Remote Sensing
Programming Lesson
(TGO)

May 2018
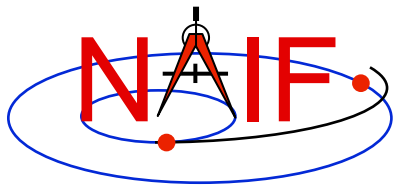
Navigation and Ancillary Information Facility

Mars

Mars as seen from
ExoMars-16 TGO

Sun as seen
from Mars

Sun

TGO

Earth as seen from
ExoMars-16 TGO

Earth

Remote Sensing Lesson:
"Obtaining Target States
and Positions"

Mars

IAU_MARS

Remote Sensing Lesson:
"Spacecraft Orientation
and Reference Frames"

α

Nominal instrument
view direction

TGO_SPACECRAFT

Mars as seen from
ExoMars-16 TGO

TGO
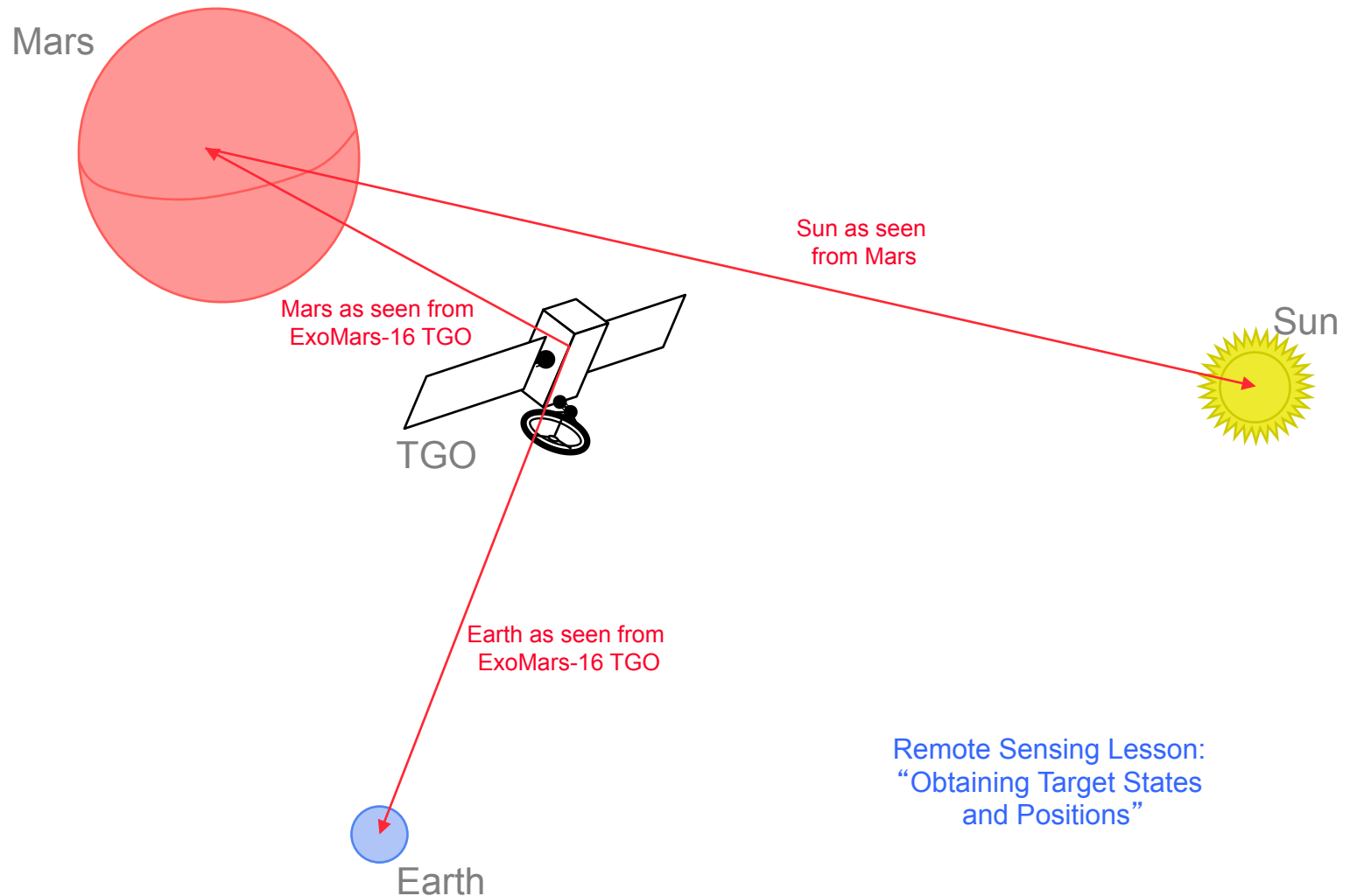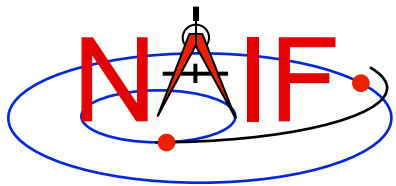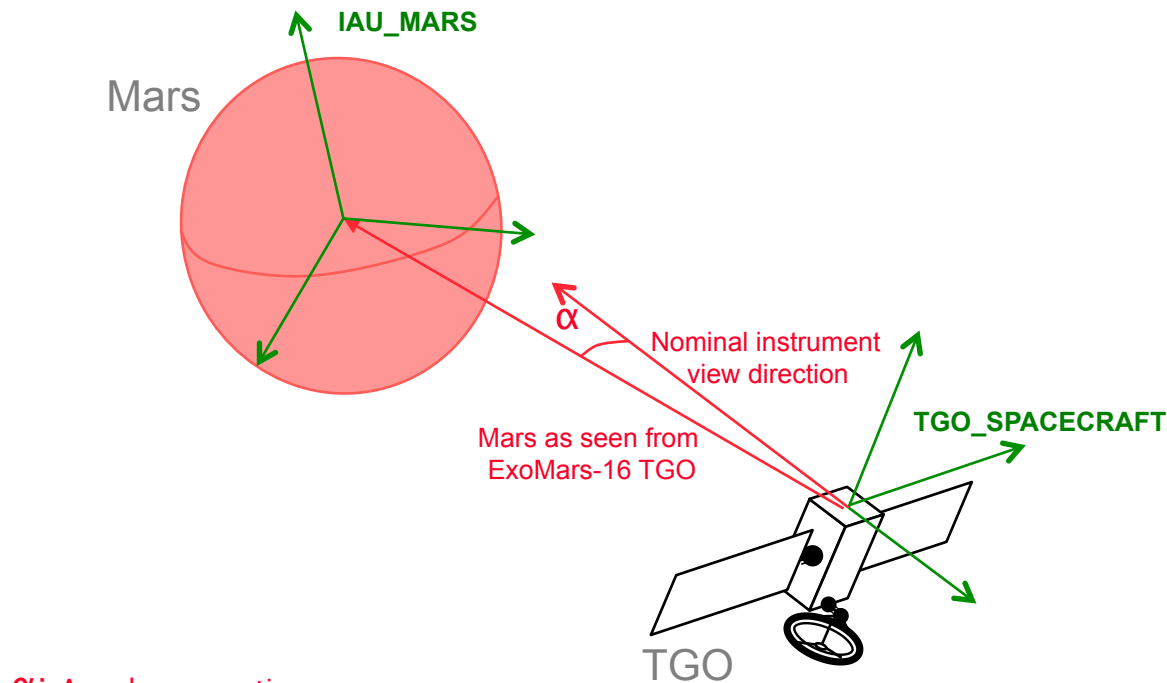
α: Angular separation
between nominal instrument
direction and direction to Mars

