HST observations of Jupiter's UV aurora during Juno's orbits PJ03, PJ04 and PJ05. EGU2017-2957

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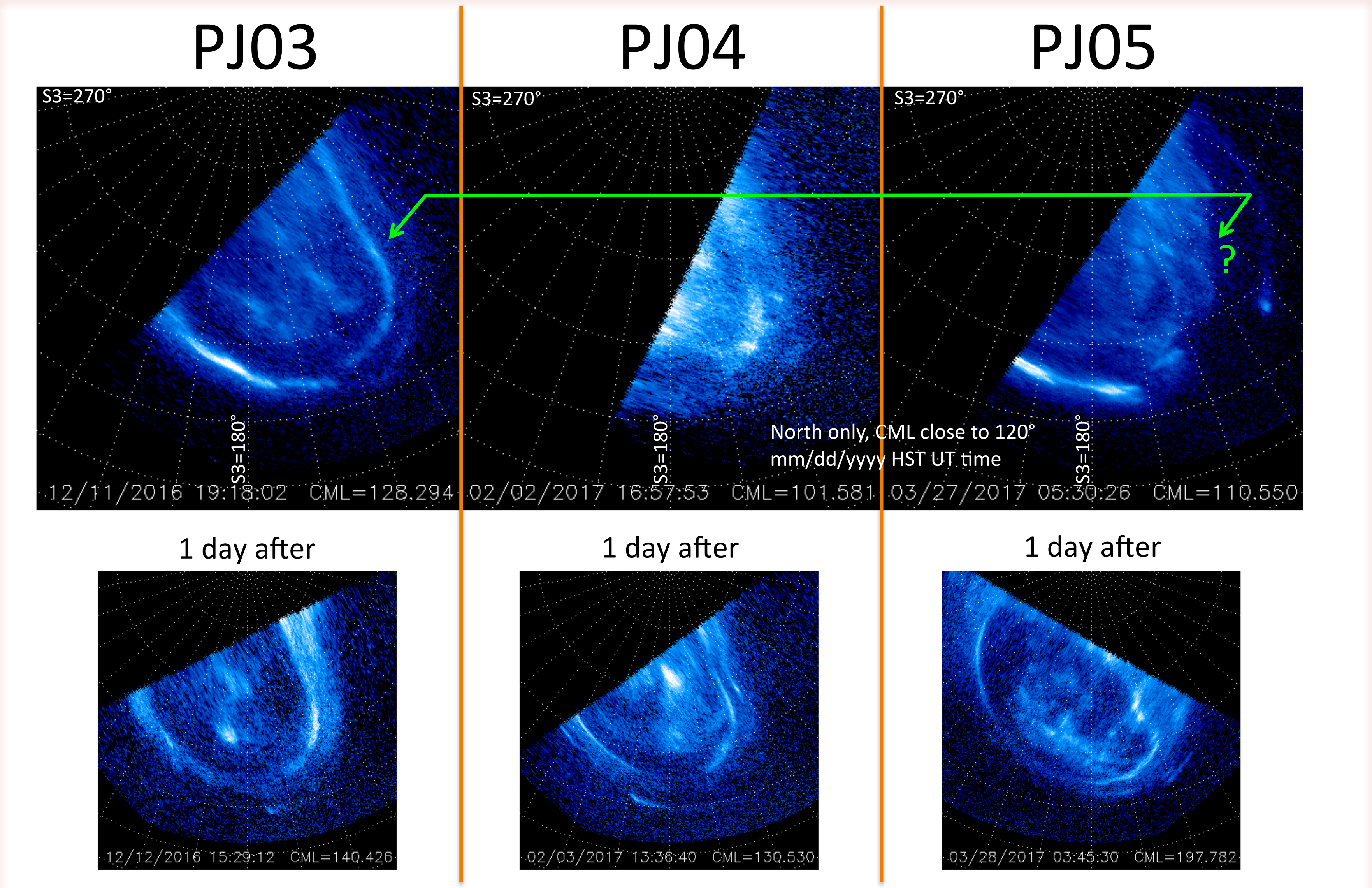
The intense ultraviolet auroral emissions of Jupiter are currently being monitored in the frame of a large Hubble Space Telescope (HST) program meant to support the NASA Juno prime mission. The present study addresses the three first Juno orbits (PJ03, 04 and 05) during which HST obtained parallel observations. These three campaigns basically consist of a 2-week period bracketing the time of Juno's closest approach of Jupiter (CA). At least one HST visit is scheduled every day during the week before and the week following CA. During the ~12-hour period centered on CA and depending on observing constraints, several HST visits are programmed in order to obtain as many simultaneous observations with Juno-UVS as possible. In addition, at least one HST visit is obtained near Juno's apojove, when UVS is continuously monitoring Jupiter's global auroral power, without spatial resolution, for about 12 hours. We are using the Space Telescope Imaging Spectrograph (STIS) in time-tag mode in order to provide spatially resolved movies of Jupiter's highly dynamic aurora with timescales ranging from seconds to several days. We discuss the preliminary exploitation of the HST data and present these results in such a way as to provide a global magnetospheric context for the different Juno instruments studying Jupiter's magnetosphere, as well as for the numerous ground based and space based observatories participating to the Juno mission.



