

Cassini Ultraviolet Imaging Spectrograph
UVIS HSP

Ring Stellar Occultation Atlas

Volume 3: Rev 040 – Rev 058

Version: 1.3
May 31, 2018

Table of Contents

The table lists all occultations in this volume, including the star name, rev number, indication of ingress (I) or egress (E), date of the occultation, duration of the occultation, radial range coverage and elevation angle of the star.

Occultations are presented chronologically in the order they were observed. To keep the file size of this atlas manageable, it is presented in multiple volumes, each one covering a subset of the occultations.

Introduction

Over the course of the Cassini mission, the High Speed Photometer (HSP) of the Ultraviolet Imaging Spectrograph (UVIS) observed 170 occultations of stars by Saturn's rings. Details on the UVIS instrument can be found in Esposito et al. (1998, 2004). Information on the handling of HSP ring occultation data as well as a summary of data calibration and reduction techniques for the first part of the Cassini mission are in Colwell et al. (2010). This document provides a tabular and visual overview of these stellar occultations.

Description of Data Products in the Atlas

The HSP data consist of a time series of measured photon counts. With the exception of observations of some faint stars where the background signal dominates or is a significant contribution, the measured signal is primarily due to starlight transmitted through the rings. The HSP integration times are 1, 2, 4, or 8 msec. The majority of occultations used a 1 msec integration period, with most of the rest at 2 msec. In this atlas the data are binned to 1 second.

The data are shown in two plots: (1) a plot spanning the range of 70,000 km to 150,000 km from Saturn for all occultations to allow direct comparison of signal and coverage on a single distance scale; and (2) a plot that shows the data zoomed to the radial range of coverage of the occultation.

Two additional geometry plots are included for each occultation: (1) the radial ring plane resolution of the occultation (in the frame of Saturn, not accounting for ring particle motion or diffraction); and (2) the value of ϕ , an angle measured in the ring plane in the counterclockwise sense from the outward radial vector at the measurement point to the direction to the star projected into the ring plane. Thus, an observation where the look vector to the star is tangent to the rings has $\phi=90$ degrees.

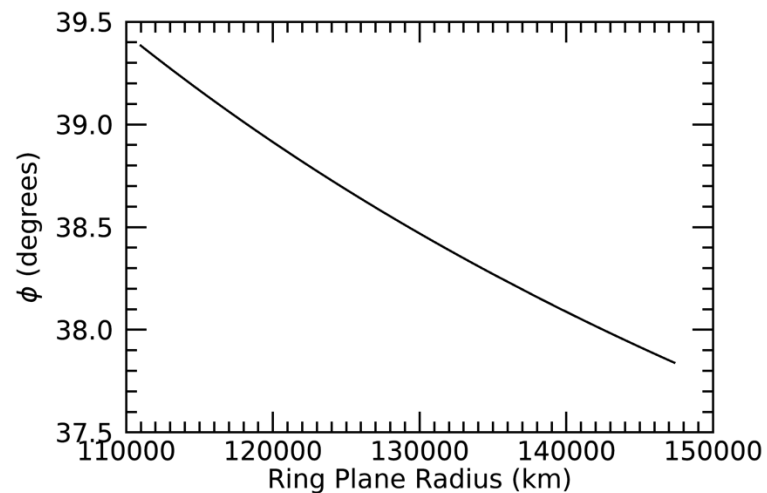
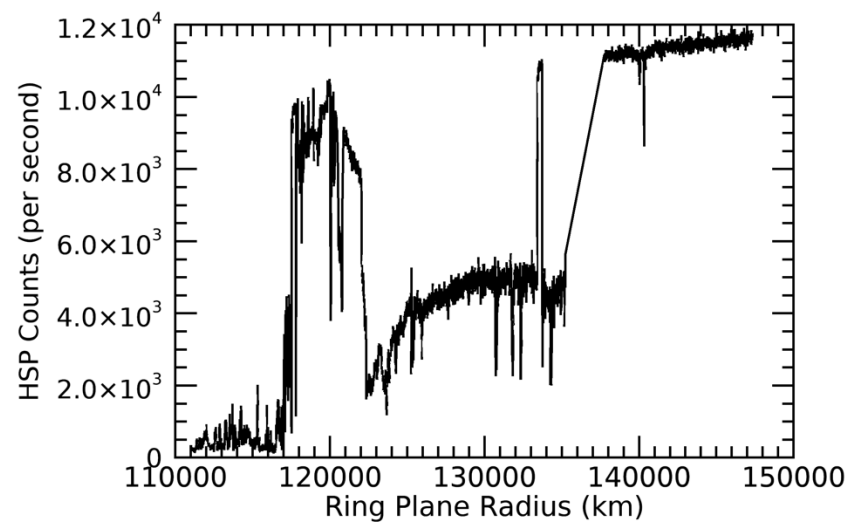
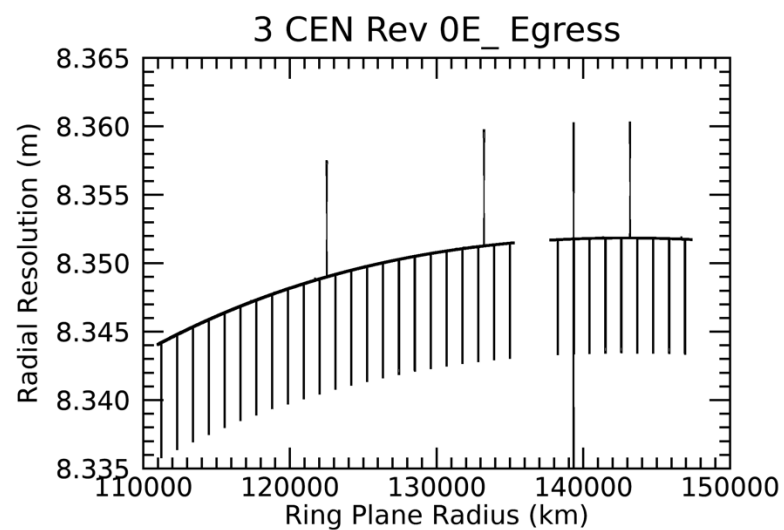
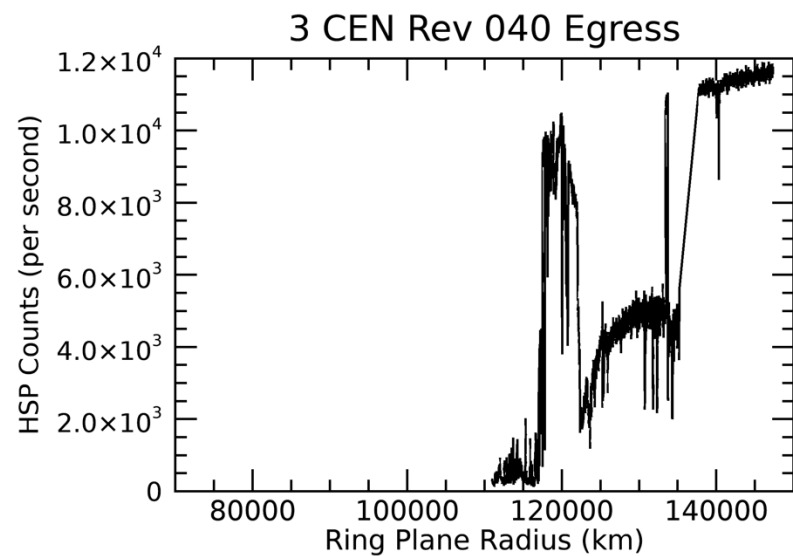
On the page following the data plots, a geometry visualization is shown at a time near the middle of the occultation. The position of the UVIS HSP field of view is labeled on each of these plots. Occultations that cut a chord across the rings, are presented here as separate "Ingress" and "Egress" occultations, referring to the portion of the occultation where the observation point is approaching or receding from Saturn, respectively. Some geometry visualizations are missing and will be included in the next revision of this volume.

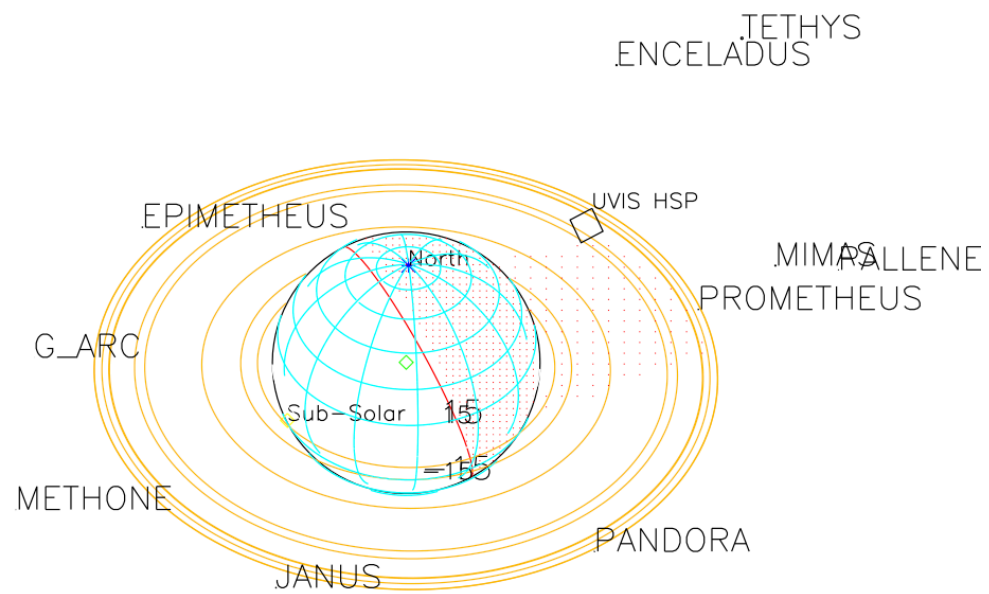
Document assembled by Joshua Colwell, UVIS Co-Investigator, University of Central Florida, with the assistance of Stephanie Eckert Grant, Richard Jerousek, and Tina Notrika, UCF.

References

1. Colwell, J. E., L. W. Esposito, D. Pettis, M. Sremčević, R. G. Jerousek, E. T. Bradley 2010. Cassini UVIS Stellar Occultation Observations of Saturn's Rings. *Astron. J.* **140**, 1569-1578, doi:10.1088/0004-6256/140/6/1569.
2. Esposito, L. W., J. E. Colwell, and W. E. McClintock 1998. Cassini UVIS Observations of Saturn's Rings. *Planet. Space Sci.* **46**, 1221-1235.
3. Esposito, L. W., C. A. Barth, J. E. Colwell, G. M. Lawrence, W. E. McClintock, A. I. F. Stewart, H. U. Keller, , A. Korth, H. Lauche, M. Festou, A. L. Lane, C. J. Hansen, J. N. Maki, R. A. West, H. Jahn, R. Reulke, K. Warlich, D. E. Shemansky, and Y. L. Yung 2004. The Cassini Ultraviolet Imaging Spectrograph Investigation. *Space Sci. Rev.* **115**, 299-361.

