

PDS Analyst's Notebook for MSL and MER

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What is the Analyst's Notebook?

A tool to support landed mission science

Contains integrated access to peer-reviewed, released data provided by the instrument teams, supported by documentation describing data format, content, and calibration

Gives insight into why and how particular observations were made

MER and MSL Notebook versions

There are public and team versions of the Notebook.

- Public version is updated coincident with archive releases.

- Team version is updated immediately as new data arrive.

Team version assists with data validation and builds on strong collaboration between data producers and PDS archivists that begins soon after mission selection with creation of the project data management and archive plans.

Analyst's Notebook components

Standard PDS Release

Archived Data

- Standard EDR and RDR data products

Documentation

- Software Interface Specification
- Spacecraft and instrument reports

Calibration Data

- Calibration reports and data

Additional data and tools

Special Products

- Additional products of interest
- Science team supplemental products

Documentation

- Daily operations reports
- Science team reports
- Historical reports

Resources

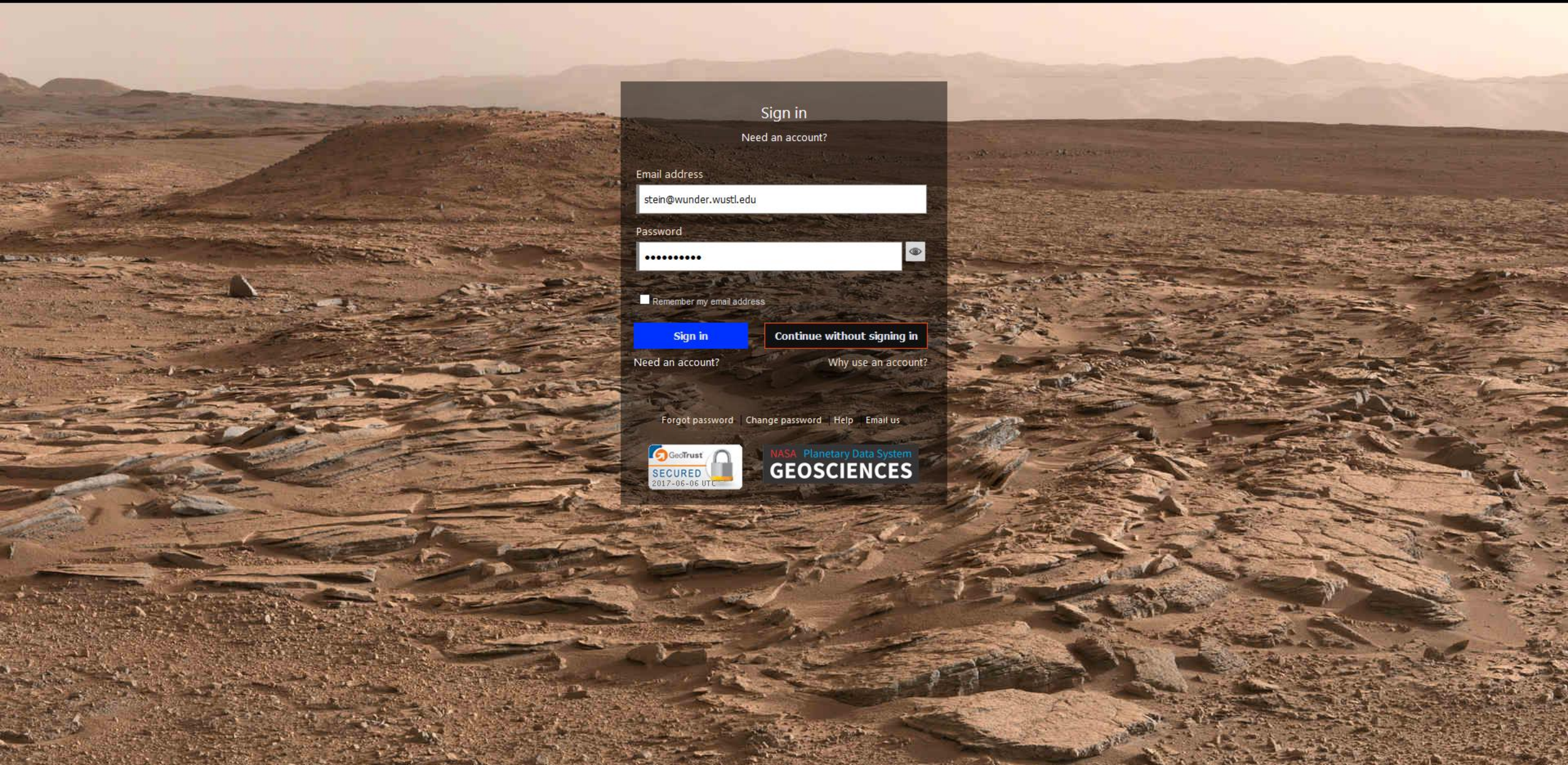
- Historical mission overview
- Science paper references
- Links to additional resources

Value Added Elements



Suite of tools and data representations that enhance archive use








- Data, document, and target search
- Interactive maps
- Context mosaics
- Image measurement
- Data transformation
- Cross instrument data browsing
- Integrated plans / timeline



HIDE
You are using the Analyst's Notebook version 3. Please send comments to an@wunder.wustl.edu.

