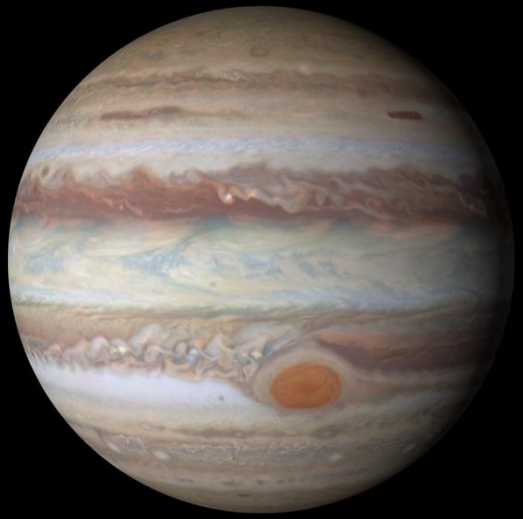
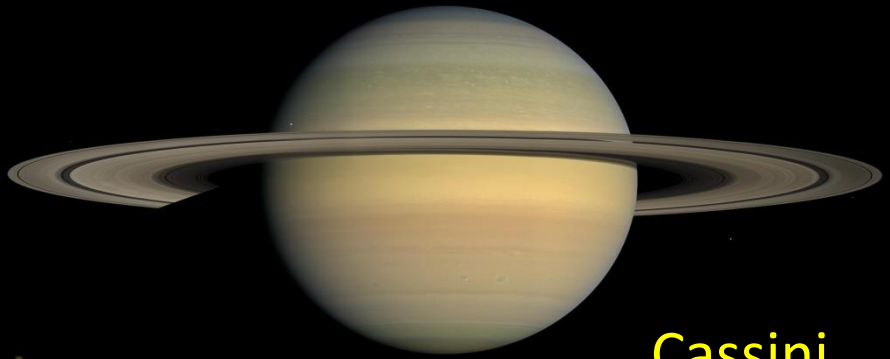


