

Brief History of CRISM Observing Modes

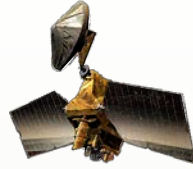
Nov 2015

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JHU/APL*

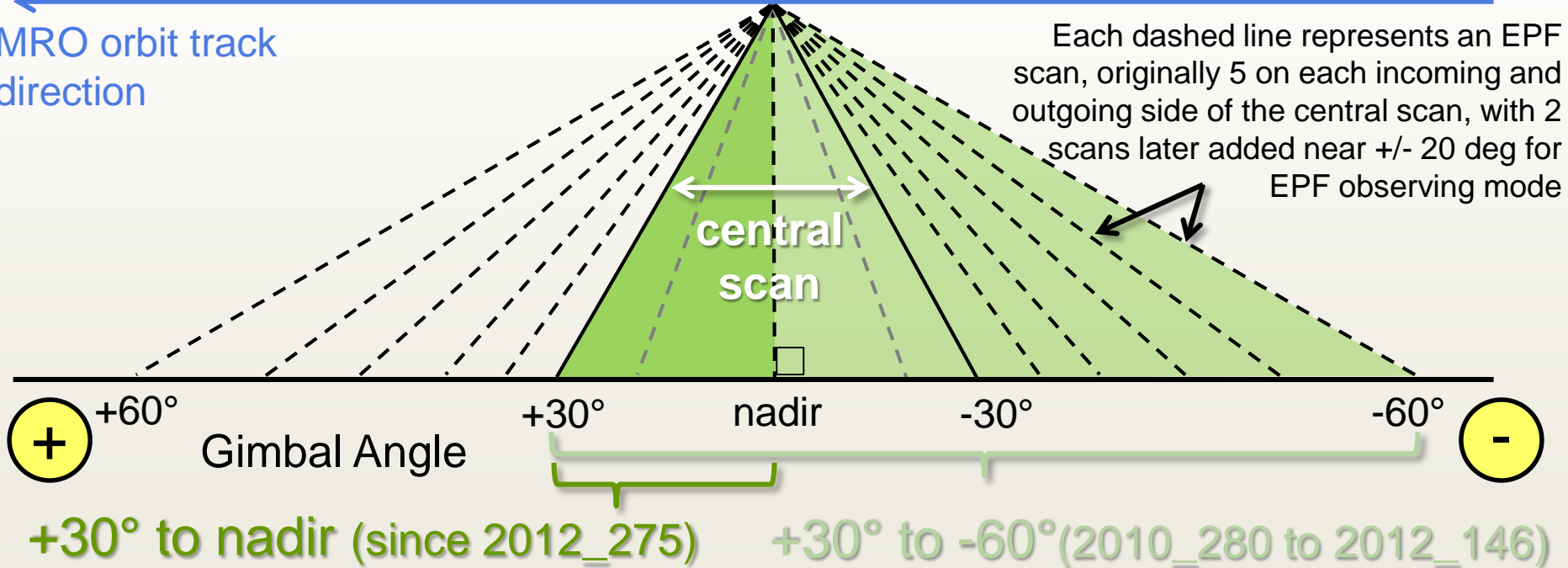


Observing Schematic & Gimbal Range of Motion

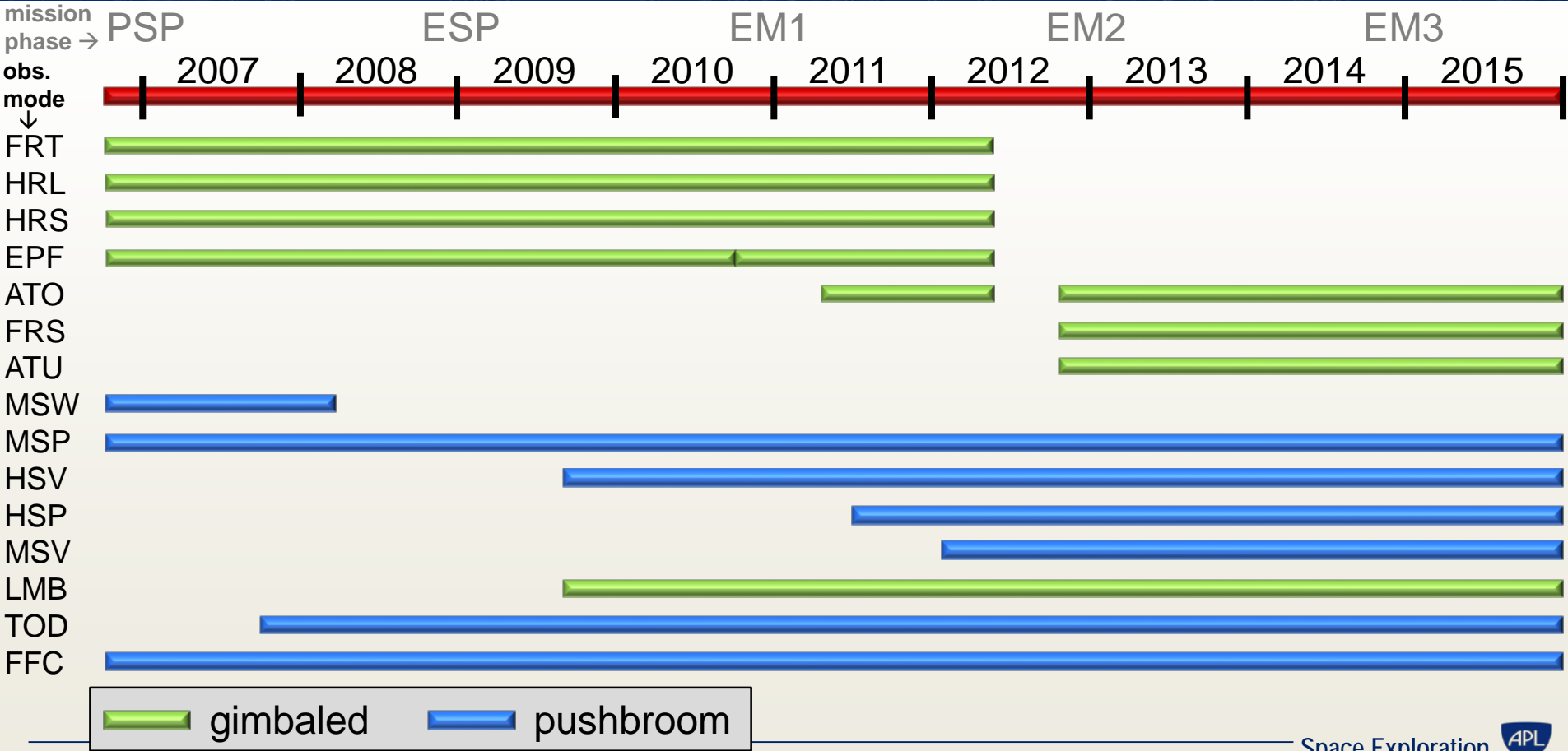
Original range of gimbal motion
 $+60^\circ$ to -60°



