

# An Overview of JMARS THEMIS Targeting Software

## Getting Started:

1. Put the JMARS CD in your CD drive
2. Double click on the studentjmars.jar file
3. JMARS will open up with the start of the orbit of a given day. This will take a few minutes.
4. Time (seen as *Time, Slew*) is given as an ET or ephemeris time. This is the number of seconds since January 1, 2000.

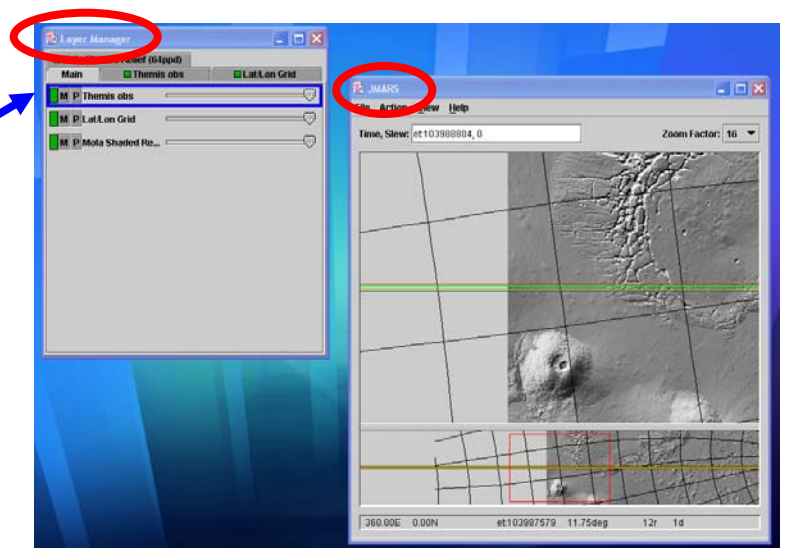
## Looking at JMARS:

I. There are two windows:

1. Layer Manager: Used to add and adjust data layers.

As a general rule, the *Themis obs* line should be selected (outlined with a blue box). If it is not, simply click on that line.

2. JMARS Window: Shows the data layers in two different views – focus on this window. (You can maximize this window if you wish.)

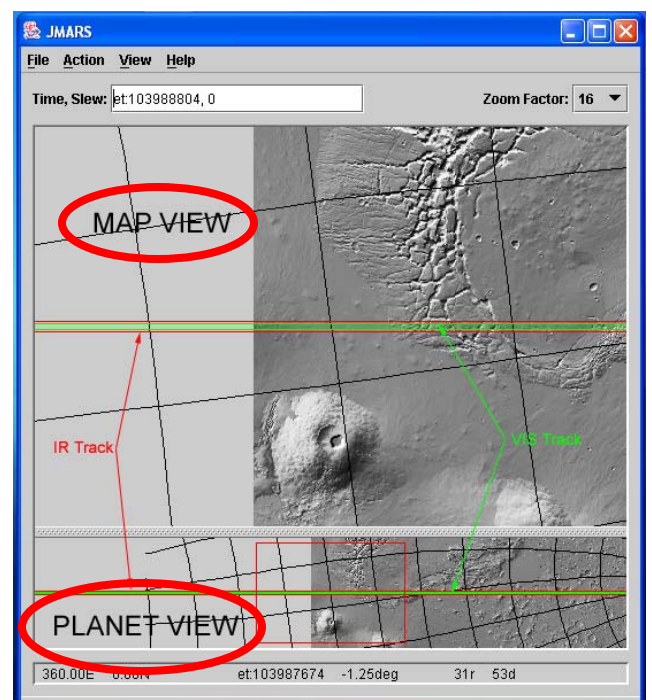


JMARS Window: Two views

1. Planet view (at the bottom of the window)
2. Map view (enlarged view of the red box seen in the planet view)

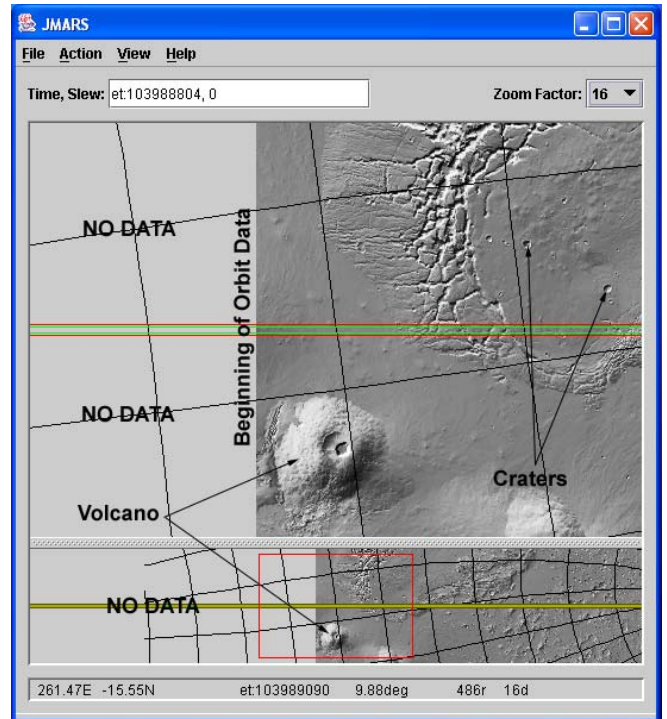
Odyssey orbit track:

- Lines in the center of each view are the predicted ground track of the THEMIS camera and Odyssey spacecraft
- Red lines: infrared camera track (32 km wide)
- Green lines: visible camera track (18 km wide)



## II. Background Data Set:

- The background data set shown here is a shaded relief map (indicating topography) made up of data from the Mars Orbiter Laser Altimeter (MOLA)
- Your targeting CD will show the colorized MOLA topography data set as the background
- When starting up, there is no data to the left (sometimes this may appear as red, blue, and black squares)
- This is the beginning of the day's orbits. Each orbit begins at the equator.
- Odyssey orbits Mars 12 times a day (every 2 hours)

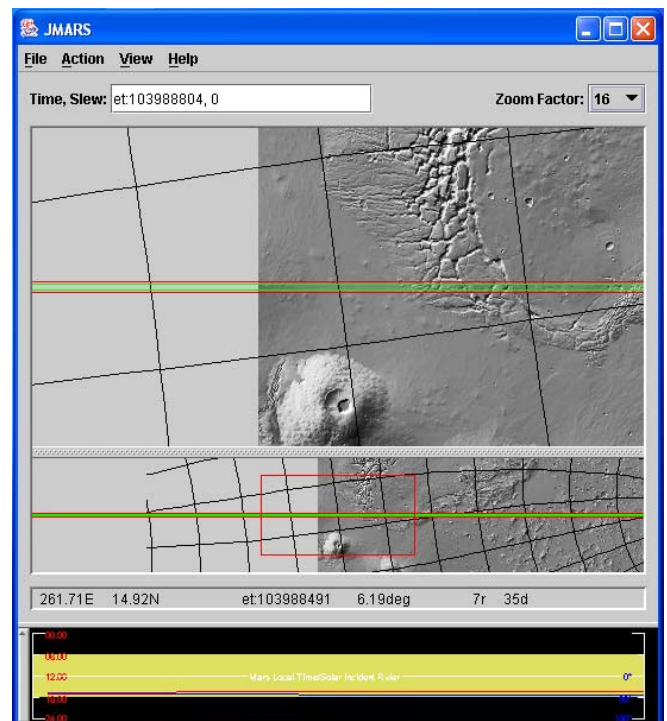


Note: JMARS shows the planet on its side with the North Pole to the left as you start and the South Pole to the right. (You may notice the South Pole in the planet view of your screen.) When you are on the day side of the planet, north is to the left.

## III. Solar Incidence / Mars Local Time Ruler:

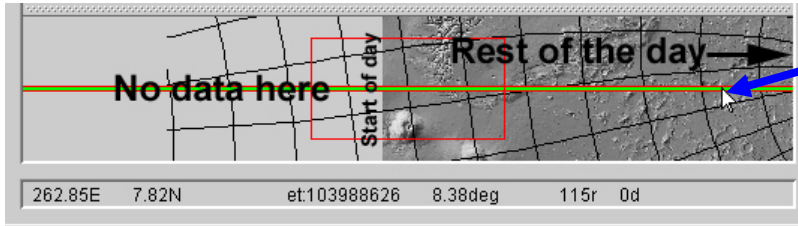
- This should appear at the bottom of the JMARS window
- Blue line: Solar Incidence Angle (SIA)
- Red line: Mars Local Time (MLT)
- You are on the day side of Mars when both red and blue lines are in yellow (day) region

Sometimes these lines can barely be seen within the yellow box – but look closely!

