

HiRISE RDR Product SIS Review (DTM Updates)

#	WHO	COMMENT	RESPONSE
1	All	We received many suggestions on ways to improve the RDR Product SIS documentation. Many have asked for clarification on documentation, equations, etc.	The final HiRISE RDR Product SIS will incorporate most if not all of these editorial recommendations. We will provide additional clarification on topics noted by the reviewers.
2	Paul Geissler	The adopted naming convention gives few clues to the location of the data products on the surface of Mars. Some sort of an index file of map would be helpful for users looking for DTMs of a specific feature or region.	The HiRISE Team will construct an index table for DTMs similar to the indexes already being created for the EDR and RDR products. This index file will be placed in the INDEX directory of the HiRISE PDS volume, and will contain location information in the same way that the other tables do.
3	Larry Crumpler	I viewed the left and right images as pairs and found them to be correctly referenced and labeled (!), although the stereopsis was somewhat less than I am use to seeing in HiRISE image pairs. I have viewed many HiRISE stereo pairs as visual pairs, the "geological way", and generally find it to be useful for mapping. However, this image pair appeared to exhibit some edge effect along high contrast contacts that I have not noticed in previous image pairs. I am not certain whether it is a characteristic of the particular terrain example, or whether it is an artifact of the gridding. The relief in this area is flat compared to many other stereo pairs I have examined. For example, many of the small calderas at the summit of small shield volcanoes are obvious depressions. So maybe this was not a particularly strong pair to use as a demonstration.	One thing to keep in mind when viewing the orthophotos is that they have been resampled to correct for topography. This may explain why they appeared "flattened" compared to the original imagery.

4	Paul Geissler	It isn't stated in the SIS whether GeoTIFF information is incorporated in the DTM labels. Many potential users could be put off by the belief that the data cannot be used in a GIS environment, or the perceived difficulty in doing so.	Documentation of the GeoTIFF information will be added to the SIS.
5	Ed Guinness, Trent Hare	Pick either an attached or detached label and use only one. Modify text in section 5.2.1	Given the confusion this has caused for the reviewers as well as some users internal to HiRISE, we have abandoned the detached label in favor of a single attached label for the DTM product. However, the JPEG2000 formatted orthoimages will continue to have a detached label.
6	Ed Guinness, Paul Geissler, Larry Crumpler	These reviewers all had questions about the use of HiRISE DTMs in various software packages.	There is a variety of ever-changing commercial and open source software available. We hesitate to list specific software since the software environment is such a fast moving target. Our goal is to adequately define the format of the products to allow the scientific community to import these products into the software package of their choice. We could list the software that these products were tested with, by us and by the reviewers, if you feel that would really contribute useful information in the SIS. That being said, we have found that some software packages, such as NASAView, while not incompatible with the DTMs, are not ideally suited to perform analysis on the DTMs due to lack of functionality or limitations within that software that make working with large DTMs difficult. Information about problems found in using the DTMs in specific software packages will be included in the errata file as they are brought to our attention. This information will become dated but may be a useful guide for future users of the data set.
7	Ed Guinness	Section 5.4 states that the DTM will be tied to the MOLA data 'when possible'. Will the label indicate whether or not a given DTM has been tied to MOLA? If not tied to MOLA, how well are the elevations known relative to the Mars 2000 datum?	We use the MOLA tracks as our reference points for elevation as noted in the label. At equatorial latitudes, sometimes the MOLA tracks do not completely span the HiRISE image footprint. In polar regions, although the MOLA tracks are more densely spaced, seasonal changes in snow/frost coverage create variability on the scale of a few meters. In both of the cases mentioned here, we use our best judgement to tie the HiRISE project to the MOLA tracks.

8	Ed Guinness, Paul Geissler, Trent Hare	Is there a reference that can be cited in the SIS to provide the user with more details on how the DTM are generated and what the accuracy is? (Guinness)... (In the wish list category...) It would be wonderful if Socet Set output an error image or uncertainty image that could be included with the DTMs, so that we might know where to trust the results and where/when to be skeptical (Geissler)	We intend to produce error and point editing information that will be released as an extras product, the exact form this will take has not yet been determined. More details about the DTM production should become available as we complete the process of defining standard procedures that should normalize the production of DTMs across the institutions that will be submitting DTMs for inclusion in the PDS data set. In addition, the Kirk et al., 2008 reference has been added to the SIS.
9	Ed Guinness	Is the plan to release the DTMs one year after they are produced (stated in the SIS) or one year after the stereo pairs are located?	The plan is to release DTMs one year after the DTM has been produced. We acquire stereo pairs at a much higher rate than we can produce the DTMs. So both halves of the stereo pair may have been acquired for quite some time prior to the production of the DTM.
10	Ross Beyer	While the choice of JP2 for the orthoimages is probably the best choice for a variety of reasons, many users will grumble because there is not yet widespread support for the JP2 format. However, I think that it is the best format for the long term.	Since HiRISE is already using the JPEG2000 format for the standard RDRs, continuing its usage here seems appropriate and desirable.
11	Betty Sword & Ed Guinness	Sample DTM products I used NASAView for PC, and was able to view the files with no problems. I only looked at two images: DT1EA_008669_1705_009025_1705_A01.LBL and DT1EC_008669_1705_009025_1705_A01.LBL The value for PRODUCER_FULL_NAME (ALFRED MCEWEN, PRINCIPLE INVESTIGATOR, SARAH S. MATTSON, TECHNICAL CONTACT) is too long. The allowed length is 60 characters. Suggest just using the names and removing the titles.	We will amend the procedure to just write out the name of the P.I. followed by the name of the producer e.g. "ALFRED MCEWEN, SARAH MATTSON"