Getting started
[About data releases](#)

Use the navigation buttons to the left to access Notebook sections.

-  **Mission**
High-level overview of the mission. Information is derived from the mission science and instrument teams reports.
-  **Sol**
Detailed surface operations listings on day by day basis. Includes data products, documents, targets, mosaics, and plans.
-  **Search**
Customizable searches for data, targets, and documentation.
-  **Map**
Interactive plot showing rover traverse over time.
-  **Resources**
Additional information about the mission and data.
-  **User**
Management of user history, personalized settings, cart, and bookmarks.
-  **Help**
Help with using the Notebook, or provide feedback to the developers.

Switch to [version 2](#) of this Notebook

HIDE

Mission summaries

The mission summaries provide an overview of the Curiosity surface operations. Information is derived from a variety of sources, including the mission science and instrument team reports.

Historical overview

The mission is summarized with brief entries for each day's activity.

[Historical overview](#)

Science targets

A sortable, searchable list of all targets created by the science team

[Science targets](#)

Mission overview

MSL Curiosity Landed Operations Historical Overview

The mission is summarized with brief entries for each day's activity. Click on a sol to go to the Sol Summary for that sol.

[Download as PDF](#) [Download as Excel spreadsheet](#) [Reload table](#)

Click on a column header to sort.

Sol	Activity	Start site	L sub S	UTC at local noon
<input type="text"/>	<input type="text"/>	<input type="text"/>		
1	HGA Deploy and Characterization and Remote Sensing	1	151.15	2012-08-07 02:15
2	HGA Point to Earth, RSM Deploy and Range of Motion Checks, Sunfind, and Remote Sensing	1	151.68	2012-08-08 02:54
3	HGA Characterization, FSW Transition Preparation, Instrument Checkouts, and Remote Sensing	2	152.21	2012-08-09 03:34
4	FSW Transition Preparation	2	152.74	2012-08-10 04:13
5	FSW Transition Activity	3	153.27	2012-08-11 04:52
6	FSW Transition Activity	3	153.80	2012-08-12 05:32
7	FSW Transition Activity	3	154.34	2012-08-13 06:11
8	FSW Transition Activity	3	154.87	2012-08-14 06:51
9	Instrument Checkouts	3	155.40	2012-08-15 07:30
10	Instrument Checkouts	3	155.94	2012-08-16 08:10
11	Instrument Checkouts	3	156.48	2012-08-17 08:49
12	Instrument Checkouts and Targeted Remote Sensing	3	157.01	2012-08-18 09:28
13	Instrument Checkouts and Targeted Remote Sensing	3	157.55	2012-08-19 10:08
14	Arm Unstow, SSS Aliveness Checkouts, and Targeted Remote Sensing	3	158.09	2012-08-20 10:47
15	Steering Actuator Checkout and Targeted Remote Sensing	3	158.63	2012-08-21 11:27

1 2 3 4 5 6 7 8 9 10 ...

Page size: 15

1512 items in 101 pages

Science targets

MSL Targets

The list of MSL targets is taken from the mission planning endeavors. Names have been assigned to areographic the Mars Science Laboratory (MSL) team for planning and operations purposes. The names are not recognized by the International Astronomical Union.

ROLS. SORT listing by clicking on a column title. SEARCH by entering value(s) in boxes mn titles. Click on a SOL to see all data for that sol (opens new window). Click on a see more about that target (opens new window). PAGE CONTROLS are at bottom of

[Reload table](#)

	Target	Owner
	<input type="text"/>	<input type="text"/>
	Acadia	vkfox
	aegis_post_1514a	aegis
	Asticou	wrapin
	Baker_Island	vkfox
	Bass_Harbor_Head	vkfox

Back 3 sols

Sol 1416

Next 3 sols

More

?

3 products : A0 L0 R0

RAD

Sol 1415

SCLK 523117224

Seq mcam00560

Site 56 / 1122 / 8

8 products : L0

D

Sol 1415

SCLK 523117643

Seq mcam06929

Site 56 / 1122 / 8

2 products : L7 R7

E

Sol 1415

SCLK 523117775

Seq mcam06930

Site 56 / 1122 / 8

3 products : L0 R0

RAD

Sol 1415

SCLK 523117819

Seq mcam00543

Site 56 / 1122 / 8

8 products : R0

Sol 1415 documents (2)

Sol 1415 targets (3)

Sol 1416 overview

Sol 1416 data products (242)

Sol 1416 documents (2)

Sol 1416 plans (1)

Sol 1416 Activity Plan (post engineers) - View as list

Sol 1416 Activity Plan (post engineers) - View as timeline

Sol 1416 targets (18)