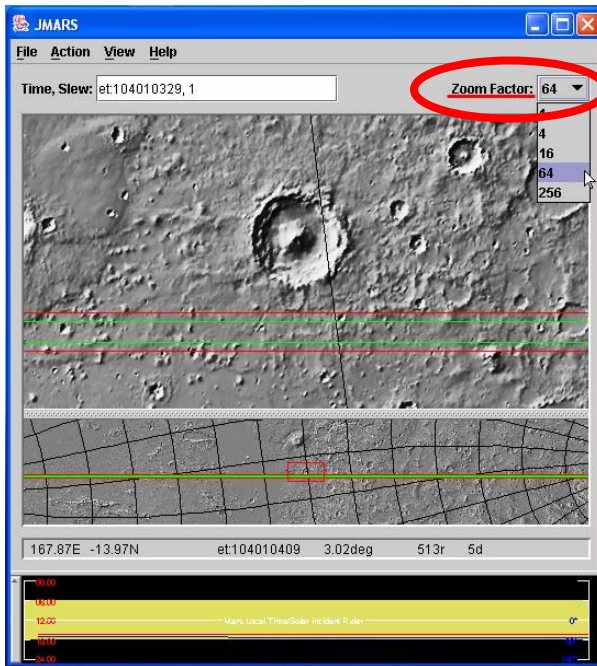


## Navigating in JMARS:

- To move: Left-click on the orbit lines in the planet view (bottom view). Be sure to click on the lines themselves. This will re-center the planet view and map view on the clicked location, keeping the orbit track in the center.
- As you continue to click to the right, you will be continuously “orbiting” around Mars.
- Allow time for the program to redraw. This may take a minute or longer.



Click within the orbital predict lines in the **planet view** to navigate in JMARS

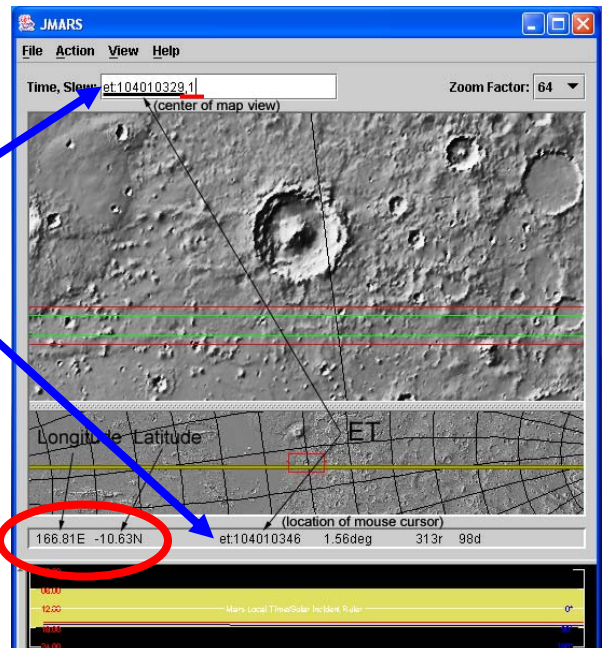


Zoom Factor:

- Zoom Factor can be changed in upper right corner
- Zoom Factor of 64 is useful

## Important Numbers:

- Ephemeris Time (ET)
  - ET at the top of the JMARS window is the ET at the center of the map view
  - ET below the planet view is the ET at your mouse location
  - The ,/ after the ET simply indicates the orbital track is in the center of the screen. You should focus on the 9-digit ET and can ignore the numbers after the comma.
  - Latitude and longitude below planet view are at your mouse location.







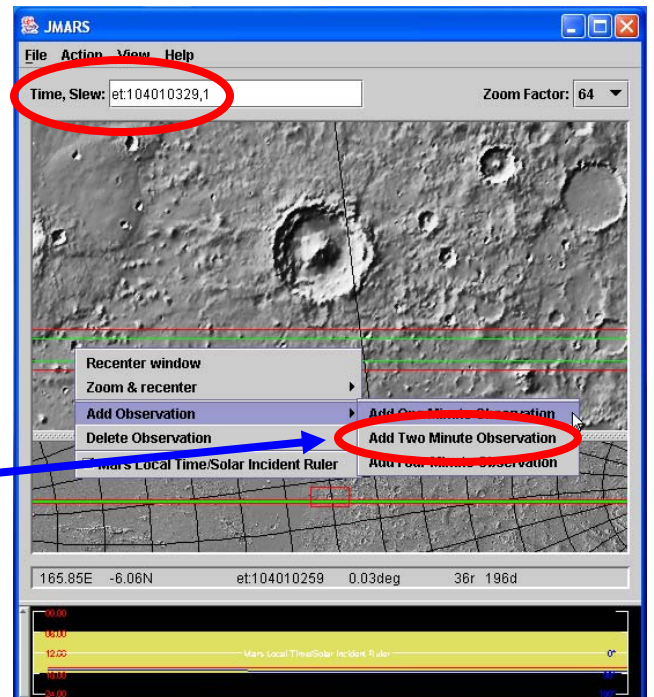
# Tracking Potential Image Targets AND Creating an Observation