Star		Rev	Ing/Eg	Year/Day	B	ϕ	Radius	Duration (min)
3	CEN	40	E	2007-073	39.3	39.4- 37.8	110987-147354	145.2
β	PSA	40	I	2007-063	29.2	288.1-269.5	142566-119979	80.8
γ	GRU	40	E	2007-063	35.1	232.4-181.8	67339-147705	249.8
ψ	CEN	40	I	2007-073	44.3	216.9-216.5	149972-136109	62.3
θ	ARA	40	E	2007-060	53.9	16.3- 33.6	130041-136092	168.7
θ	ARA	40	I	2007-060	53.9	348.5- 16.3	146852-130041	286.8
α	AUR	41	I	2007-082	-50.9	297.8-351.8	143866- 71307	206.3
β	SGR	41	E	2007-079	46.3	38.3- 64.6	127359-141956	217.3
β	SGR	41	I	2007-079	46.3	18.2- 38.3	135500-127359	160.3
δ	PER	41	I	2007-082	-54	240.6-232.8	149745- 49258	167.5
γ	GRU	41	E	2007-080	35.1	243.1-193.0	91528-142230	213
γ	GRU	41	I	2007-080	35.1	294.4-243.1	145958- 91528	222.4
θ	ARA	41	E	2007-078	53.9	63.8- 89.4	63681-152229	427.9
β	PER	42	I	2007-098	-47.4	230.8-227.8	149674- 84460	88.8
κ	CEN	42	E	2007-092	48.5	141.6-115.3	114712-127824	310.5
κ	CEN	42	I	2007-092	48.5	178.0-141.6	142152-114712	462.4
ζ	PER	42	E	2007-098	-38	328.0-344.0	132810-137956	50.8
ζ	PER	42	I	2007-098	-38	318.1-328.0	134700-132810	30.6
μ	SCO	43	E	2007-112	43.4	356.5- 37.4	109113-143481	445.4
μ	SCO	43	I	2007-112	43.4	345.3-356.5	111207-109113	102.4
λ	SCO	44	I	2007-129	41.7	244.4-211.1	141062- 69543	319.2
ζ	ORI	47	E	2007-179	-2.7	106.6- 99.3	78769-137732	64.8
α	SCO	55	E	2008-003	32.2	49.6- 68.0	115023-142164	130.7
ι	CEN	56	E	2008-014	42.7	80.0- 77.5	131855-141213	48
β	LUP	57	I	2008-026	49.6	231.9-226.1	148146-119417	98.4
δ	LUP	57	I	2008-026	47	260.4-259.3	147964-114918	96.7
γ	LUP	57	I	2008-026	47.4	262.3-261.8	148220-135462	35.7
ι	CEN	57	E	2008-026	42.7	80.8- 76.5	128119-144648	84.5
κ	CEN	57	I	2008-026	48.5	239.3-238.4	146913-139319	24.8
ν	CEN	57	E	2008-026	48	142.2-133.8	104915-106010	58
ν	CEN	57	I	2008-026	48	174.2-142.2	122932-104915	244.4
SAO 205839		57	I	2008-026	44.3	262.7-263.7	146086-129998	55.5
β	LUP	58	I	2008-038	49.6	234.1-228.1	146867-114495	108.9
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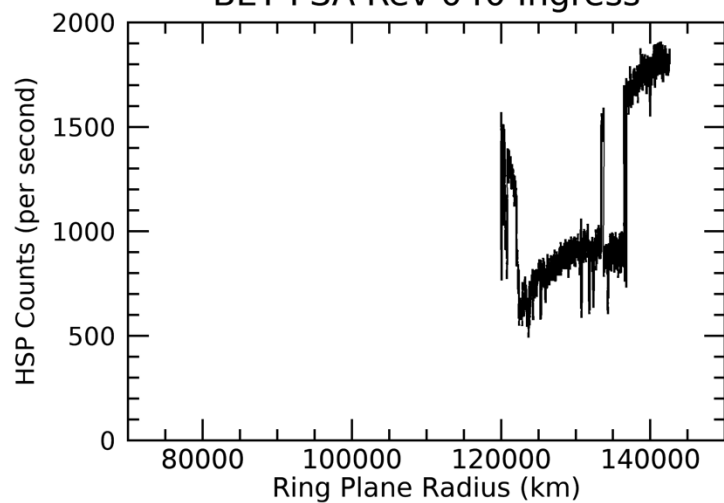
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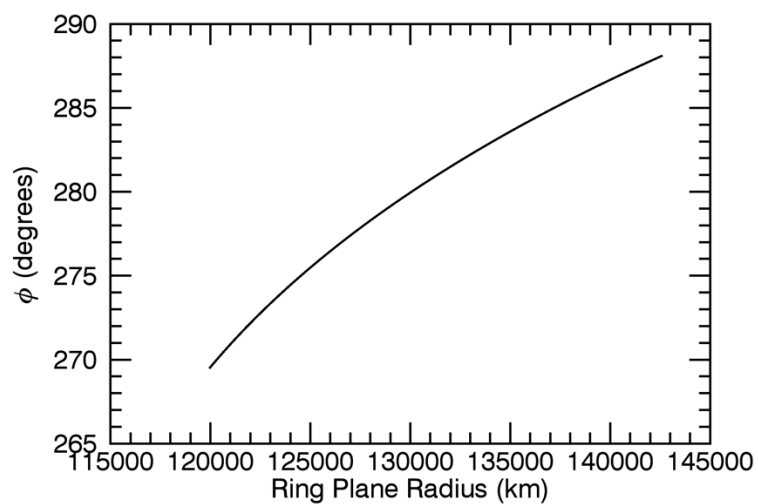
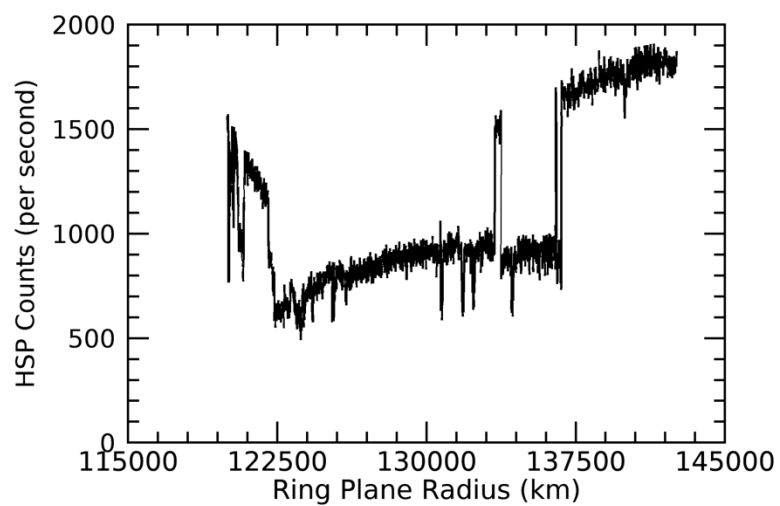
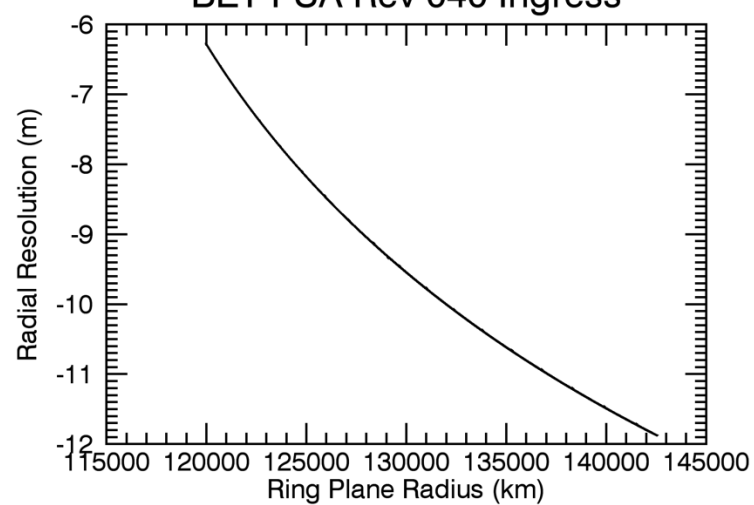
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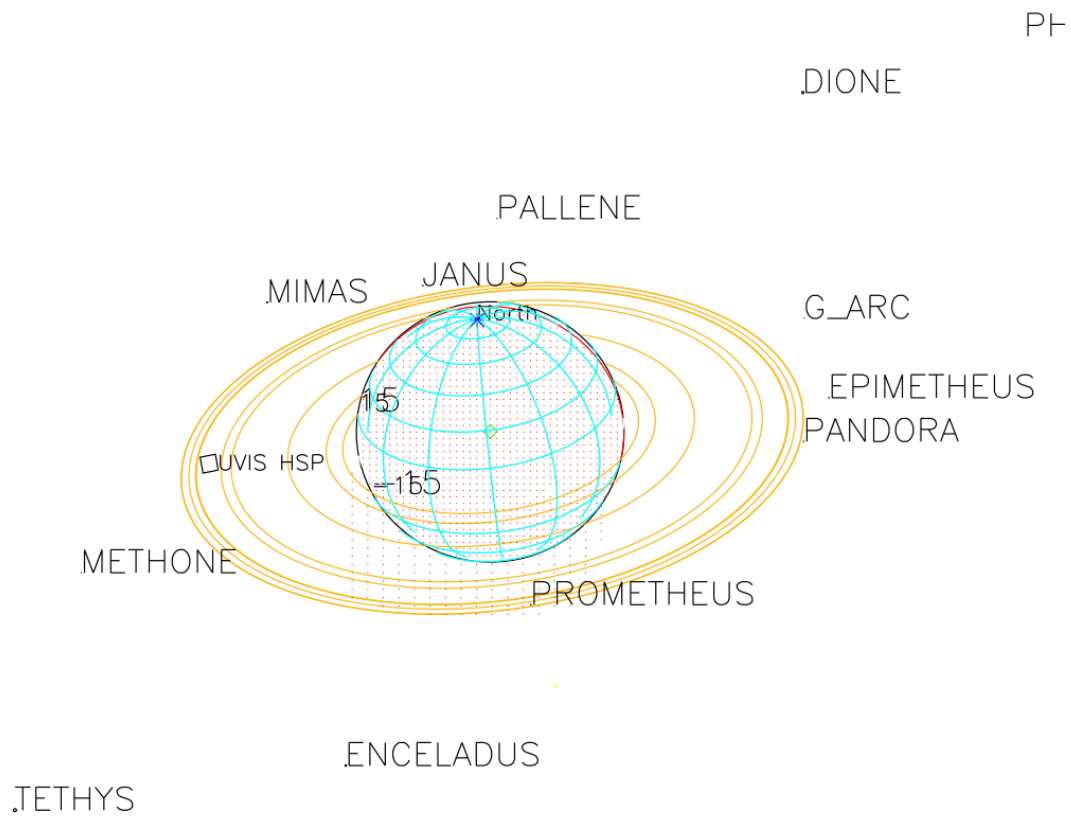
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BET PSA Rev 040 Ingress



BET PSA Rev 040 Ingress



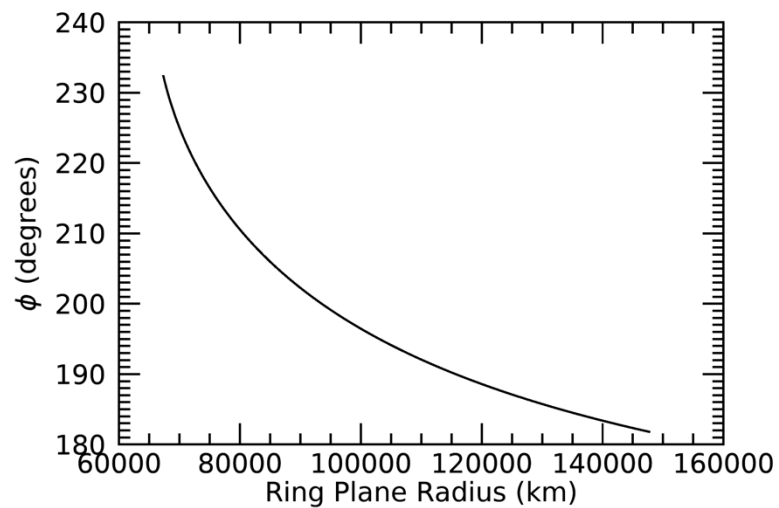
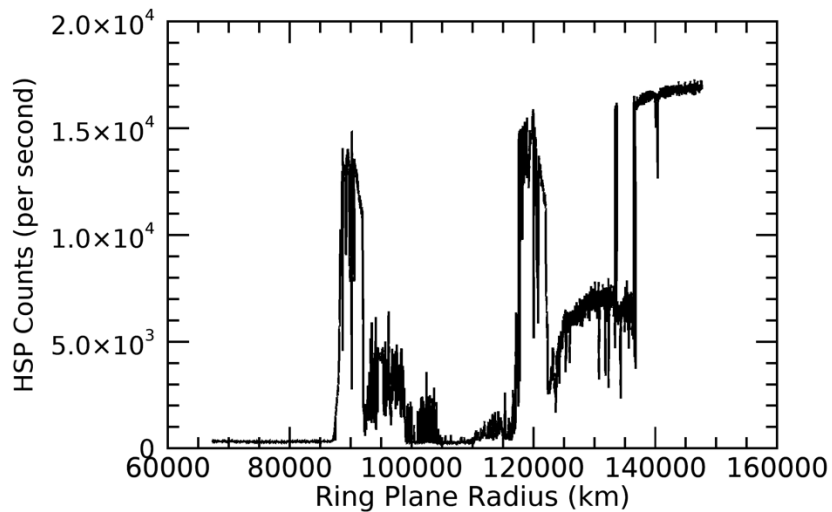
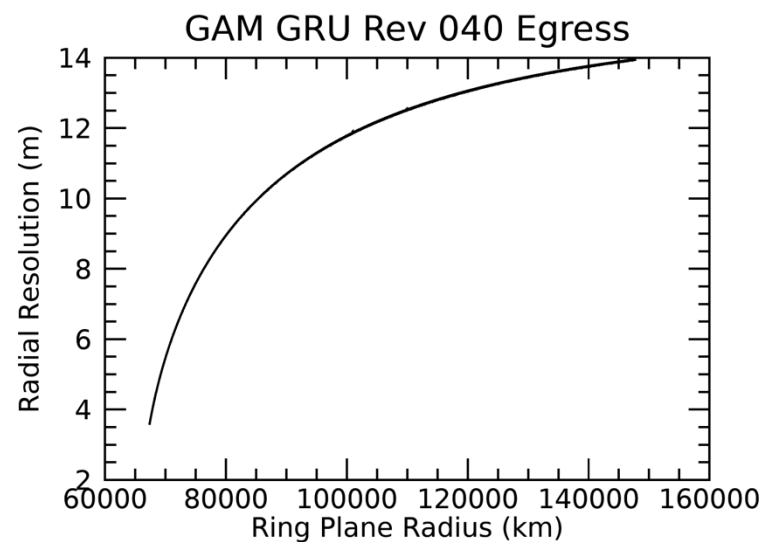
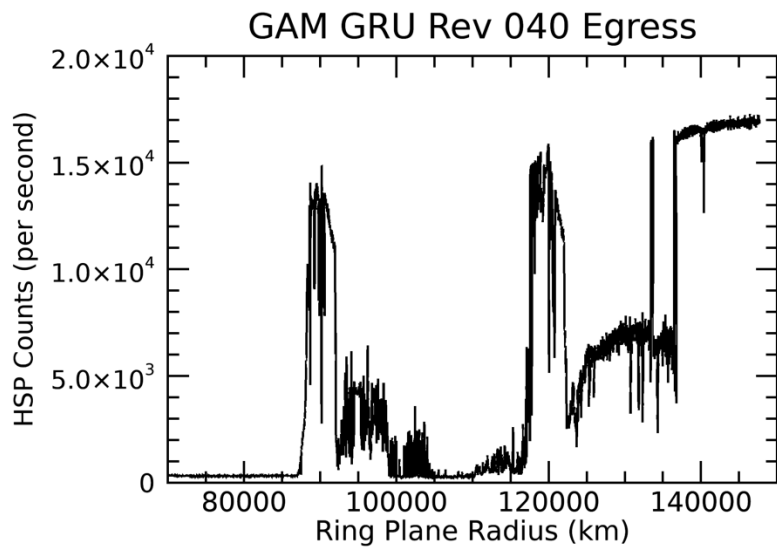


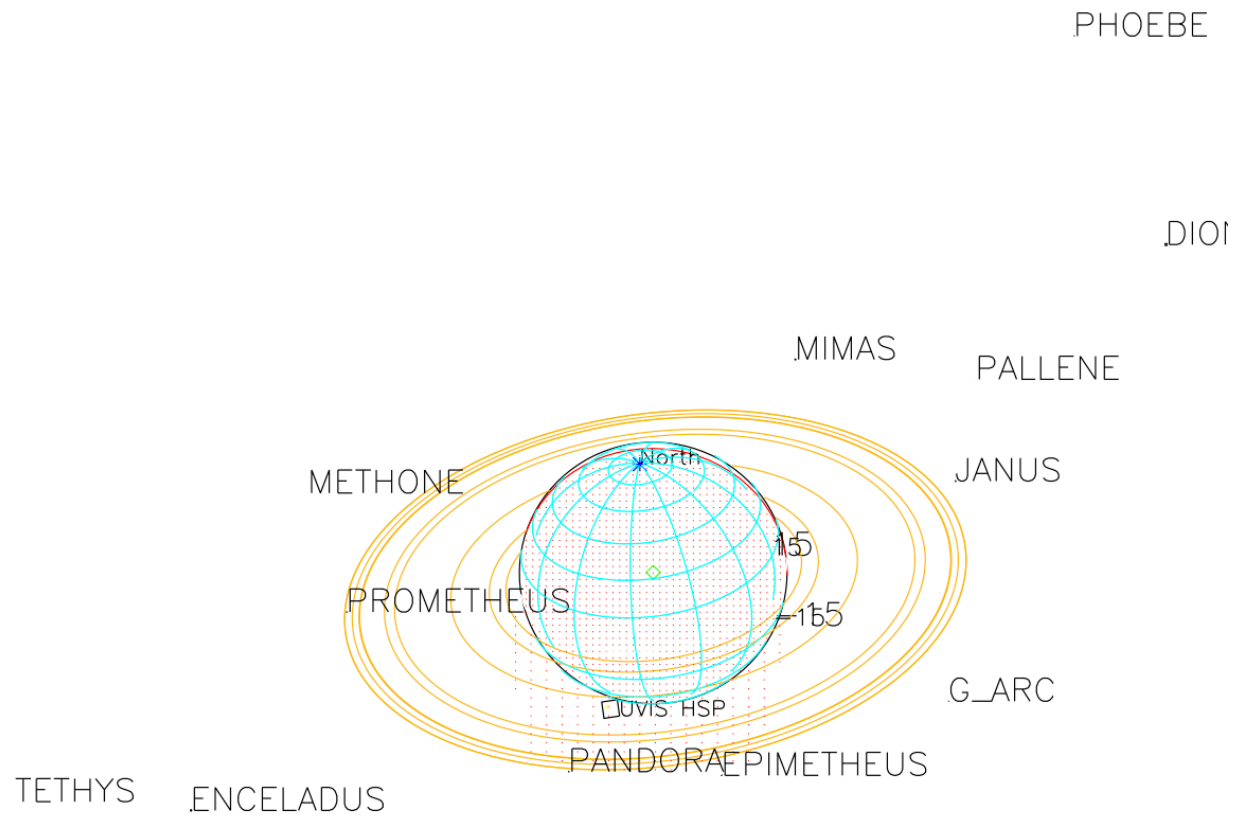
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Sub-s/c lat/lon: 24.98, 2.04