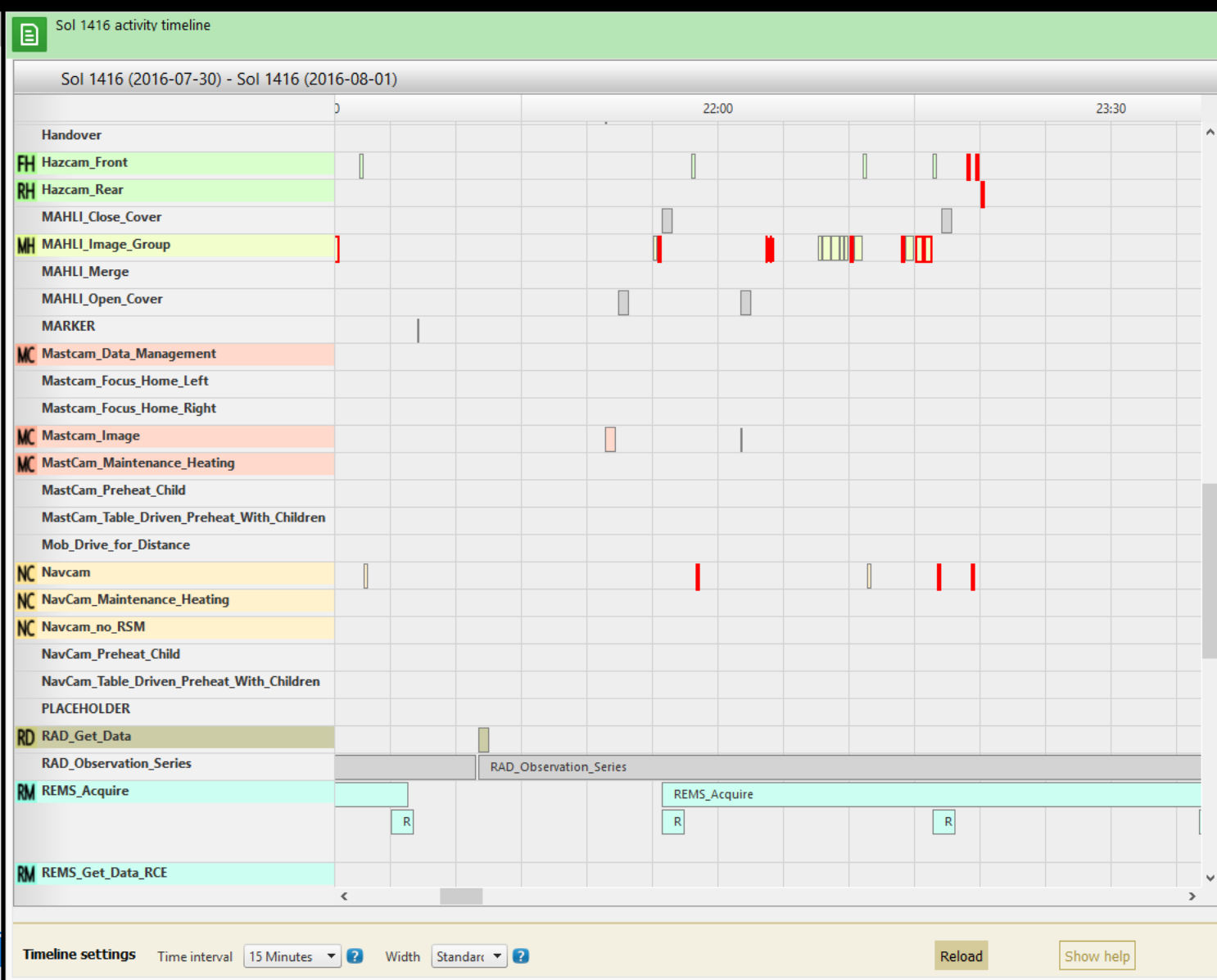
Chibia

Defined Sol 1416 on an image from site 56, drive 1122 and found on 102 other images

Add checked items to cart

Clear all

Check all



QUICK START

Using the timeline

The timeline shows the activity plan for a given sol. Activities are grouped by activity type. Hover over an activity to see the full name. Click on an activity to see the details. Activities outlined in red are associated with one or more data products.

Contents of this help page

[What the timeline shows](#)

[About the details view](#)

[About the activities plan](#)

[Interface tips](#)

About the timeline

What the timeline shows











The timeline is a time-ordered representation of a one-sol activity plan. Each activity is shown as a bar, positioned and sized based on the activity start and end times. Activities outlined in red are associated with one or more data products. Activities are grouped name, thus the time ordering of sol's activities in the chart is not strictly top to bottom, left to right.