12	Betty Sword & Ed Guinness	<p>IMAGE_MAP_PROJECTION object (line 20) - required missing keyword: COORDINATE_SYSTEM_TYPE PROJECTION_LATITUDE_TYPE: Not an allowed keyword in the IMAGE_MAP_PROJECTION object.</p>	<p>Issue resolved via email. Our IMAGE_MAP_PROJECTION object is the same as what we are using for the HiRISE RDRs, which was approved during the original RDR peer review.</p>
13	Betty Sword & Ed Guinness	<p>DT1EC_008669_1705_009025_1705_A01.LBL CENTER_FILTER_WAVELENGTH is duplicated in this file, once at line 87, and then again at line 104 - both with different values. Can only use one.</p>	<p>The value listed on line 87 is 1.0. This value is not representative of the data, and should be removed. The 700 NM value is correct.</p>
14	Ed Guinness	<p>The DTM was difficult to display in a way that made the topo data visible. I tried NASAview, ENVI, and GeoViewer. I think the problem is the value used for missing_constant and how to scale the data for display. I also found it hard to figure out missing_constant value because it is a floating point number and listed in the label in HEX. I am guessing that it is a large value. In ENVI, at least, this causes the default stretch to show the border area as black and the map area to be saturated as white. I would recommend that the missing_constant be listed as a floating point value and not in HEX. I would also recommend that the minimum and maximum value of the non-missing data be listed in the label. That would help in picking values to scale the data into a reasonable range for display.</p>	<p>We are adding VALID_MINIMUM and VALID_MAXIMUM keywords to the IMAGE object. After looking at how some software packages handle the MISSING_CONSTANT value, it appears that keeping this as a HEX value is desired.</p>

15	Ed Guinness	I do not understand why the label refers to the data as scaled pixel values when the data are floating point numbers in units of meters and the scaling_factor is 1 and the offset is 0. That is, the "pixel units" and geophysical units are the same. It seems to me to be simpler say that the pixel values are already in geophysical units and drop the scaling_factor and offset from the label, along with removing the sentence about conversion between pixel values and geophysical values.	The word 'Scaled' will be removed from the note. The reviewer is correct that it seems redundant to call the pixel values scaled, when they are not, but we feel keeping the scale = 1 and offset = 0 keywords makes it clear. The NOTE informs the user that the pixel values are the actual elevations, the scale and offset keywords tell the software the same thing.
16	Ed Guinness	The ^image points on the detached label to the second record of the image file. The first record is not defined by the label – not a good practice	Since we have decided to not include a detached label, this is no longer a problem.
17	Ed Guinness	The label_records keyword in the detached label should not be included	No action needed since we have abandoned the use of the DTM detached label
18	Ed Guinness	Not sure why the center_filter_wavelength keyword is in this label. I would remove it (in the DTM label)	Agreed. It has been removed.
19	Ed Guinness	The end_object statements should have values for the object they refer to	Agreed. The end object values will be retained.
20	Ed Guinness	The value of note should be reformatted so that it line wraps nicely	All notes and comments exceeding the length of a standard terminal screen will be wrapped.

21	Ed Guinness	A unit of <bytes> is used in several values of keywords ending in _BYTES. Including the unit seems redundant and <bytes> is not a standard value for a unit (ortho-label)	Addressed in private email, we will continue to use the <bytes> unit to be consistent with the RDRs.
22	Ed Guinness	File names should not be mixed case. Change to upper case	I am not sure to what this comment is referring. If it is to the file extensions of the main products, then it is possible there were mixed cases in the first batch of sample products. This has been resolved. If it is referring to the ortho labels JP2 objects, then that is generated by the PDS_to_JP2 software, and refers to an intermediate .img file. I am not sure if it is appropriate to change those to upper case.
23	Ed Guinness	Required record_type keyword is missing from image labels	RECORD_TYPE is in both the JPEG2000 image data objects (compressed and uncompressed). For the compressed file object, RECORD_TYPE = UNDEFINED. For the uncompressed file object, RECORD_TYPE = FIXED_LENGTH.
24	Ed Guinness	Compressed_file object is missing required file_records keyword.	According to Appendix A of the PDS Standards reference, the FILE_RECORDS keyword is not applicable to file objects that have the RECORD_TYPE keyword set to "UNDEFINED" which is the case for all our JPEG2000 formatted products. We will continue to omit the FILE_RECORDS keyword, as specified in the email to Betty and Ed.
25	Ed Guinness	I don't understand why some labels use projection_latitude_type and others keyword_latitude_type in the map projection object	Actually all of the HiRISE RDR and DTM labels should contain both of these keywords. The full reasoning for why both keywords are included is explained in Appendix B of the SIS. Essentially both of these keywords can have different values depending on the particulars of the projection. For HiRISE, we are defining our map projection such that both keywords will always have the same value, but we are including both in the label to avoid any ambiguity.
26	Ed Guinness	<meters/pixel> should be <m/pixel>	Addressed in email, we will continue to use <meters/pixel> to remain consistent with the RDRs.