10-sec HST exposures (polar views) taken near perijove for PJ03, PJ04 and PJ05, only in the north near CML=120° (for comparison). The bottom row is showing how the aurora looked like ~1 day after. The viewing is not always favorable, but it allows us to compare morphologies on different days, and it is clearly changing very much.

For example, the green arrow is pointing to a PM narrow arc (part of the main emission) which is well present on PJ03, but not on PJ05.

Near perijove of PJ05, the aurora was particularly disturbed, with the main emission broken into small arcs. One day after, the main emission recovered and the aurora looked more 'normal' ...

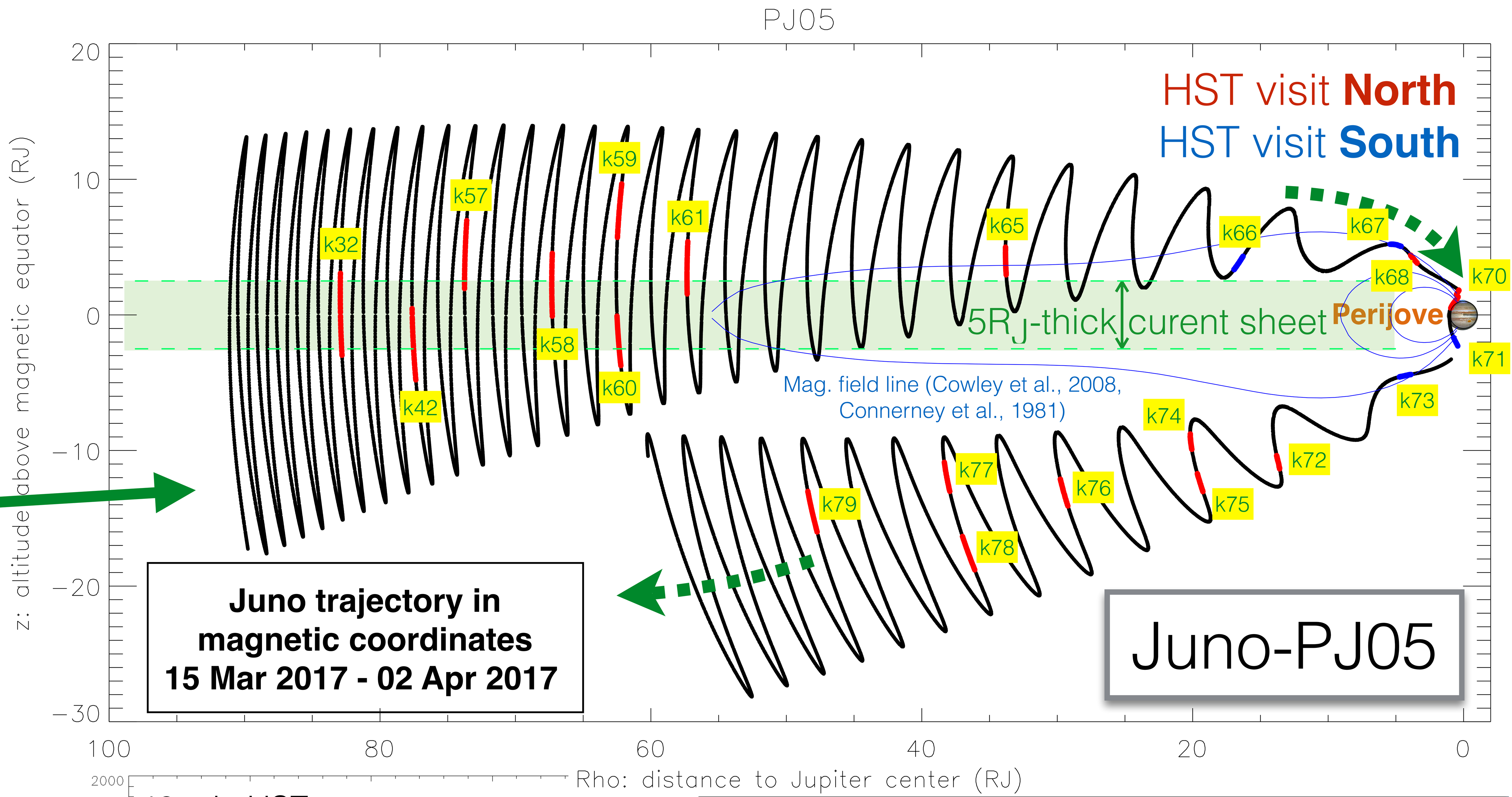
STIS time tag movies

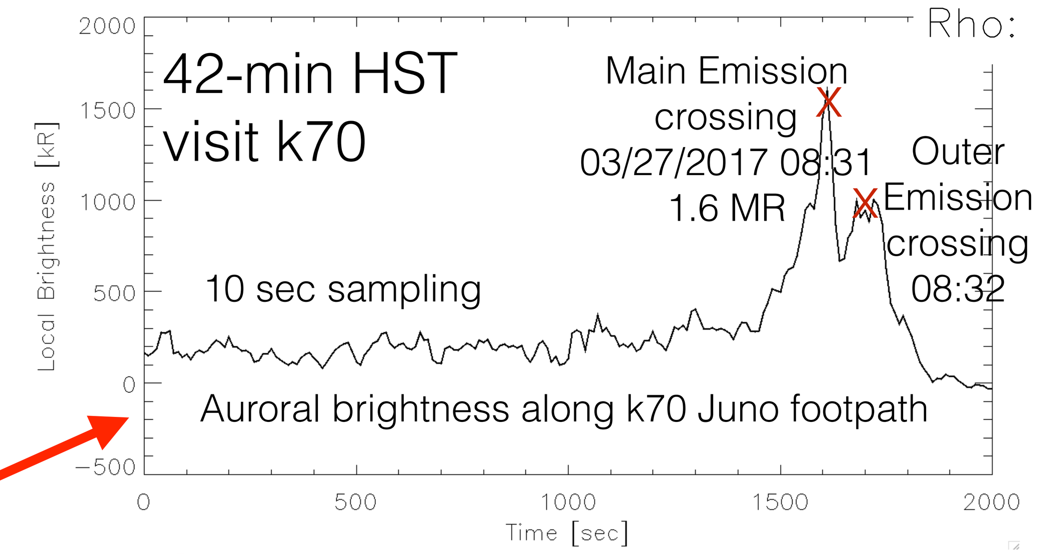
Far-UV Multi-Anode Micro-channel Array channel on the Space Telescope imaging Spectrograph with the SrF2 filter attenuating the strong Ly-alpha line and contamination from geocoronal emissions. The plate-scale is of 0.0248 arcsec/pix (75 km/pix, PSF ~2-3 pix, 1024x1024 pix). Brightness/emitted power by H2 molecules in the 70-180 nm range, counts to kR conversion from Gustin et al. (2012).

Full movie duration ~42 min.

STIS time tag visits

Here, **we focus on the most recent Juno orbit PJ05**, which took place in March-April 2017 with a perijove time of 27-Mar-2017 08:53:20. 21 relevant HST visits are marked on the Juno magnetic trajectory with their **'k' ID number**. Red streaks correspond to HST observations of the **north** and blue for the **south**. k70 and k71 were obtained within a ~2-hour period bracketing the perijove time. The other ones were taken roughly 1 day apart.