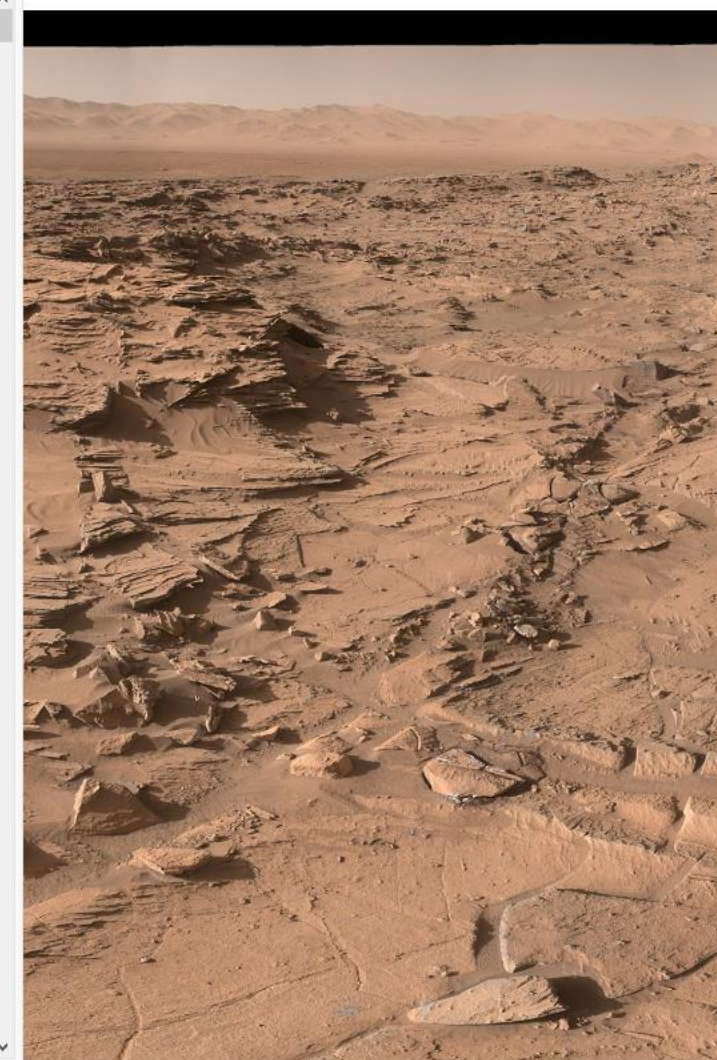
Accessing activity details

Click on an activity to see details in the right hand window. You can hover over an activity in the timeline to see the full name (for systems supporting mouse hovering).

Target Actions ?

319 images found

	Product	Rover distance to target (m)	View target on image	View product
	NC RAD Sol 782 SCLK 466929080 Seq ncam00286 Site 44 / 0 NLB_466929080RADLF0440000NCAM00286M1	38.3	Show target plotted on this image ↗	View product
	NC RAD Sol 782 SCLK 466929080 Seq ncam00286 Site 44 / 0 NRB_466929080RADLF0440000NCAM00286M1	38.2	Show target plotted on this image ↗	View product
	NC RAD Sol 782 SCLK 466929080 Seq ncam00286 Site 44 / 0 NAB_466929080RADLF0440000NCAM00286M1	38.3	Show target plotted on this image ↗	View product
	NC RAD Sol 785 SCLK 467192240 Seq ncam00548 Site 44 / 36 NLB_467192240RADLF0440036NCAM00548M1	40.0	Show target plotted on this image ↗	View product
	NC RAD Sol 787 SCLK 467371215 Seq ncam00290 Site 44 / 190 NLB_467371215RADLF0440190NCAM00290M1	33.7	Show target plotted on this image ↗	View product
	NC RAD Sol 787 SCLK 467371215 Seq ncam00290 Site 44 / 190 NRB_467371215RADLF0440190NCAM00290M1	33.8	Show target plotted on this image ↗	View product
	NC RAD Sol 787 SCLK 467371215 Seq ncam00290 Site 44 / 190 NAB_467371215RADLF0440190NCAM00290M1	33.7	Show target plotted on this image ↗	View product
	NC RAD Sol 788 SCLK 467462321 Seq ncam00548 Site 44 / 190 NLB_467462321RADLF0440190NCAM00548M1	33.8	Show target plotted on this image ↗	View product
	NC RAD Sol 790 SCLK 467626313 Seq ncam00292 Site 44 / 256 NLB_467626313RADLF0440256NCAM00292M1	33.8	Show target plotted on this image ↗	View product
	RAD Sol 790 SCLK 467626313		Show target	



HIDE

SEARCH DATA

Time

Sol

Start

End (opti)

?

SCLK

Start

End (optional)

?

UTC date

Start

End (optional)

?

L sub s

Start

End

LTST

00:00

00:00

?

Location

Site

?

Drive

?

Pose

Instrument

☒ All

☐ AP APXS

☐ MD MARDI

☐ RH Rear Hazcam

☐ CC ChemCam

☐ MC Mastcam

☐ RM REMS

☐ CM CheMin

☐ MH MAHLI

☐ SM SAM

☐ DN DAN

☐ NC Navcam

☐ SP SA/SPaH

☐ FH Front Hazcam

☐ RD RAD

Command

Sequence

?