Sun

Earth
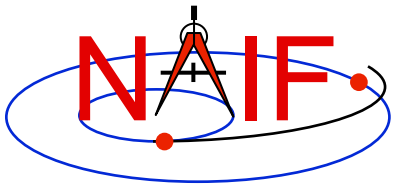
Mars Shape

The next two tasks ask for computing observation geometry parameters for Mars modeled as a triaxial ellipsoid and as a triangular plate model provided in a DSK, resulting in significantly different values for these two cases. This should not be surprising given how different Mars topography is from the ellipsoidal surface, for some areas by many kilometers, as illustrated by the animation/view below.
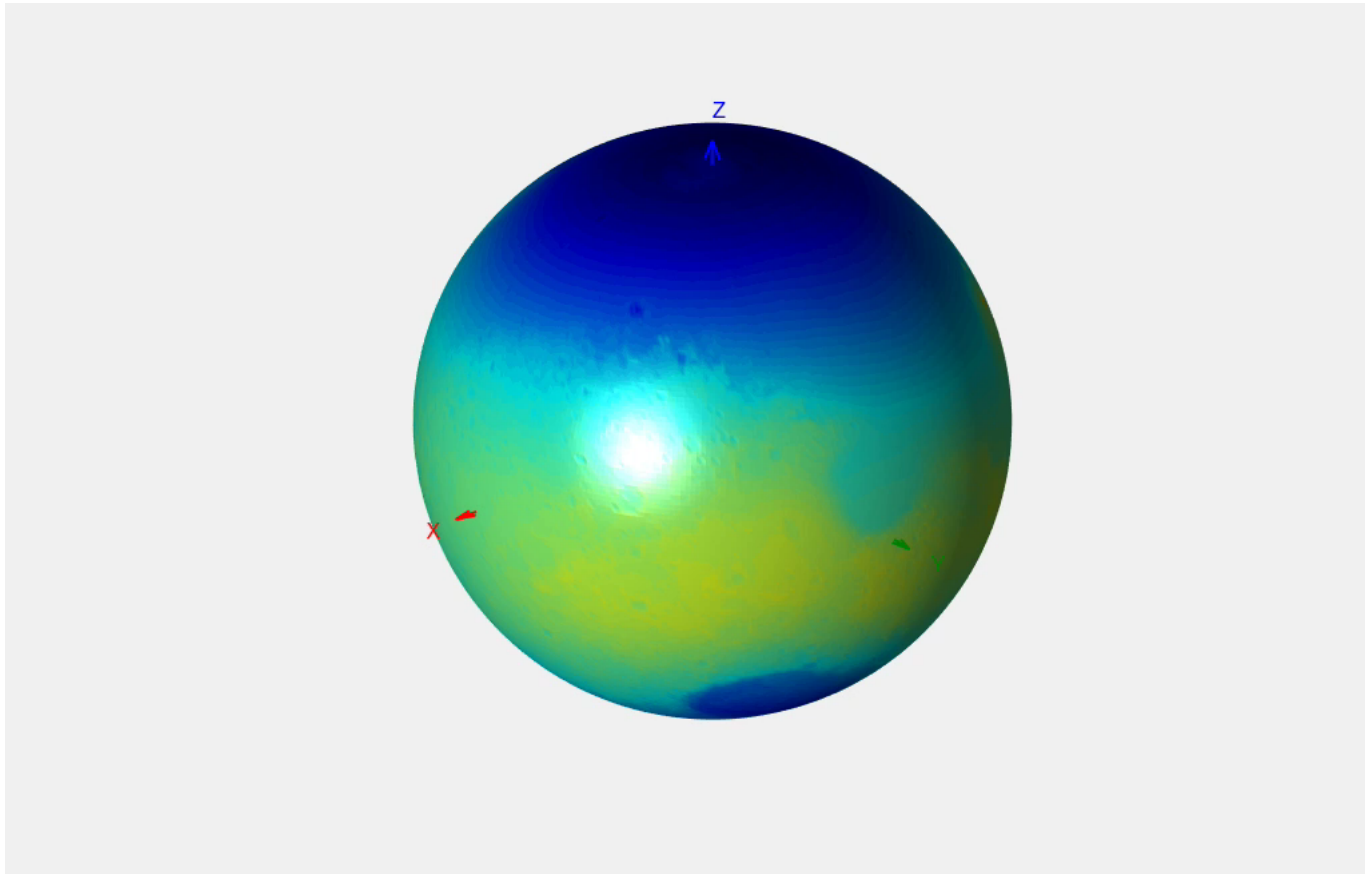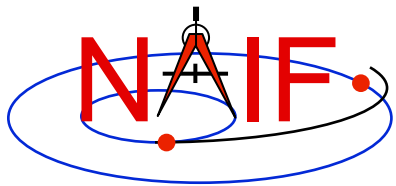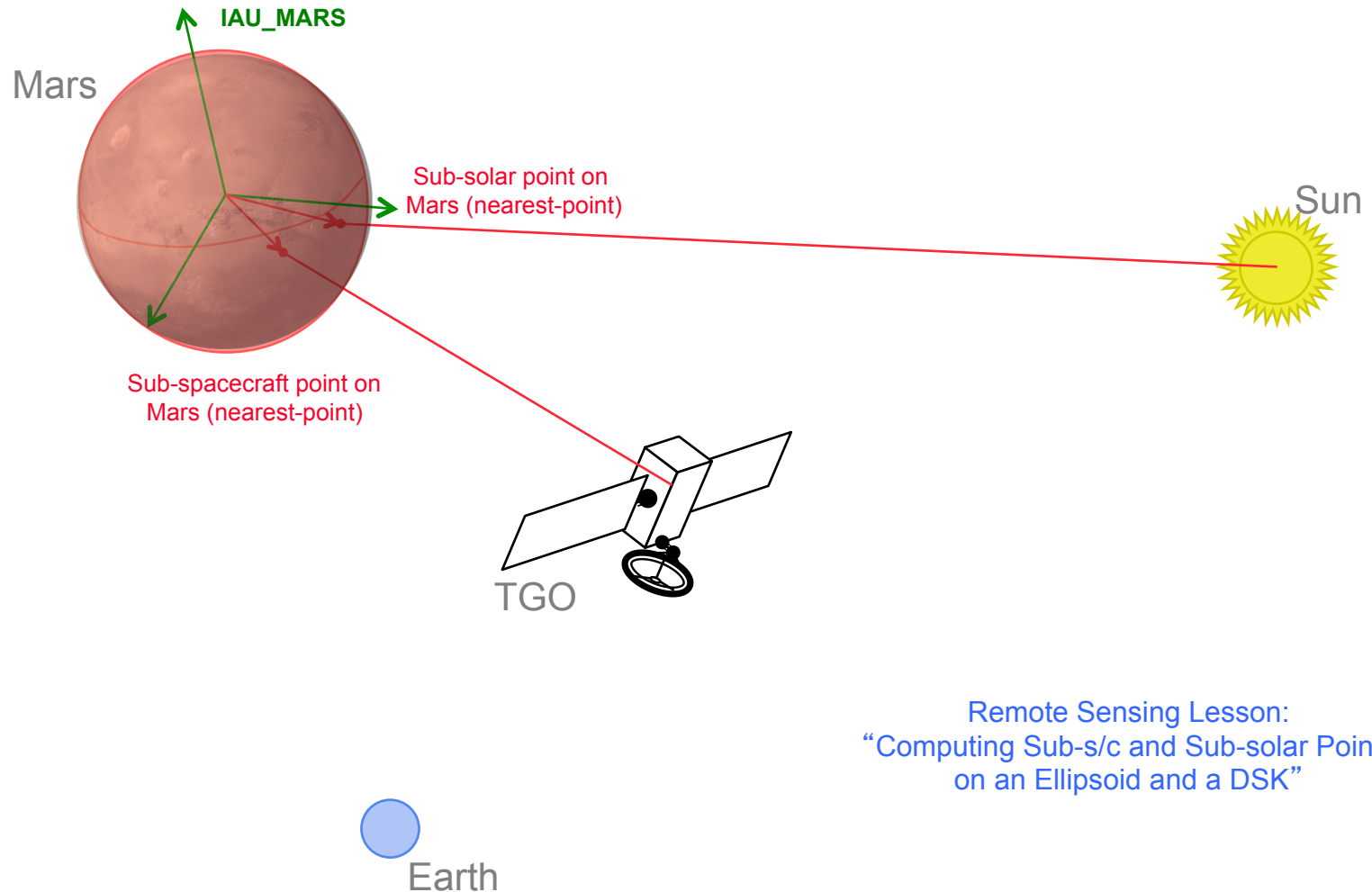
Navigation and Ancillary Information Facility