27	Larry Crumpler	<p>I expected to see any of a variety of DTM products ranging from stereo pairs, pixel-value elevations, color-coded elevation maps, contour maps, or even anaglyphs. Many of these have been available from the USGS. Instead there appears to be a .img file that is the DTM of unknown character or format. All of the images are image files, which is o.k.. In fact, the base stereo pairs are the raw data behind the DTM process. But the DTM itself could be expanded to something basic as well such as contour maps (without the image).</p>	<p>The DTMs we are producing are intended to be of the form that additional products can be derived from them, but are not intended to be able to fulfill every possible way that the elevation data will be used. Additional products such as contour maps, error files, etc are planned to be included as supplementary extra products to the standard DTM products defined in this SIS. The exact set of supplementary products to be produced has not yet been determined, so input from the reviewers about what they would like to see added is appreciated.</p>
28	Larry Crumpler	<p>I would encourage PDS to seriously look at how files are labeled. PDS conventions for file labels are extremely coded and not very intuitive. A key document in actually understanding the files to be reviewed was Paragraph 5.7 "DTM Product Naming Convention" in the document "HiRISE_RDR_v12". Once I found that key paragraph, I was able to actually understand the files. Unfortunately, even with the translator in hand, the file labels are confusing. The image labels for example are unnecessarily "coded": "A" means 0.25 m and "C" means 1.0 m and "1" means Left. Again this is one of my conflicts with PDS conventions. A more useful label would give some clues to the actual image characteristics without the need for translation. For example, the distinction between 0.25 m and 1.0 m appears to be one little letter in the image file name and the letters themselves do not reflect the characteristic....</p> <p>This is mainly my conflict with PDS file labels. But why does it have to be in code? Can't we provide a label that directly reflects the image characteristics?</p>	<p>We agree that understanding the encoding of the file names is difficult, however this is not a problem unique to the PDS. All cataloging systems need to devise methods to uniquely identify the items in their collection, and those methods are always subject to constraints. For example, the PDS standard restricts the lengths of the file names to 40 characters. The encoding scheme we devised is designed to uniquely identify a product within these PDS constraints, but it is not intended to be the best way to determine metadata about a product or to be the best way to facilitate searching. To make searching easier, and to give a summary view of the entire set of products within the PDS Volume, the HiRISE team will provide tabular index files where such things as resolution, footprint coverage, product type, etc are unambiguously searchable, without needing to understand the encoding of the product id. These index files will be located in the INDEX directory of the HiRISE PDS Volume along with the INDEX files for the EDRs and RDRs.</p>
29	Larry Crumpler	<p>Why not a simple pixel value map of elevation? And to avoid the obvious problem with the limitation of bits, why not just a simple 8 bit contour map then? In addition to shaded relief or color-coded relief, contour maps are fundamental. They are quantitative, directly reflect the preferred sample spacing, and can be viewed in any format.</p>	<p>The pixel values are indeed the elevation (in the case of the DTM), although this is obviously not true for the orthoimages, since these are the orthorectified versions of the original images. A contour map or 8bit grayscale elevation map could be possible extra products, but would not be produced as a standard PDS product.</p>

30	Larry Crumpler	I am pleased that there is no anaglyph products. While anaglyphs are o.k., for some public information products, they have no value for science analysis	The HiRISE GDS is already producing anaglyphs, but they are being released as extras and are not considered to be standard products, nor are they associated with the production of the DTMs. In most cases, with the exception of DTMs at high latitudes, it is highly likely that anaglyphs have already been produced for all stereo pairs.
31	Paul Geissler	I would like to have jpg browse images. (Although I realize that in a few years, everyone will easily be able to cope with jpeg2000 and this request will be laughable...)	We are already planning to provide low resolution browse and thumbnail images in jpg format for all standard products
32	Trent Hare	There seems to be a slight label issue with the internal JPEG2000 label.	This is a broader issue that not only impacts the DTMs but also the RDRs that have already been produced. We may not be able to completely address this issue at this time. Essentially the standard for how the equirectangular projection is defined is evolving, and the current definition being used within the HiRISE GDS is now out of date compared to current GIS software. At a minimum, we will update the PDS errata to note this difference, and we will work towards resolving this problem, perhaps via a future reprocessing effort, or by applying a fix directly to the previous products, if this is deemed appropriate.
33	HiRISE Team	We have discovered a problem in how we export the DTM data from SOCET SET to ISIS, which can lead to the pixel scale being set incorrectly.	We are now working with the USGS to develop an updated SOCET SET conversion utility that will properly resample the pixel data to match the PROJECTION_CENTER_LATITUDE bin of the image.