Juno
JUICE

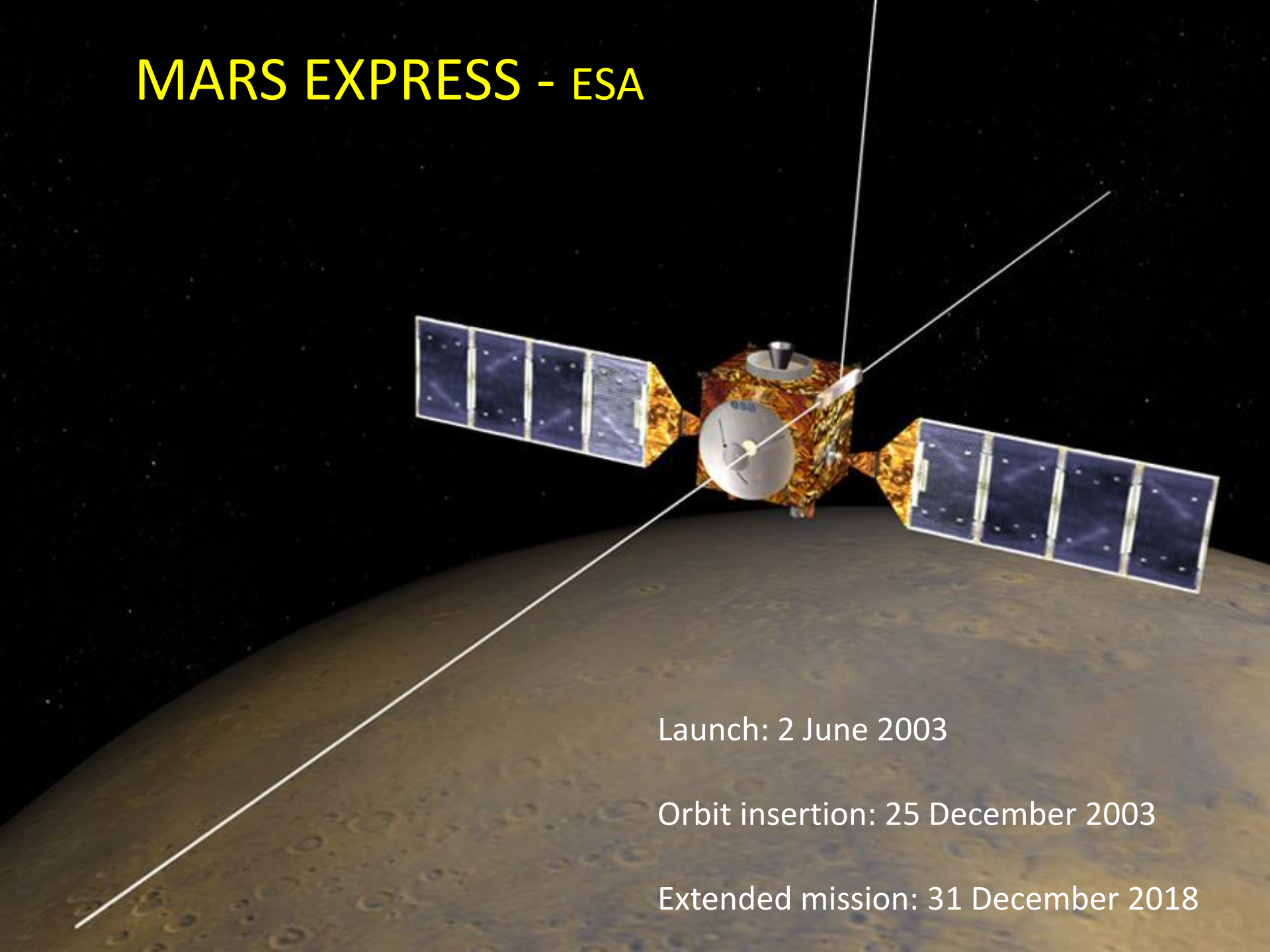


Cassini

Mars Express
MAVEN
TGO

ICON
SMILE

MARS EXPRESS - ESA



Launch: 2 June 2003

Orbit insertion: 25 December 2003

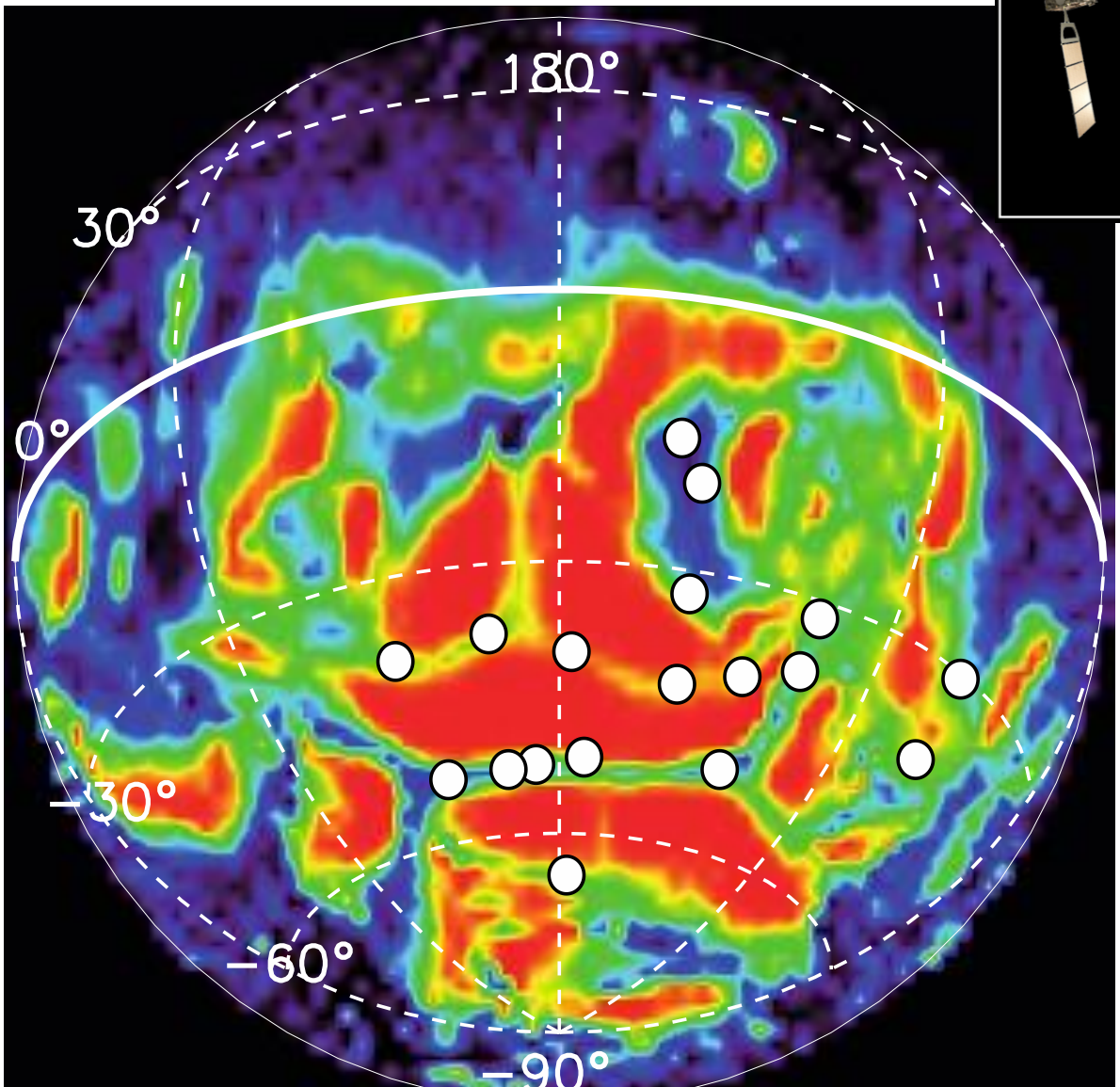
Extended mission: 31 December 2018

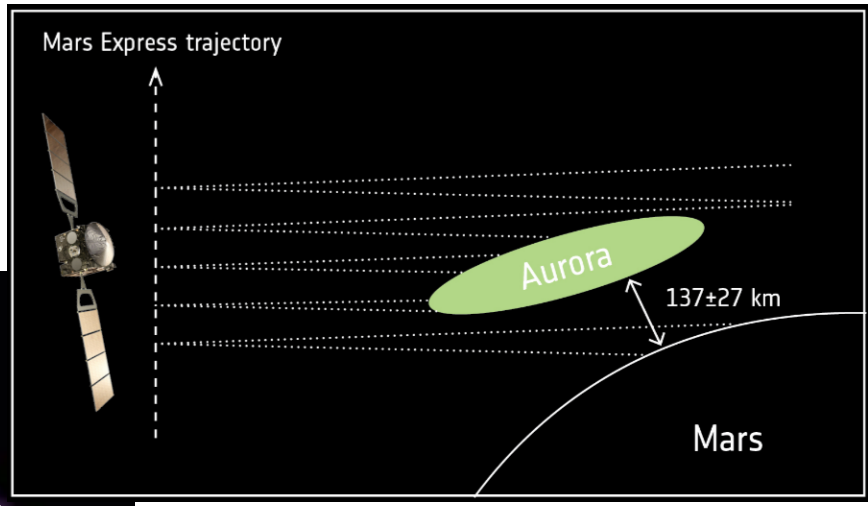
SPICAM

UV spectrograph

Used for variety of atmospheric studies:

- Nitric oxide nightside emission → global transport by the Martian general circulation
- Dayside UV emission → chemical composition and thermal profile of the upper atmosphere
- Nightside aurora in regions of crustal magnetic field



