HiCat Science Users Perspective
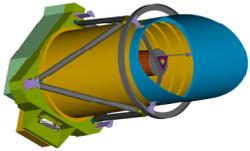
Laszlo Keszthelyi (Co-Investigator)

U.S. Geological Survey
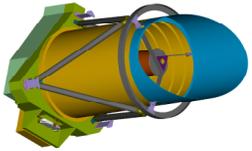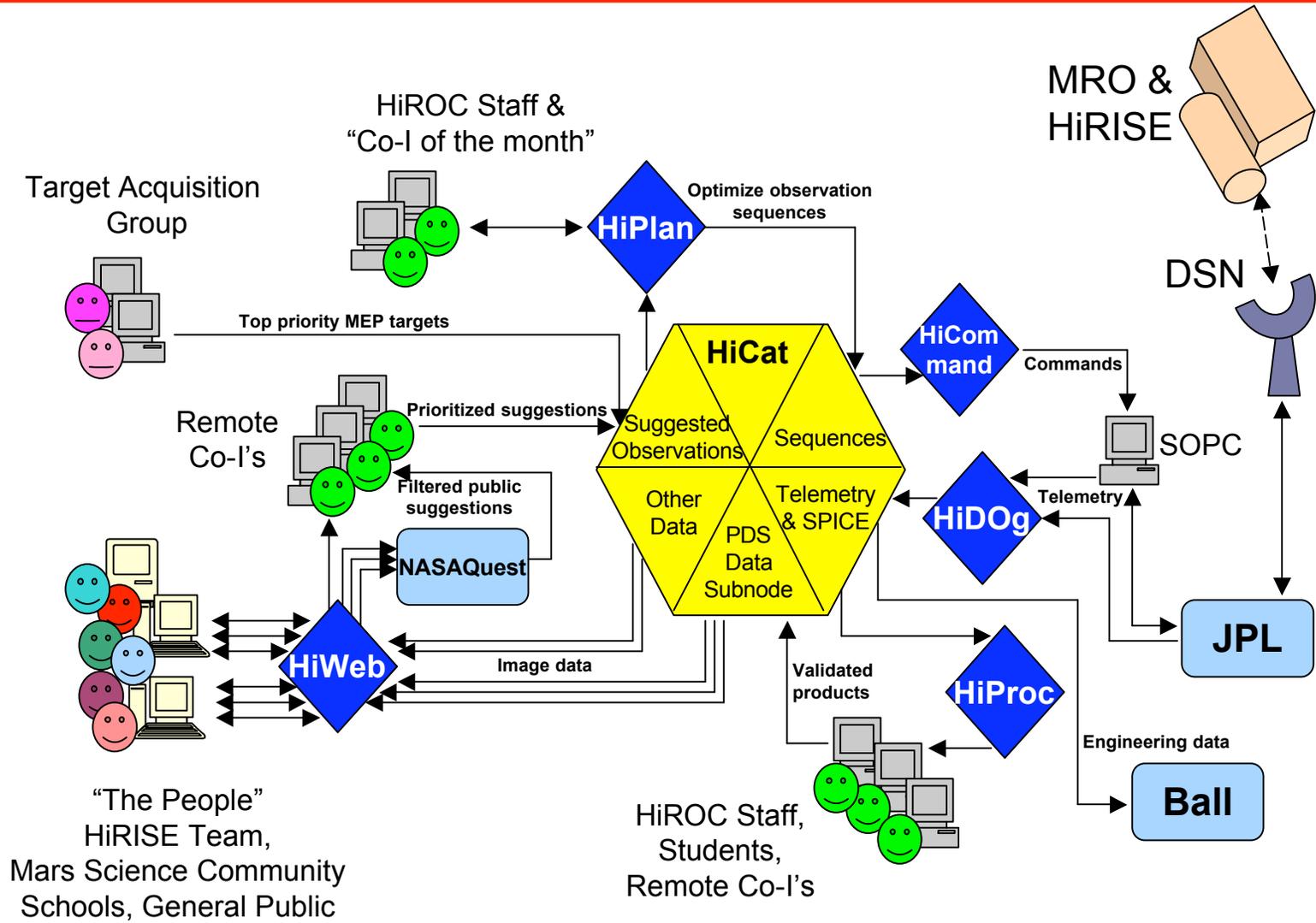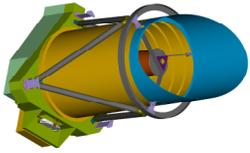
The "*People's Camera*" concept is central to the **HiRISE** experiment. It allows the <u>all</u> people interested in Mars to participate in the experiment including <u>suggesting targets</u> and web <u>release of images</u>, in PDS format, within days of acquisition.