Help me choose

Source

☒ All

☐ Ground

☐ Nav

☐ Sun

☐ Unknown

?

Image eye and filter

Eye

☒ Both

☐ Left

☐ Right

?

Filter

☒ All

☐ 0

☐ 1

☐ 2

☐ 3

☐ 4

☐ 5

☐ 6

☐ 7

☐ 8

?

Mosaics

Show in results

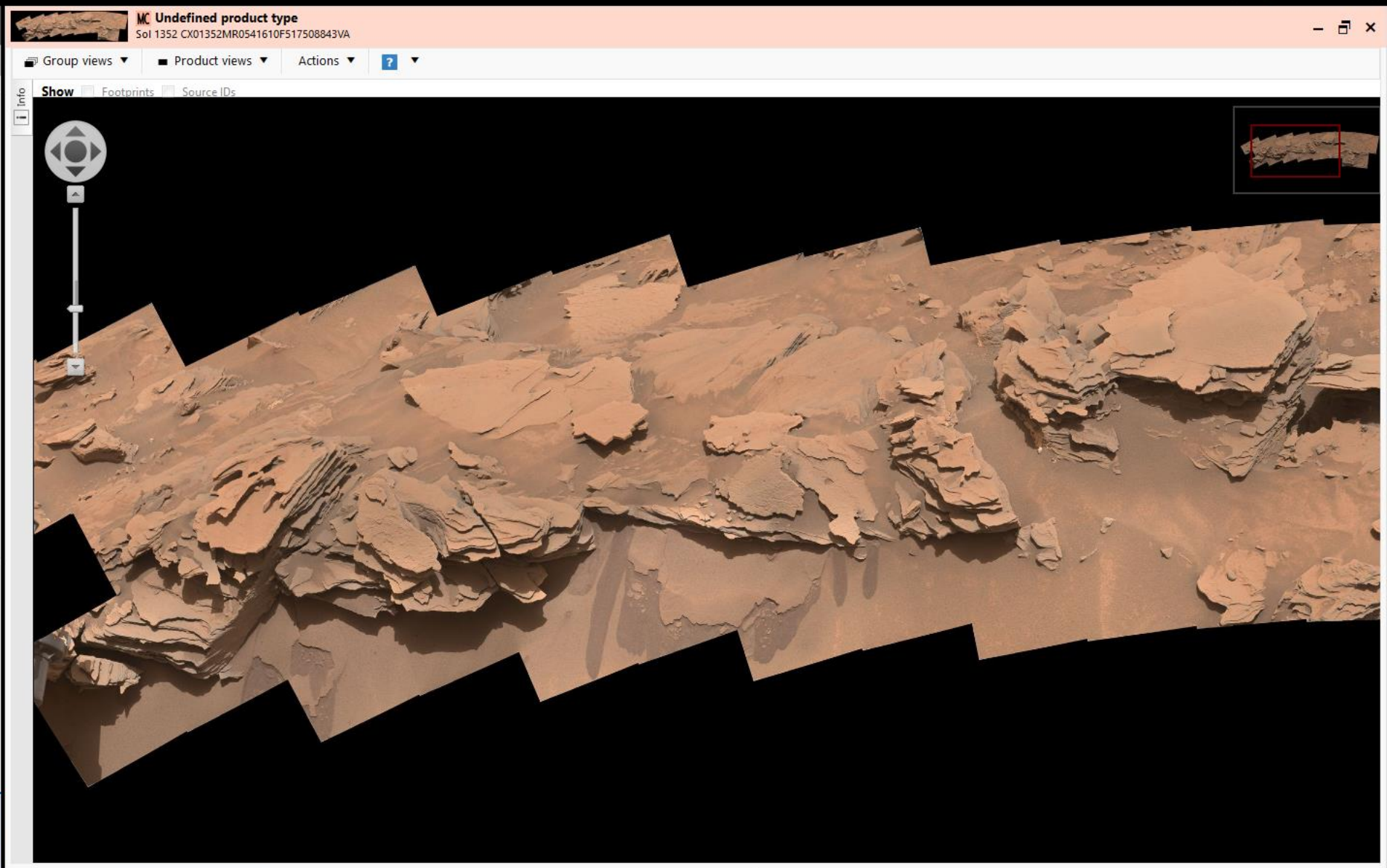
Products

Sort order

Sol, Instrument

Search

Reset form



Site Sol 390 ▾ More ▾

Site 30 / 484 / 6

Items open . Change using "More" menu item above.

