

NH MVIC Data Review

NH-P-MVIC-2/3-PLUTO-V3.0

Jian-Yang Li

Planetary Science Institute

June 19, 2017

Dataset Overview

- Updated from v2.0 of the same dataset
- Summary of changes
 - Complete delivery of all data covering the Pluto Encounter and subsequent Calibration Campaign
 - Includes all data from v2.0 and new data downlinked from 1/31/2016 through 10/31/2016
 - Full frame data of all previously delivered sub-frame data
 - Changes to calibration: FITS headers and PDS labels, no substantial changes expected for data pixel values
- MVIC is a multi-color imaging instrument
 - One panchromatic framing camera (MPF)
 - Two panchromatic TDI (MP1, MP2)
 - Four filtered TDI (MC0 – MC3) with red, blue, NIR, and CH4 filters
 - All detectors 5024 (24 columns of overscan) wide
 - MPF 128 lines
 - TDI detectors 32 lines

Overall Assessment

- Excellent datasets as in previous deliveries
- Data labels contain all essential information for display and use the data, such as geometry keywords and orientation keywords, etc.
- Geometric parameters calculated from current SPICE data consistent with values in PDS labels
- Problems with the ICD as previously identified have all been addressed, but better consistency and information about housekeeping data are needed

Summary Changes from v2.0

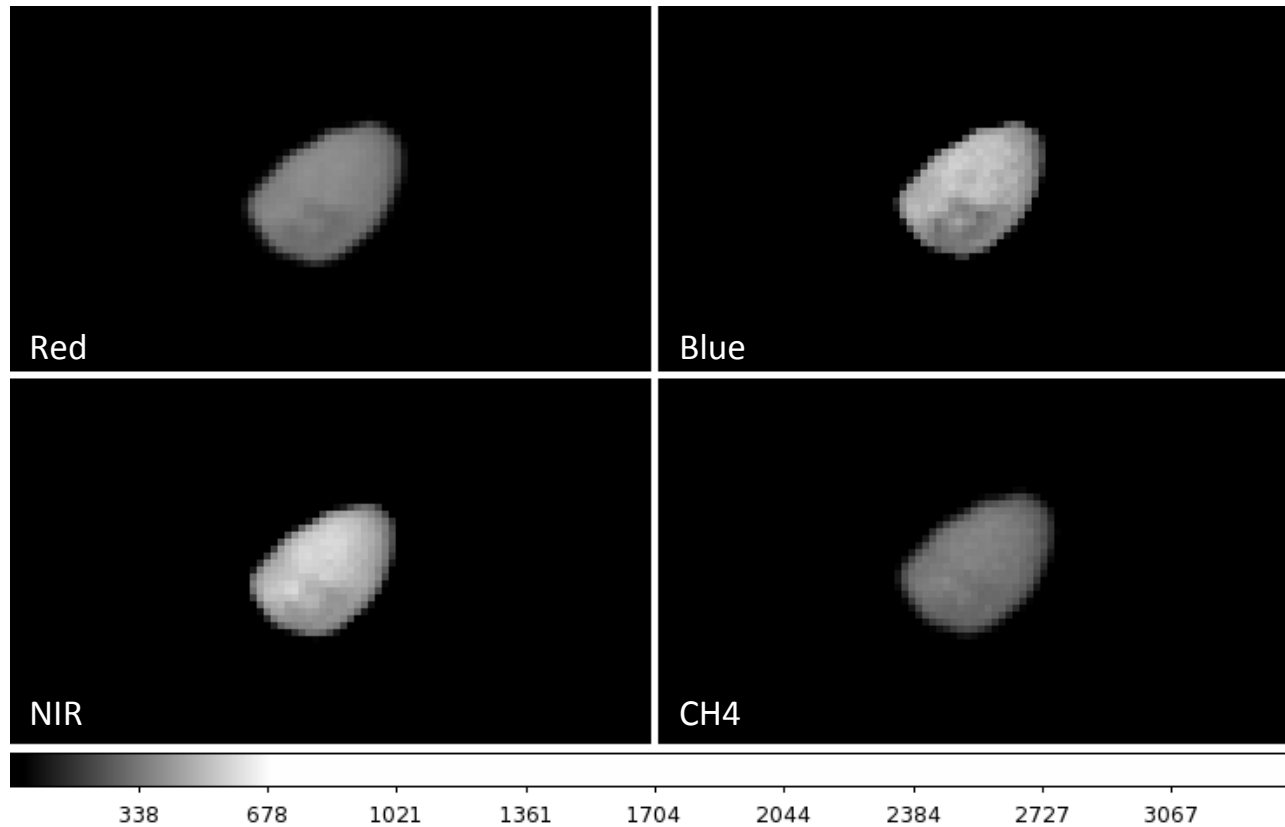
- Updated all version numbers in all related files
- catalog/ directory
 - dataset.cat
 - Version specific changes, such as STOP_TIME, version number etc.
 - Description of new data
 - Description of functional test images
 - Description of informal target names used outside of PDS document area (labels)
 - Removal of target xy position list(?)
 - mvic.cat: Added explanation about flat field array as a 1-D array
 - nh.cat
 - Added notes about flyby distance
 - Added notes about the Calibration Campaign
 - Updated information on extended mission
 - Updated mission timeline
 - Updated mission phase list
 - nhsc.cat: small updates on RALPH, LORRI, and SDC
 - ref.cat: two references removed