The **HiRISE** Science Team has determined that this is the <u>optimal way</u> to use the camera. This way, the team can select the <u>best targets</u> that anyone can come up with. And the only way the <u>volume of data</u> will be analyzed is if they are <u>promptly given</u> to the person most interested in them.

USGS

MRO & HiRISE

DSN

HiROC Staff &
"Co-I of the month"

Target Acquisition
Group

HiPlan

Optimize observation sequences

HiCat

HiCommand

Commands

SOPC

Top priority MEP targets

Remote
Co-I's

Prioritized suggestions

Suggested
Observations

Sequences

Telemetry

Filtered public suggestions

Other
Data

Telemetry
& SPICE

HiDOg

NASAQuest

PDS
Data
Subnode

JPL

Image data

HiWeb

Validated products

HiProc

"The People"
HiRISE Team,
Mars Science Community
Schools, General Public

HiROC Staff,
Students,
Remote Co-I's

Engineering data

Ball
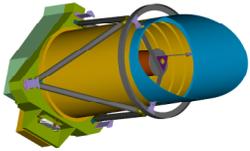
Science Team Requirements

1. Anyone with web access can suggest a HiRISE observation.
2. Suggestions required to contain enough information to prioritize and acquire the image.
3. Co-I's remotely produce imaging sequences.
4. Data is rapidly validated at HiROC or remotely.
5. Data is available for science analysis by anyone with web access within days of the necessary ancillary information being produced.
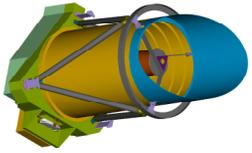
- Suggestor registers as a HiWeb user.
- Select a "region of interest" to image on a basemap, with overlay of data from MGS, MO2001, MEx, MRO, etc.
- If the area has been requested or imaged already, they are so informed (re-imaging can be requested, given an adequate reason).
- Suggestor is prompted for information such as (a) science rationale for observation; (b) acceptable range of resolution; (c) need for color, stereo; (d) seasonal or other temporal constraints; (e) lighting geometry constraints.
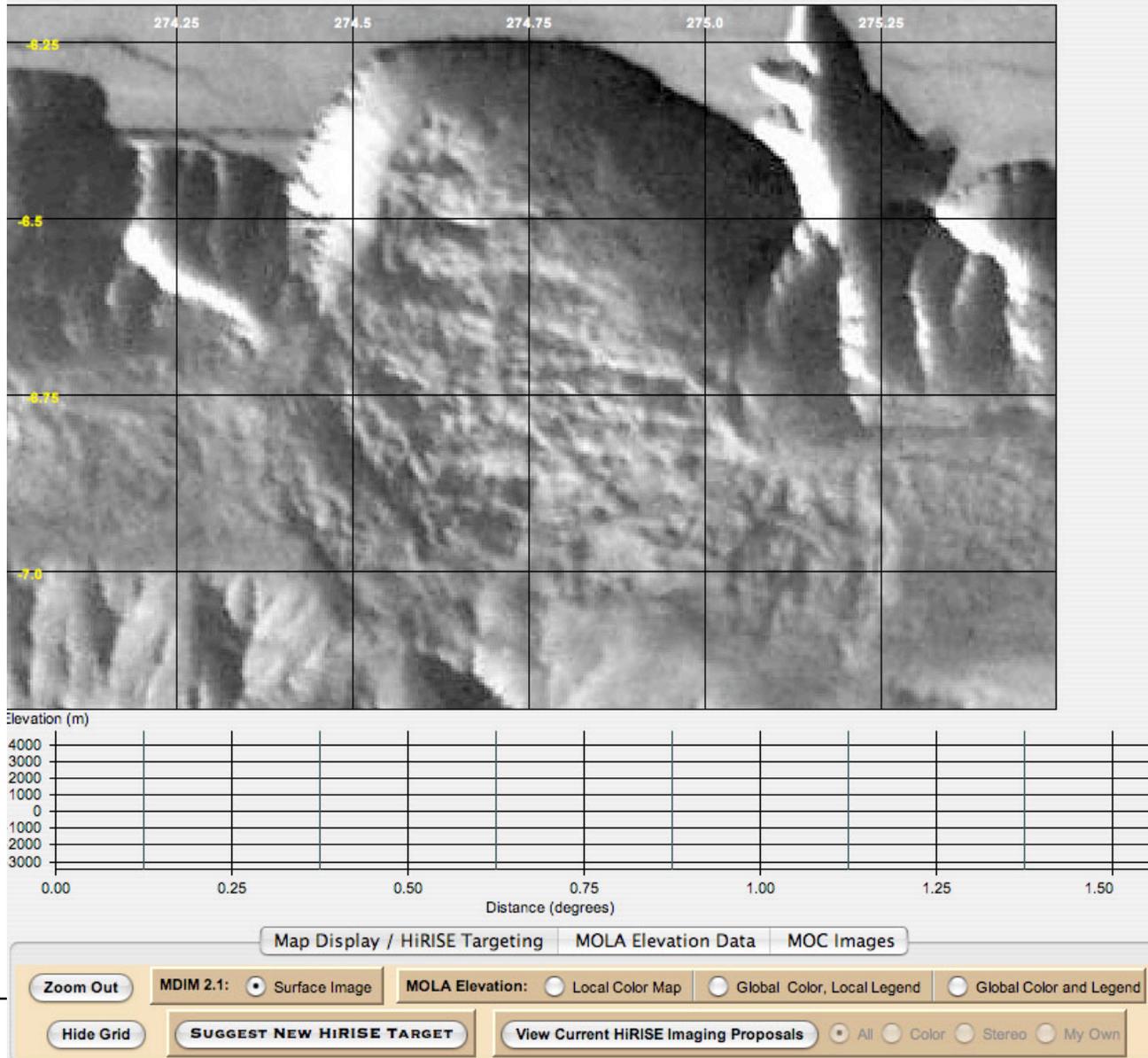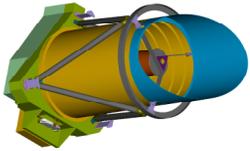
HiWeb (Demo Version)

