

SHARAD Targeting

Mars Radar Workshop

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Nominal Targeting - Schedule

- MRO operates in cycles, each lasting two Earth weeks.
- The cycle is divided into three phases. The first phase encompasses long-term “big picture” planning for the whole two week cycle. This is called the “IO” phase.
- The other two phases are for near term planning for each individual week in the two week cycle. These are called “NIO” phases.
- SHARAD targeting occurs almost entirely in the long-term IO phase. We create a complete list of target selections for the full two weeks at the very onset of planning. We then carry these selections through to the NIO phase, where we de-conflict with other instruments.



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IO Planning Schedule

Mon	Tue	Wed	Thr	Fri	Sat	Sun
			Long Term Statefile (late)			
Mon Targets Due	Tue Targets Submitted	Wed	Thr	Fri	Sat	Sun



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WebMap for Targeting

- Every two weeks, a new cycle begins and a long-term set of planning files, known as a state-file, is released by the MRO project. This typically occurs in the early evening on Thursday.
- I've been in the habit of trying to process this state-file as soon as it is released on Thursday evening. Our schedule is fairly tight, and much of it occurs during the weekend. It is helpful to get an early start on the planning.
- Barring an early start, I have the state-file processed by Friday morning.
- Target selections are due with me by the following Monday evening.