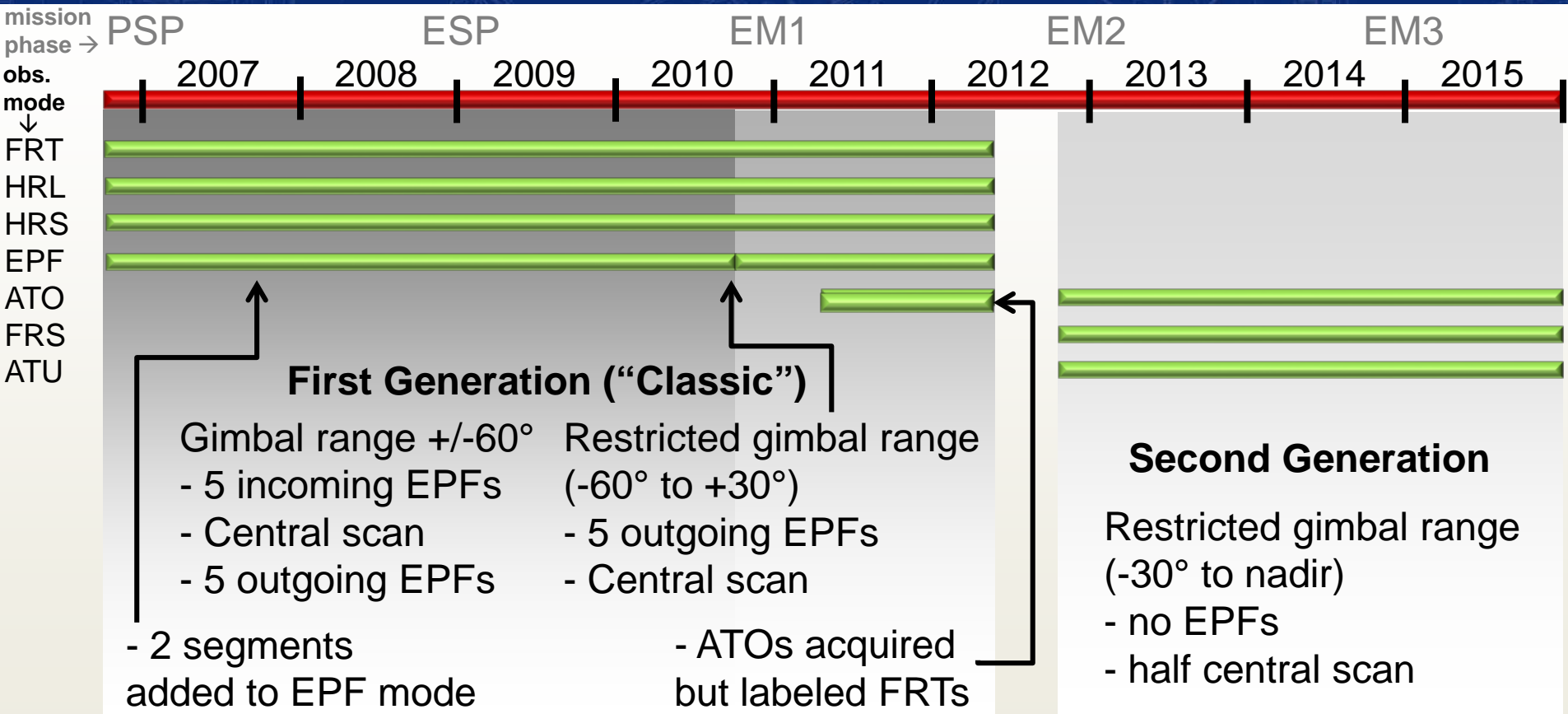
←
MRO orbit track
direction



Timeline of Observing Modes

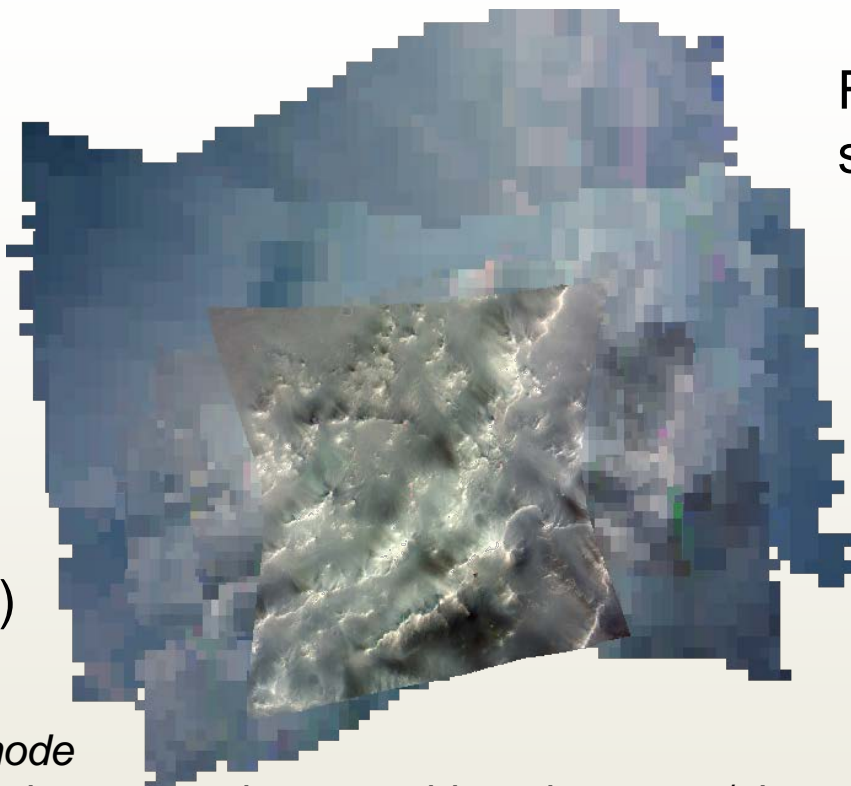
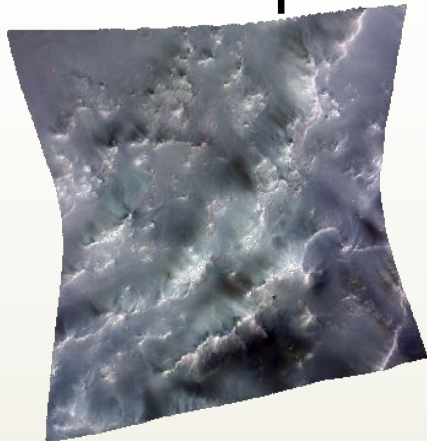


Timeline of Observing Modes: **Gimbaled** (Surface Science)



Classic Targeted Observing Modes: FRT, EPF

~20 m/pix

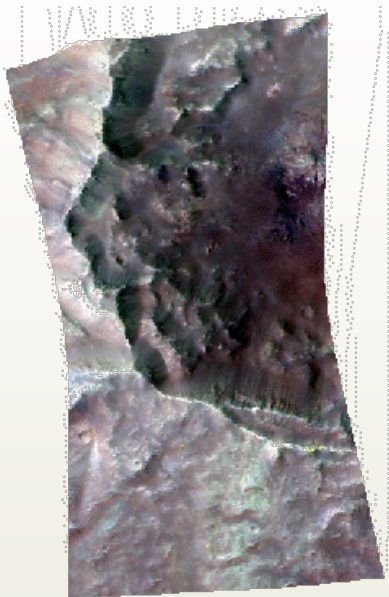


FRT central
scan + EPF
sequence

Full Resolution Targeted (FRT)
central scan only

- **Emission Phase Function (EPF) mode** consists of 5 (or 6) incoming and outgoing scans plus a 10x-binned, ~200 m/pix central scan
- Each FRT/HRL/HRS also has 5 EPF segments but the central scan is ~20 or ~40 m/pix.

Classic Targeted Observing Modes: HRL, HRS



Half Resolution Long (HRL)

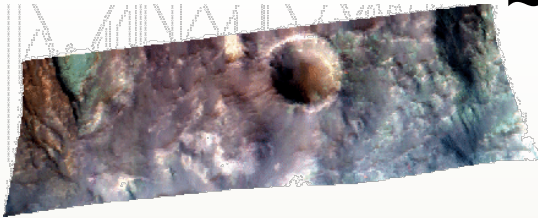
40 m/pix



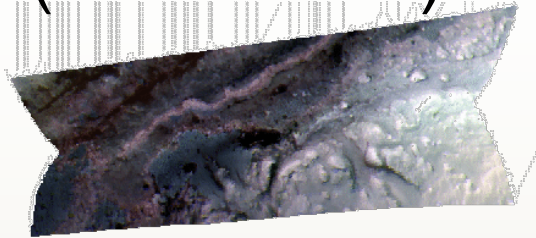
Half Resolution Short (HRS)