Personal Information

FIRST NAME:	MIDDLE NAME:	LAST NAME:	SUFFIX:

EMAIL:	ZIP CODE:	COUNTRY: United States

OCCUPATION:	AFFILIATION:	HIGHEST GRADE COMPLETED: 12

Username/Password

SELECT USER NAME:

SELECT PASSWORD:

VERIFY PASSWORD:

Classroom Proposal

○ I'M AN EDUCATOR
○ I'M A STUDENT
◉ I AM NEITHER

☐ THIS IS A CLASS PROPOSAL

GRADE LEVEL: Other

SCHOOL:

ADDRESS:

CITY/TOWN:

STATE/PROVINCE:

HiRISE Team Member Information

☐ I'M A HiRISE TEAM MEMBER

☐ Principal Investigator ☐ Deputy PI ☐ Project Manager ☐ Co-Investigator
☐ Validator ☐ Target Acquisition Group ☐ Education/Public Outreach ☐ HiROC Staff

SCIENCE THEMES FOR CO-INVESTIGATORS:

☐ Atmospheric Science ☐ Fluvial and Hydrothermal Processes ☐ Future Exploration - Water
☐ Landscape Evolution ☐ Layering Processes and Stratigraphy ☐ Periglacial-Glacial-Regolith Processes
☐ Polar Geology ☐ Seasonal Processes ☐ Volcanology

Cancel   Clear   Submit
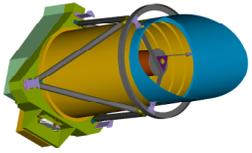
HiWeb (Demo Version)

HiWeb (Demo Version)

Location and General Parameters | Science Justification | Seasonal Constraints | Viewing Angles

Image Coordinates

CENTER LATITUDE	-6.516	MIN. LATITUDE	-6.562
CENTER LONGITUDE	275.324	MAX. LATITUDE	-6.469
HEIGHT	0.094	MIN. LONGITUDE	275.297
WIDTH	0.055	MAX. LONGITUDE	275.352

OR

General Parameters

RESOLUTION
2

BINNING LEVEL
2

Justification for resolution of 2 or more

Want to measure thickness of layers to better than 1 m precision

☐ COLOR NEEDED
☑ STEREO NEEDED

Justification for color and/or stereo

Want to measure thickness of layers

User Verification

USER NAME: [   ] PASSWORD: [   ] NEW USERS: [REGISTER FIRST]

Cancel   Clear   Submit
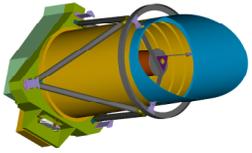
What the science team does with the suggestion

- Requests are sorted by science theme and distributed to the Co-I in charge of that theme.

- The team member uses team-version of HiWeb to view the requests. They read the science rationale behind each request and rank it on a scale of 0-9. Requests from the TAG are assumed to be of maximum science value.