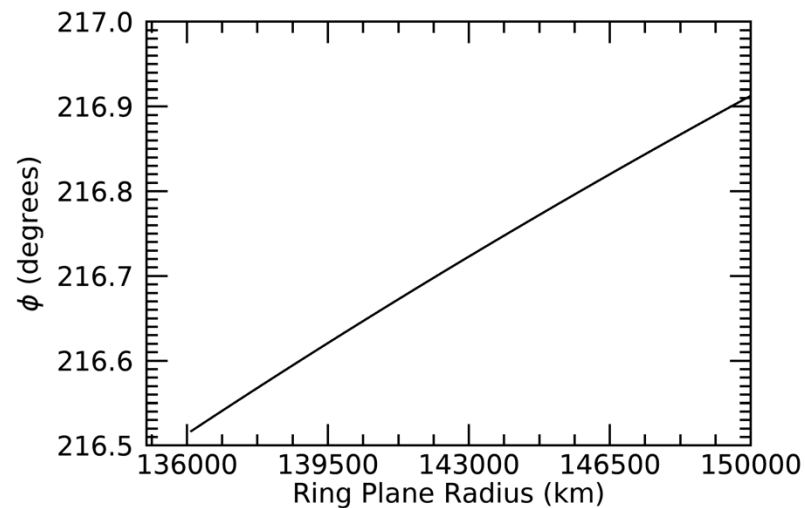
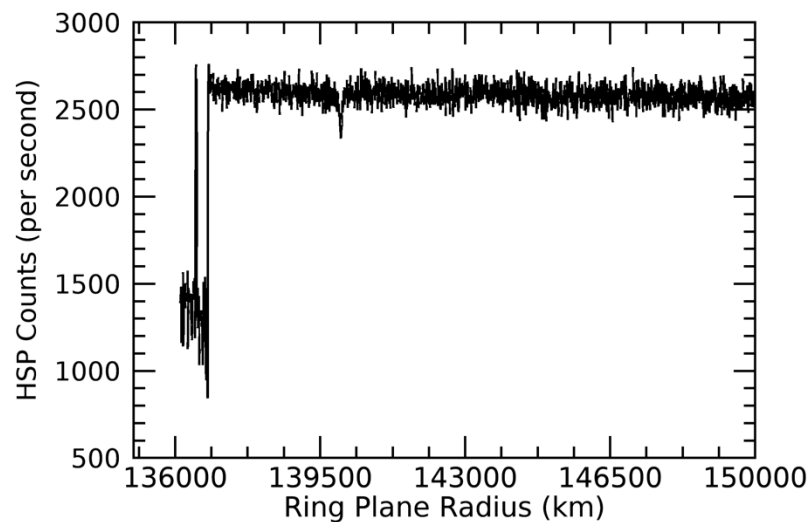
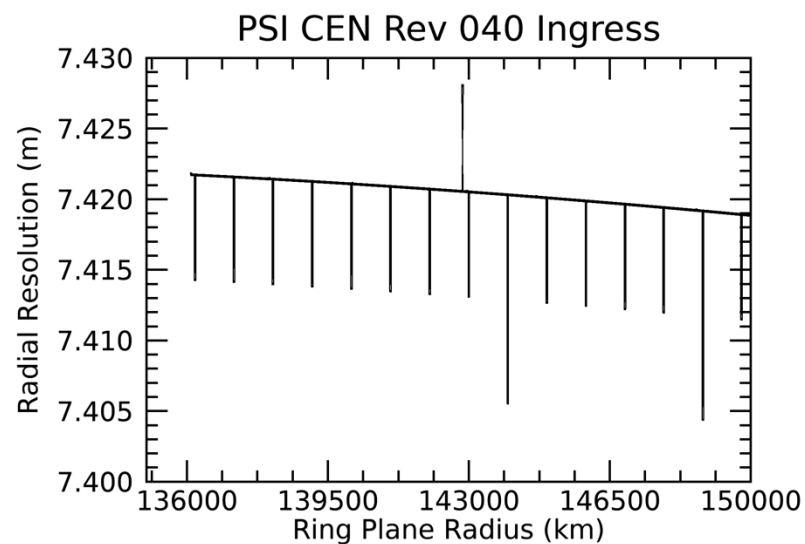
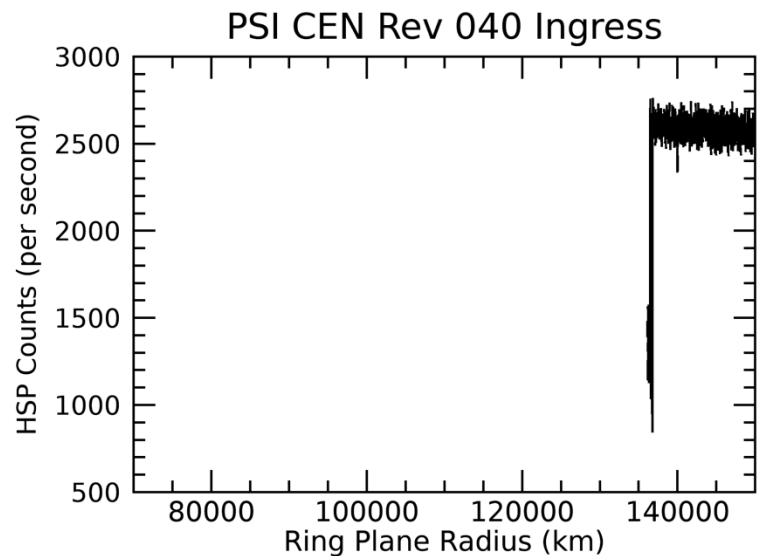


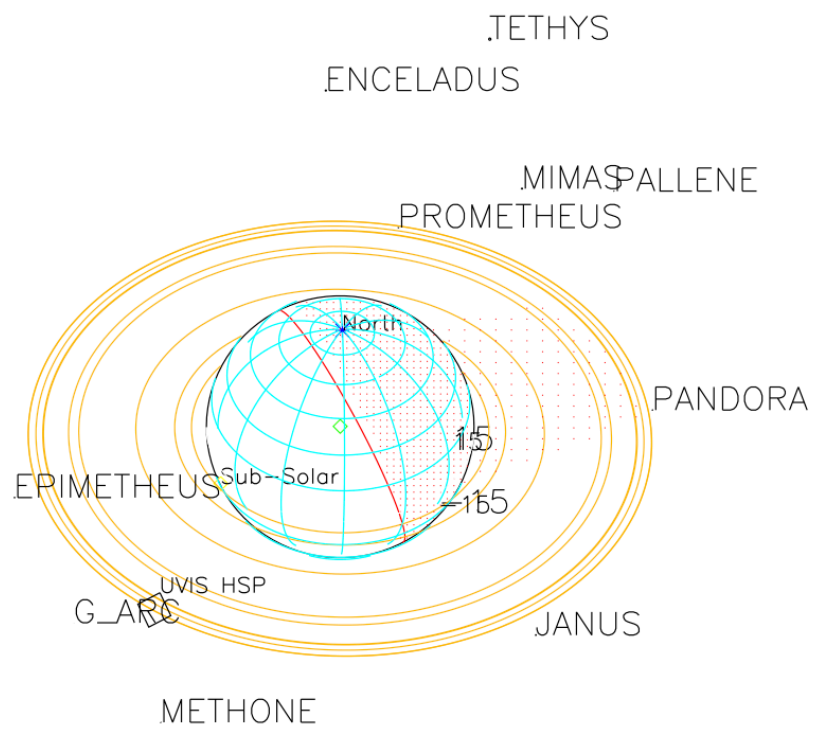
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Sub-s/c lat/lon: 27.62, 132.28



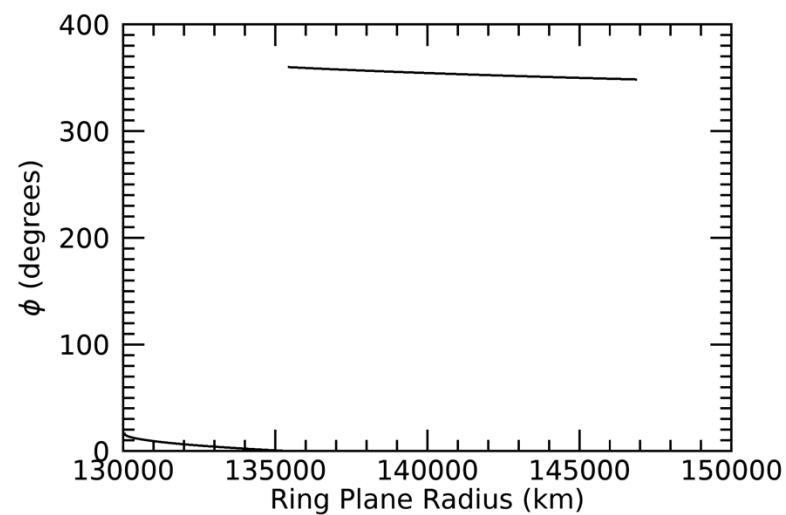
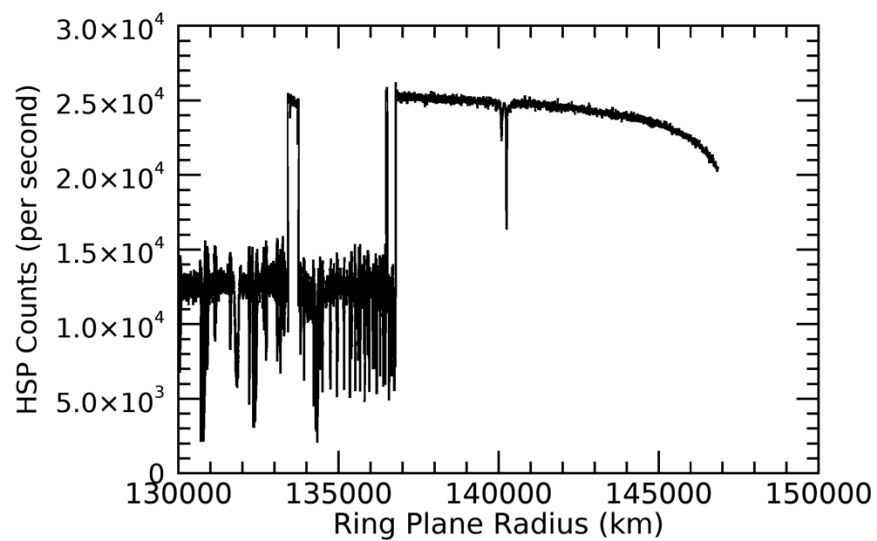
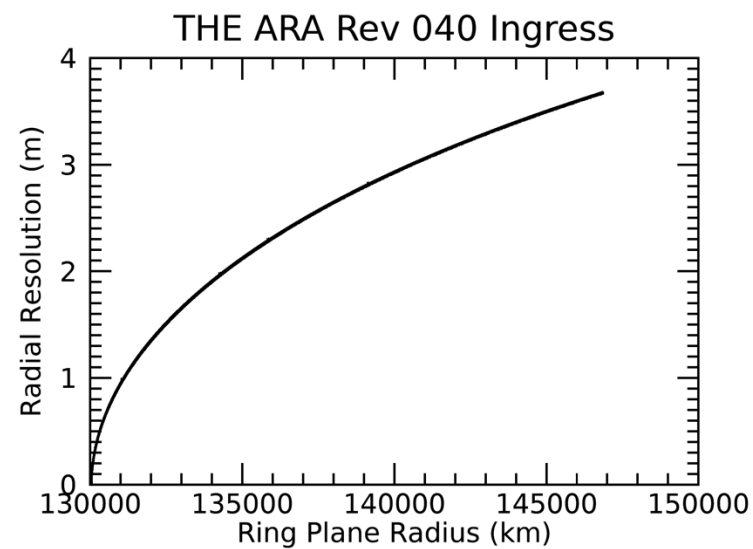
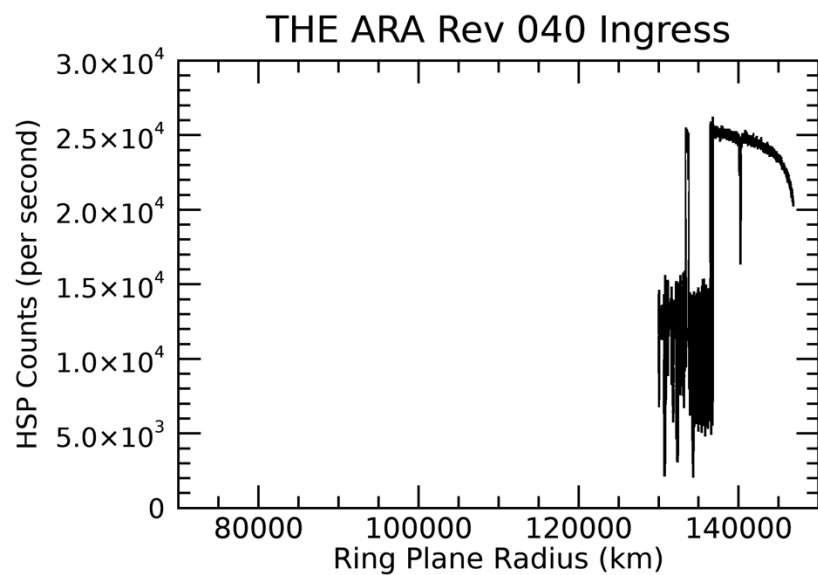


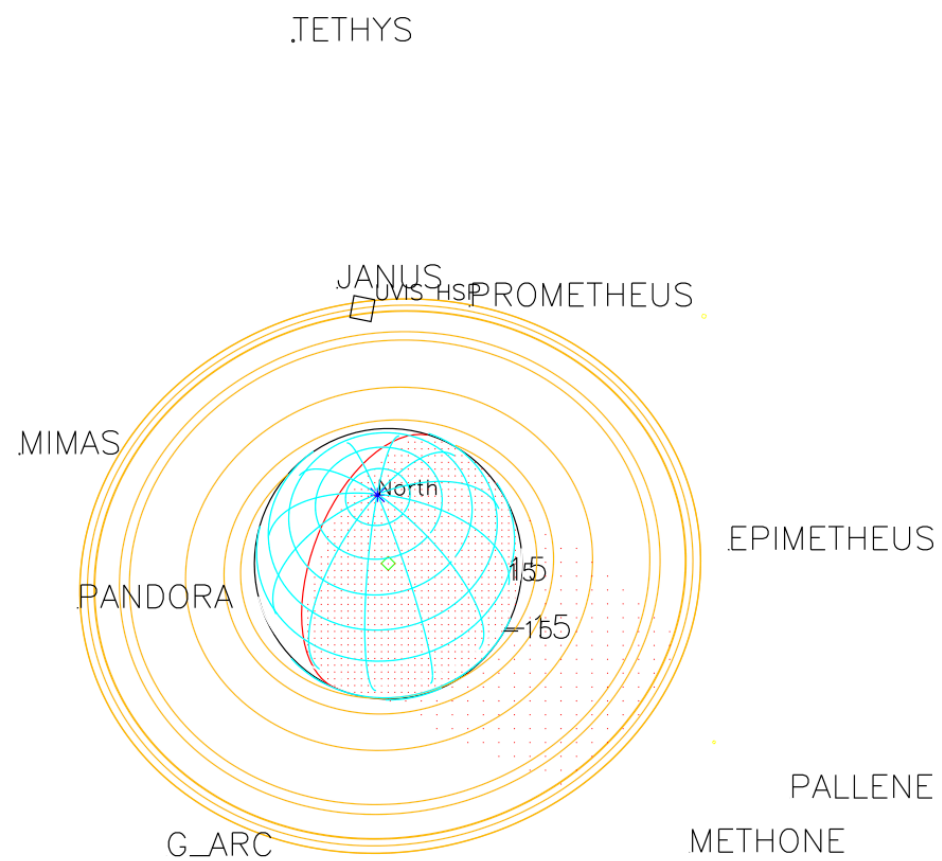
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Target RA/dec: 211.81, -35.37