Second Generation Targeted Observing Modes

~20 m/pix (cross-track)



Full Resolution Short (FRS)
(~20 m/pix)



Along Track Oversampled (ATO)
(variant of FRT before 2012_142)
(highest spatial resolution in center)



Along Track Undersampled (ATU)
(~40 m/pix downtrack)



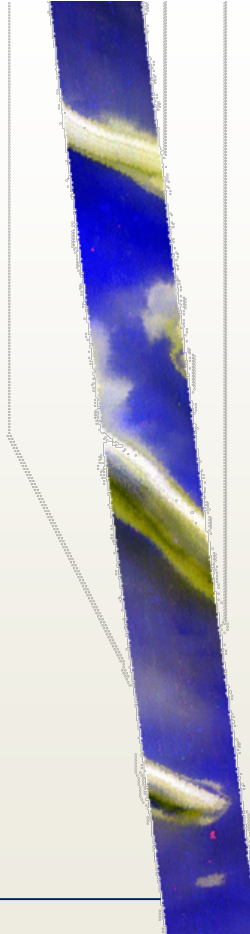
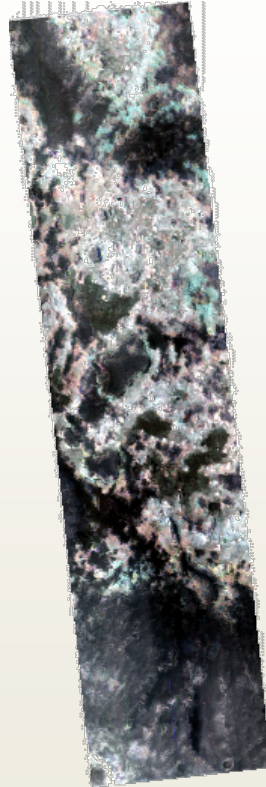
ATO (after 2012_142)
(up to ~8 m/pix downtrack, but
requires special processing for
increased resolution)

Mapping Modes

100 m/pix

MultiSpectral Window
(MSW)

MultiSpectral VNIR
(MSV)