- At the monthly team telecon, the Co-I brings the top priority suggestions up for team debate, allowing the priority to rise to 10-15.
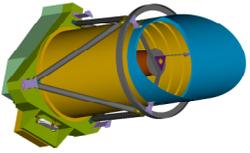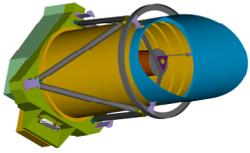
Planning Imaging Sequences

To generate the imaging sequence, the team member logs into the secure HiRISE web site about a month before the plan is to be executed and

1) Starts up HiPLAN.

2) Inputs the dates the imaging plan will cover.

3) Checks to see what high priority requests can be viewed.

5) Manually adjust observations and the imaging modes used in problematic orbits to increase the coverage of high priority targets.

6) Check memory and downlink usage tools find problems.

7) Adjust observations and imaging modes to increase efficiency of memory and downlink usage.

8) Places the optimized imaging sequence into HiCAT.

- Derived from MRO Project's MTT tool which is derived from THEMIS JMARS tool.

- HiPlan development starts in FY06, a few HiRISE specific modules exist today.

- Requirement #1: Provide a user-friendly interface for planning imaging sequences.

- Requirement #2: Allow planning to be done efficiently and securely from remote sites.
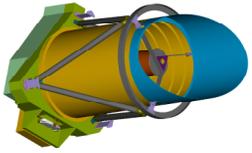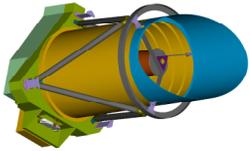
HiPLAN -- hypothetical view 1

Ho500709   H0500710   H0500711   H0500712   H0500713   H0500714

Options
o MDIM
x MOLA
o TES
o MOC
o past HiRISE
x Orbit tracks
x visible requests
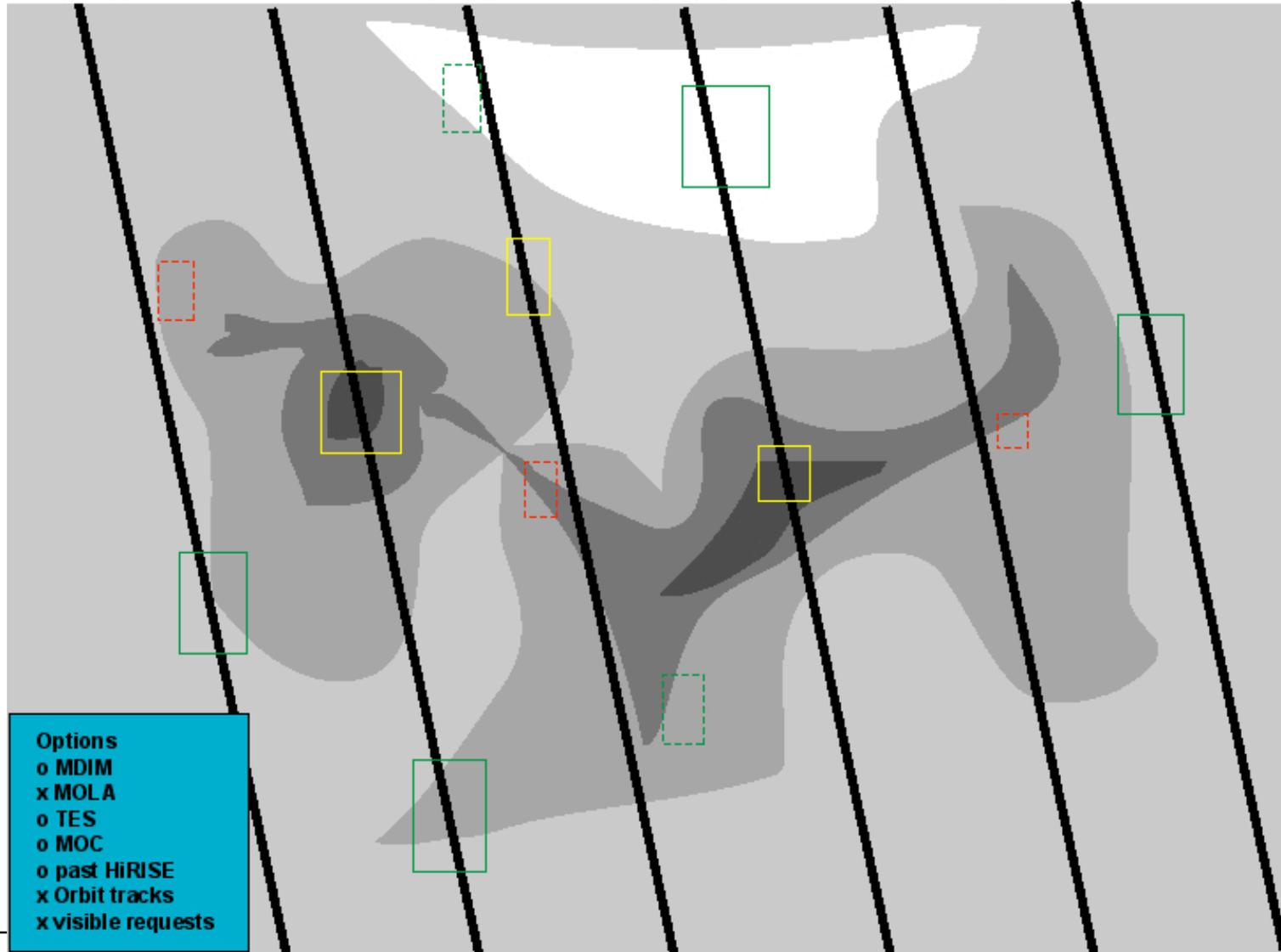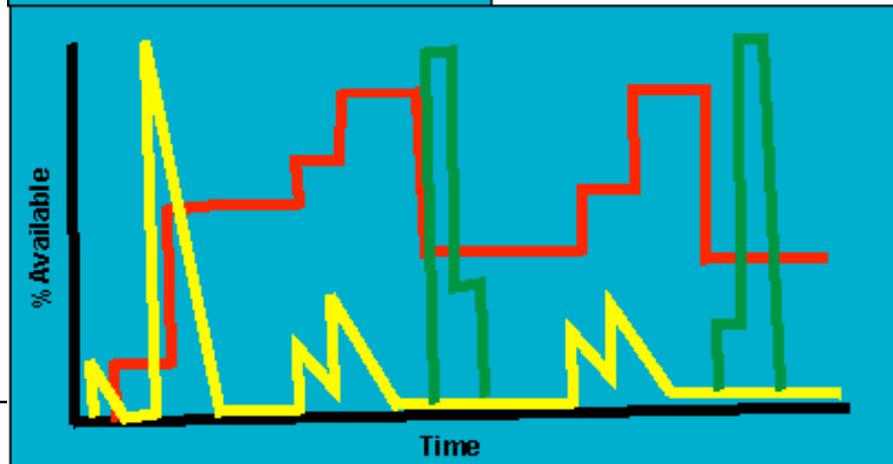
HiPlan- view 2