Sol 572

78 Data

AP CC CM DN FH MC MD MH NC RH RD RM SM SP

2 Documents

0 Plans

0 Targets

23 Mosaics

Remote Sensing

Sol 573

65 Data

AP CC CM DN FH MC MD MH NC RH RD RM SM SP

2 Documents

0 Plans

0 Targets

3 Mosaics

Drive toward "Kimberley" Target, MAHLI Wheel Imaging, and Ta

Sol 574

98 Data

AP CC CM DN FH MC MD MH NC RH RD RM SM SP

2 Documents

1 Plan

4 Targets

11 Mosaics

Sol 574 overview

☐ Sol 574 data products (98)

☐ CC ChemCam (54)

☐ DN DAN (8)

☐ FH Front Hazcam (3)

☐ MC Mastcam (38)

MC E Sol 574 SCLK 448448125 Seq mcam02321 Site 30 / 484 / 6 3 products : L0 R0

MC E Sol 574 SCLK 448448176 Seq mcam02322 Site 30 / 484 / 6 3 products : L0 R0

MC E Sol 574 SCLK 448448244 Seq mcam02323 Site 30 / 484 / 6 1 product : R0

MC E Sol 574 SCLK 448448259 Seq mcam02323 Site 30 / 484 / 6 1 product : R0

MC E Sol 574 SCLK 448448272 Seq mcam02323 Site 30 / 484 / 6 1 product : R0

Add checked items to cart

Clear all

Check all

Traverse map

7 locations found

Click on a location below to load details.

Site 30 / 484 / 6

Sols 572-574

255 Data

6 Doc

1 Plan

5 Targ

23 Mos

0 Spec

Site 30 / 484 / 12

Sol 574

1 Data

2 Doc

1 Plan

5 Targ

8 Mos

0 Spec

East: 8144604.56, North: -274202.61

Reload by: most recent | Auto refresh on | More

NC

Sol 997

Description of the format of the ChemCam Archive volumes

AAREADME.TXT

NRB_523208642RAD LF0561122NCAM00207M1

Sol 1416

Site 56 / 1122 / 37

NC

Sol 1514

Target N151409

Sol 1514

Site 59 / 1596 / 0

NC

N_L000_0002_EDR0 02POLTRM0000_DECK_M1

Sol 2

Site 2 / 0

NC

Sol 2

Site 2 / 0

NC

Traverse map

Search results: Products, Sols 100-101

AP

APB_531686462RSP 15120591260_P1

Sol 1512

Site 59 / 1260 / 22

NC

NLB_515755021RAD LF0540938NCAM00309M1

Sol 1332

Site 54 / 938 / 64

MC

CX01417ML0561236 F523287710VA

Sol 1417

Site 56 / 1236 / 10

CC

CR0_531896998PRC_F0591596CCAM01514L1

Sol 1514

Site 59 / 1596 / 22

NC

N_L000_0002_EDR0 02PERTRM0000_DECK_M1

Sol 2

Site 2 / 0

NC

N_L000_0002_EDR0 02VRTTRM0000_DECK_M1

Sol 2

Site 2 / 0

NC

N_L000_0002_EDR0 02CYLTUM0000_CORR_M2

Sol 2

Site 2 / 0

NC

CX00002NL0020000 F397681339VA

Sol 2

Site 2 / 0 / 0

NC

N_L000J1414XRNM0 56POL_S_1122_A1911M1

Sol 1414

Site 56 / 1122

MC

1502MR 007618001 0404435 E01_DRCX

Sol 1502

Site 58 / 2760 / 8

MH

1504MH 000170000 0304806 R00_DRCX

Sol 1504

Site 59 / 0 / 24

MH

1504MH 000299001 0504727 C00_DRCX

Sol 1504

Site 59 / 0 / 6

Windows

CR0_48866551
Sol 1027 Site 48 / 157

Label for the Plane
PDSDD.LBL

Dondo
Sol 1416 Site 56 / 112

CX01352MR0541E
Sol 1352 Site 54 / 161

1504MH 0001700C
Sol 1504 Site 59 / 0 / 2

Undefined product type
Sol 1352 CX01352MR0541610F517508843VA

Group views | Product views | Actions | ?

Show | Footprints | Source IDs

Sol 1504 1504MH0001700000304818R00_DRCX

Group views | Product views | Actions | ?

Cursor position (i,j)
Sample 329, Line 267

Reload by: most recent

Auto refresh on

More

Items open on this page. Change using "More" menu item above.