Summary Changes from v2.0

- document/
 - No remarkable changes other than version numbers etc.
 - sample/ subdirectory updated based on new data
- index/
 - Sequence update
 - Addition of new data in idnex.tab and slimindex.tab
 - Checksums
- data/
 - 189 new images added
 - 138 existing sub-frame images changed to full-frame
 - Label changes
 - Some Unknown changed to N/A
 - TARGET_NAME = N/A changed to Calibration or other meaningful words
 - Note added for TARGET_NAME
 - Update on some kernel files due to calibration changes
 - All data in level 2 dataset are in level 3 dataset, with same array shapes for full-frames
 - Otherwise everything is exactly the same, including data values

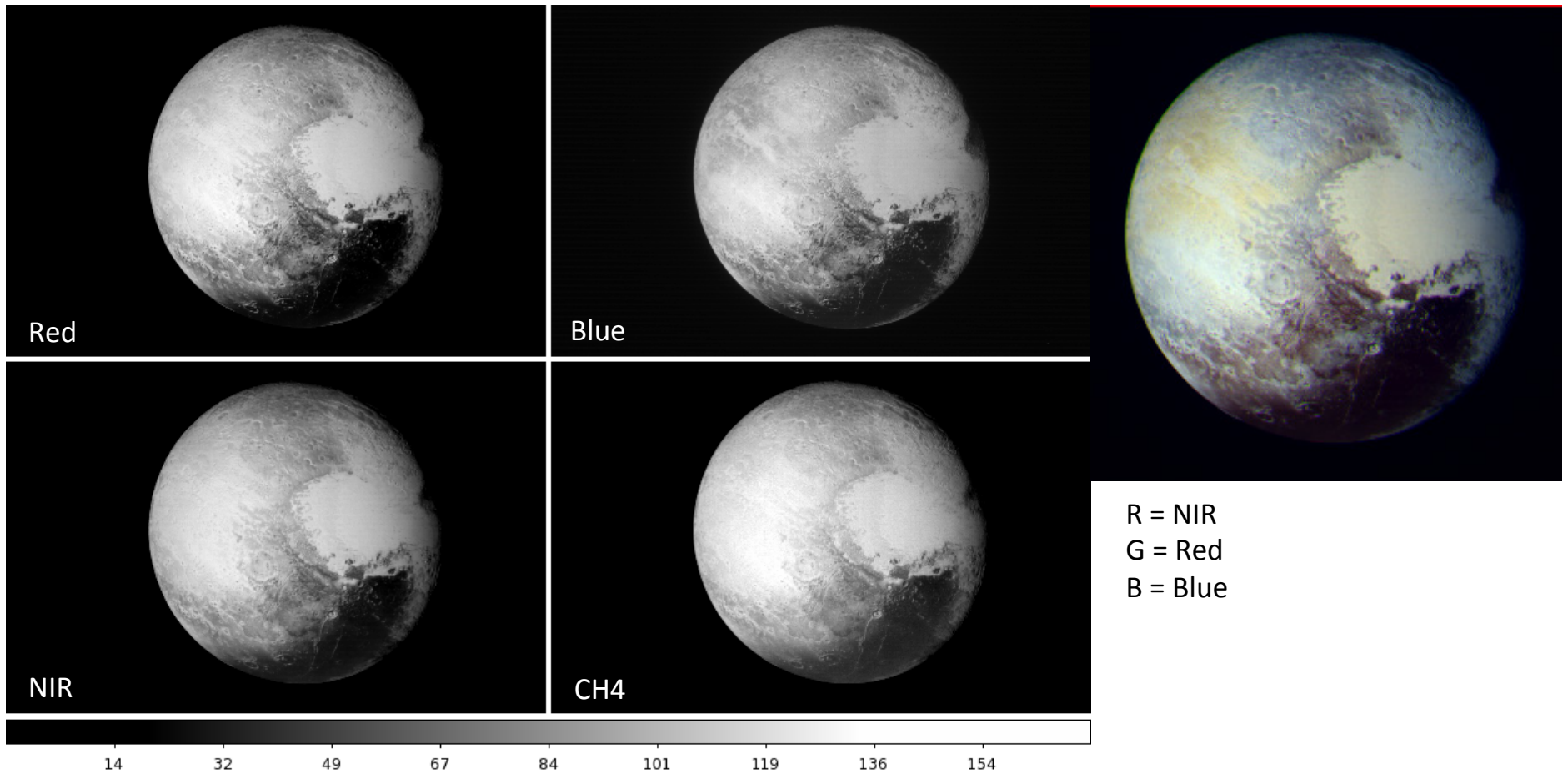
Example Images

Nix color images (0299165322_0x536):



Example Images

Pluto color images (0299162512_0x536):



ICD Housekeeping Data Description

Table 10-7: RALPH/MVIC Housekeeping Limits

Mnemonic	Yellow Low Limit	Yellow High Limit	Red Low Limit	Red High Limit
RALPH_HK2.POS_12V	11.75	12.25	11.5	12.5
RALPH_HK2.NEG_12V	-12.25	11.75	-12.5	11.5
RALPH_HK2.POS_5V	4.75	5.25	4.5	5.5
RALPH_HK2.NEG_5V	-5.25	-4.75	-5.5	-4.5
RALPH_HK2.POS_30V	29.75	30.25	29.5	30.5
RALPH_HK2.MVIC_TEMP	-144	26	-150	30
RALPH_HK2.MVIC_VRD	1.9	2.1	1.8	2.2
RALPH_HK2.MVIC_VOD	1.9	2.1	1.8	2.2
RALPH_HK2.MVIC_VOG	1.9	2.1	1.8	2.2

Table 10-8: RALPH/MVIC Level 1 Keywords

Keyword	Description
MET510	The MET (Mission Elapsed Time) of the Ralph housekeeping packet (ApID 0x510) that marks the start of an observation, used to determine the observation start time (STARTMET) and frame rate