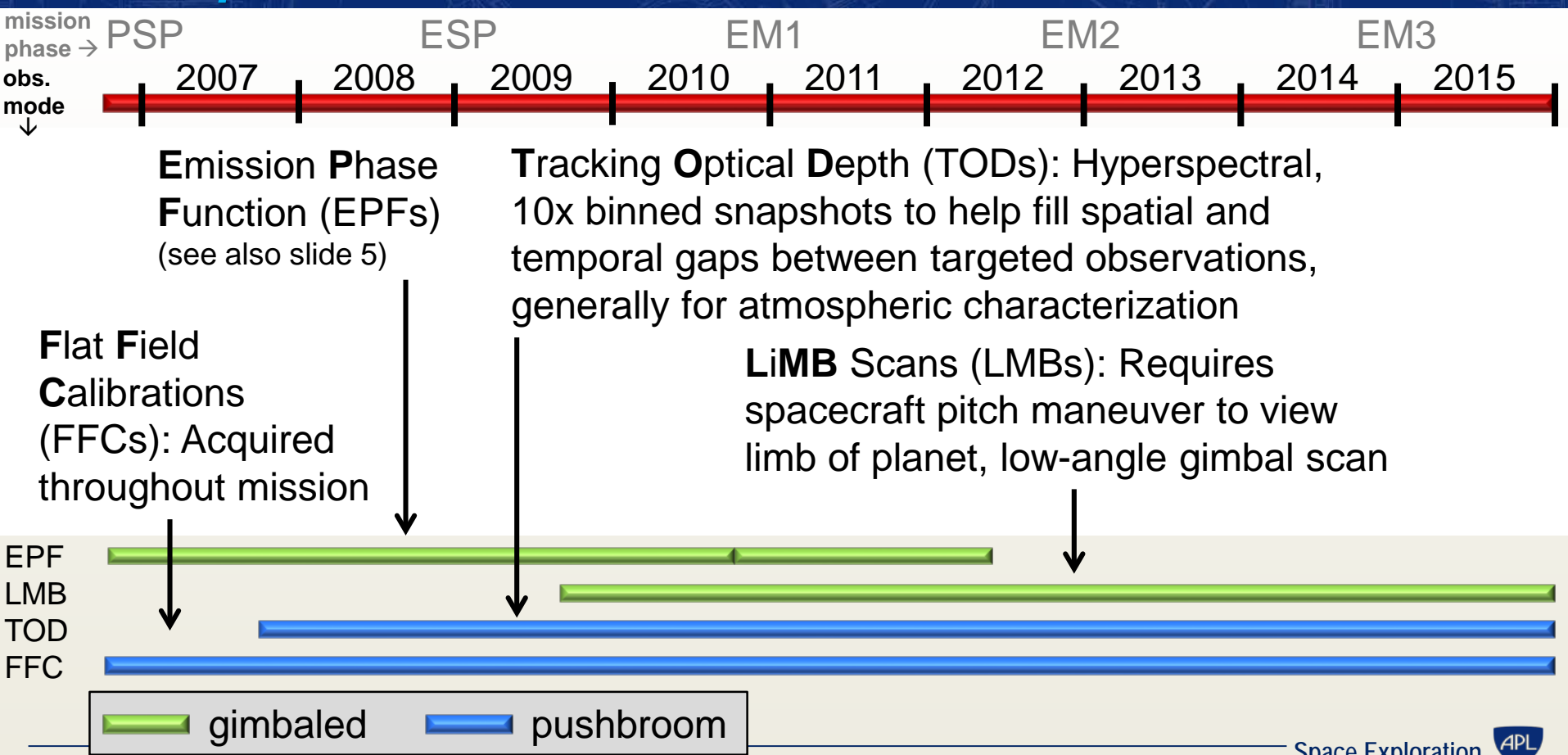


200 m/pix

MultiSPectral Mapping (MSP)
HyperSPectral Mapping (HSP)
HyperSPectral VNIR (HSV)