## I. Keeping track of interesting potential targets

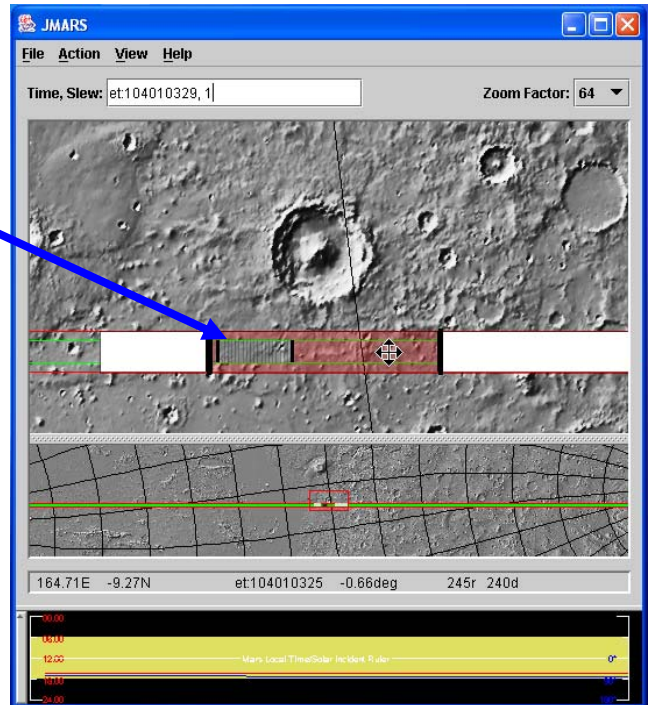
1. Continue to scroll through the orbits by left clicking on the orbit lines in the planet view (bottom view). As you continue to click to the right, you will be “orbiting” around Mars.
2. As you scroll through the orbits, write down any interesting ET locations on the Target Consideration Form (see last two pages of handout). Note down the ET from your mouse location. Also include the Latitude and Longitude of the mouse location in case you want to view this area on a map of Mars. **(IMPORTANT NOTE: Current latitude restrictions for targeting are 85N to 0N).**
3. You can revisit an ET by simply typing in the 9-digit et in the *Time, Slew:* box and hitting return.
4. Once you have a primary and a secondary choice for targeting, fill out the Target Selection Form (see last two pages of handout).

## II. Getting to your location of interest and creating your observation:

1. Enter the target’s ET in the *Time, Slew:* field
2. Note: Look at the Layer Manager window and make sure you clicked on the line of words (NOT the tab) that says ‘Themis Observation’ (see page 1 instructions).
3. On the JMARS window right-click on map view (or for MACs hold down the apple key and click the mouse)
  - a. Choose “Add Observation”, then “**Add Two Minute Observation**”
4. The cursor becomes a faint cross

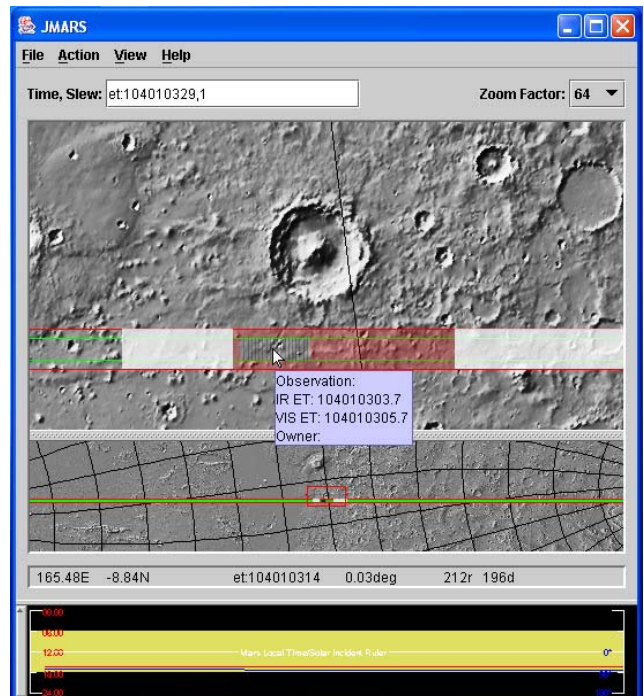


5. Click on the predicted orbit track in map view to show observation stamp
6. Click one more time to select the observation stamp and move stamp onto desired target area
7. Red area is infrared image -not used by most MSIP teams. Gray box inside red area is visible image. You are targeting this image. Faint gray lines are boundaries between *framelets*. There will be about 19 framelets in this one-band image. Visible image target is ~18 km by ~57 km

