

REX Activities in KEM1 Approach, Encounter, and Cruise

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The REX activities in Loads 18240 to 20112, are associated with two tasks:

1. 2014 MU₆₉ (Arrokoth) Encounter Observations
2. Radio Path Characterization
3. Calibration Campaign for testing instrument response differences

Each of the tasks was bookended with the REX Test Patterns, which use preset sequences with known response to compare with the REX output to test the performance of the REX process. Since the Test Patterns are run in concert with every REX event, they will not be further described in the four REX measurements to follow.

1. MU₆₉ Encounter Observations (Load 18359), Lead-In (Load 18344), and Lead-Out (19003)

The following is the DataTrack listing of the REX data during the Arrokoth Encounter.

18344	KARX_1ab_TestPatt_2018_358	2018-358_19:04:33	S/C	407,984,193	407,984,318
18344	KARX_1ab_TestPatt_2018_358	2018-358_19:04:48	S/C	407,984,208	407,984,318

18359	KERX_MU69_CA03-TEMP_REX_2019001__RADIOMETRIC	2019-001_04:28:04	S/C	408,622,807	408,623,822
18359	KERX_MU69_CA03-TEMP_REX_2019001__RADIOMETRIC	2019-001_04:28:19	S/C	408,622,822	408,623,689

18359	KERX_M_CA08P_REX	2019-001_05:48:19	S/C	408,627,621	408,628,218
18359	KERX_M_CA08P_REX	2019-001_05:48:34	S/C	408,627,636	408,628,677

18359	KERX_EARTH_CA12-IONSPHR_REX_2019001	2019-001_06:05:44	S/C	408,628,674	408,630,748
18359	KERX_EARTH_CA12-IONSPHR_REX_2019001	2019-001_06:05:59	S/C	408,628,689	408,671,798

18359	KERX_X_CA08-TEMP-BKGD_REX_2019002	2019-002_03:18:39	S/C	408,705,044	408,709,585
18359	KERX_X_CA08-TEMP-BKGD_REX_2019002	2019-002_03:18:54	S/C	408,705,059	408,709,600
18359	KERX_X_CA03-TEMP-BKGD_REX_2019002	2019-002_04:34:27	S/C	408,709,594	408,710,820
18359	KERX_X_CA03-TEMP-BKGD_REX_2019002	2019-002_04:34:42	S/C	408,709,609	408,710,820

19003	KDRX_1ab_TestPatt_2019_004	2019-004_22:04:33	S/C	408,945,393	408,945,518
19003	KDRX_1ab_TestPatt_2019_004	2019-004_22:04:48	S/C	408,945,408	408,945,518

2. Radio Path Characterization (Loads 18240, 18287, 19017–19213, 19276 thru subsequent loads)

Radio path characterization measurements with REX are nominally on a monthly cadence during the New Horizons extended mission. Due to operations constraints such as spacecraft hibernation and DSN scheduling, the monthly cadence has been irregular. The REX data are from uplinks in both polarizations (RCP and LCP), and are recorded and processed as described for the solar conjunctions. The objective is to assess the uplink’s frequency and amplitude stability, and to associate the standard deviation measure of the stability distributions with characteristics of the radio path such as multipath propagation.

The Radio Path Characterization was done on:

- September 9, 2018
- October 20, 2018
- February 2, 2019
- March 21, 2019
- April 19, 2019
- May 07, 2019
- June 12, 2019
- July 10, 2019
- August 08, 2019
- October 19, 2019
- November 14, 2019
- December 21, 2019
- January 09, 2020
- February 11, 2020
- March 10, 2020

The following is the DataTrack listing of the REX data during the Radio Path Characterizations.

