

Alice Data Review

New Horizons KEM2 K7 v1.0 Levels 2 and 3

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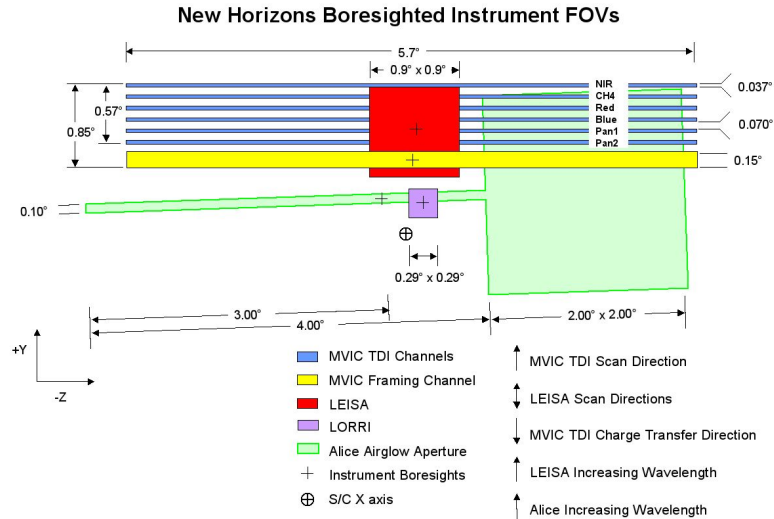
Overview: KEM2 K7 v1.0

- Review of nh_a_alice_2_KEM2_v1.0 and nh_a_alice_3_KEM2_v1.0
- Previously reviewed Alice KEM1 versions,
- New submission includes data from 4/30/2022 to 5/1/2024 (S/C Time)
 - 572 total observations

- 1. No major issues preventing database from use**
- 2. 2 minor liens**

Brief P-Alice Instrument Overview

- P-Alice is an ultraviolet spectrograph sensitive from 520 to 1870 Angstroms
- A “lollipop” shaped slit is used (wide on top, narrow on bottom)
- Detector has 1024 columns in the spectral dimension, 32 rows in the spatial dimension.



Boresight Locations			
	Rot abt Y (deg)	Rot abt Z (deg)	Rot abt X (deg)
S/C	0.00	0.00	
Ralph/MVIC Frame	-0.07	-0.74	
Ralph/MVIC P2	-0.08	-0.92	
Ralph/MVIC NIR	-0.08	-1.50	
Ralph/LEISA	-0.11	-1.04	
LORRI	-0.17	-0.32	
Alice Airglow	0.21	-0.37	2.00

Axes are S/C coordinates, as projected onto sky.
 -X is into page, +X is out of page.
 During MVIC TDI and LEISA scans, s/c rotates about the -Z axis.
 Diagram is to scale. Based on pre-flight and in-flight alignments specified in nh_v110.tf.

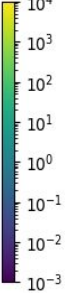
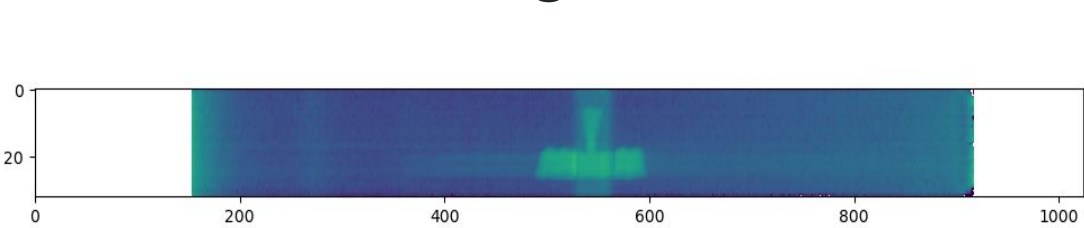
H. Throop/SwRI, 21-Sep-2007