All mapping mode
observations can
vary in length:
~45, 180, or 540 km

Timeline of Observing Modes: Atmospheric Modes and Calibrations



Atmospheric Observations

LMB

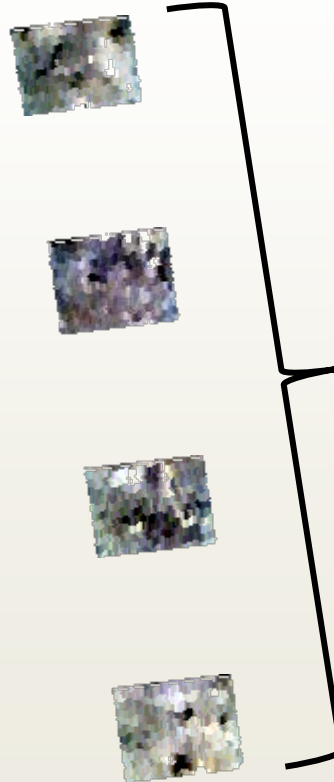
space

atmosphere

surface



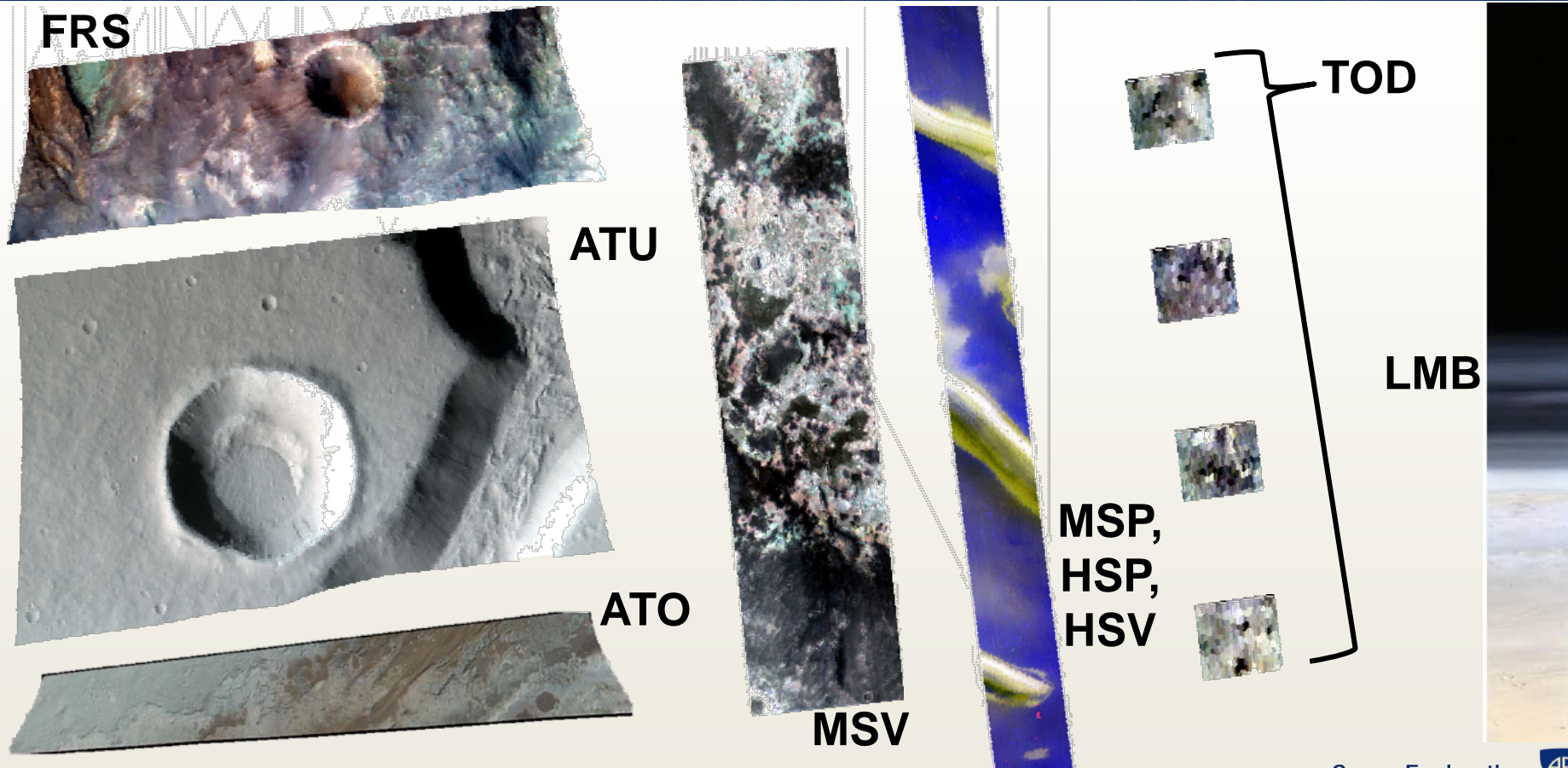
TOD



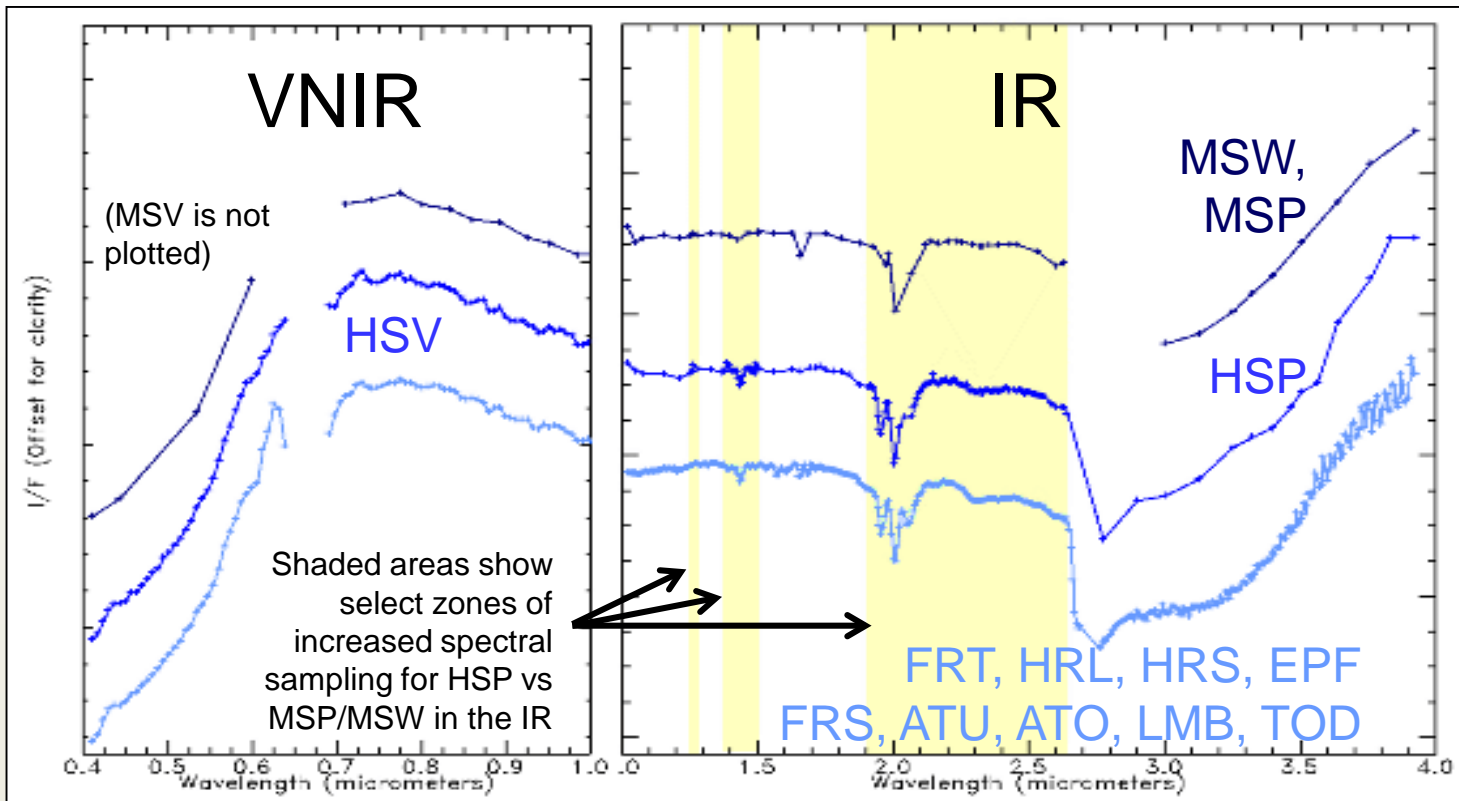
- 4 hyperspectral snapshots of surface
- Pixels are non-square and elongated downtrack – similar to flat fields

EPF not shown
(see slide 5)

Summary: Current Suite of Observing Modes



Summary: Current Observing Mode Spectral Sampling



number of bands:

VNIR IR

19 55

107 154

107 436

VNIR-only modes:

HSV/FRS/ATO/ATU

107 0

MSV

90 0