Subsolar lat/lon: -10.93, 83.51

Sub-s/c lat/lon: 36.17, 147.48





2007-060T18:56:00.000 1592851.4 km

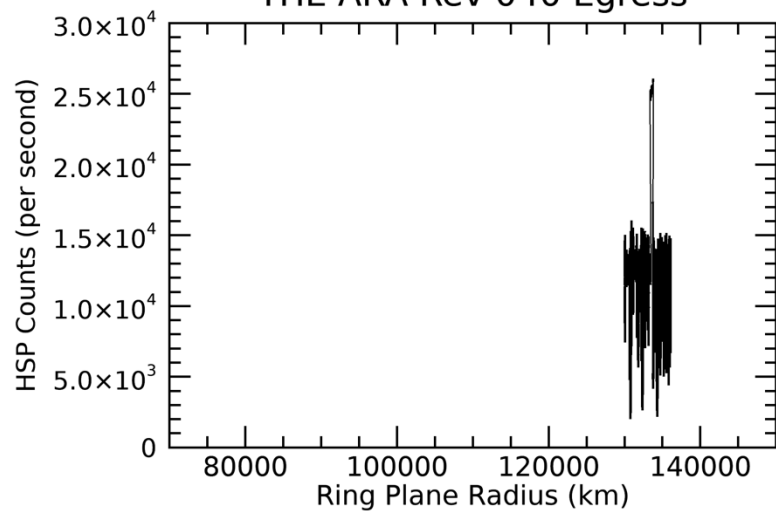
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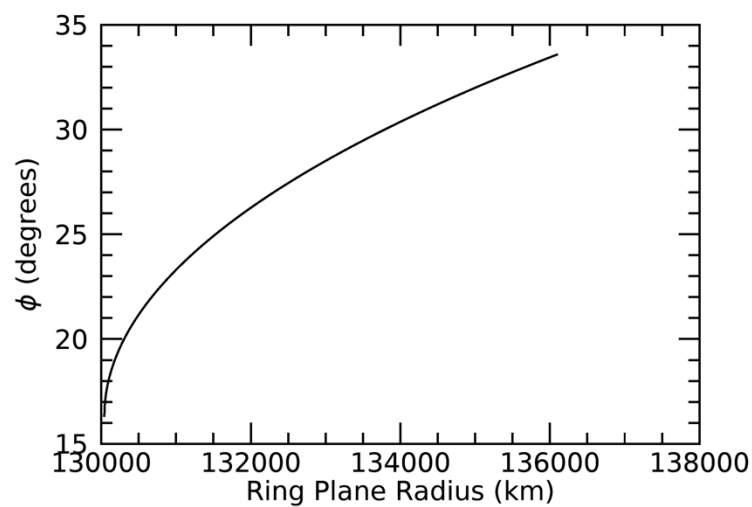
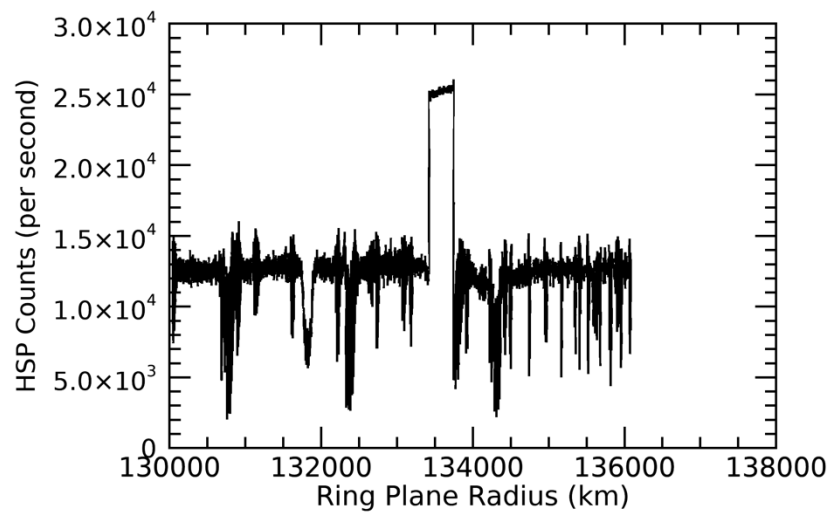
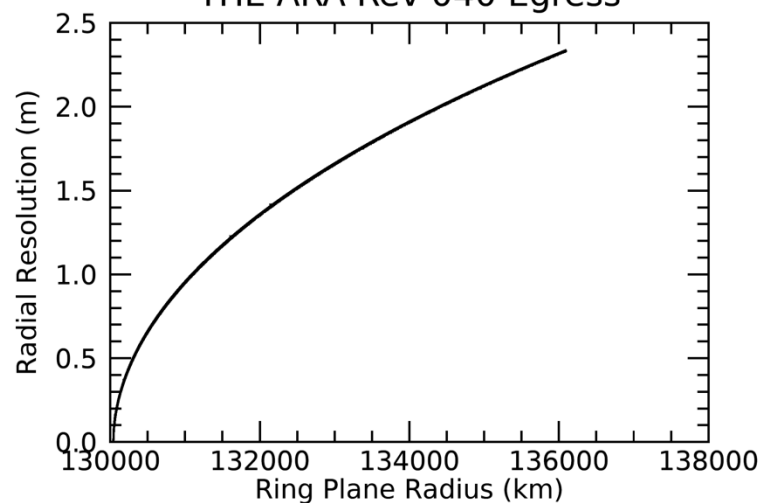
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ENCELADUS

THE ARA Rev 040 Egress

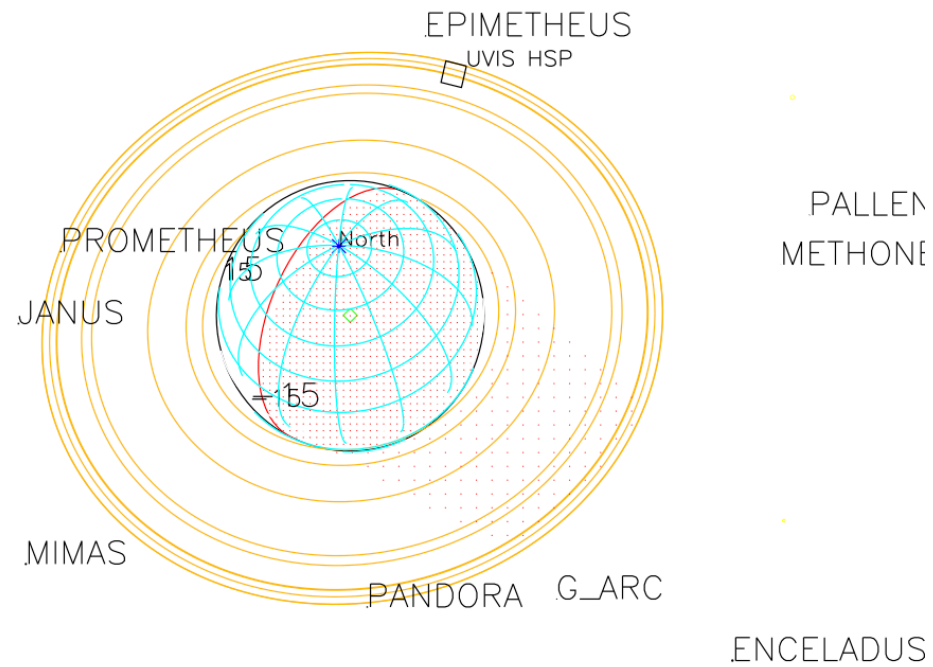


THE ARA Rev 040 Egress



DIONE

TETHYS

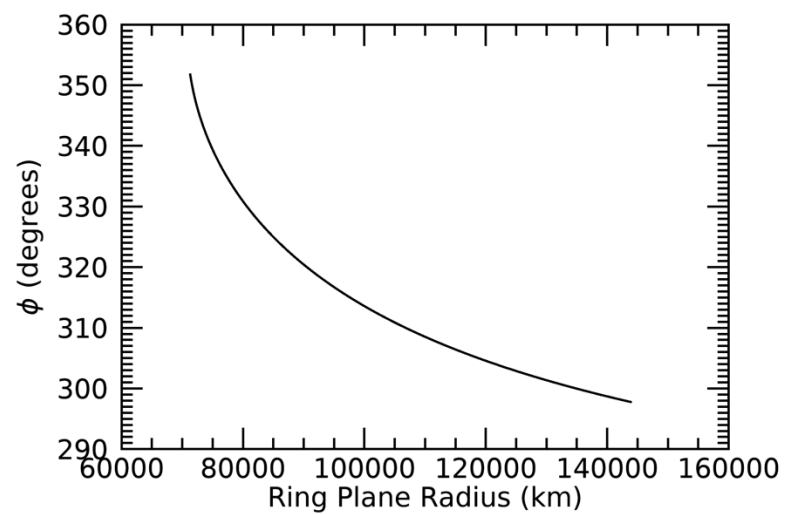
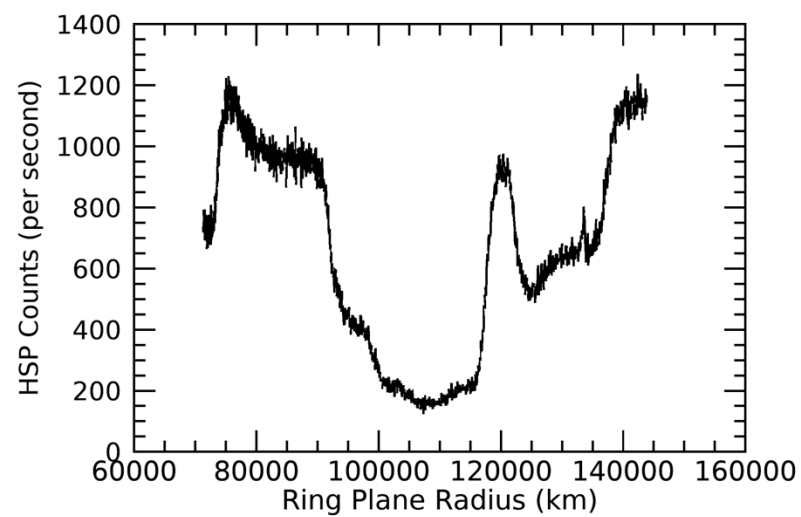
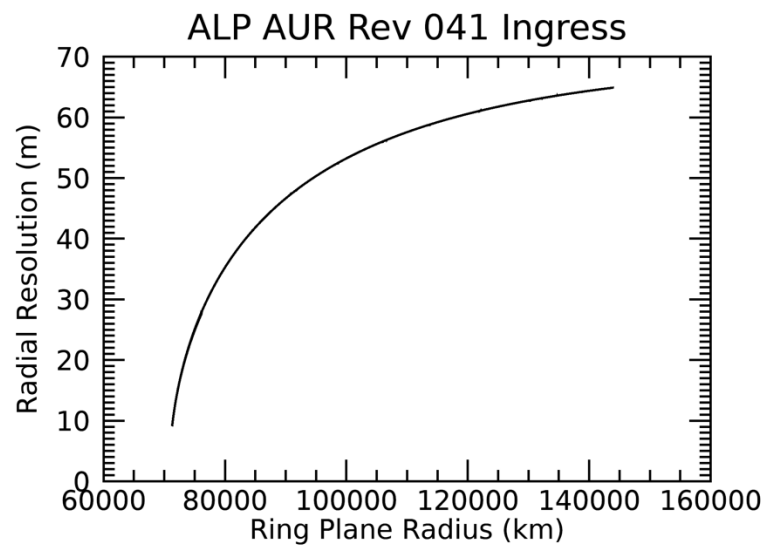
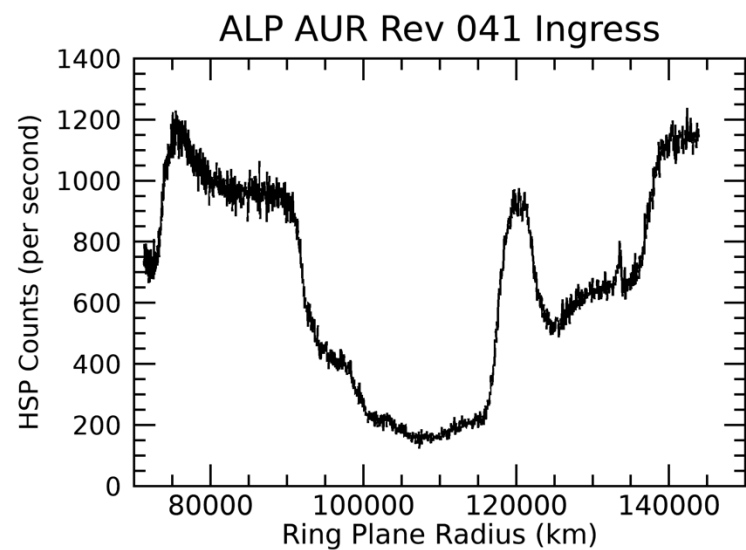