09/09/2018:

18240	KARX_1ab_TestPatt_2018_252	2018-252_09:42:30	S/C	398,792,070	398,792,372
18240	KARX_1ab_TestPatt_2018_252	2018-252_09:42:45	S/C	398,792,085	398,792,387
18240	KARX_3ab_Radio_Path_Characterization_2018_252	2018-252_09:47:34	S/C	398,792,374	398,792,568
18240	KARX_3ab_Radio_Path_Characterization_2018_252	2018-252_09:47:49	S/C	398,792,389	398,792,568

10/20/2018:

18287	KARX_1ab_TestPatt_2018_293	2018-293_07:36:17	S/C	402,326,897	402,327,199
18287	KARX_1ab_TestPatt_2018_293	2018-293_07:36:32	S/C	402,326,912	402,327,214
18287	KARX_3ab_Radio_Path_Characterization_2018_293	2018-293_07:41:21	S/C	402,327,201	402,327,390
18287	KARX_3ab_Radio_Path_Characterization_2018_293	2018-293_07:41:36	S/C	402,327,216	402,327,390

02/02/2019:

19017	KDRX_1ab_TestPatt_2019_033	2019-033_21:08:59	S/C	411,447,659	411,447,961
19017	KDRX_1ab_TestPatt_2019_033	2019-033_21:09:14	S/C	411,447,674	411,447,976
19017	KDRX_3ab_Radio_Path_Characterization_2019_033	2019-033_21:14:03	S/C	411,447,963	411,448,152
19017	KDRX_3ab_Radio_Path_Characterization_2019_033	2019-033_21:14:18	S/C	411,447,978	411,448,152

03/21/2019:

19073	KDRX_1ab_TestPatt_2019_080	2019-080_22:02:09	S/C	415,511,649	415,511,951
19073	KDRX_1ab_TestPatt_2019_080	2019-080_22:02:24	S/C	415,511,664	415,511,966
19073	KDRX_3ab_Radio_Path_Characterization_2019_080	2019-080_22:07:13	S/C	415,511,953	415,512,142
19073	KDRX_3ab_Radio_Path_Characterization_2019_080	2019-080_22:07:28	S/C	415,511,968	415,512,142

04/19/2019:

19108	KDRX_1ab_TestPatt_2019_109	2019-109_20:05:00	S/C	418,010,220	418,010,522
19108	KDRX_1ab_TestPatt_2019_109	2019-109_20:05:15	S/C	418,010,235	418,010,537
19108	KDRX_3ab_Radio_Path_Characterization_2019_109	2019-109_20:10:04	S/C	418,010,524	418,010,713
19108	KDRX_3ab_Radio_Path_Characterization_2019_109	2019-109_20:10:19	S/C	418,010,539	418,010,713

05/07/2019:

19108	KDRX_1ab_TestPatt_2019_127	2019-127_21:13:49	S/C	419,569,549	419,569,851
19108	KDRX_1ab_TestPatt_2019_127	2019-127_21:14:04	S/C	419,569,564	419,569,866
19108	KDRX_3ab_Radio_Path_Characterization_2019_127	2019-127_21:18:53	S/C	419,569,853	419,570,042
19108	KDRX_3ab_Radio_Path_Characterization_2019_127	2019-127_21:19:08	S/C	419,569,868	419,570,042

06/12/2019:

19150	KDRX_1ab_TestPatt_2019_163	2019-163_17:04:25	S/C	422,664,985	422,665,287
19150	KDRX_1ab_TestPatt_2019_163	2019-163_17:04:40	S/C	422,665,000	422,665,302
19150	KDRX_3ab_Radio_Path_Characterization_2019_163	2019-163_17:09:29	S/C	422,665,289	422,665,478
19150	KDRX_3ab_Radio_Path_Characterization_2019_163	2019-163_17:09:44	S/C	422,665,304	422,665,478

07/10/2019:

19171	KDRX_1ab_TestPatt_2019_191	2019-191_16:03:49	S/C	425,080,549	425,080,851
19171	KDRX_1ab_TestPatt_2019_191	2019-191_16:04:04	S/C	425,080,564	425,080,866
19171	KDRX_3ab_Radio_Path_Characterization_2019_191	2019-191_16:08:53	S/C	425,080,853	425,081,042
19171	KDRX_3ab_Radio_Path_Characterization_2019_191	2019-191_16:09:08	S/C	425,080,868	425,081,042

08/08/2019:

19213	KDRX_1ab_TestPatt_2019_220	2019-220_12:41:53	S/C	427,574,033	427,574,335
19213	KDRX_1ab_TestPatt_2019_220	2019-220_12:42:08	S/C	427,574,048	427,574,350
19213	KDRX_3ab_Radio_Path_Characterization_2019_220	2019-220_12:46:57	S/C	427,574,337	427,574,526
19213	KDRX_3ab_Radio_Path_Characterization_2019_220	2019-220_12:47:12	S/C	427,574,352	427,574,526

10/19/2019:

19276	K2RX_1ab_TestPatt_2019_292	2019-292_07:55:28	S/C	433,777,647	433,777,949
19276	K2RX_1ab_TestPatt_2019_292	2019-292_07:55:43	S/C	433,777,662	433,777,964
19276	K2RX_3ab_Radio_Path_Characterization_2019_292	2019-292_08:00:32	S/C	433,777,951	433,778,140
19276	K2RX_3ab_Radio_Path_Characterization_2019_292	2019-292_08:00:47	S/C	433,777,966	433,778,140

11/14/2019:

19297	K2RX_1ab_TestPatt_2019_318	2019-318_09:05:35	S/C	436,028,254	436,028,556
19297	K2RX_1ab_TestPatt_2019_318	2019-318_09:05:50	S/C	436,028,269	436,028,571
19297	K2RX_3ab_Radio_Path_Characterization_2019_318	2019-318_09:10:39	S/C	436,028,558	436,028,747
19297	K2RX_3ab_Radio_Path_Characterization_2019_318	2019-318_09:10:54	S/C	436,028,573	436,028,747

12/21/2019:

19339	K2RX_1ab_TestPatt_2019_355	2019-355_04:36:04	S/C	439,208,883	439,209,185
19339	K2RX_1ab_TestPatt_2019_355	2019-355_04:36:19	S/C	439,208,898	439,209,200
19339	K2RX_3ab_Radio_Path_Characterization_2019_355	2019-355_04:41:08	S/C	439,209,187	439,209,376
19339	K2RX_3ab_Radio_Path_Characterization_2019_355	2019-355_04:41:23	S/C	439,209,202	439,209,376

01/09/2020:

20006	K2RX_1ab_TestPatt_2020_009	2020-009_03:27:37	S/C	440,846,376	440,846,678
20006	K2RX_1ab_TestPatt_2020_009	2020-009_03:27:52	S/C	440,846,391	440,846,693
20006	K2RX_3ab_Radio_Path_Characterization_2020_009	2020-009_03:32:41	S/C	440,846,680	440,846,869
20006	K2RX_3ab_Radio_Path_Characterization_2020_009	2020-009_03:32:56	S/C	440,846,695	440,846,869

02/11/2020:

20041	K2RX_1ab_TestPatt_2020_042	2020-042_20:48:25	S/C	443,760,024	443,760,326
20041	K2RX_1ab_TestPatt_2020_042	2020-042_20:48:40	S/C	443,760,039	443,760,341
20041	K2RX_3ab_Radio_Path_Characterization_2020_042	2020-042_20:53:29	S/C	443,760,328	443,760,517
20041	K2RX_3ab_Radio_Path_Characterization_2020_042	2020-042_20:53:44	S/C	443,760,343	443,760,517

03/10/2020:

20062	K2RX_1ab_TestPatt_2020_070	2020-070_18:57:18	S/C	446,172,557	446,172,859
20062	K2RX_1ab_TestPatt_2020_070	2020-070_18:57:33	S/C	446,172,572	446,172,874
20062	K2RX_3ab_Radio_Path_Characterization_2020_070	2020-070_19:02:22	S/C	446,172,861	446,173,050
20062	K2RX_3ab_Radio_Path_Characterization_2020_070	2020-070_19:02:37	S/C	446,172,876	446,173,050

3. Calibration Campaign (Load 19234)

The calibration campaign for REX was run in concert with other *New Horizons* instruments in the 19234 load that began in late August, 2019, and concluded in September, 2019. Data were gathered to determine if instrument response had changed since the previous calibration event after the Pluto-Charon system flyby.

The following is the DataTrack listing of the REX data during the Radio Path Characterizations.