IAU_MARS

Mars

Sub-solar point on
Mars (nearest-point)

Sun

Sub-spacecraft point on
Mars (nearest-point)

TGO

Remote Sensing Lesson:
"Computing Sub-s/c and Sub-solar Points
on an Ellipsoid and a DSK"
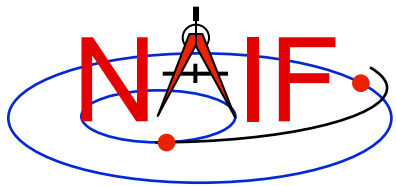
Earth

Navigation and Ancillary Information Facility

IAU_MARS

Mars

Illumination angles at
the intersect point

Normal to the surface
at intersect point

Direction to the Sun from the
surface intersect point

Sun

TGO_NOMAD_LNO_NAD

NOMAD LNO Nadir
boresight and FOV
corner vectors

Mars surface
intersects for NOMAD
LNO Nadir boresight
and FOV corners
(five points)

TGO
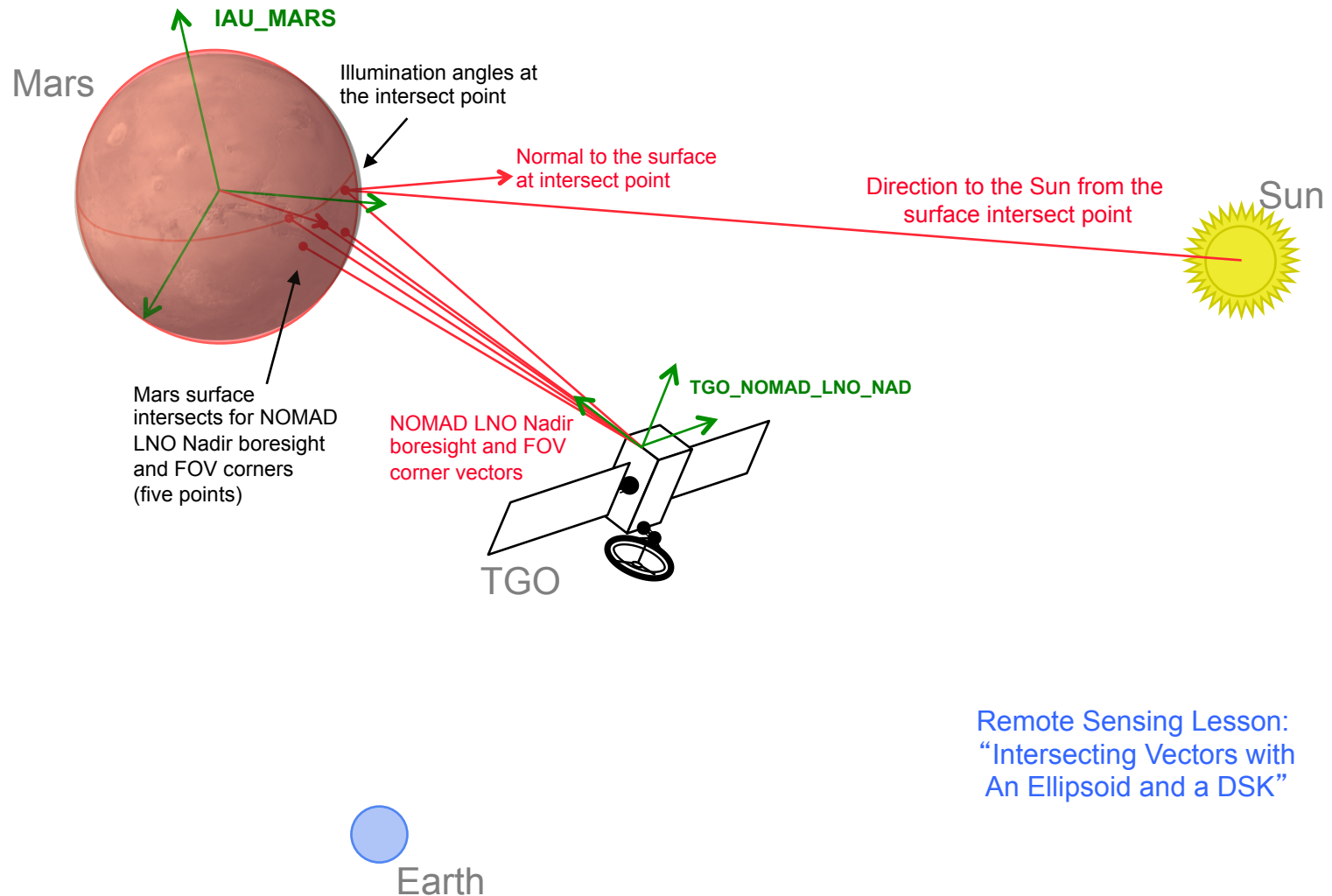
Remote Sensing Lesson:
"Intersecting Vectors with
An Ellipsoid and a DSK"

Earth