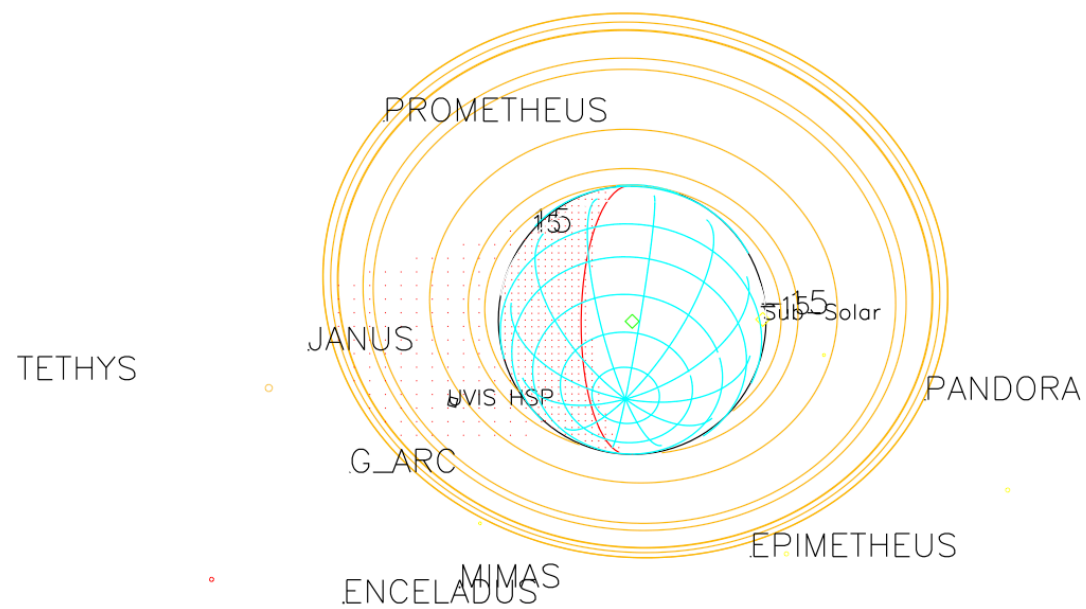
2007-060T22:43:00.000 1577163.5 km

Target RA/dec: 274.16, -53.83

Subsolar lat/lon: -11.08, -122.34

Sub-s/c lat/lon: 51.94, 13.20



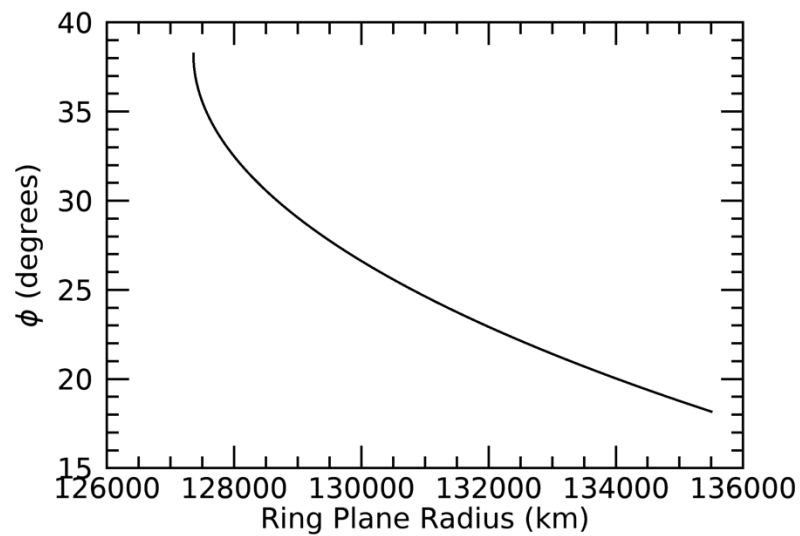
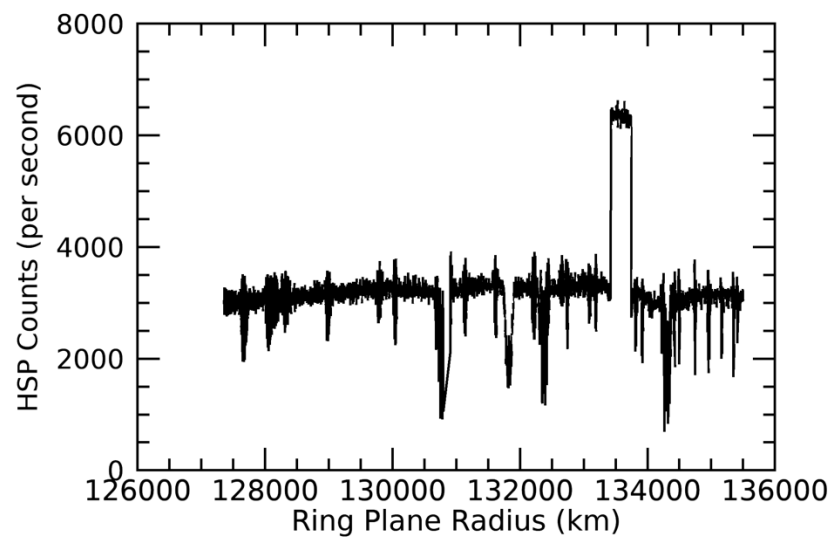
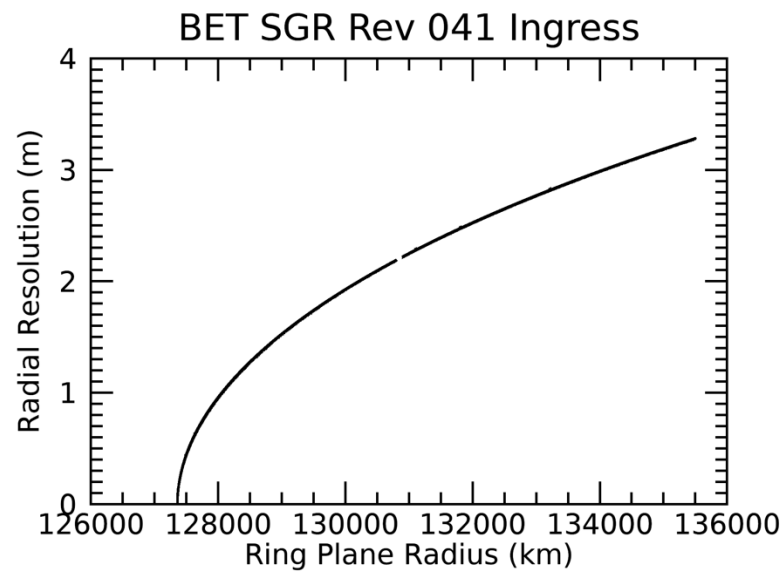
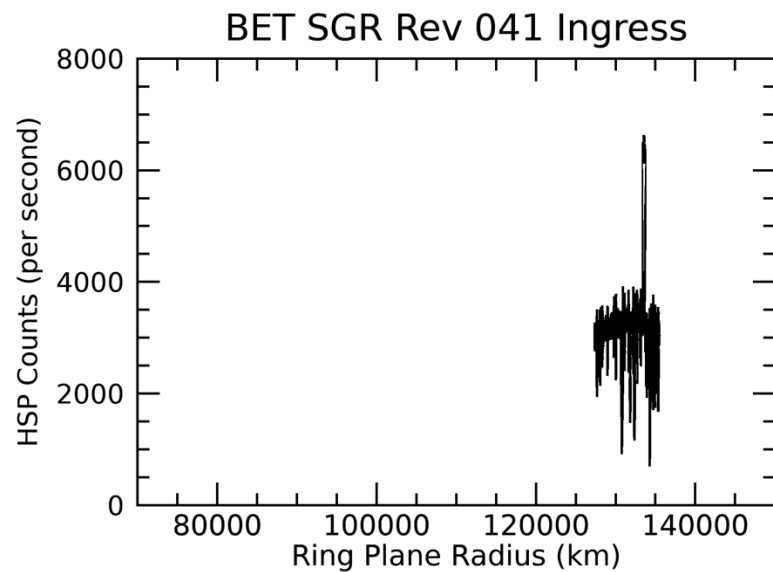


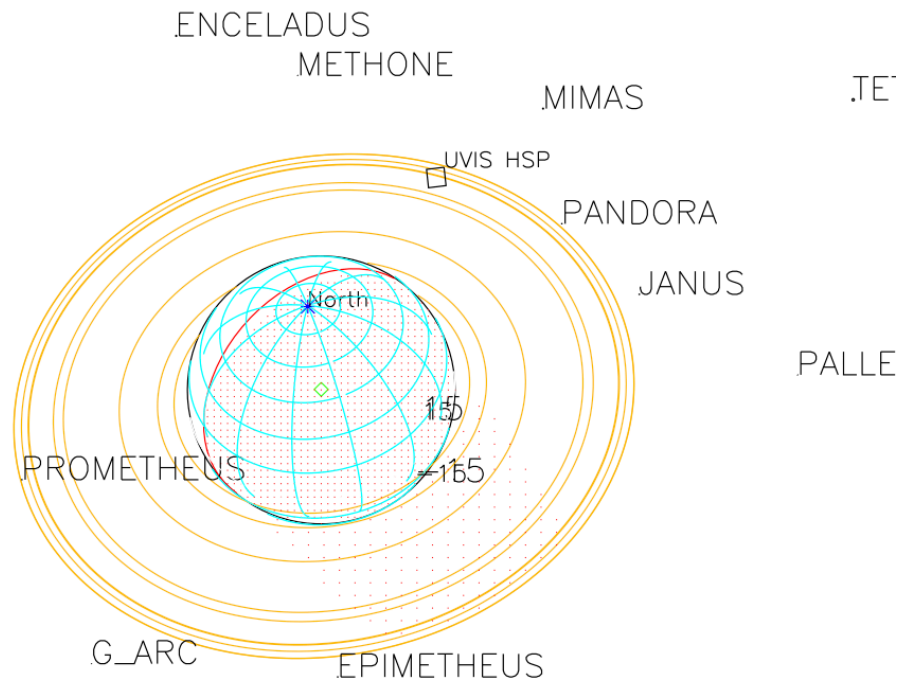
2007-082T18:19:00.000 600635.73 km

Target RA/dec: 68.01, 49.84

Subsolar lat/lon: -10.82, -170.45

Sub-s/c lat/lon: -50.34, 114.40



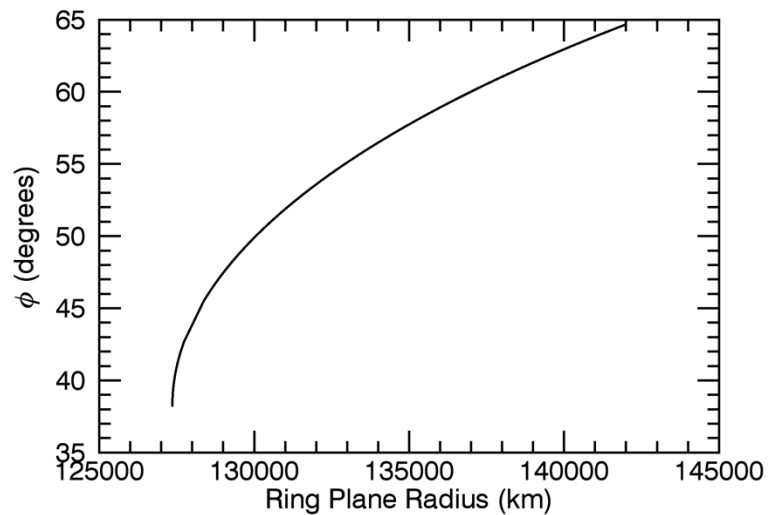
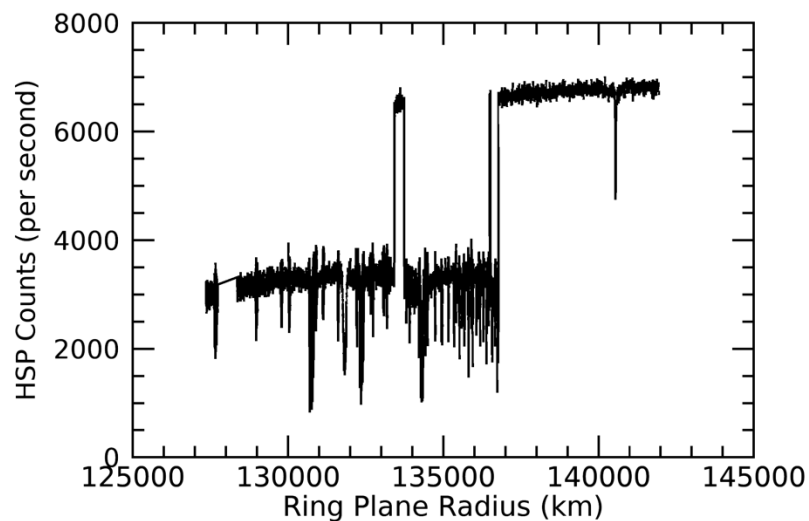
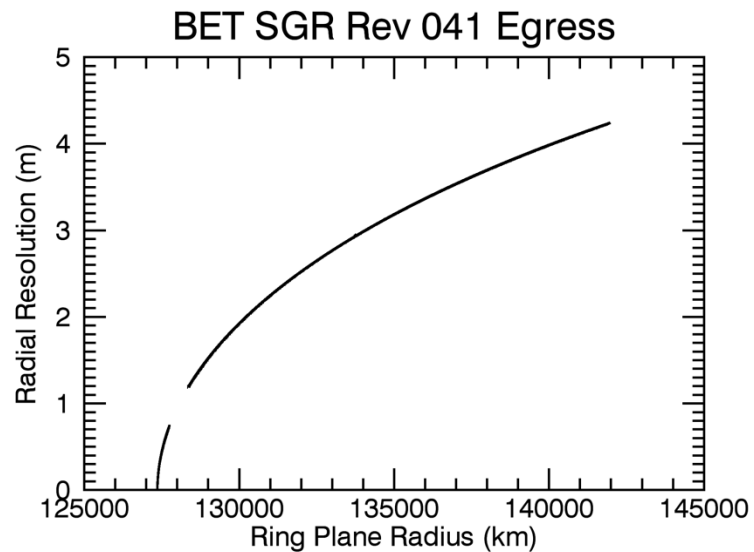
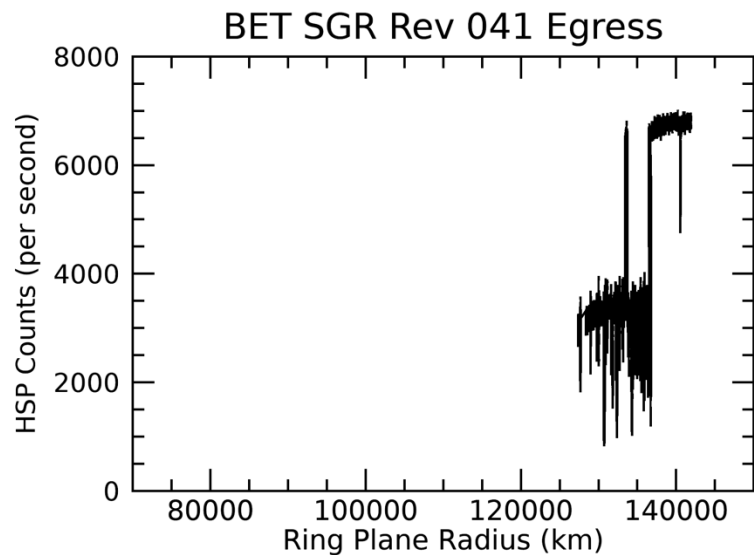


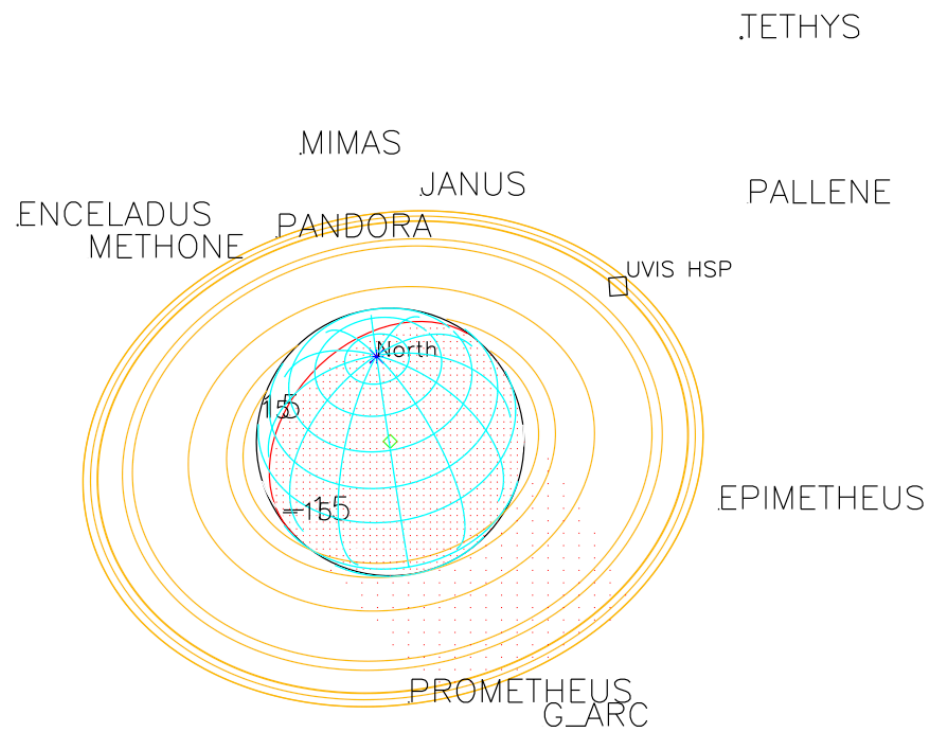
2007-079T10:13:00.000 1319346.8 km

Target RA/dec: 293.74, -48.38

Subsolar lat/lon: -10.86, 15.48

Sub-s/c lat/lon: 44.23, 169.28



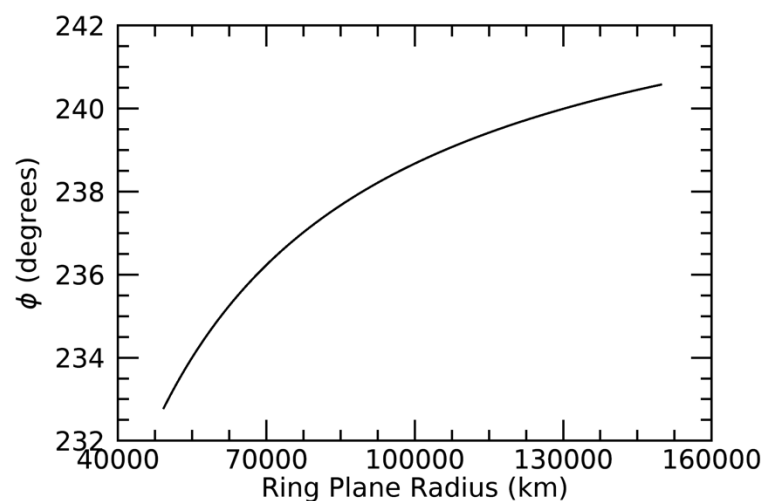
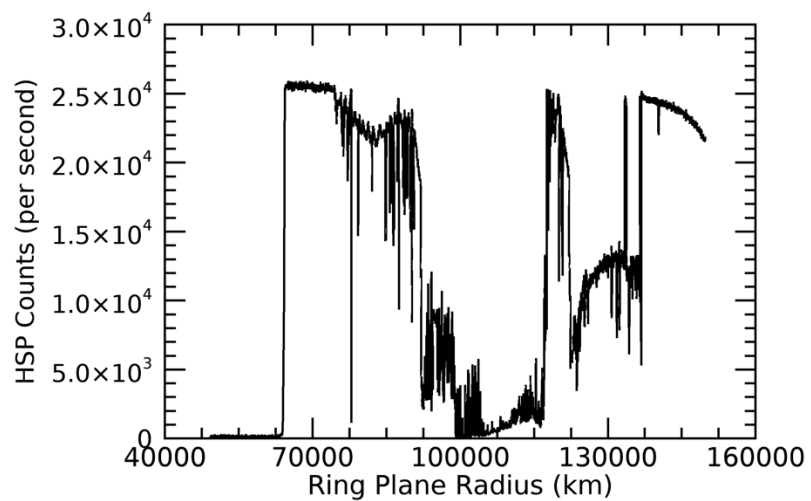
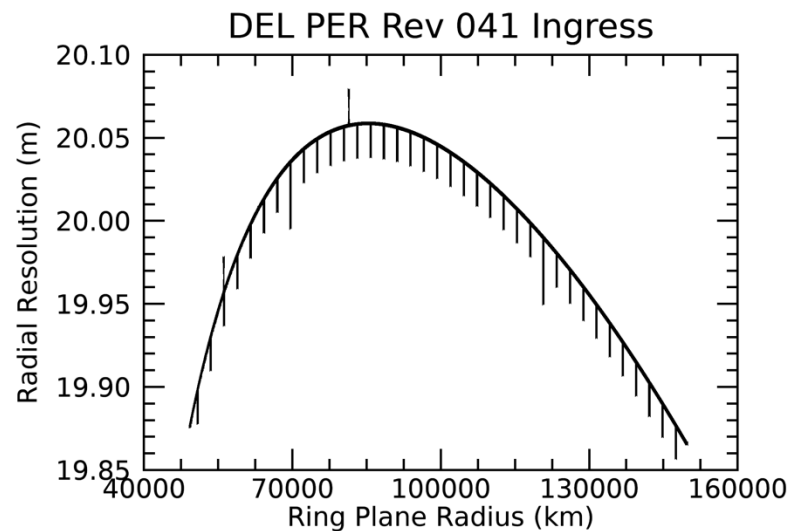
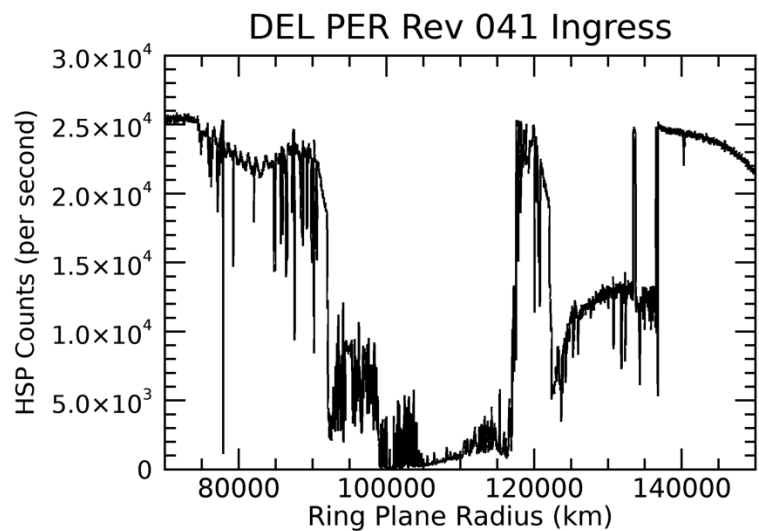