Observation List

H050070913
H050070914
H050071001
H050071002
H050071003
H050071201
H050071401
H050071402

Observation H050071001

Res=0.35 (<0.5) m/pixel
Area=7x14 (>5x10) km
SNR=181/98/87 (>150/--/--)
MaxDN=200/204/239
MinDN=12/8/14
Summing= 1x1
Compression=

none
8-14 bit
ICER
8-14 bit + ICER
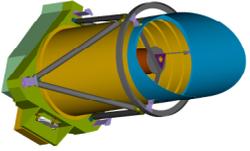
ICER Compression Ratio
③ : 1

Preliminary Playback Plan

0500709

Image ID	SS/SL/NS/NL	ICER#
H050070913	0/0/20/40	1
H050070914	10/10/10/10	5

0500710

Image ID	SS/SL/NS/NL	ICER#
H050068502	8/24/14/28	2
*H050071001	0/0/20/40	20
H050071002	0/0/10/10	----

* = save on S/C memory

% Available

Time

Data Validation

- Each HiRISE image product (EDR and RDR) will be validated before release.

- Step 1: "Data Verification" involves comparison of information in the header with the actual image data and what was commanded. Discrepancies are flagged automatically.

- Step 2: "Visual Validation" involves opening the image and examining the data (in a cursory manner) by humans to verify that the image is devoid of strange problems.

- Step 3: "Data Vet" correction of problems that have been identified.
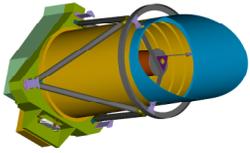
Data Distribution (HiWeb)

- Scientifically useful data (RDRs) will be made available over the web via HiWeb.

- Users will need to be able to search for images based on a variety of criteria (location, date, resolution, color, etc.)

- Users will be able to make measurements and adjustments to the image, not just view a static file.

- JPEG2000 compression to keep bandwidth requirements reasonable.
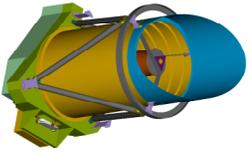
- Many of the software elements that will need to interface with HiCat (e.g., HiPlan, HiWeb-part 2) have not been developed. HiCat is designed based on guesses on how those software elements will interface with the database.

- Remote access needs to be secure.

- Remote access needs to be fast (or database needs to be replicated locally) for remote users.