New Horizons REX Data Set Review – KEM1 V5.0 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-v5.0
- nh-a-rex-3-kem1-v5.0

Four previous versions of the dataset (v1.0, v2.0, v3.0, v4.0) were reviewed in February 2020, May 2020, November 2020, and January 2022. The version 5 dataset contains additional data over the version 4 dataset. 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. <u>Review Details</u>

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 11 new radio path characterizations (the last one in Jan 2022), additional data files in the MU69 encounter, and data from an additional test from a software test onboard in preparation for an extended mission. Of most interesting scientific importance is the additional datafiles from the MU69 encounter.

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Date	V5.0	Experiment	Comments
2018-09-09		Radio Path Characterization	
2018-10-21		Radio Path Characterization	
2019-01-01	Updated	MU69 radio brightness and ionosphere	Added 3460 data files
		detection attempt	
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	V5.0	Experiment	Comments
2019-08-08		Radio Path Characterization	
2019-09-04		Calibration Campaign	
2019-09-09		Calibration Campaign + Radio Path	
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		Radio Path Characterization	
2020-05-19		Radio Path Characterization	
2020-06-26		Radio Path Characterization	
2020-07-29	Updated	Radio Path Characterization	Added 100 data files
2020-08-21		Radio Path Characterization	
2020-09-22		Radio Path Characterization	
2020-11-18		Radio Path Characterization	
2020-12-20		Radio Path Characterization	
2021-01-06		Radio Path Characterization	
2021-02-15		Radio Path Characterization	
2021-03-15	New	Radio Path Characterization	
2021-04-15	New	Radio Path Characterization	
2021-05-20	New	Radio Path Characterization	
2021-06-15	New	Radio Path Characterization	
2021-07-13	New	Radio Path Characterization	
2021-08-11	New	Radio Path Characterization	
2021-09-07	New	Radio Path Characterization	
2021-09-23	New/Partial	Ecliptic Dust Radiometry Test	Partial data, per
			documentation
2021-10-09	New	Radio Path Characterization	
2021-11-21	New	Radio Path Characterization	
2021-12-12	New	Radio Path Characterization	
2022-01-13	New	Radio Path Characterization	

I noticed no issues with the data in my review. I examined the calibrated dataset in more detail than the raw dataset, but everything appears in order with both.

Documentation

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