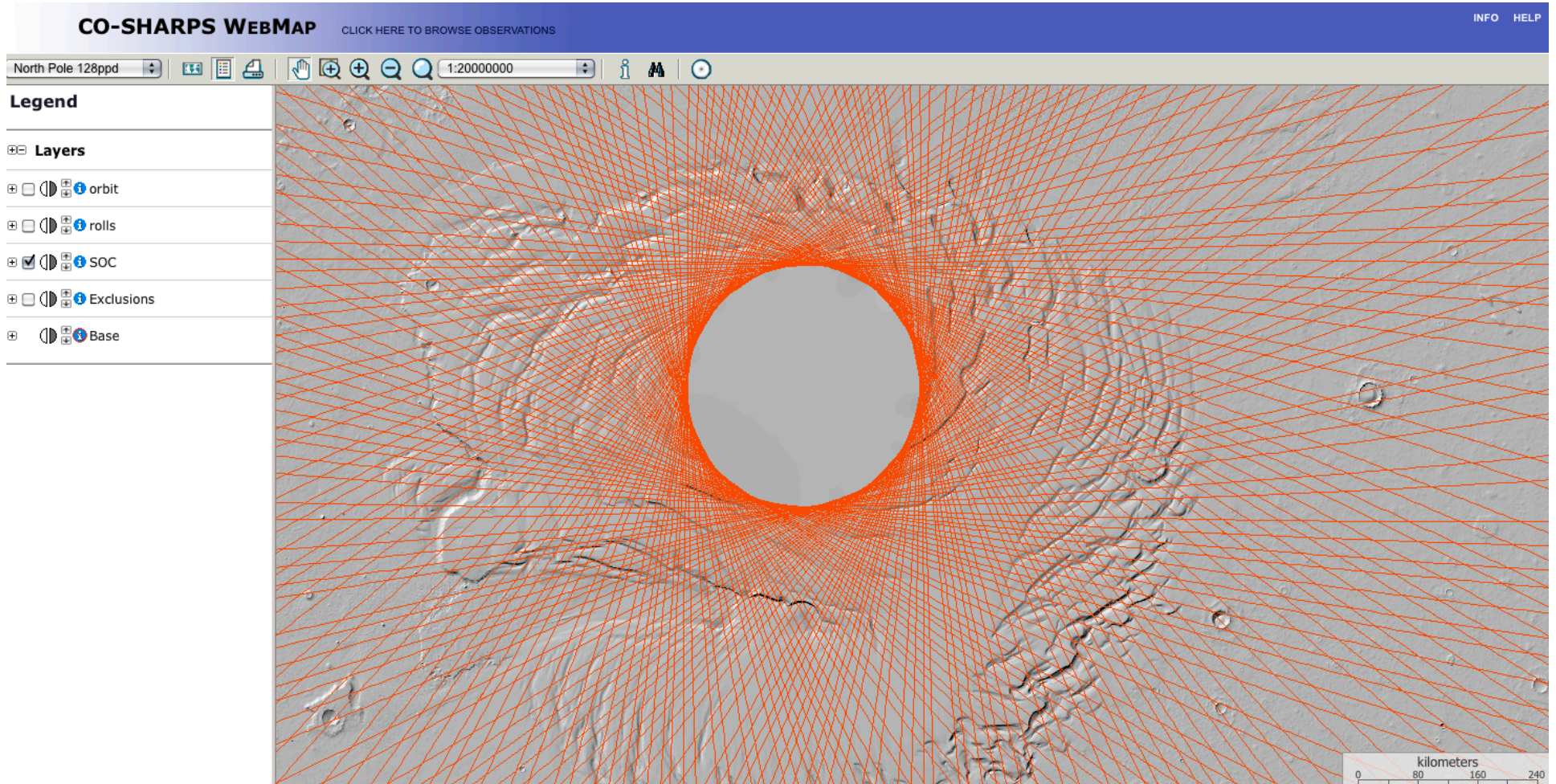


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WebMap for Targeting



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WebMap for Targeting

CO-SHARPS WEBMAP [CLICK HERE TO BROWSE OBSERVATIONS](#) INFO HELP

Hillshade 64ppd 1:40000000

Identify/Query

Single click to query a point
Click and drag to query an area

Layer Name:
PredictSow

results: 6

URL	Zoom to
32757 target 225	
32757 target 413	
32757 target 220	
32757	
32757 target 148	
32757 target 261	



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WebMap for Targeting

- The WebMap is a web application that is accessed via an SSH tunnel.
- Participants in SHARAD targeting receive an email when the WebMap is updated and ready to support target selections for the current IO cycle.
- The WebMap is interactive and provides orbit numbers for ground tracks over features of interest.
- It also provides target ID values when ground tracks are over one of our target boxes.
- Gaps in the ground track coverage are true to spacecraft maneuvers or rules that preclude SHARAD observations.
- The WebMap is available in equatorial and polar projections. It's also available as a shapefile product.



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Target Volume

- Historically, SHARAD has employed a “front loaded” IO-only targeting scheme termed “oversubscription.”
- It represented a mechanism where conflicting SHARAD observations are simply replaced with different target selections.
- In truth, our present operations have not yet needed to rely on oversubscription. We’ve had a very high success rate. I mention it because it is our historic mode of operating and because SHARAD planners are asked to consider and include alternate orbits over their target selections.
- We honor the priority ordering of selected targets. Oversubscription shouldn’t equal “dilution.”



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MUST HAVE Observations

- SHARAD is allowed a short list (three) of highest priority IO selections that are tagged as “must have.” These observations get a first-in-line priority over the nominal IO observations of other instruments.
- Many factors influence what we present as our “must have” requests for SHARAD. Foremost of these, however, are targets that represent rare or important science opportunities.
- Please communicate when your target requests are particularly rare or important for your research.



Night-side Observations

- As an instrument, SHARAD detects the ionosphere of Mars when it is illuminated by the Sun. Obviously, this effect does not occur during night-side observations.
- Few other instruments on MRO operate on the night-side. Consequently, night-side observations seldom require de-confliction and are the easiest to plan and most likely to be selected and acquired by our instrument. They also produce the best surface sounding dataset.



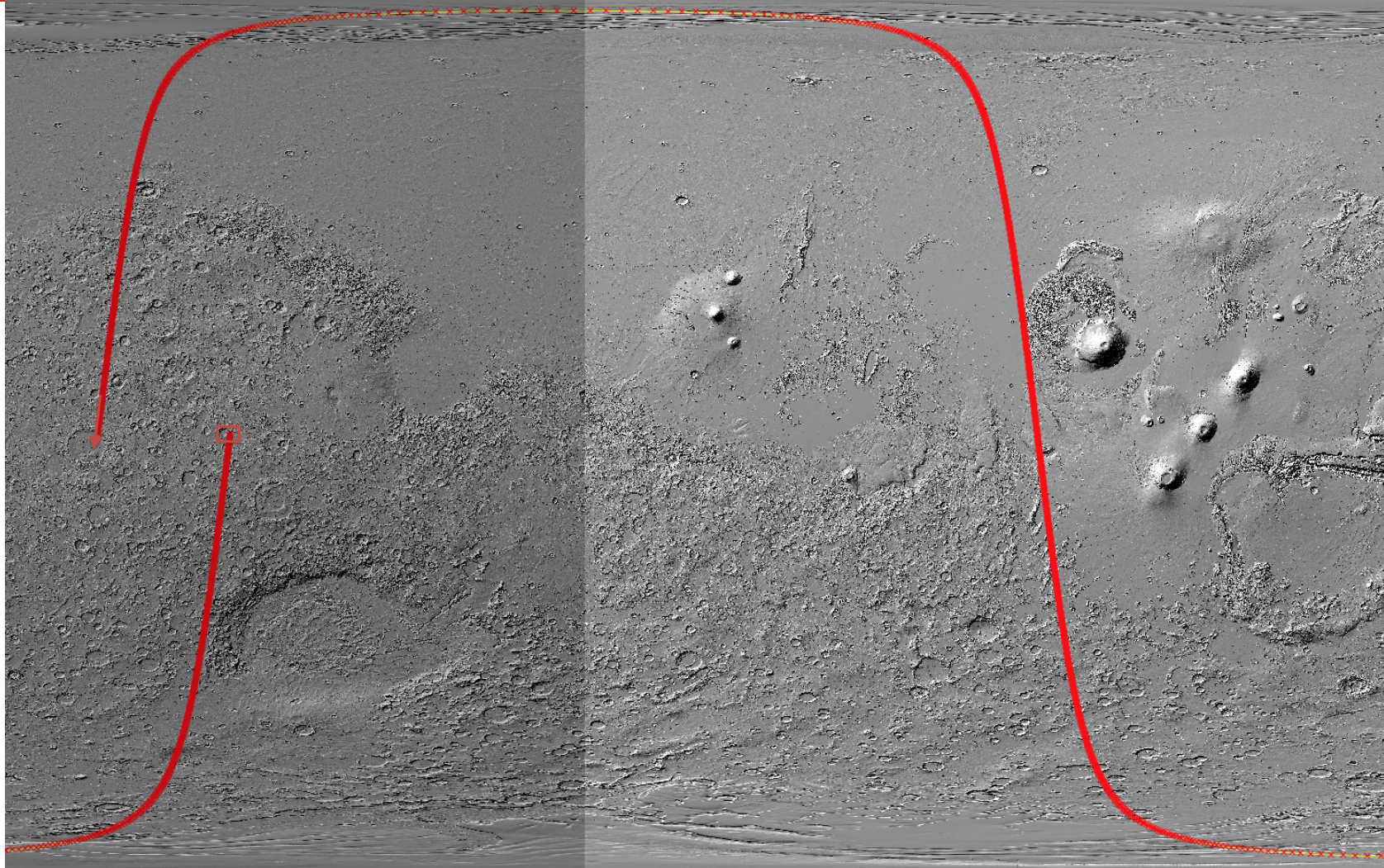
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Knowing the Dark-side