09/04/2019 and 09/09/2019:

19234	K2RX_1ab_TestPatt_2019_247a	2019-247_05:29:34	S/C	429,880,893	429,884,849
19234	K2RX_1ab_TestPatt_2019_247a	2019-247_05:29:49	S/C	429,880,908	429,884,864
19234	K2RX_11ab_Radiometric_2019_247	2019-247_06:35:32	S/C	429,884,854	429,886,202
19234	K2RX_11ab_Radiometric_2019_247	2019-247_06:35:47	S/C	429,884,869	429,886,217
19234	K2RX_11ab_Radiometric_2019_247	2019-247_06:58:05	S/C	429,886,207	429,889,535
19234	K2RX_11ab_Radiometric_2019_247	2019-247_06:58:20	S/C	429,886,222	429,889,550
19234	K2RX_11ab_Radiometric_2019_247	2019-247_07:53:38	S/C	429,889,540	429,890,888
19234	K2RX_11ab_Radiometric_2019_247	2019-247_07:53:53	S/C	429,889,555	429,890,903
19234	K2RX_11ab_Radiometric_2019_247	2019-247_08:16:11	S/C	429,890,893	429,895,085
19234	K2RX_11ab_Radiometric_2019_247	2019-247_08:16:26	S/C	429,890,908	429,895,100
19234	K2RX_11ab_Radiometric_2019_247	2019-247_09:26:08	S/C	429,895,090	429,896,438
19234	K2RX_11ab_Radiometric_2019_247	2019-247_09:26:23	S/C	429,895,105	429,896,453
19234	K2RX_11ab_Radiometric_2019_247	2019-247_09:48:41	S/C	429,896,443	429,900,671
19234	K2RX_11ab_Radiometric_2019_247	2019-247_09:48:56	S/C	429,896,458	429,900,686
19234	K2RX_11ab_Radiometric_2019_247	2019-247_10:59:14	S/C	429,900,676	429,902,024
19234	K2RX_11ab_Radiometric_2019_247	2019-247_10:59:29	S/C	429,900,691	429,902,039
19234	K2RX_11ab_Radiometric_2019_247	2019-247_11:21:47	S/C	429,902,029	429,905,658
19234	K2RX_11ab_Radiometric_2019_247	2019-247_11:22:02	S/C	429,902,044	429,905,674
19234	K2RX_REX18ab_HGASideLobe_2019_247	2019-247_12:22:21	S/C	429,905,662	429,908,669
19234	K2RX_REX18ab_HGASideLobe_2019_247	2019-247_12:22:37	S/C	429,905,677	429,908,684
19234	K2RX_20ab_CA08TempBkgd_2019_247	2019-247_13:12:32	S/C	429,908,680	429,911,543
19234	K2RX_20ab_CA08TempBkgd_2019_247	2019-247_13:12:47	S/C	429,908,695	429,911,558
19234	K2RX_Rex7_ColdSkyA_2019_247	2019-247_14:00:26	S/C	429,911,546	429,913,092
19234	K2RX_Rex7_ColdSkyA_2019_247	2019-247_14:00:41	S/C	429,911,561	429,913,107
19234	K2RX_Rex7_ColdSkyB_2019_247	2019-247_14:26:15	S/C	429,913,095	429,913,347
19234	K2RX_Rex7_ColdSkyB_2019_247	2019-247_14:26:30	S/C	429,913,110	429,913,347
19234	K2RX_1ab_TestPatt_2019_247b	2019-247_14:31:34	S/C	429,913,413	429,990,713
19234	K2RX_1ab_TestPatt_2019_247b	2019-247_14:31:49	S/C	429,913,428	429,916,434
19234	K2RX_1ab_TestPatt_2019_252	2019-252_14:57:16	S/C	430,346,955	430,347,257
19234	K2RX_1ab_TestPatt_2019_252	2019-252_14:57:31	S/C	430,346,970	430,347,272
19234	K2RX_3ab_Radio_Path_Characterization_2019_252	2019-252_15:02:20	S/C	430,347,259	430,347,448
19234	K2RX_3ab_Radio_Path_Characterization_2019_252	2019-252_15:02:35	S/C	430,347,274	430,347,448