Data Review: Alice KEM2 K7 v1.0

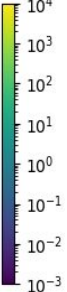
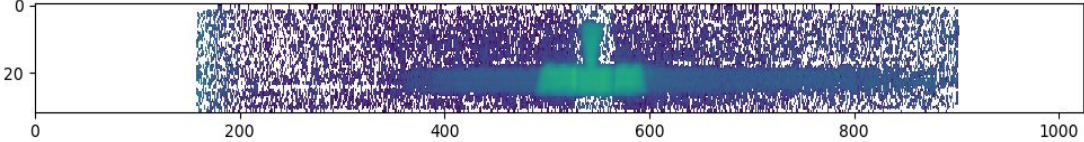
Usability

- All .fits files accessed using Python and astropy.io.fits
 - All eng files calibrated according to ICD
 - All sci files accessed, both data and headers
 - Log file with machine readability available
 - PNGs with both user-calibrated, science files, and differences available on request
 - Python code available as well
- All .lblx files checked with Python script for machine readability
 - Log available upon request
- Select files checked in NASAView/DS9 to ensure _eng.fits files matched _sci.fits files
- Also used pds4_tools to verify information in headers
 - Via pds4_read/pds4_view

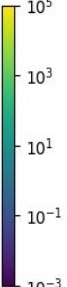
Example Difference Image: ali_0555638258_0x4b2_sci



User Calibrated

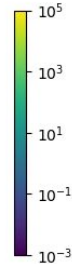
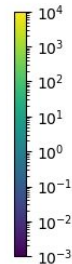
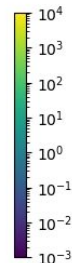
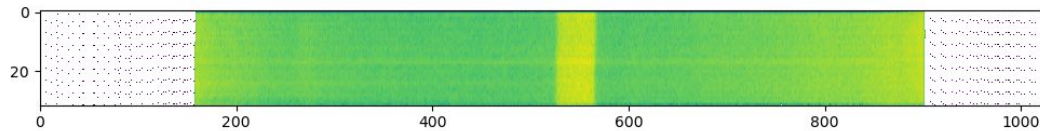