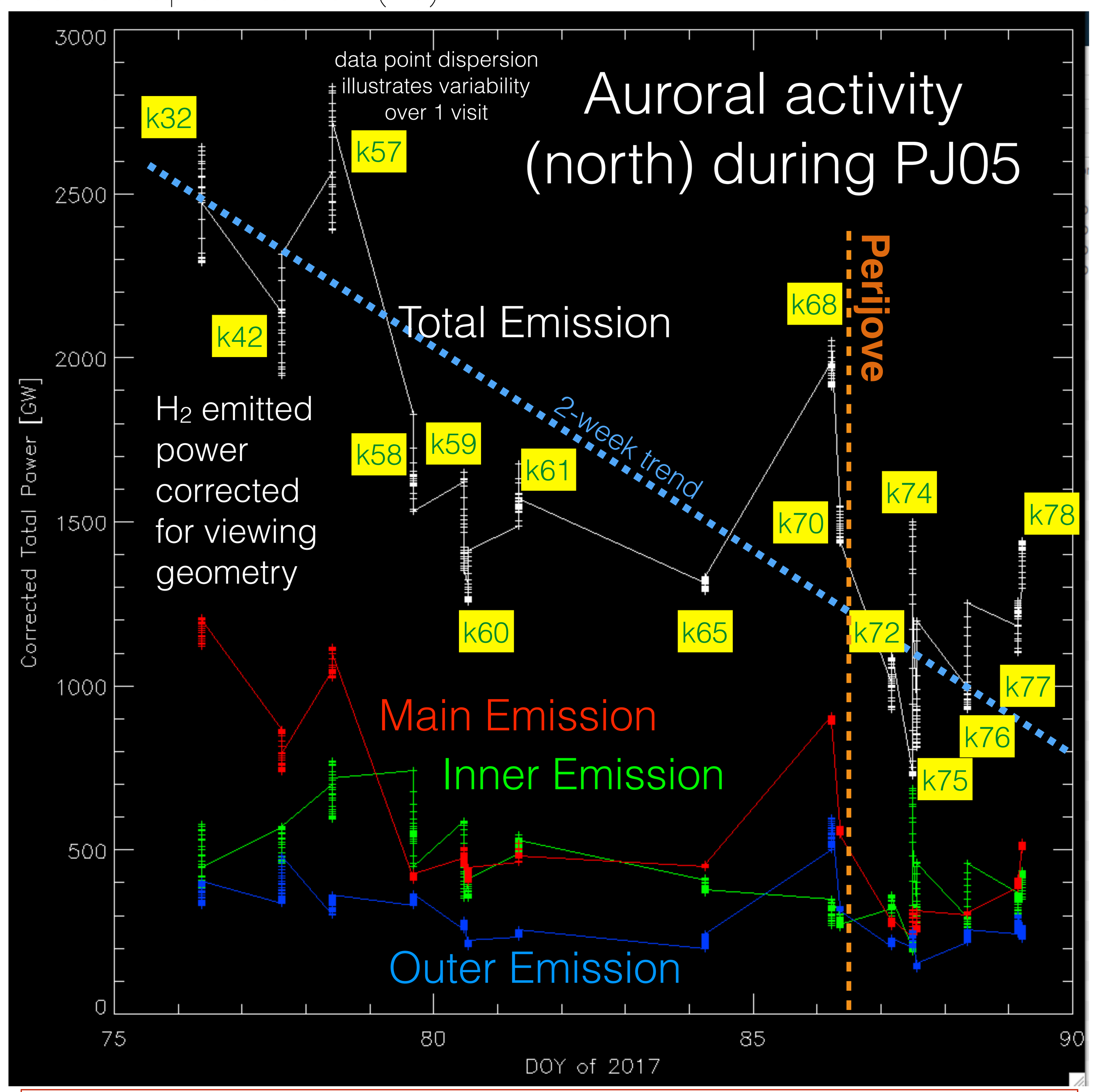




HST times converted to Juno times

visit ID	start time	end time	hem.
od8k32anq	03/17/2017 08:01:34	03/17/2017 08:44:30	N
od8k42anq	03/18/2017 14:14:38	03/18/2017 14:56:02	N
od8k57anq	03/19/2017 09:19:18	03/19/2017 10:00:42	N
od8k58anq	03/20/2017 15:31:36	03/20/2017 16:13:01	N
od8k59anq	03/21/2017 10:36:09	03/21/2017 11:17:33	N
od8k60anq	03/21/2017 12:11:31	03/21/2017 12:52:55	N
od8k61anq	03/22/2017 07:16:01	03/22/2017 07:57:25	N
od8k65anq	03/25/2017 05:12:14	03/25/2017 05:53:38	N
od8k66anq	03/26/2017 14:34:54	03/26/2017 15:16:18	S
od8k67anq	03/27/2017 03:17:49	03/27/2017 03:59:13	S
od8k68anq	03/27/2017 04:53:10	03/27/2017 05:34:34	N
od8k70anq	03/27/2017 08:03:54	03/27/2017 08:45:19	N
od8k71anq	03/27/2017 09:39:17	03/27/2017 10:20:41	S
od8k73anq	03/27/2017 12:50:00	03/27/2017 13:31:24	S
od8k72anq	03/28/2017 03:08:15	03/28/2017 03:49:39	N
od8k74anq	03/28/2017 11:05:09	03/28/2017 11:46:33	N
od8k75anq	03/28/2017 12:40:25	03/28/2017 13:21:49	N
od8k76anq	03/29/2017 07:44:56	03/29/2017 08:26:10	N
od8k77anq	03/30/2017 02:49:08	03/30/2017 03:30:32	N
od8k78anq	03/30/2017 04:24:30	03/30/2017 05:05:54	N
od8k79anq	03/31/2017 09:01:07	03/31/2017 09:42:31	N

Perijove 03/27/2017 08:53:20



The global auroral activity and morphology change substantially over a few hours. During PJ05, the activity continuously decreased for 2 weeks, with sporadic stronger episodes. The main emission (ME), outer emission (equatorward of ME) and the inner emission (poleward of ME, including flares) do not follow the same trends. Near PJ05 perijove, the aurora was particularly disturbed and the ME was broken and very strong.