MH

1504MH 000170000 0304818 R00_DRCX

Sol 1504 Site 59 / 0 / 24

MC

CX01352MR0541610 F517508843VA

Sol 1352 Site 54 / 1610 / 28

Target Dondo

Sol 1416 Site 56 / 1122 / 0

CM

Label for the Planetary Data System Data Dictionary file

PDSDD.LBL

CC

CR0_488665553PRC_F0481570CCAM02027L1

Sol 1027 Site 48 / 1570 / 86

NC

N_L000_0785_ILT0 44CYP_S_0036_UNCORM2

Sol 785 Site 44 / 36

NC

N_L000_1514_ILT0 59POL_S_1998_UNCORM1

Sol 1514 Site 59 / 1998

NC

N_L000_1514_ILT0 59VRT_S_1998_UNCORM1

Sol 1514 Site 59 / 1998

NC

N_R000_1514_ILT0 59CYP_S_1998_UNCORM1

Sol 1514 Site 59 / 1998

NC

N_L000J1513XRNM0 59CYL_S_1596_A0653M1

Sol 1513 Site 59 / 1596

Target Whale_Rock

Sol 796 Site 44 / 568 / 0

Target cand2

Sol 1000 Site 48 / 1570 / 0

MC

1513ML 007700000 0604211 C00_DRCX

Sol 1513 Site 59 / 1596 / 8

NC

NLB_523208642RAD LF0561122NCAM00207M1

Sol 1416 Site 56 / 1122 / 37

MH

0387MH 000171000 0104361 R00_DRCX

Sol 387 Site 15 / 998 / 4

FH

FLA_398742695RAD LF0030004FHAZ00200M1

Sol 14 Site 3 / 4 / 4

MH

CX01032MH0481600 F489104626VA

Sol 1032 Site 48 / 1600 / 36

MC

CX00198MR0060000 F415054968VA

Sol 198 Site 6 / 0 / 2

FH Rad-corrected absolute radiance units, integer

Sol 14 FLA_398742695RADLF0030004FHAZ00200M1

Group views

Product views

Actions

File

Draw

Measure

DRAWING (0)

LOCATION (4)

DISTANCE (1)

PROFILE (1)

Loc #	Pixel		Location (m)			Rover dist (m)	Az (deg)	El (deg)
	i	j	x	y	z			
1	281	378	0.56	4.40	0.25	4.44	70.06	-28.27
2	449	356	-1.09	4.62	0.21	4.75	94.38	-27.78
3	72	442	1.60	3.49	0.28	3.85	49.61	-30.27
4	871	355	-5.13	2.74	-0.04	5.82	154.72	-20.87

Add new location

Prof #	Segment	From Loc #	To Loc #	Dist (m)	Bearing (deg)	Ave slope (deg)
1	1	3	4	6.79	186.41	-2.70

Add new profile

Profile 1 (from location 3 to 4)

Elevation (site frame, -Z m)

Cursor position (i,j)

Sample 862, Line 44

Windows

CC CR0_488665553PRC_F0481570CCAM02027L1 Sol 1027 Site 48 / 157

CM Label for the Plane PDSDD.LBL

Dondo Sol 1416 Site 56 / 1122

MC CX01352MR0541610 F517508843VA Sol 1352 Site 54 / 161

MH 1504MH 000170000 0304818 R00_DRCX Sol 1504 Site 59 / 0 / 24

Activity plan Sol 1416

FH FLA_398742695RADLF0030004FHAZ00200M1 Sol 14 Site 3 / 4 / 4

13

Resources

The resources provide access to supplementary information related to Curiosity.

Getting started for new users

Not sure where to start? Read about [getting started](#) in the Notebook.

Context mosaics

Browse and search collection of [context mosaics](#) that include areas where archive mosaics do not exist.

Press release images

Browse and search collection of [press release images](#) with detailed captions. These images are popular for use as computer wallpaper.

Mission and instrument data set documents

[View documents](#) like the Data Set Software Interface Specification (SIS) documents that provide detailed descriptions of data products, Mission and Instrument Description (Catalog) Files, calibration, and errata files.

Coordinate system

Documentation on positioning and the coordinate system used by science instruments.

[MSL Coordinate Systems for Science Instruments](#) (2013-0303, 344 KB)

[Pointing, Positioning, Phasing, and Coordinate Systems](#) (2016-0511, 8 MB)

Abbreviations, acronyms, and other useful terms

A [list of terms](#) used in MSL data and documentation.

Published references

A list of [scientific papers](#) about MSL and Curiosity.

Context mosaics

Instrument

☐ MH MAHLI (280)
 ☐ MC Mastcam left (1798)
 ☐ MC Mastcam right (942)
 ☐ NC Navcam left (825)
 ☐ NC Navcam right (433)

Sol

1
 to
 1514
 (4266)

Source images

☐ up to 5 (2630)
 ☐ 6 to 10 (761)
 ☐ 11 to 20 (381)
 ☐ 21 to 50 (320)
 ☐ 51 to 100 (117)
 ☐ 101+ (69)

Context mosaics ?