SOC Calibrated



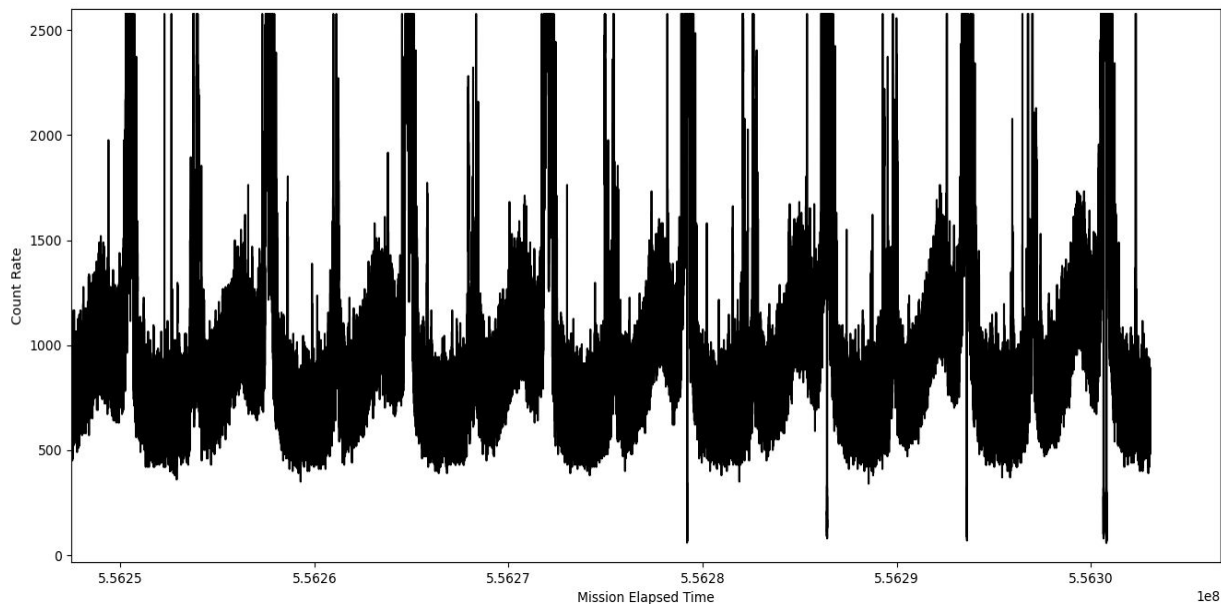
Percent Difference

Example Difference Image: ali_0554317768_0x4b2_sci.png



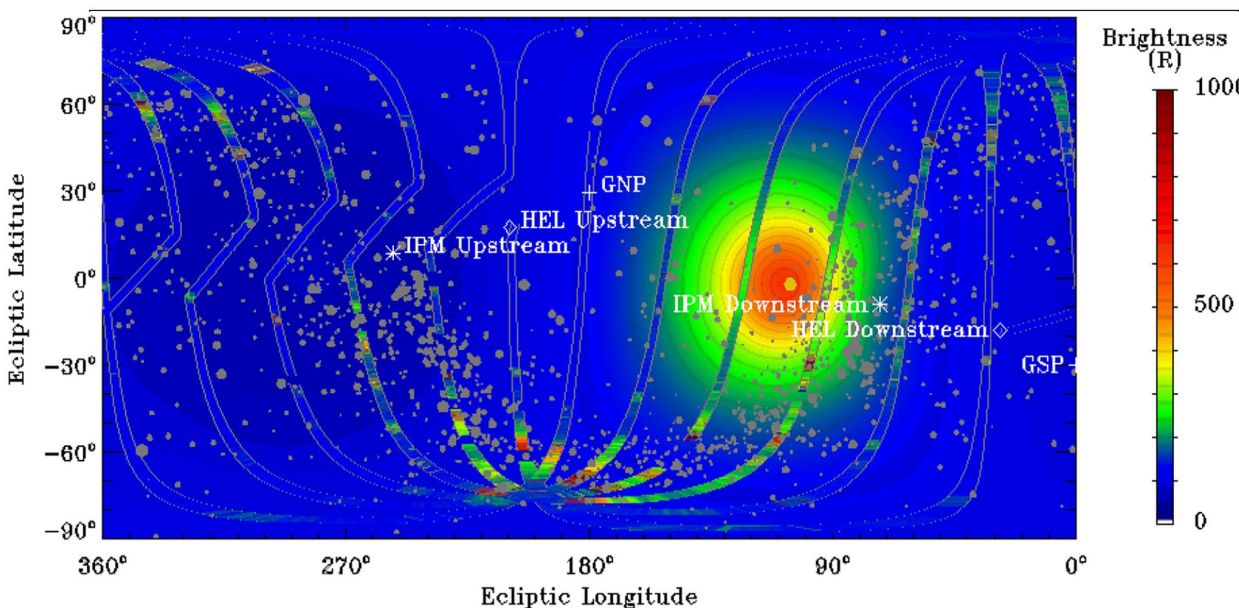
- My pipeline produces approx 5000x lower counts for certain images
- Sci files appear to be dark files → header keywords ‘APRDRPOS’ are ‘1’ for all instances.
 - Count rates are all <200 counts/s
 - Cannot identify from ICD if “1” is closed or open
- Observing descriptions indicate science targets?

Lyman Alpha Countrate



- 86 extended Ly-A High Cadence Countrate (HCCR) observations while scanning in RA and DEC.
- Need detailed pointing files to recreate high level data product maps, but in principle straightforward to do.

Lyman Alpha Countrate



- HCCR mode described in SOC Instrument ICD in Alice section
- Pointing files to generate Ly-A maps?
 - Count rate variation within single files points to scanning motion
 - No scan rate in header
 - Can't replicate plots like in Gladstone et al. 2018
- Potential addition to header? Or missing reference?

Major Issues

1. None

Minor Issues

1. Dark observations that have science descriptions/targets?
 - a. Unclear to user why aperture door was closed for 199 observations if science targets are identical to observations with door open
2. No pointing files for mapping Lyman-Alpha emissions, or scan rate info