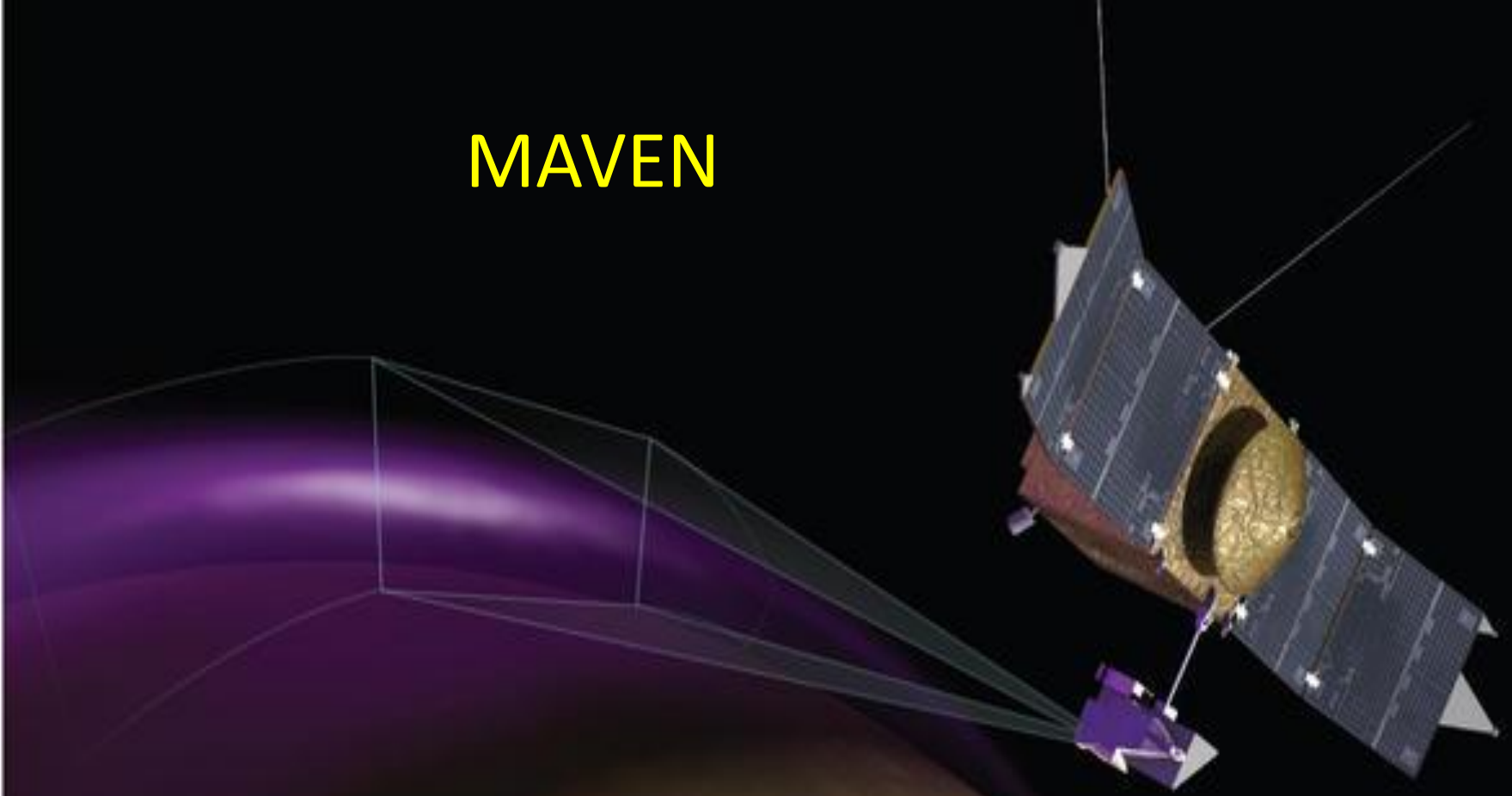


- Altitude determination

- Mapping and relation with crustal magnetic field topology

- Currently: search for proton aurora

MAVEN



Launched: 18 Nov 2013

Orbital insertion: 21 Sept 2014

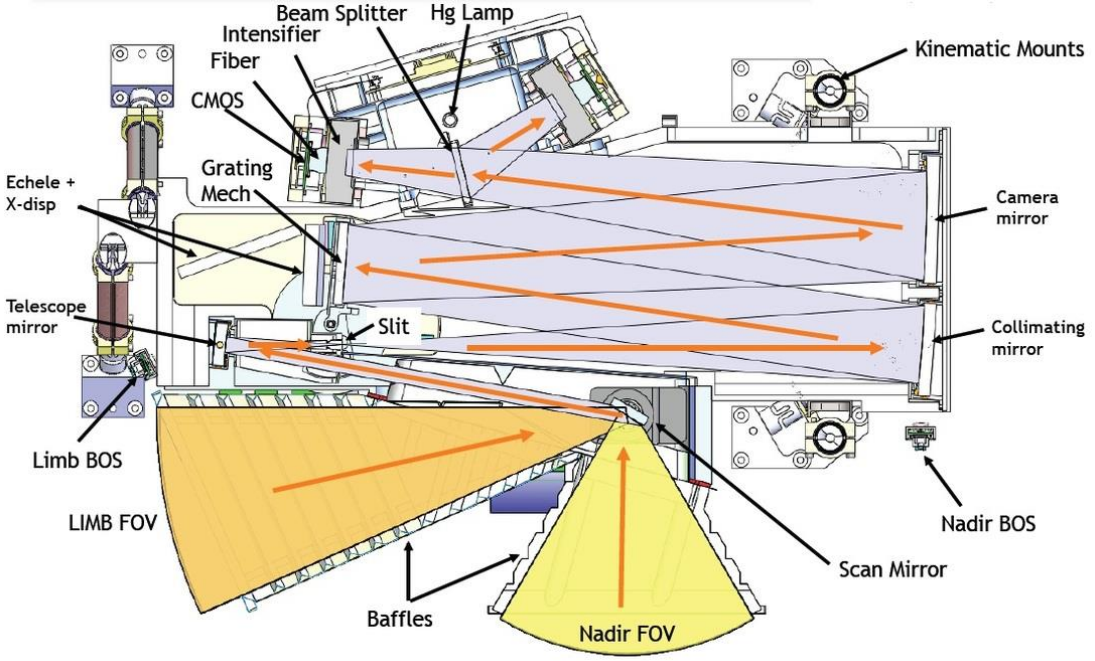
Currently: third extension up to September 2018

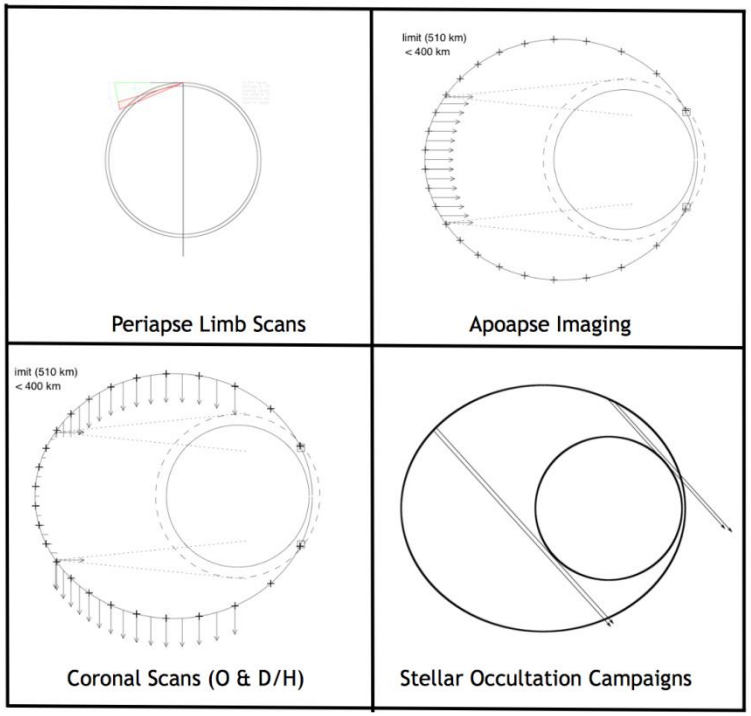
Future: will serve as a telecomm relay

IUVS

Imaging spectroscopy from 110–340 nm, with resolution of 0.5–1.0 nm.

Four operating modes





IUVS science objectives

Vertical profiles to characterize composition & structure – Multispecies periapsis limb scans

Global images to characterize spatial distribution & variability

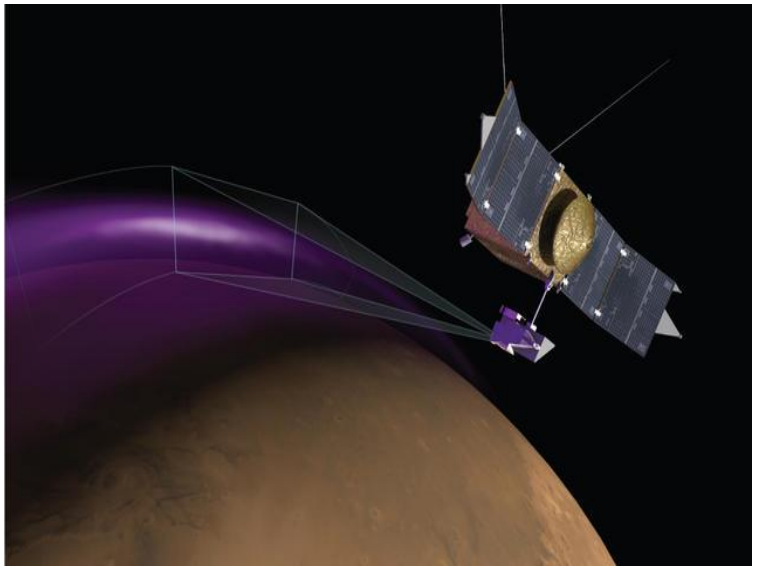
Deuterium/Hydrogen ratio vs. altitude to constrain escape process

