New Horizons MVIC Data review

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1. Datasets overview
- PDS version: PDS3
- 2 data sets from the Multispectral Camera of RALPH instrument

  nh-a-mvic-2-kem1-v5.0

  nh-a-mvic-3-kem1-v5.0

- Level: 2 raw and 3 calibrated
- Mission phases:

  KEM1 v5.0 added new data (data downlink before 03/01/2021)

- Datasets comparison:

	Version 2.0	Version 3.0	*Version 4.0*	***Version 5.0***
Image number	77	254	321	**360**
Time range	2018-08-31 - 2019-01-01	2018-08-31 - 2019-03-20	2018-08-31 - 2019-09-02	**2018-08-31 - 2021-09-02**

- Summary:
  Benefit from our previous reviews, this version review went pretty simple and easy. I compared the files with the previous version and only checked the changed or new parts. Generally, both level 2 and 3 datasets are well produced, and well documented. Found very minor issues.

2. Review process
- All processing and evaluation:

- Compare difference between different level and different version sets with tools:
  - Diff Files 23.1

- ○ Beyond Compare 4.4.1
- Read all .fit and label files (all can be read correctly).
- Check the headers and labels
- Compare catalog files in all datasets, and analyze the difference
- Compare documents in document/directory
- Collect aspect data from all image headers, check consistency between levels

3. Catalog/Document/Index
- Some mis-format problems in the previous version label of some calibration files are all fixed.
- In /catalog/dataset.cat, there is this description added to version 5.0 part:
  "Earlier in the KEM1 mission phase, some playbacks of MVIC images used windowing to save downlink bandwidth. The New Horizons Science Operations Center (SOC) has now begun the long process of playing back many of these windowed files in full-file format. The names of affected files will not change. **However, the new file versions may contain a binary table partition called WINDOW_MISMATCHES.** This **optional partition** holds information on byte-by-byte differences within the previous window boundaries and is mainly used by the SOC for internal verification." I noticed that the WINDOW_MISMATCHES extensions are the same as v4.0 (no file is affected). And all the images of level 1 MVIC have this binary table. Suggest to change this description to be more accurate.

- When Nw = 1row, is WINDOW_MISMATCH meaningless info?

4. Data
   Files can be correctly read by python, IDL and ds9.

5. Conclusion: these v5.0 datasets are **certifiable**.