Night-side Descending



Day-side Ascending



UNIX

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DOS



Target Selection Pre-processor

- I've written a script named "ts" that converts target selections received by scientists into spreadsheet entries that are handed to SHOs for commanding.
- "ts" isn't perfect, but it provides a much needed starting point. I ask that target selections sent to me be provided in a format that "ts" immediately accepts.

- Required:

- `./ts -o OrbitNumber`
↑ orbit number
script name ("ts")

If an orbit crosses the equator on the night-side, provide the orbit number that contains the bulk of the observation. Also add a comment that you know the night-side orbit crosses the equator.



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How to Target a Region

- Target by target ID. Target ID's are pre-existing geographic “boxes” that are/were maintained in Italy.
- `./ts -o OrbitNumber -t ID_NUMBER`
- Due to the change in operations, there is some confusion about how to **properly** request new target ID's. It is best to make the request through one of us at CO-SHARPS, or one of the CO-I's.



Target a Polar Region

For our polar regions, historically, we had three target box ID's that surrounded each pole. Each target box was 120 degrees in longitude. It was hard to plan an observation that crossed multiple 120 degree "boxes."

This has been replaced by targets defined in latitude. The targets begin and end roughly 15 degrees away from each pole.

I say "roughly" because there is a spacecraft operations constraint that requests must be tagged as ascending or descending. A request that's centered at the true pole is neither ascending nor descending. Thus, we pad the observation and make it slightly longer on the trailing side.



Target a Polar Region

- Polar crossing targets are selected via
- For the North Pole
- `./ts -o OrbitNumber -np1d`
- For the South Pole
- `./ts -o OrbitNumber -sp1d`
- Note: two dashes above.



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Custom Targets

- Our planning can accommodate “custom” targets over arbitrary regions.
- Requester needs to provide a starting latitude and an ending latitude. If there is confusion (or uncertainty) about which of the two latitudes is the start, then please provide a mean longitude of the observation. Be mindful that orbits will cross the same latitude twice.
- `./ts -o OrbitNumber -lat1 StartLAT -lat2 EndLAT`



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Rolled Target Selection

Desired Roll Type	“ts” script flag
Default roll selection is to prefer completely rolled, but accept a completely nadir observation.	NO SPECIAL FLAG
Only acquire as a rolled completely observation.	--rollOnly
Only acquire as a completely nadir observation.	--nadirOnly
Accept a mix of rolled and nadir (ride-along).	--nadirVariable



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Other Options

- I accept comments using the `-c` flag. Comments should be either free of whitespace, or else surrounded by quotes.
- `./ts -o OrbitNumber -t targetID -c "Must Have"`



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Other Options

- I am able to join two requests together. For example: if two target boxes lead into each other, with just a small gap between the two.
- There are some popular locations where I commonly join two observations. There's always some learning curve when doing it the first time. This option is available by explicit request. It's difficult, but not prohibitive.



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BACKUP



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