TRUE510	Whether the 0x510 packet is real (YES) or assumed from a gap (NO)
RALPHEXP	Ralph per-row (SCANTYPE=TDI) or per-frame (SCANTYPE=FRAMING) exposure time in seconds
MODE	Instrument mode (0=Invalid; 1=Pan Frame; 2=Color TDI; 3=Pan1 TDI; 4=Pan 2 TDI; 5=Pan Bin (mode not used) 6=Invalid; 7=LEISA Sub; 8=LEISA Raw; 9-17=Invalid; 18=Idle; 19=Abort; 20-31=Invalid)
SIDE	Instrument hardware side (0 or 1) Note: Side 0=B, Side 1=A
DETECTOR	CCD detector use (RED; BLUE; NIR; CH4; PAN1; PAN2; FRAME)
FILTER	Detector-dependent filter (RED; BLUE; NIR; CH4; CLEAR)
SCANTYPE	Scan type (FRAMING; TDI)

Housekeeping table column keys included in the Level 1 data:

MET, AcqStart, CMDEXE_CNT, CMDREJ_CNT, VERSION, STATE, MODE, POS_12V, NEG_12V, POS_5V, NEG_5V, POS_30V, MVIC_TEMP, LEISA_TEMP, DE_NOT_DONE, EEPTAB, SPARE0, PPS, SIDE, WDT_EXP, RLY_ERR, OPCODE, XMT_AFF, XMT_FF, RCV1_OVRN, RCV1_AFF, RCV1_FF, RCV2_OVRN, RCV2_AFF, RCV2_FF, EE_WEN, IEM_ACTIVE, IEM_SELECT, WDT_EN, RLY_BSY, SPARE1, EXP_CNT, FPGA_VER, OSC_CNT, TDI_RATE, FRAME_RATE, MEMDP_STATE, MEMLD_STATE, DRAM_WIN, DE_FPGA, DISCRETE, GRP_RLY3, GRP_RLY2, GRP_RLY1, DE_SEL_RLY, GO_STATE, CODE, TABLE_AREA, MVIC_VRD, MVIC_VOD, MVIC_VOG, MVIC_BSPAR, LEISA_VRST, LEISA_VDDA, LEISA_DSUB, LEISA_GATE, LEISA_BSPAR, RPT_SHFTRTE, SHFTRTE_OFF, OBS_TABLE, LEISA_OFF1, LEISA_OFF2, LEISA_OFF3, LEISA_OFF4, CDH_THERM, DE_SPARE_50, DE_SPARE_51, ANA_GRND, CHECKSUM, CalcChecks

- Seems to be inconsistent, and no descriptions or references are given for the meaning of these keys