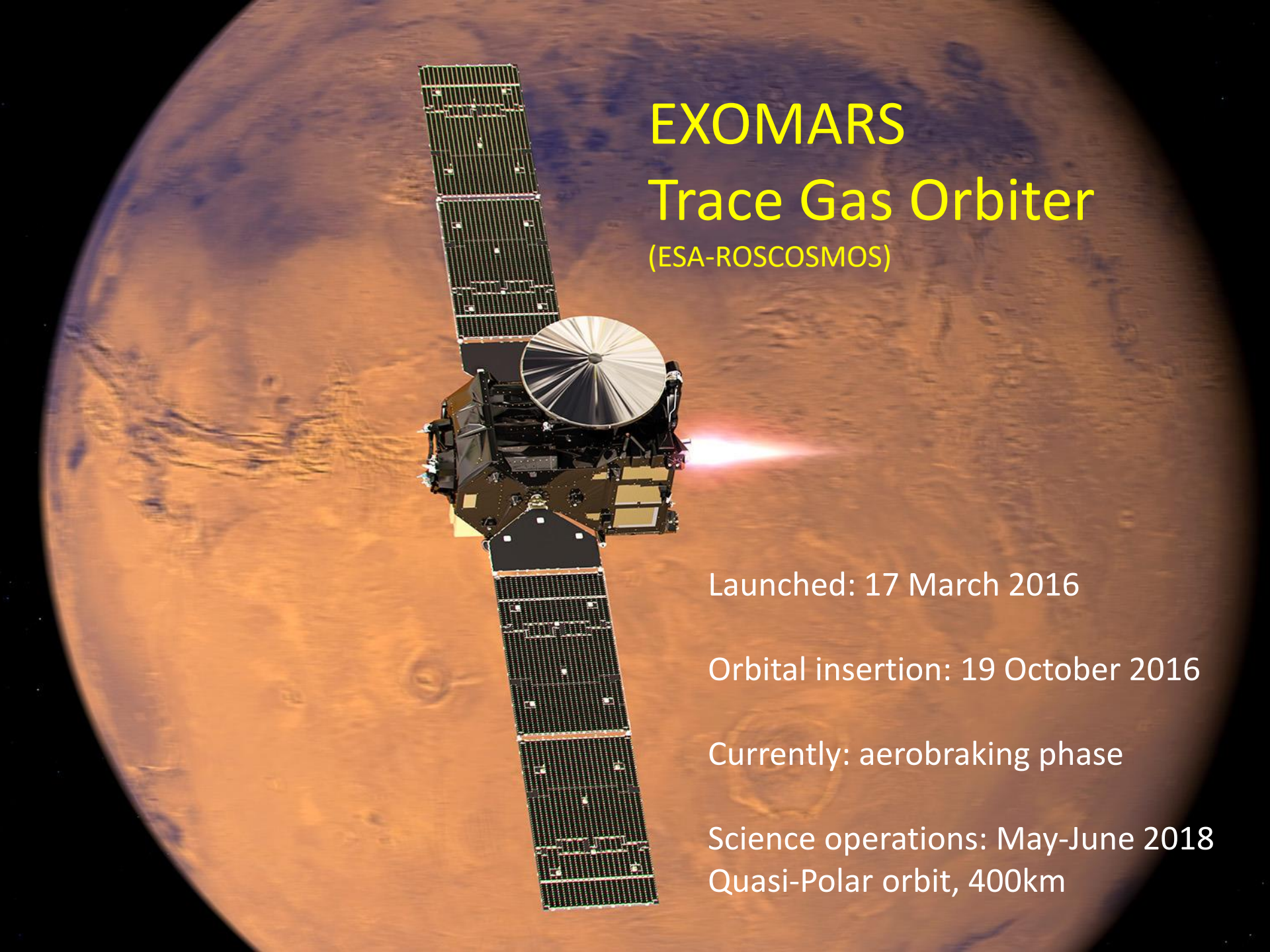
Vertical CO2 profile to characterize the underlying atmosphere

STAR implication

Analysis of vertical profiles and global images

Atmosphere modeling and comparison

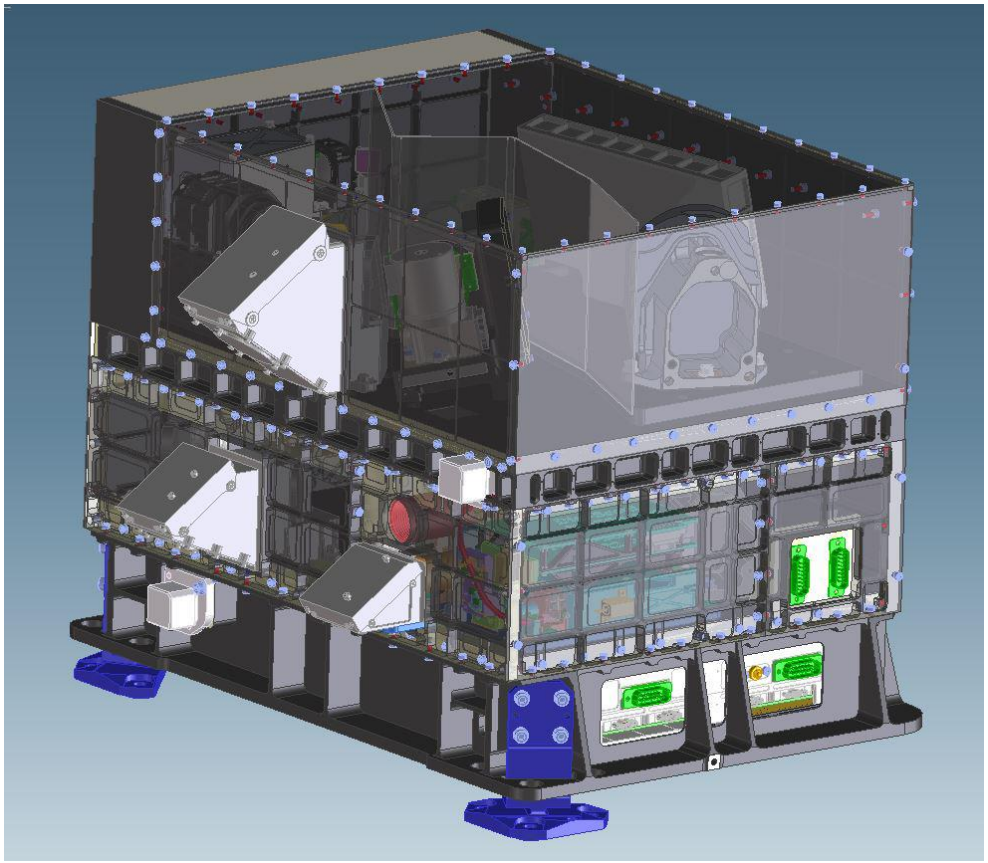



EXOMARS
Trace Gas Orbiter
(ESA-ROSCOSMOS)
Launched: 17 March 2016
Orbital insertion: 19 October 2016
Currently: aerobraking phase
Science operations: May-June 2018
Quasi-Polar orbit, 400km

NOMAD

Two IR spectrographs
One UV-visible spectrograph

Nadir + limb + solar occultation observations



NOMAD science objectives

Detection and mapping of minor constituents, including methane (?)

CO_2 and temperature mapping

Ozone limb profiles – seasonal and latitudinal mapping

Upper atmosphere science

ULg implication

Management and testing by CSL

Analysis of UV solar occultation

UV-visible upper atmospheric emissions

- Circular orbit

- 27° inclination → equatorial regions

- 550 km (+-45km) altitude

- Lifetime: 2 years nominal duration

- Launch : Nov. 2017 (Pegasus XL@Kwajalein)