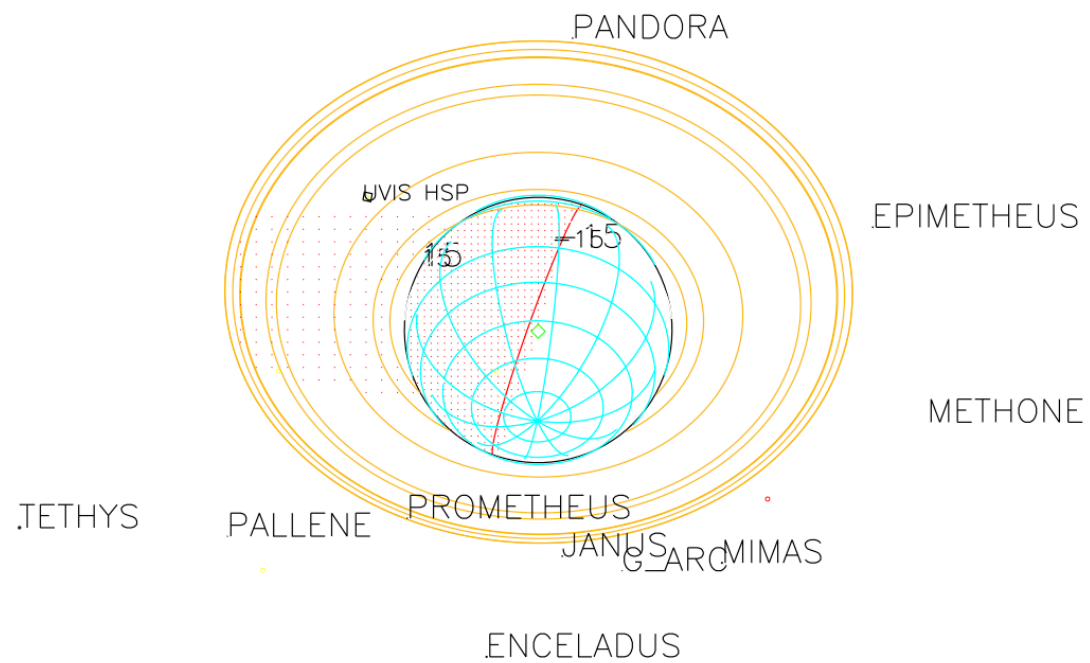
2007-079T13:31:00.000 1287319.5 km

Target RA/dec: 296.97, -47.53

Subsolar lat/lon: -10.86, -96.00

Sub-s/c lat/lon: 43.03, 60.85



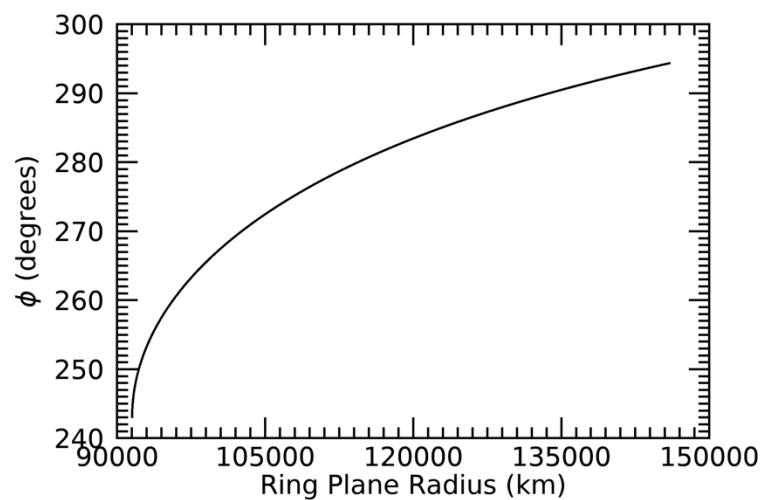
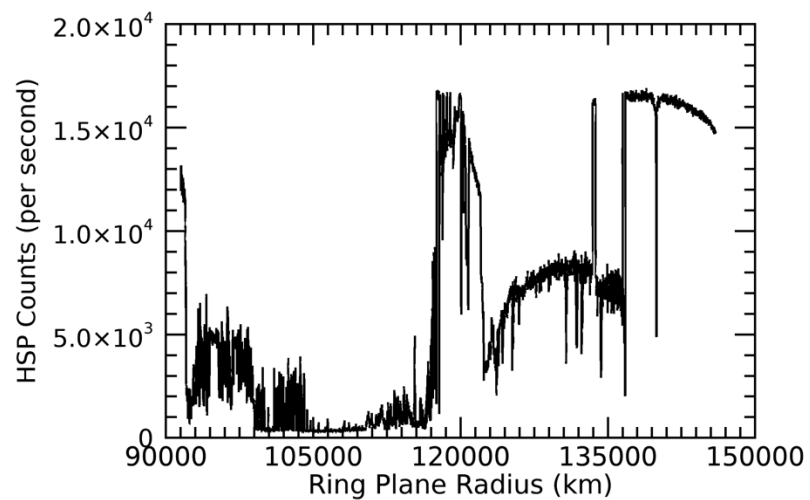
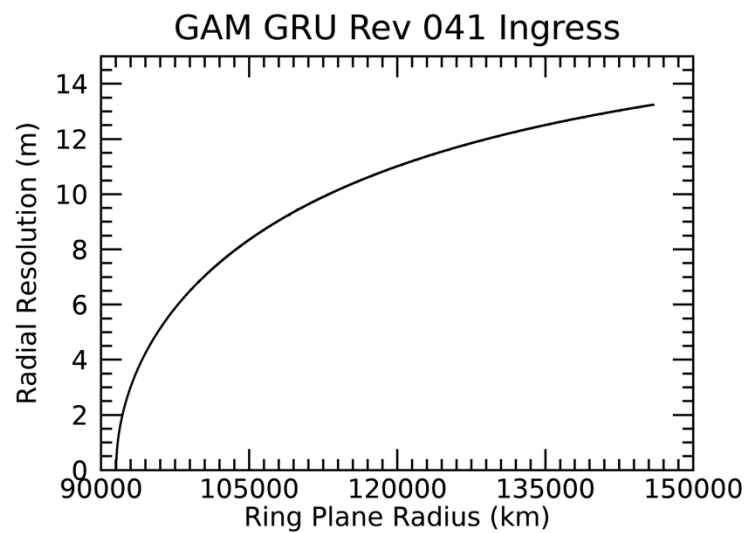
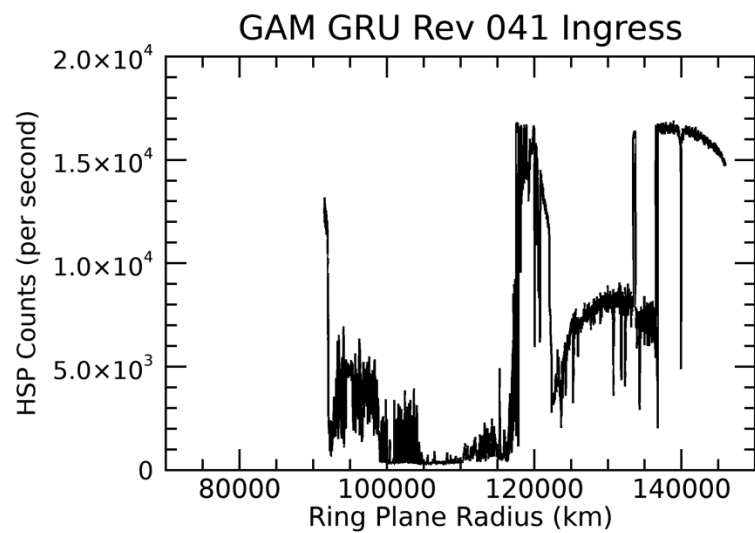


2007-082T13:10:00.000 586387.06 km

Target RA/dec: 44.58, 42.66

Subsolar lat/lon: -10.82, 3.52

Sub-s/c lat/lon: -43.79, -98.73



RHEA

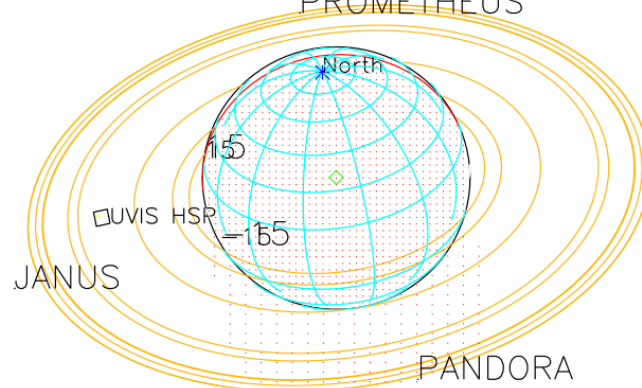
DIONE

METHONE
MIMAS
EPIMETHEUS
PROMETHEUS

ENC

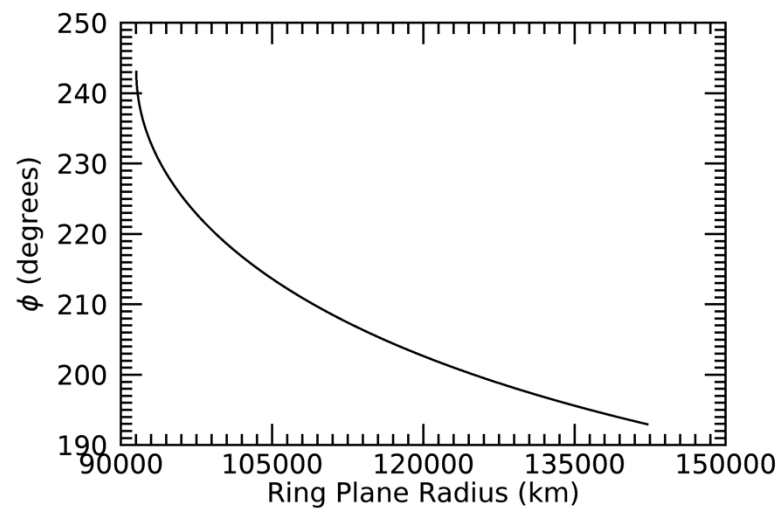
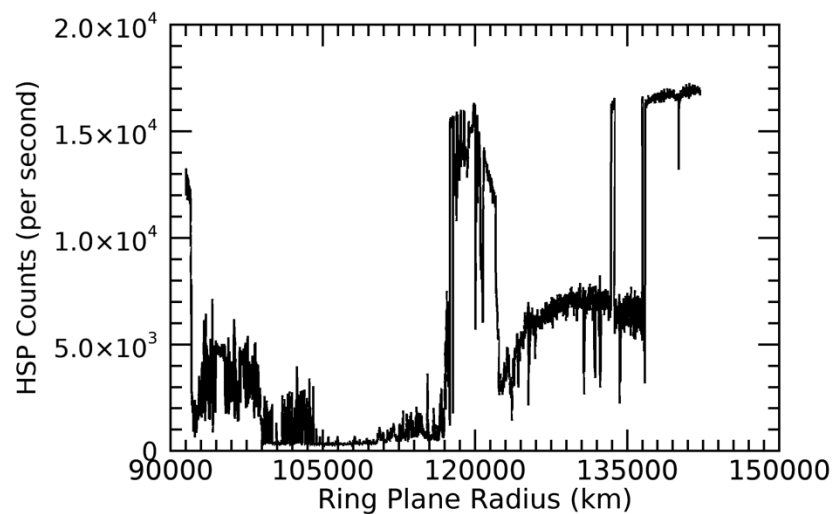
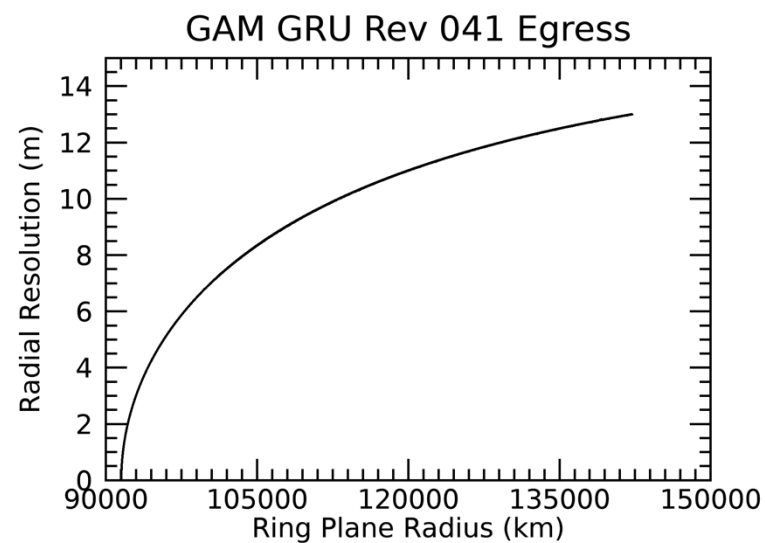
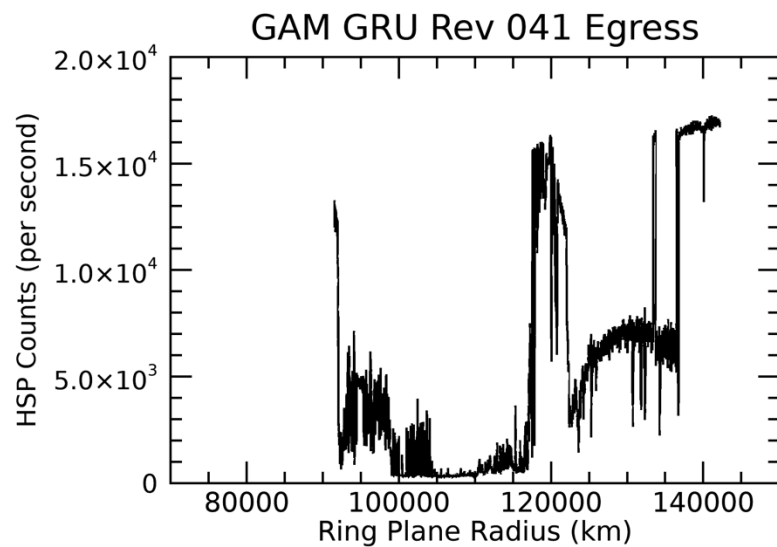
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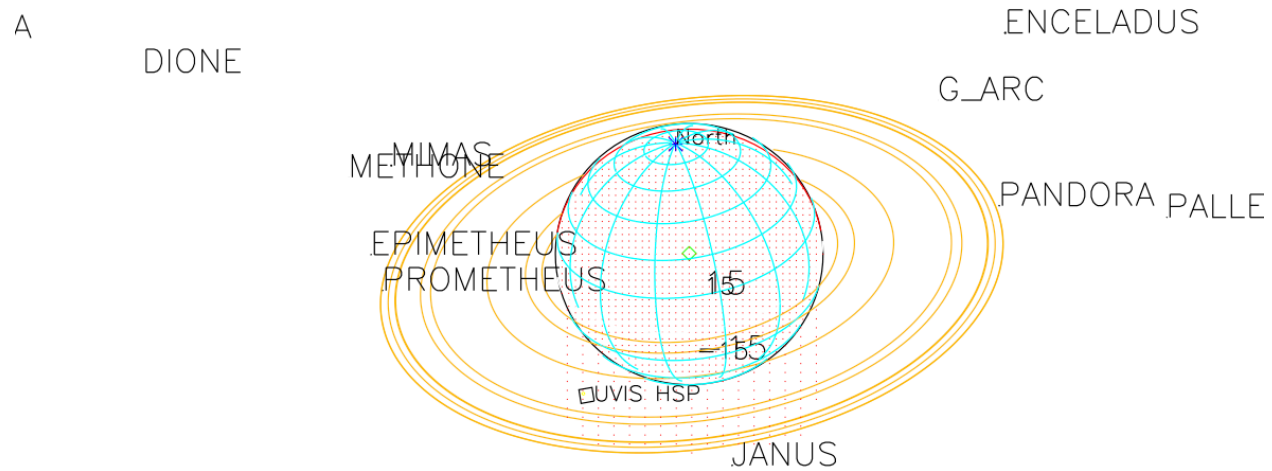
PALLENE