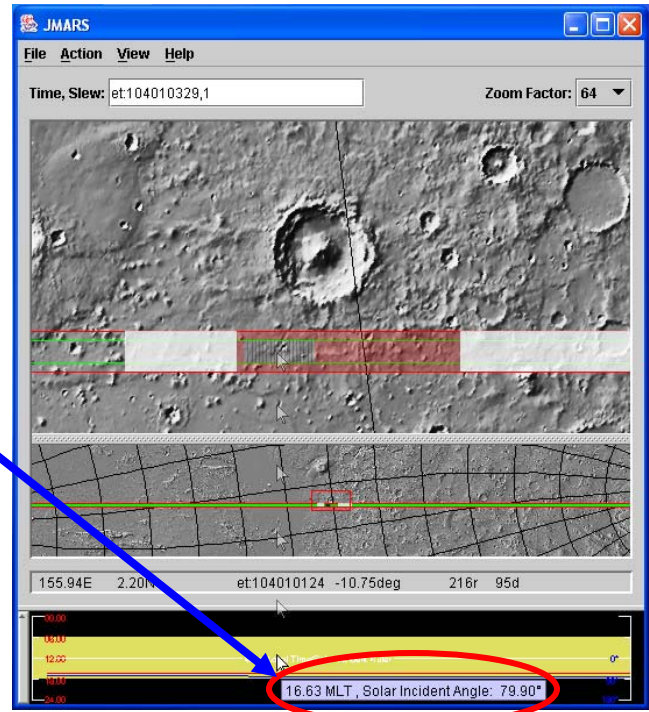


### III. Recording Important Information:

1. Place mouse cursor in the middle of the visible observation. A tooltip box (shown in purple) will appear. From this box record the *Visible (VIS) ET*. (You do not need to record the IR ET.) **Note:** The tooltip will disappear after a few seconds. Move your mouse and the tooltip will reappear.
2. Record the Lat/Lon from the lower left corner of the screen, above the Solar Incidence box.



3. Move the mouse *straight down* from the observation to the MLT/SIA ruler
  - ▶ Record from tooltip:
    - Mars Local Time (MLT)
    - Solar Incident Angle (SIA)



### **The information you need to record for mission planners are:**

- Start ET: Vis
- Center Latitude and Longitude
- Solar Incidence Angle
- Mars Local Time
- Written Description of what you target is of (what is included within the visible image)

This information is included on the Target Selection Form, at the end of this packet. The Target Selection Form is what should be submitted.



# JMARS – THEMIS Targeting Software

## *Target Consideration Form*

Scientific Question

**Start ET and orbit:** \_\_\_\_\_ (orbit \_\_\_\_\_)   
 **Latitude Restrictions:** \_\_\_\_\_  
**End ET and orbit:** \_\_\_\_\_ (orbit \_\_\_\_\_)

1. Is the target between \_\_\_\_\_ degrees North and \_\_\_\_\_ degrees South?
2. Is the target a daytime image? Do the blue and red lines appear in the daylight section of the solar incident ruler at the bottom of the screen?
3. Does the target support and match your scientific question? In other words, if your scientific question states you will be looking at features in the equatorial region you wouldn't want to choose an image near the poles.
4. Fill in the information below to keep track of your possible targets (you do not need to fill in all spaces):

THEMIS Target Consideration Information	
<u>ET &amp; Latitude and Longitude</u>	<u>Comments</u>
<b>ET:</b>  <b>Latitude:</b> <b>Longitude:</b>	
<b>ET:</b>  <b>Latitude:</b> <b>Longitude:</b>	
<b>ET:</b>  <b>Latitude:</b> <b>Longitude:</b>	
<b>ET:</b>  <b>Latitude:</b> <b>Longitude:</b>	
<b>ET:</b>  <b>Latitude:</b> <b>Longitude:</b>	



# JMARS – THEMIS Targeting Software

## *Target Selection Form*

Team Name: \_\_\_\_\_

Names: \_\_\_\_\_  
\_\_\_\_\_

<b>THEMIS Observation Information – Primary Target</b>	
<b>Start ET (VIS):</b>	
<b>Latitude/Longitude:</b>	
<b>Solar Angle:</b>	
<b>Mars Local Time (MLT):</b>	
<b>Description of What Target Looks Like:</b>	

<b>THEMIS Observation Information – Secondary Target</b>	
<b>Start ET (VIS):</b>	
<b>Latitude/Longitude:</b>	
<b>Solar Angle:</b>	
<b>Mars Local Time (MLT):</b>	
<b>Description of What Target Looks Like:</b>	