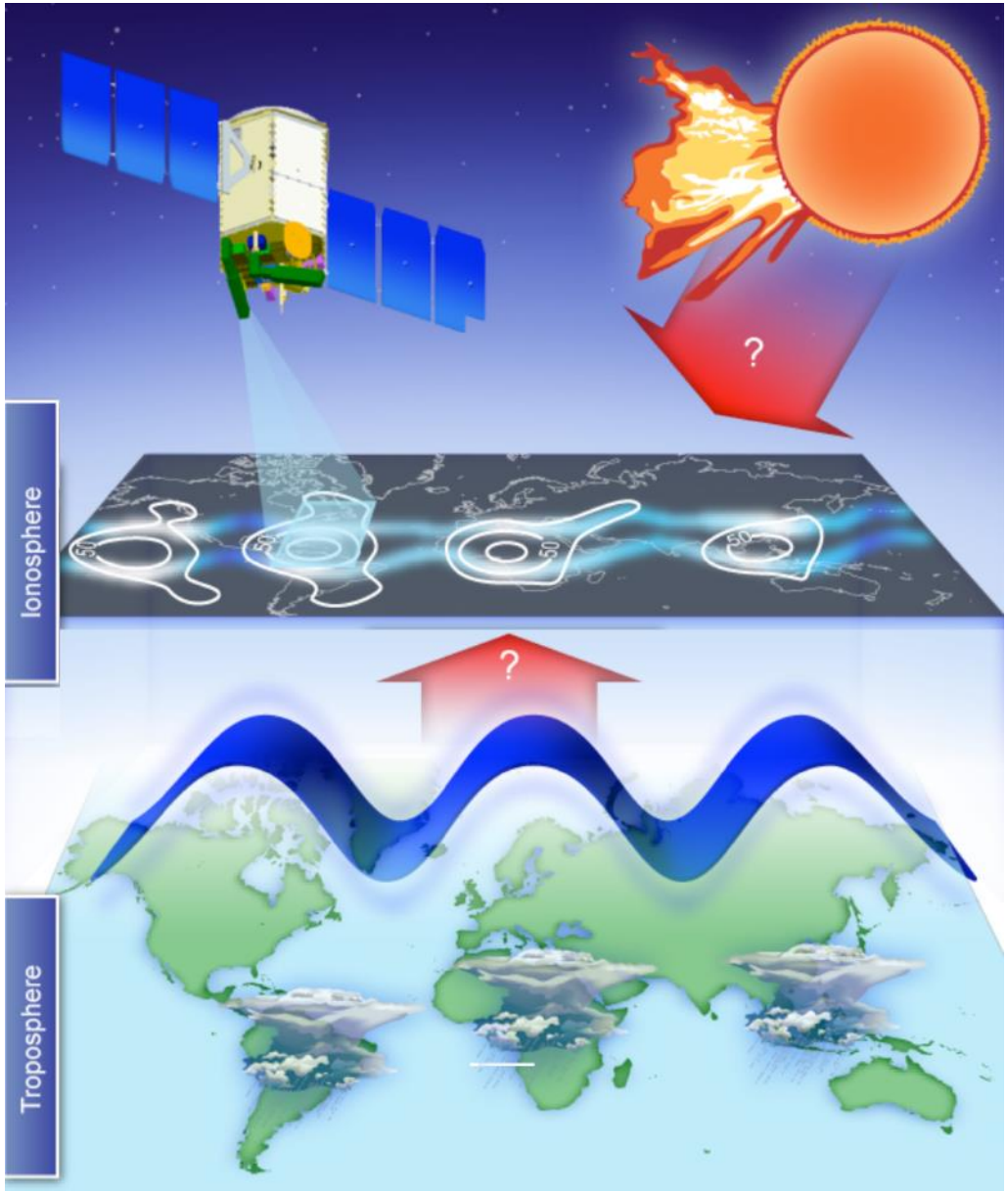
Mission objectives

Three scientific goals:

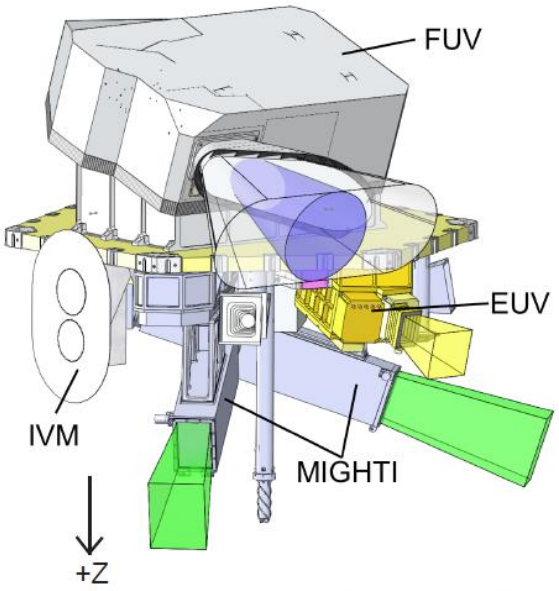
1) What are the sources of strong ionospheric variability

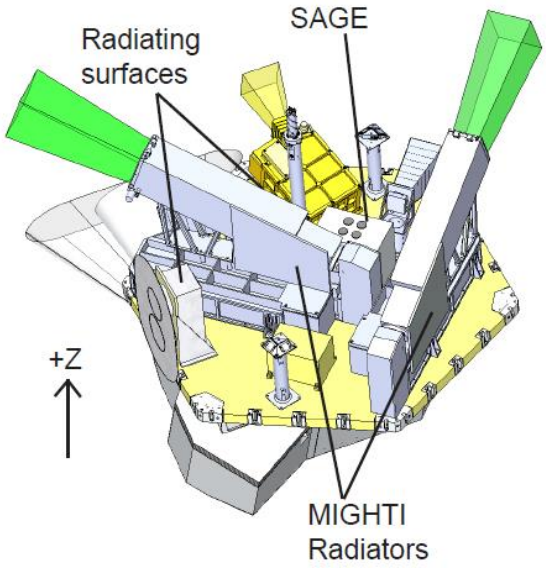
2) Understand the transfer of energy and momentum from our atmosphere into space

3) How solar wind and magnetospheric effects modify the internally-driven atmosphere-space system

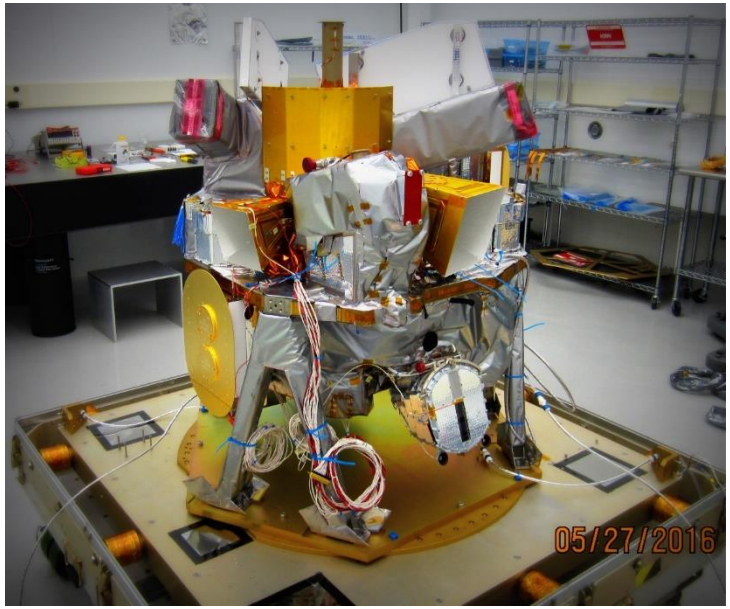


Scientific payload

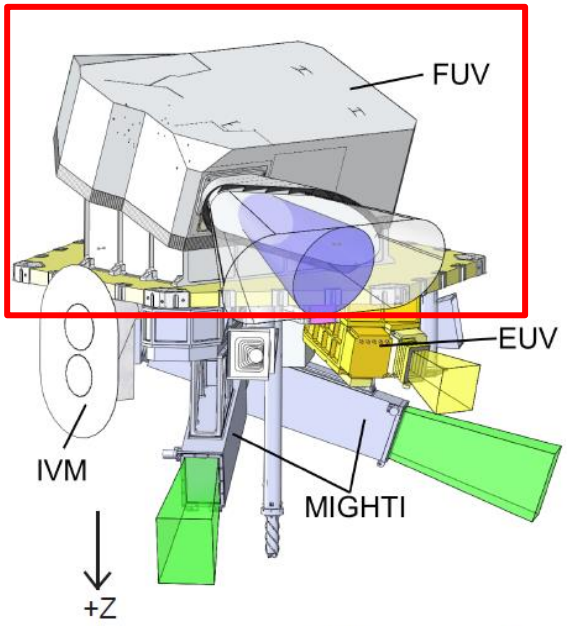


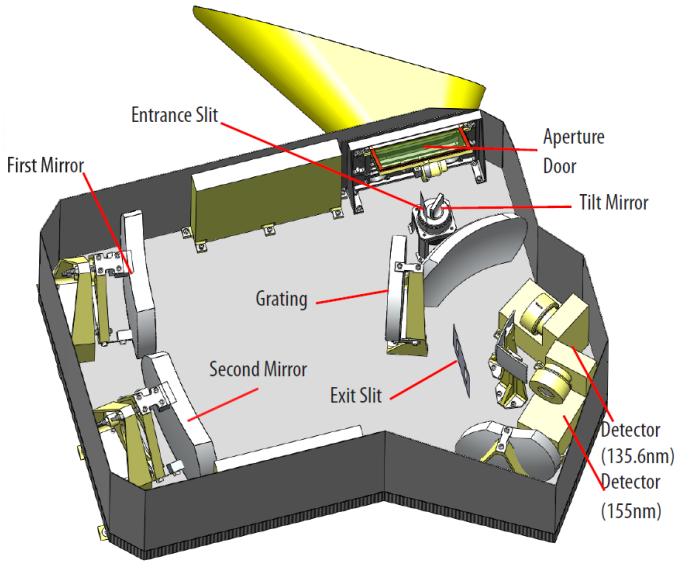


- Two limb-scanners in UV: EUV (extreme UV) and FUV (far UV)
- One imager in visible: MIGHTI
- One in-situ ion probe: IVM