(4266 mosaics)

Sol 2
 7348 x 1356
 NC Left
 10 source images
 [Preview](#)
[Open](#)

Sol 2
 4241 x 2538
 MC Left
 12 source images
 [Preview](#)
[Open](#)

Sol 2
 2813 x 2282
 NC Left
 13 source images
 [Preview](#)
[Open](#)

Sol 3
 29184 x 6253
 MC Left
 134 source images
 [Preview](#)
[Open](#)

Sol 13
 981 x 421
 MC Left
 2 source images
 [Preview](#)
[Open](#)

Sol 13
 549 x 709
 MC Left
 2 source images
 [Preview](#)
[Open](#)

Sol 13
 2558 x 1199
 MC Right
 2 source images
 [Preview](#)
[Open](#)

Sol 14
 1627 x 2156
 NC Left
 3 source images
 [Preview](#)
[Open](#)

Sol 16
 3429 x 1956
 NC Left
 5 source images
 [Preview](#)
[Open](#)

Sol 16
 2299 x 1386
 NC Left
 3 source images
 [Preview](#)
[Open](#)

Sol 17
 1600 x 1963
 MC Left
 17 source images
 [Preview](#)
[Open](#)

Sol 19
 7077 x 1940
 MC Left
 84 source images
 [Preview](#)
[Open](#)

Sol 19
 5531 x 1549
 MC Left
 5 source images
 [Preview](#)
[Open](#)

Sol 20
 1845 x 1464
 MC Left
 16 source images
 [Preview](#)
[Open](#)

Sol 20
 1834 x 1398
 MC Left
 16 source images
 [Preview](#)
[Open](#)

Showing 25 of 4266
[Next 25](#)
[Next 50](#)
[Next 100](#)

Resources
 The resources provide access to supplementary information related to Opportunity.

Getting started for new users
 Not sure where to start? Read about [getting started](#) in the Notebook.

Additional data sets

Additional data

are provided by the science and engineering teams in addition to the data integrated into the standard Notebook tools. They include

- APXS Oxide Abundance Data
- Microscopic Imager merged focal images
- Pancam Atmospheric Opacity Data
- Rover Motion Counter Data
- Inertial Measurement Unit Data
- Traverse and Crater DTMs
- Radio Science Orbit and UHF Data

Mission and instrument data set documents
 View documents like the Data Set Software Interface Specification (SIS) documents that provide detailed descriptions of data products, Mission and Instrument Description (Catalog) Files, calibration, and errata files.

Coordinate system
 Documentation on positioning and the coordinate system used by science instruments.
[Camera Data Product SIS](#) (2014-0731, 20 MB)
[MER Coordinate System](#) (2003-0806, 1 MB)

Software
 Software for viewing or manipulating MER data. This is in addition to software contained within the Data Set Documents.

Published references
 A list of [scientific papers](#) about MER Spirit and Opportunity.

Additional Data

Additional data sets
 The following data sets may not be integrated into the Analyst's Notebook data tools.

A

APXS

M

Microscopic Imager

[Merged Focal images](#)

P

Panoramic Camera

[Atmospheric Opacity Data](#)

Engineering

[Rover Motion Counter Data](#)

[Inertial Measurement Unit Data During Entry, Descent, and Landing](#)

[Traverse and Crater DTMs](#)

Mobility Reports - no longer available. Contact mer-mobility@wunder.wustl.edu for further information

Radio Science

[Orbit Data Files \(ODF\) and Ultra-High Frequency \(UHF\) Data](#)

APXS oxide abundance

A

MER APXS Oxide Abundance Data

This data set contains oxide abundance data derived from the APXS Reduced Data Record (RDR) products acquired by the Alpha Particle X-ray Spectrometers on both MER rovers. The data were provided by Ralf Gellert, University of Guelph, and Rudolph Rieder, Max Planck Institute, and archived by the PDS Geosciences Node.

Further information about these data can be found in the published reference Gellert, R., et al. (2006), Alpha Particle X-Ray Spectrometer (APXS): Results from Gusev crater and calibration report, J. Geophys. Res., 111, E02S05, doi:10.1029/2005JE002555.

Note: all links open in a separate window.

Complete archive
 Download the entire APXS oxide abundance data archive for MER. Be sure to read the documentation for important information regarding use of the data.

File	Contents
mer_apxs_oxide.zip	The complete MER APXS Oxide Abundance archive (ZIP, 314 KB).

Individual parts of the archive

Root directory

File	Contents
AAREADME.TXT	Introduction to the archive. Read this first.
ERRATA.TXT	Release notes and errata concerning the archive.
VOLDESC.CAT	Description of the volume contents as a PDS catalog object.



DATA directory

File	Contents
APXS_OXIDES_MER1.CSV	Oxide data from Opportunity Rover for sols 1 through 4000 as a comma-delimited ASCII text file.

Windows

1A 139098415 XR1
Sol 123 Site 28 / 9 / 50

APXS oxide abundanc
 Additional data

Windows  **A** 1A 139098415 XRC Sol 123 Site 28 / 9 / 50  APXS oxide abundanc



Future developments

Updated mosaic overlays

Integration of Mars Target Encyclopedia for MSL

Content based image search

Context mosaics (MER)

Targets (MER)

Improved Target – Data product relationships

Footprints and targets integrated with traverse maps



an.rsl.wustl.edu

The Analyst's Notebook is developed under funding provided by NASA to the PDS Geosciences Node. Cooperation of Mars Science Laboratory and Mars Exploration Rovers science and operations teams is greatly appreciated.

Additional input provided by the PDS Atmospheres, Imaging, and PPI Nodes, as well as by professional and citizen scientists from around the world.