# New Horizons REX Data Set Review – KEM1 V4.0 Raw & Calibrated

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## 1. Executive Summary

Two data sets from the New Horizons Radio Science Experiment (REX) were provided and reviewed:

- nh-a-rex-2-kem1-v4.0
- nh-a-rex-3-kem1-v4.0

Three previous versions of the dataset (v1.0, v2.0, v3.0) were reviewed in February 2020, May 2020 and November 2020. The version 4 dataset contains additional radio ray path characterizations from March 2020 until February 2021. These data and corresponding documentation are in good quality shape, as expected from the previous reviews. I believe the dataset is certifiable in its current state.

## 2. Review Details

***Data***

REX data come from the two sides of the instrument:

- Side-A, 0x7b1, Righthand Circularly Polarized
- Side-B, 0x7b3, Lefthand Circularly Polarized

The documentation for the dataset says the complete set of REX data for this mission duration are not all downlinked yet, however, this dataset contains more data than the previous dataset, including 2 updated experiments and 10 new experiments. Of important note is the actual experiment data from MU69 (radiometry + bistatic/ionosphere) has 314 new files, one calibration campaign has had LCP data added and the new data files are from additional (almost) monthly radio path characterizations.

*Table 1. Data the reviewer was able to find in the dataset and correlate with the documentation.*

| Date | V4.0 | Experiment | Comments |
|---|---|---|---|
| **2018-09-09** | | Radio Path Characterization | |
| **2018-10-21** | | Radio Path Characterization | |
| **2019-01-01** | | MU69 radio brightness and ionosphere detection attempt | 314 New files |
| **2019-01-02** | | Sky background radio brightness | |
| **2019-01-04** | | REX Test Patterns | |
| **2019-02-02** | | Radio Path Characterization | |
| **2019-03-21** | | Radio Path Characterization | |
| **2019-04-19** | | Radio Path Characterization | |
| **2019-05-07** | | Radio Path Characterization | |
| **2019-06-12** | | Radio Path Characterization | |
| **2019-07-10** | | Radio Path Characterization | |

| Date | V4.0 | Experiment | Comments |
|---|---|---|---|
| **2019-08-08** | | Radio Path Characterization | |
| **2019-09-04** | | Calibration Campaign | |
| **2019-09-09** | Updated | Calibration Campaign + Radio Path | LCP data added |
| **2019-10-19** | | Radio Path Characterization | |
| **2019-11-14** | | Radio Path Characterization | |
| **2019-12-21** | | Radio Path Characterization | |
| **2020-01-09** | | Radio Path Characterization | |
| **2020-02-11** | | Radio Path Characterization | |
| **2020-03-10** | New | Radio Path Characterization | RCP + LCP |
| **2020-05-19** | New | Radio Path Characterization | RCP + LCP |
| **2020-06-26** | New | Radio Path Characterization | RCP + LCP |
| **2020-07-29** | New | Radio Path Characterization | RCP + LCP |
| **2020-08-21** | New | Radio Path Characterization | RCP + LCP |
| **2020-09-22** | New | Radio Path Characterization | RCP + LCP |
| **2020-11-18** | New | Radio Path Characterization | RCP + LCP |
| **2020-12-20** | New | Radio Path Characterization | RCP + LCP |
| **2021-01-06** | New | Radio Path Characterization | RCP + LCP |
| **2021-02-15** | New | Radio Path Characterization | RCP + LCP |

I noticed no issues with the data in my review. I examined the calibrated dataset in more detail than the raw dataset – both datasets contain the same number of data files.

***Documentation***

All documentation appears complete. Perhaps the most useful document, *rex_activities_kem1.pdf*, has also been updated and appear to reflect the data.