STAR contribution

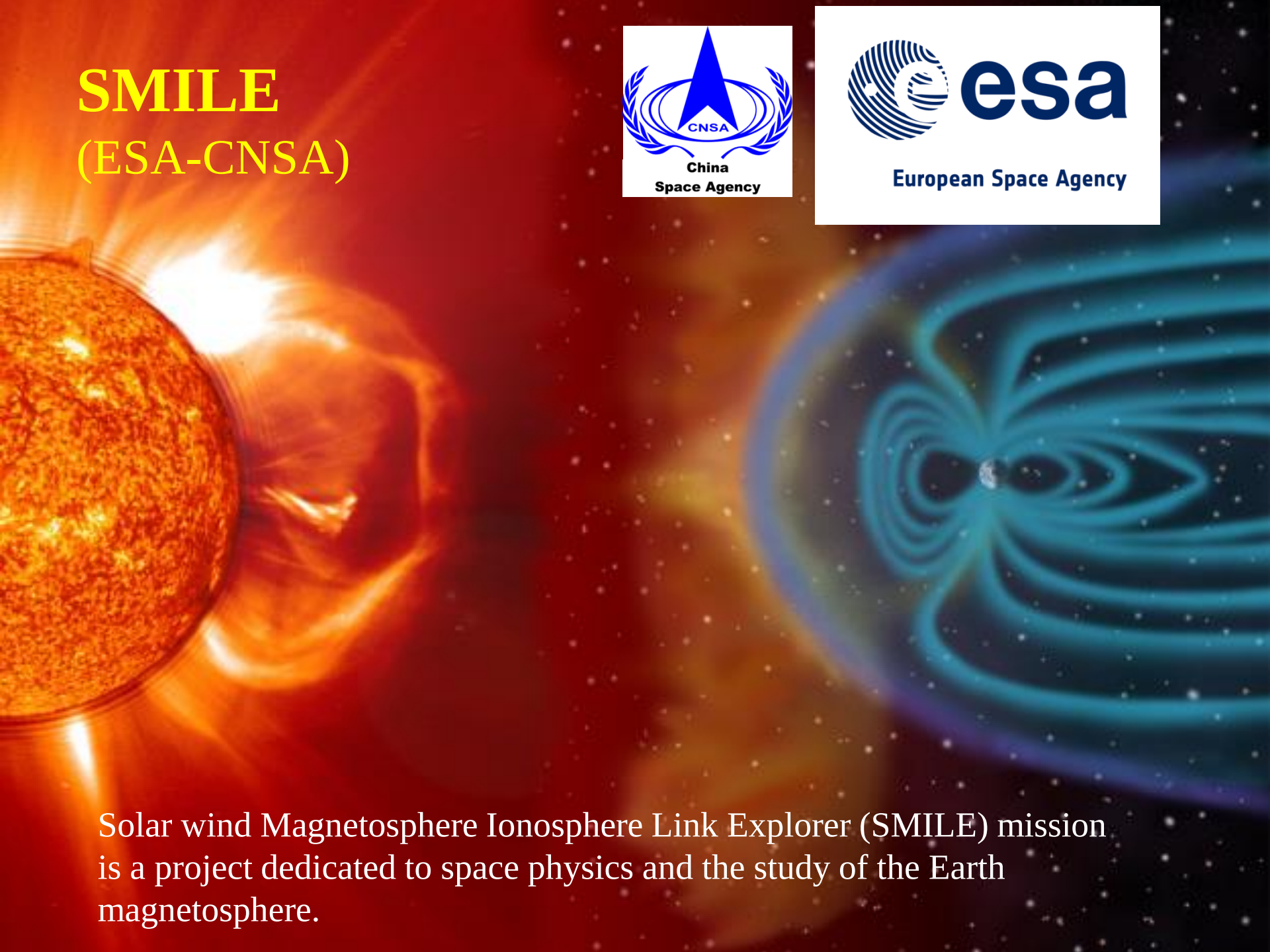




- Far Ultraviolet Imager (FUV)
  - UV alignment, calibration, optical design and analyses performed at CSL
  - Two detectors at 135.6 and 155 nm for OI and N2 LBH respectively
  - Measure O+ altitude profile (nighttime)
  - Measure O, N2 and O/N2 ratio altitude profile (daytime)

- Science objectives
  - Comparison of ICON electron density profiles with GPS, radio-occultation and ionosonde data
  - Detection of ionospheric disturbances
  - Investigation of solar activity influence
  - Radiative transfer of He 58.4

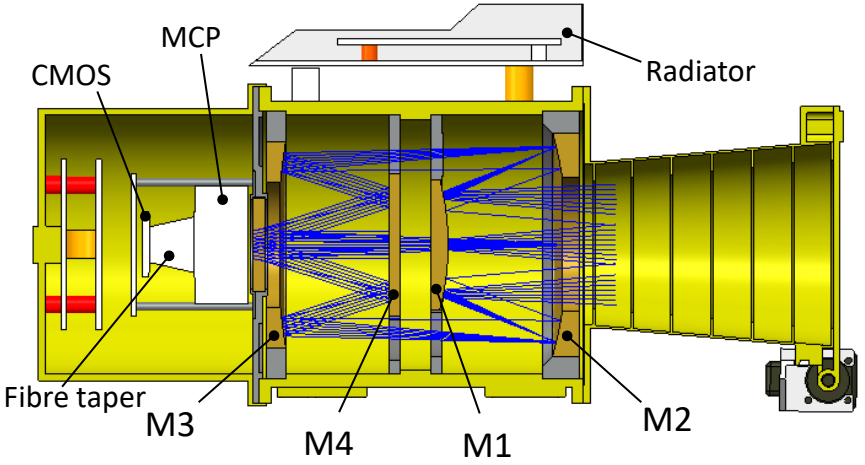
SMILE
(ESA-CNSA)

