98.63%			97.97%	95.88%						98.26%
XMM	99.46%					99.87%	97.72%	97.29%				100.00%	99.50%



Mission Challenges

- ❑ About 70% of pre-launch expected power is available for the mission
 - Eclipse seasons become challenging for combining:
 - Battery management (Depth-of-Discharge)
 - Thermal control
 - Instrument Operations
 - Distributed planning concept was originally not tuned for working with very narrow margins.



Mission Challenges

- ❑ About 70% of pre-launch expected power is available for the mission
 - Eclipse seasons become challenging for combining:
 - Battery management (Depth-of-Discharge)
 - Thermal control
 - Instrument Operations
 - Distributed planning concept was originally not tuned for working with very narrow margins.
- ❑ Small operations team
 - ESTEC – ~4 FTE
 - POS - ~4 FTE
 - ESOC - ~22 FTE (Including teams on shift and on call)
 - PI's – several FTE/team

Spacecraft Status and Outlook

- ❑ Last safe mode almost 1 year ago.
- ❑ Multiple improvements on subsystems underway
- ❑ Deployment of MARSIS being prepared
- ❑ Mission extension (for 1 martian year) to be discussed at May 2005 SPC meeting in Helsinki