TETHYS

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Target RA/dec: 321.03, -36.67
Subsolar lat/lon: -10.85, -160.30
Sub-s/c lat/lon: 30.18, 18.05





JETHYS

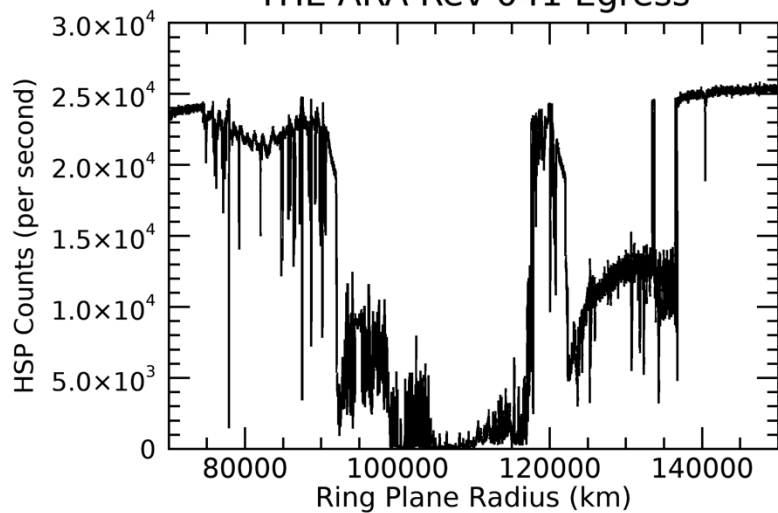
2007-080T16:23:00.000 991610.70 km

Target RA/dec: 325.02, -33.92 ○

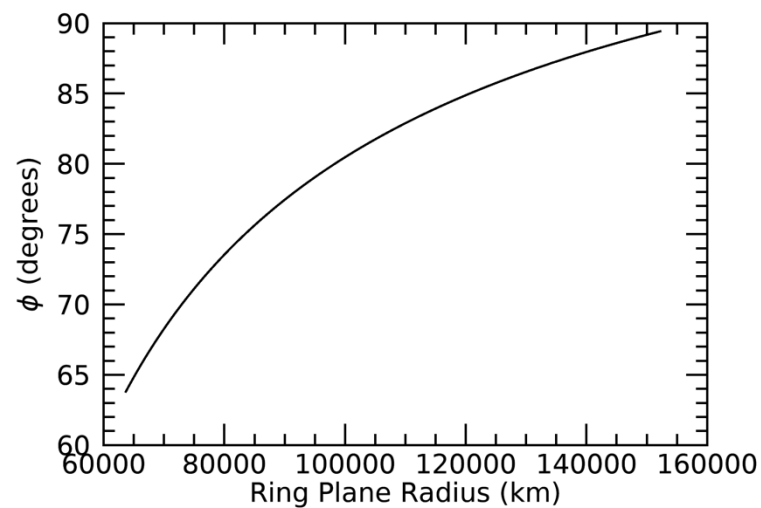
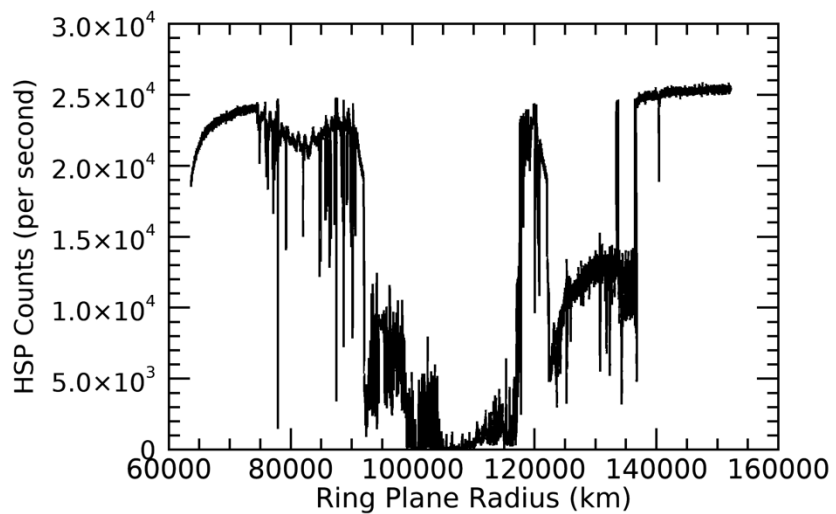
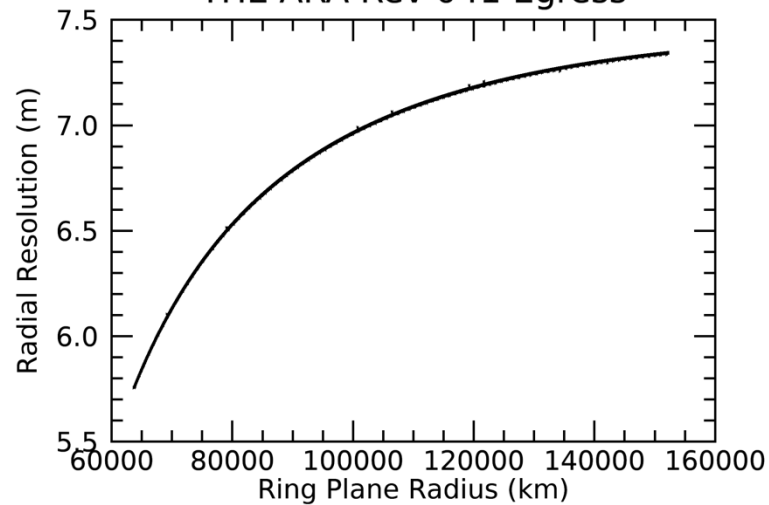
Subsolar lat/lon: -10.85, 76.39

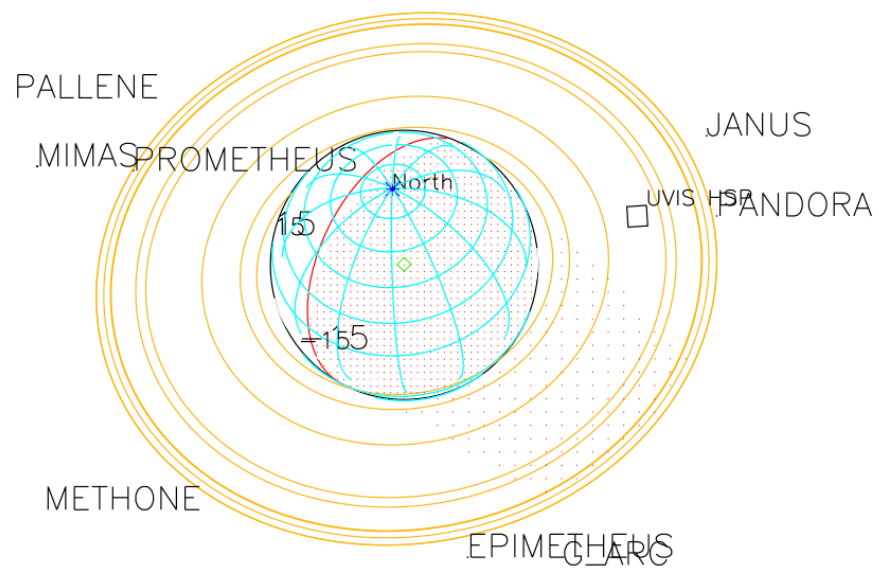
Sub-s/c lat/lon: 27.30, -101.82

THE ARA Rev 041 Egress



THE ARA Rev 041 Egress





2007-078T17:10:00.000 1468955.5 km

Target RA/dec: 277.96, -50.99

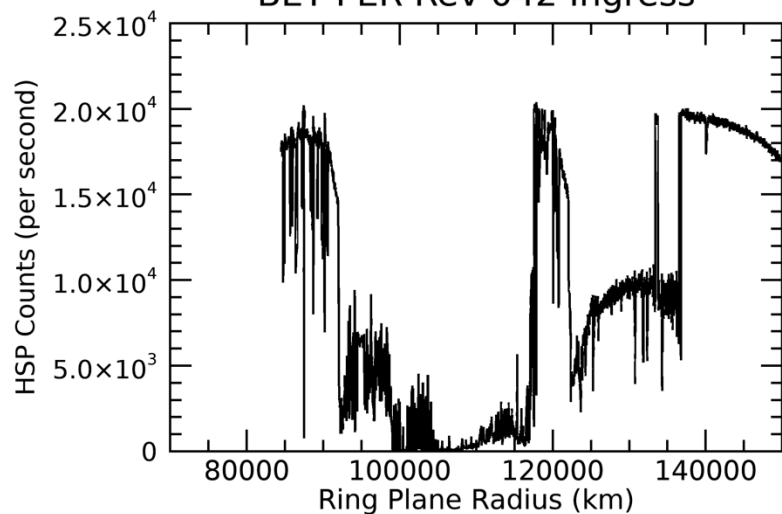
Subsolar lat/lon: -10.87, -128.54

Sub-s/c lat/lon: 48.60, 9.63

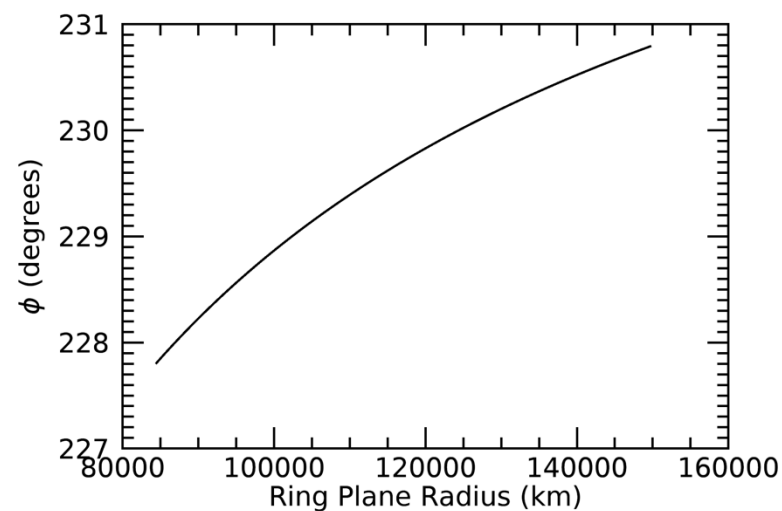
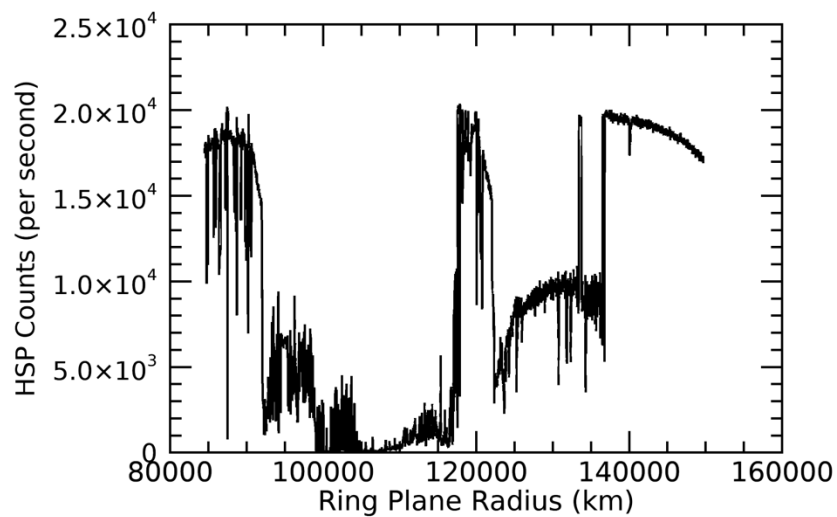
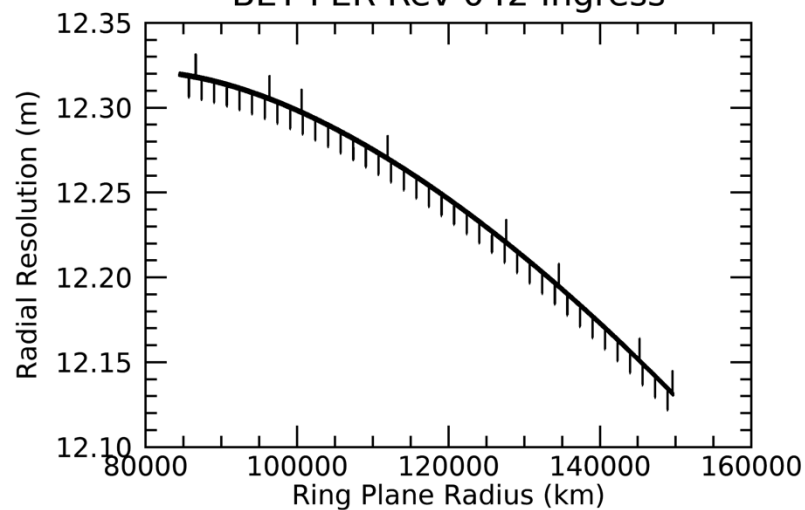
TETHYS