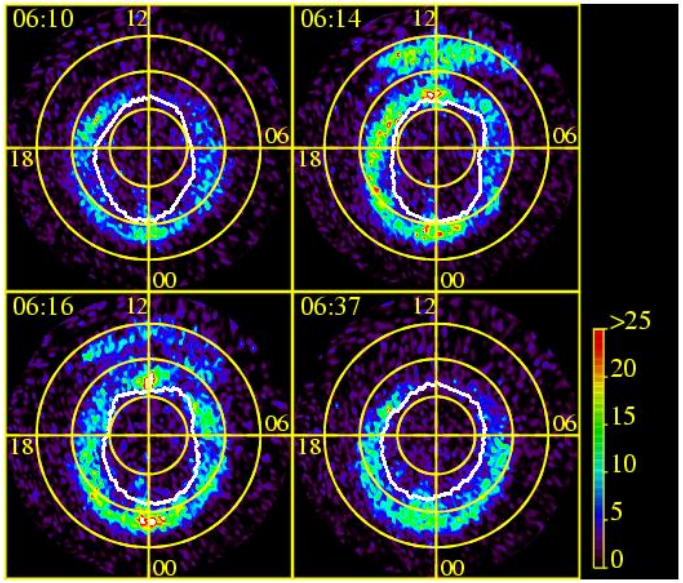


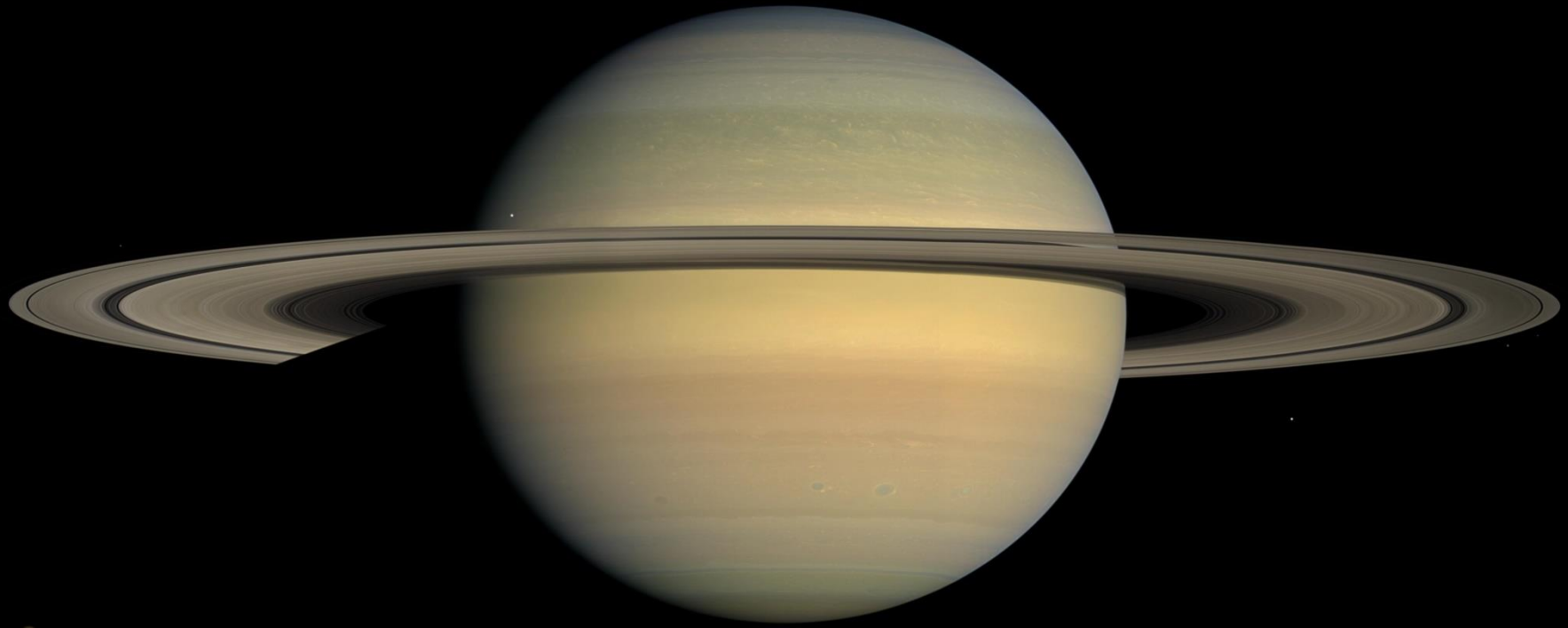
Solar wind Magnetosphere Ionosphere Link Explorer (SMILE) mission is a project dedicated to space physics and the study of the Earth magnetosphere.

SMILE (ESA-CNSA)

- Relation between the solar wind and the Earth magnetosphere, from the bow shock to the aurora.
- Expected launch: 2021
- CSL contributes to the UVI instrument, lead by U. Calgary (Canada).
- New instrument concept: UV λ fine selection using coated mirrors.
- Scientific analysis by LPAP







Cassini-Huygens – NASA & ESA

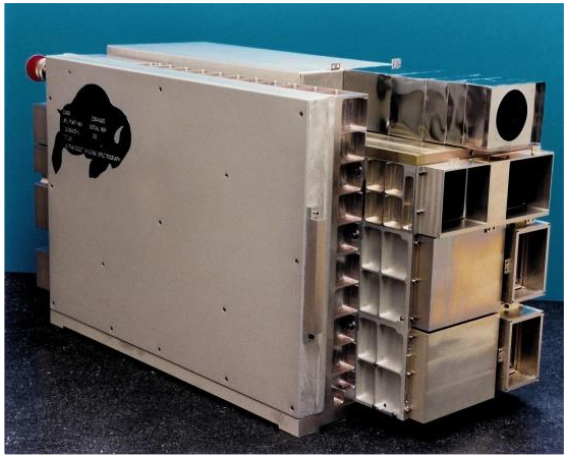
Orbital insertion: 01.07.2004

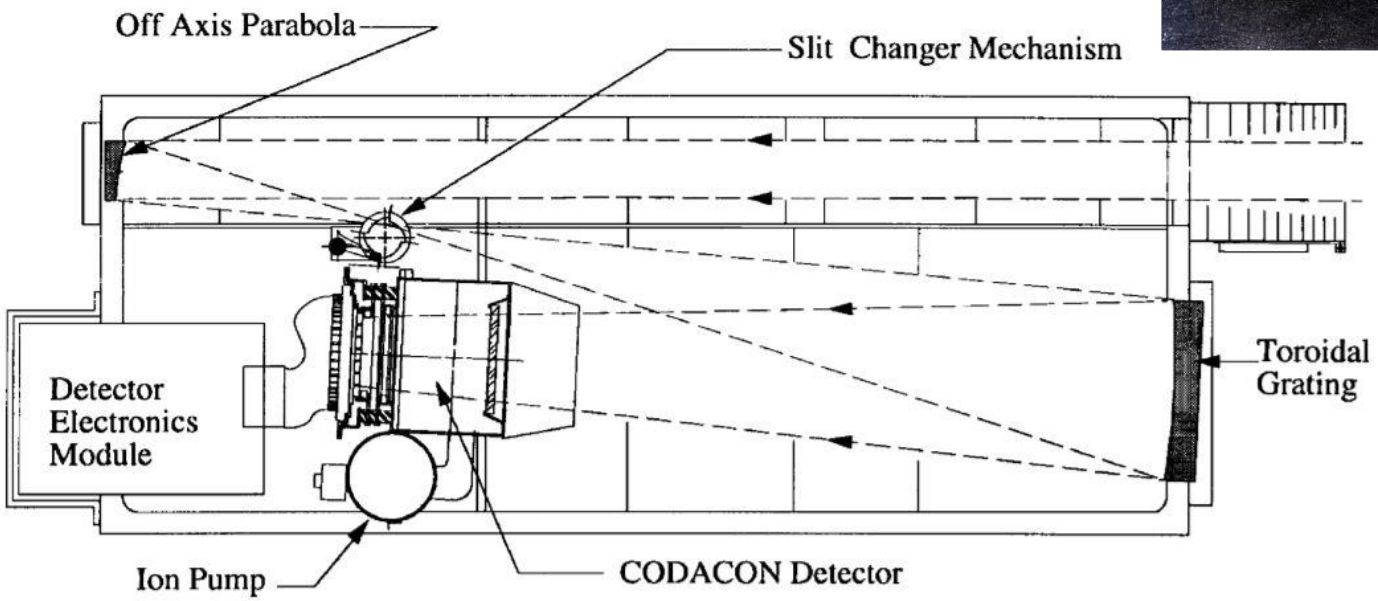
End of the mission: TODAY!

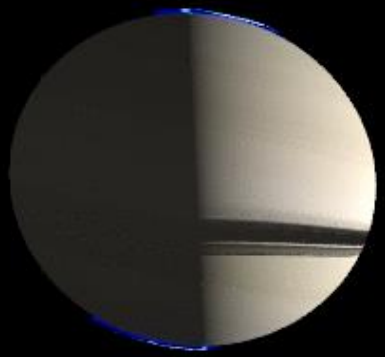
Ultraviolet Imaging Spectrograph (UVIS)

EUV 56-118 nm
FUV 111-191 nm

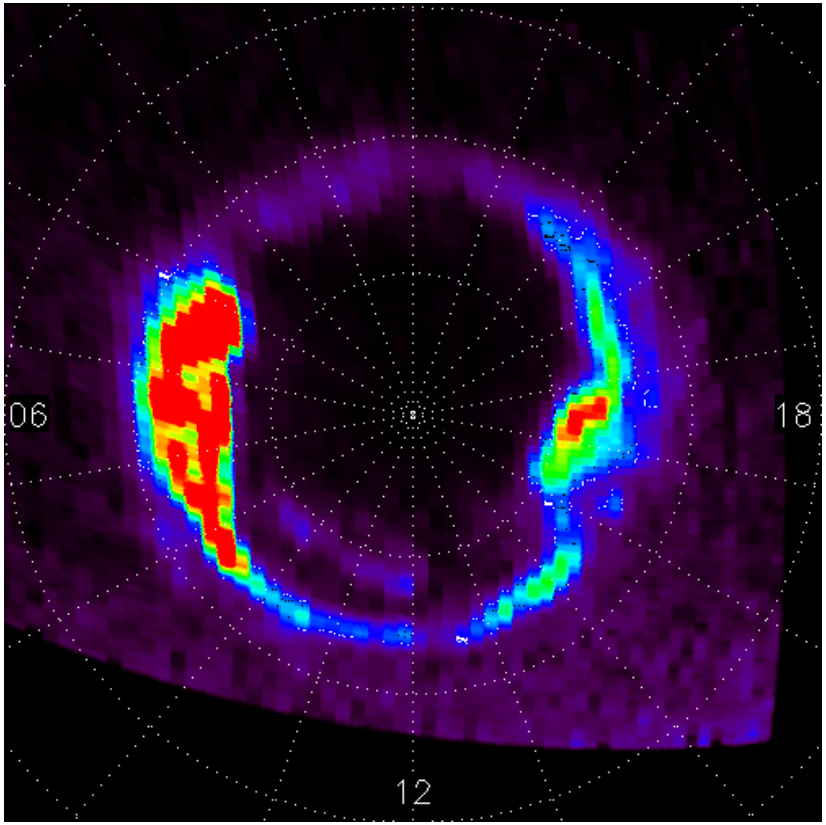
Swath of the UVIS slit by spin of Cassini



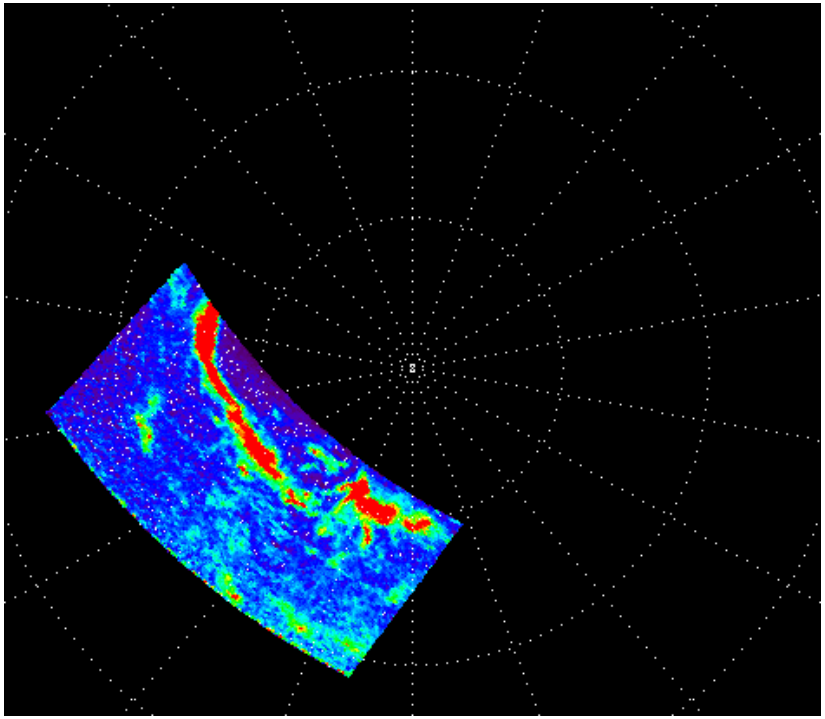


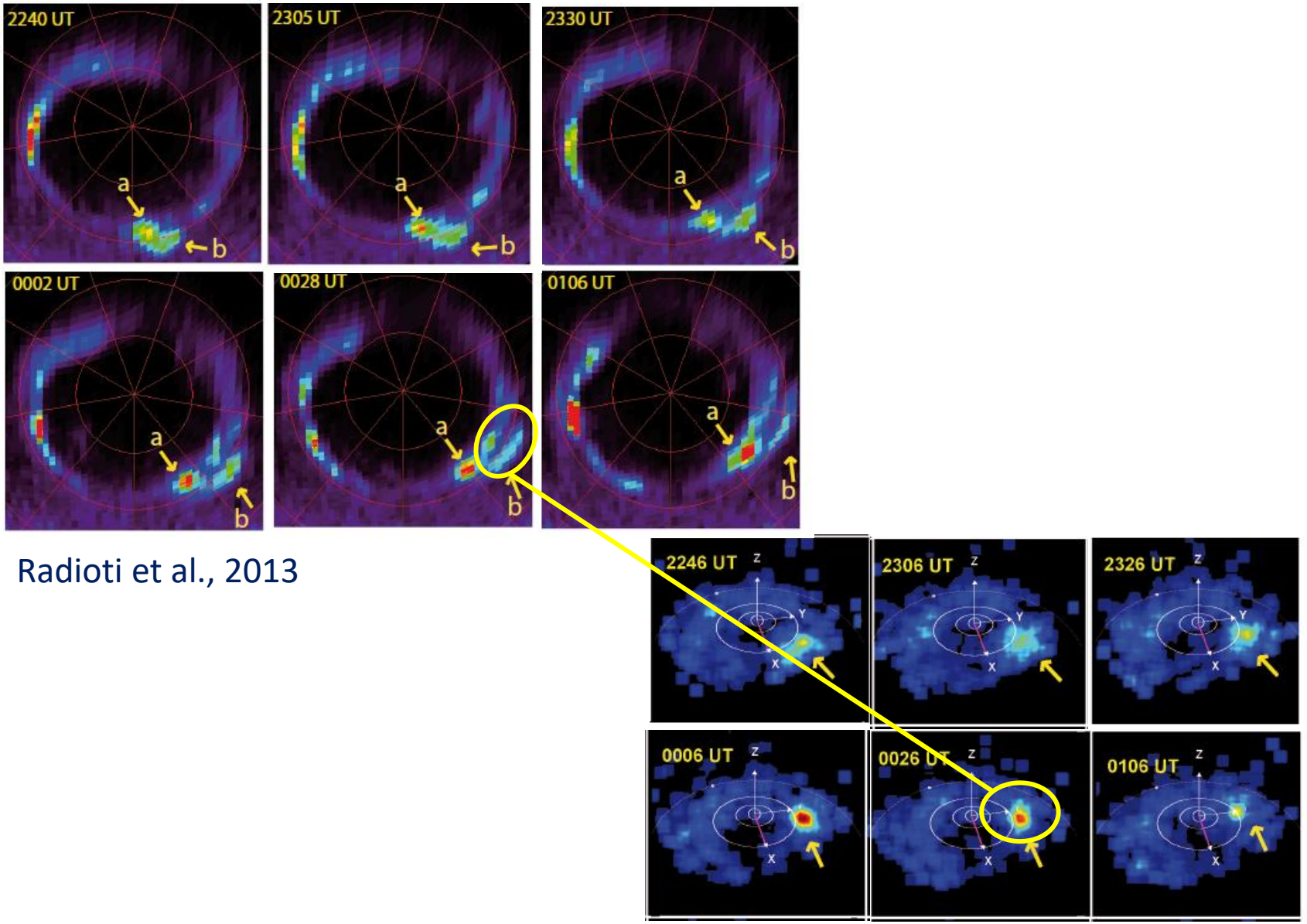


Far from the planet



Close from the planet





Radioti et al., 2013