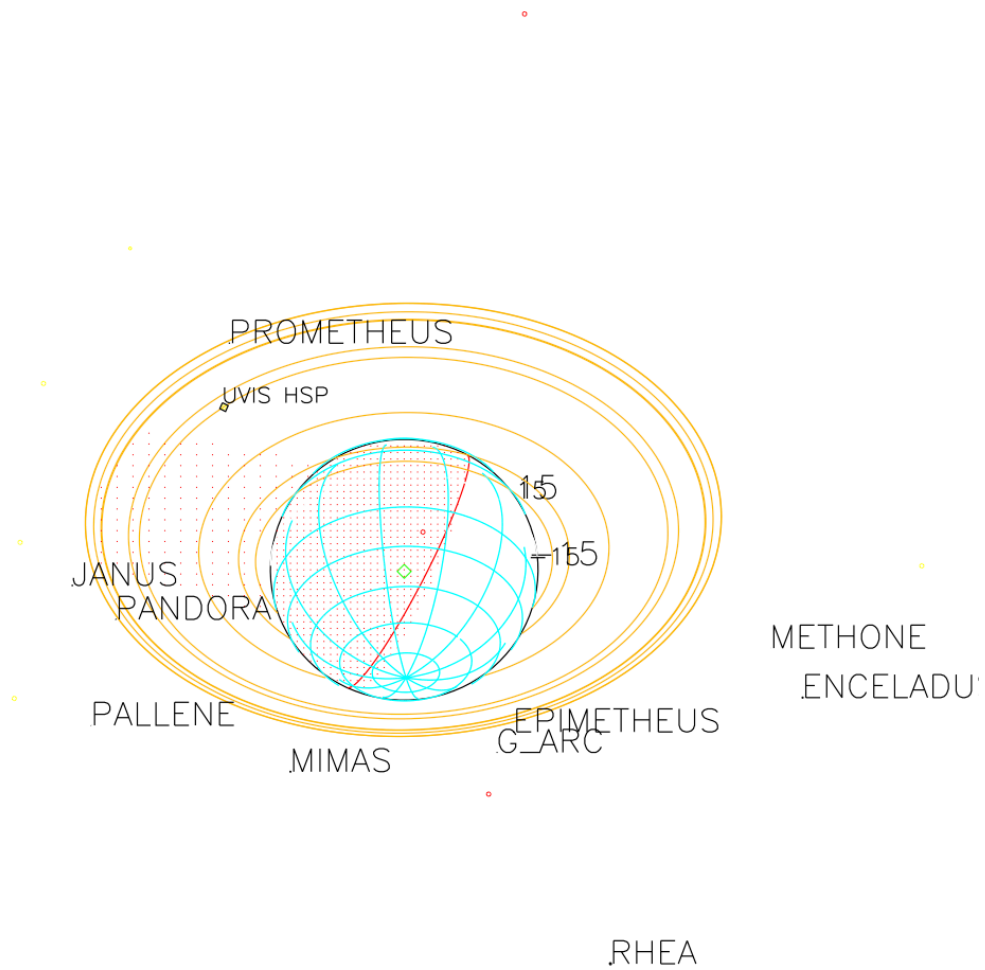
ENCELADUS

BET PER Rev 042 Ingress

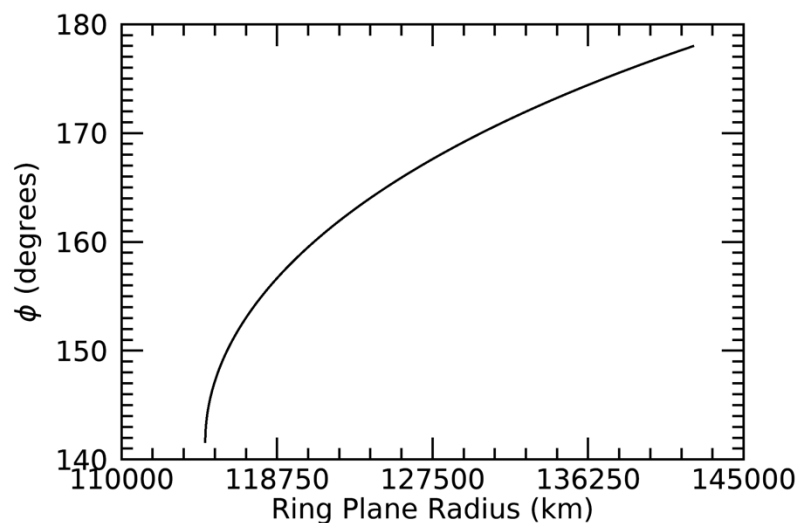
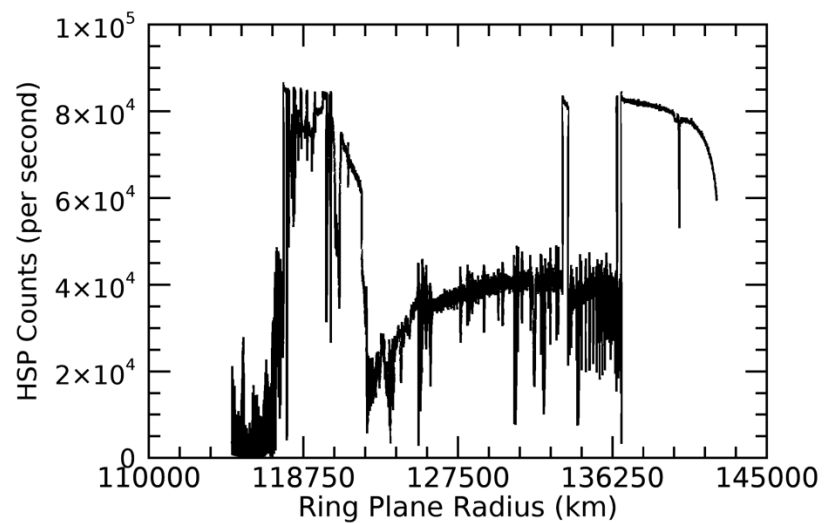
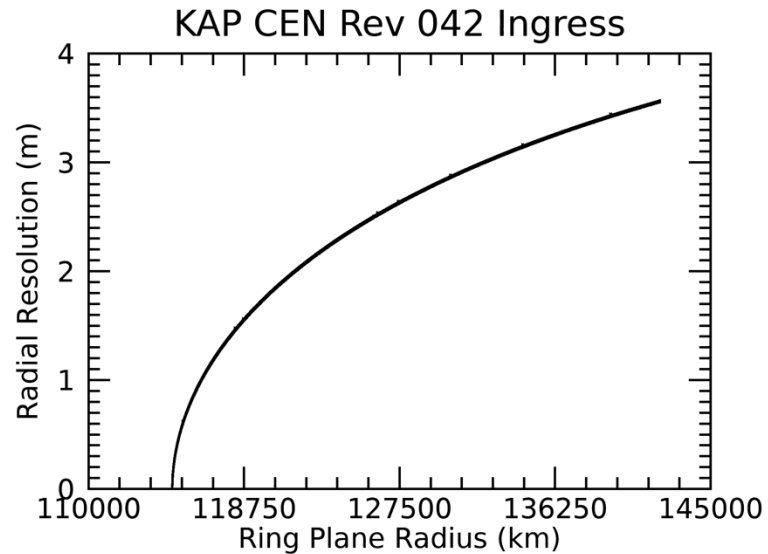
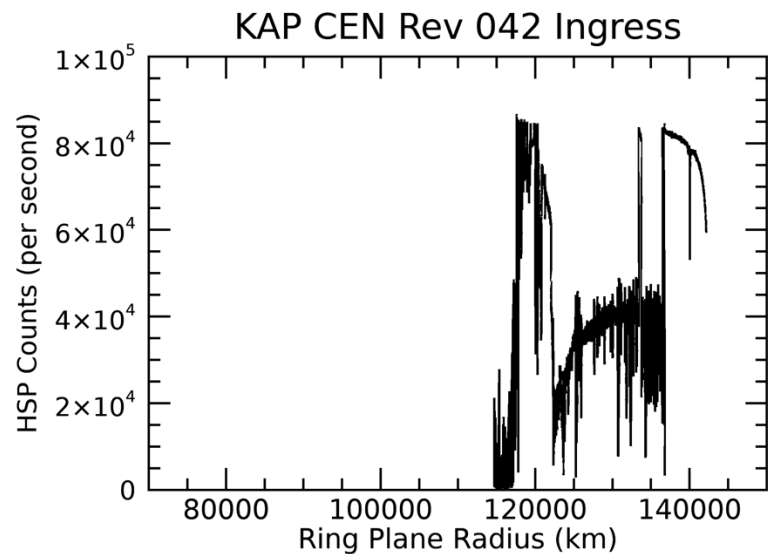


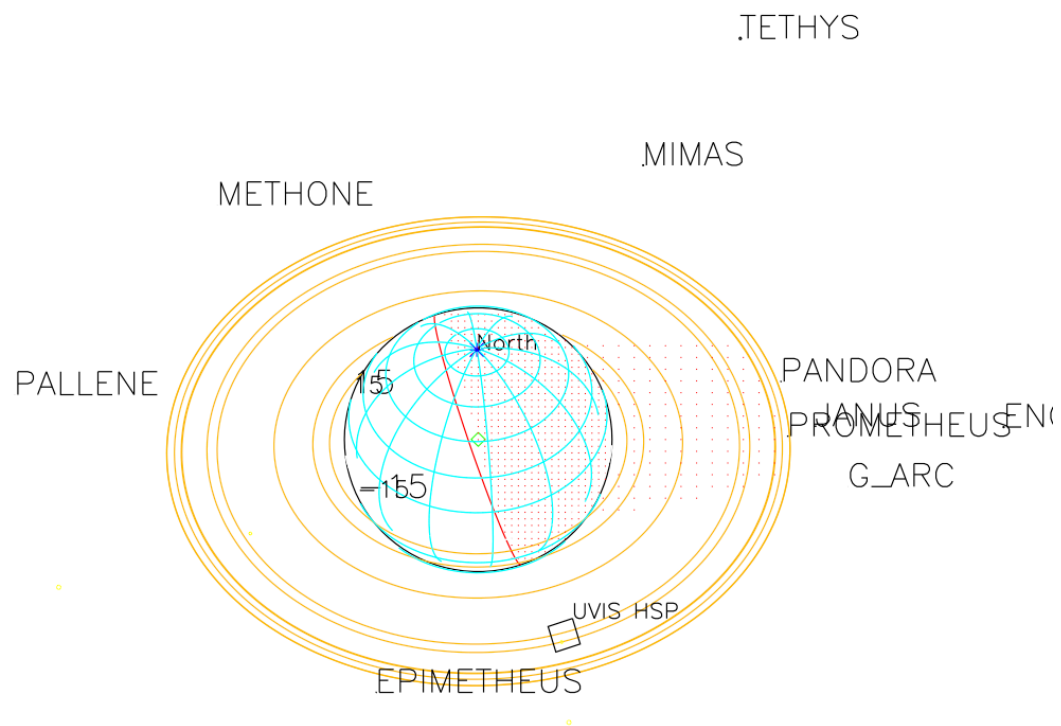
BET PER Rev 042 Ingress





2007-098T16:19:00.000 456419.67 km
 Target RA/dec: 33.69, 32.85
 Subsolar lat/lon: -10.63, -115.05
 Sub-s/c lat/lon: -34.31, 130.17





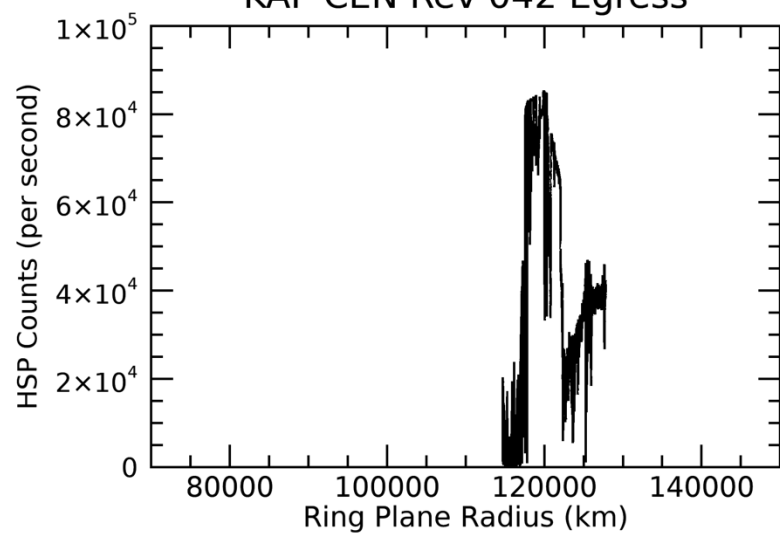
2007-092T11:08:00.000 1917435.3 km

Target RA/dec: 226.30, -39.51

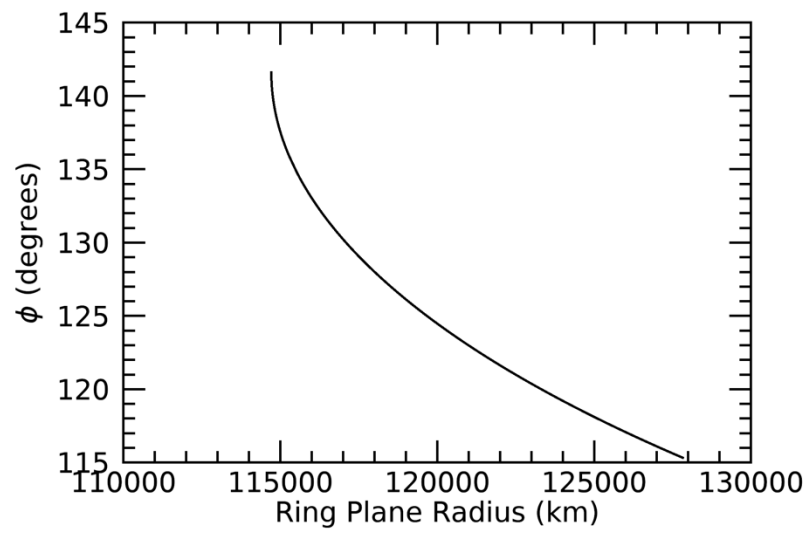
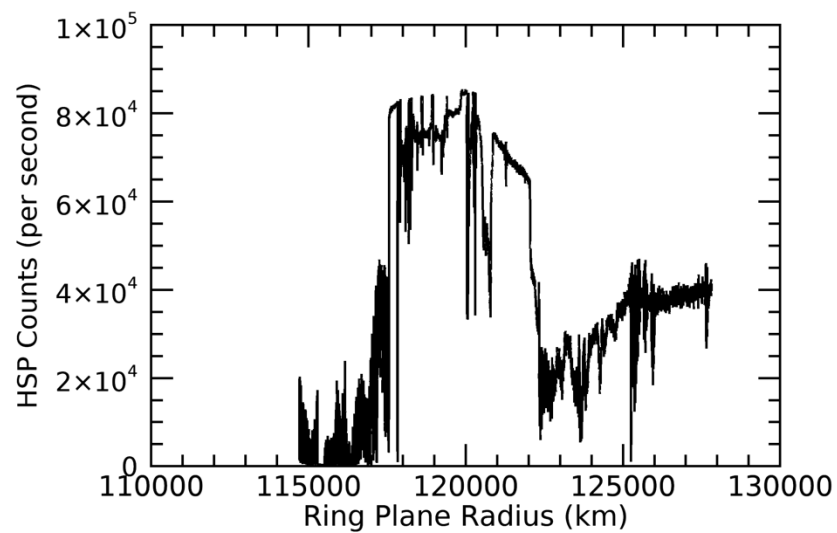
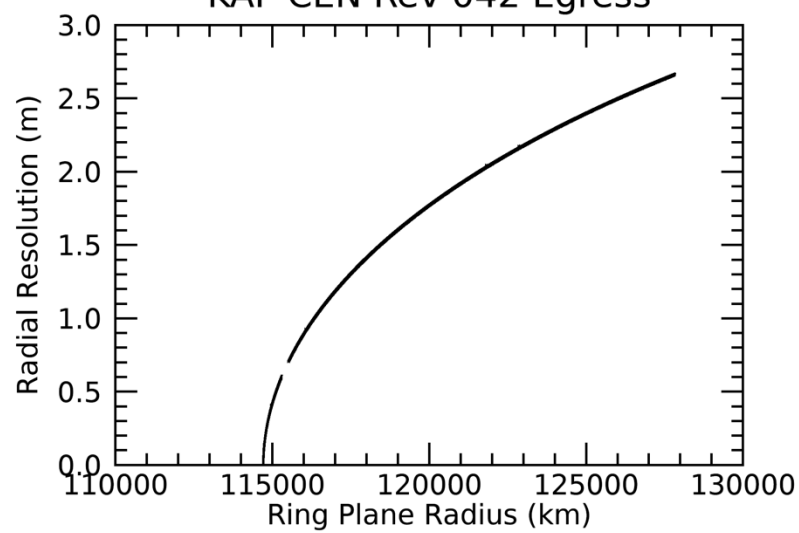
Subsolar lat/lon: -10.71, -115.35

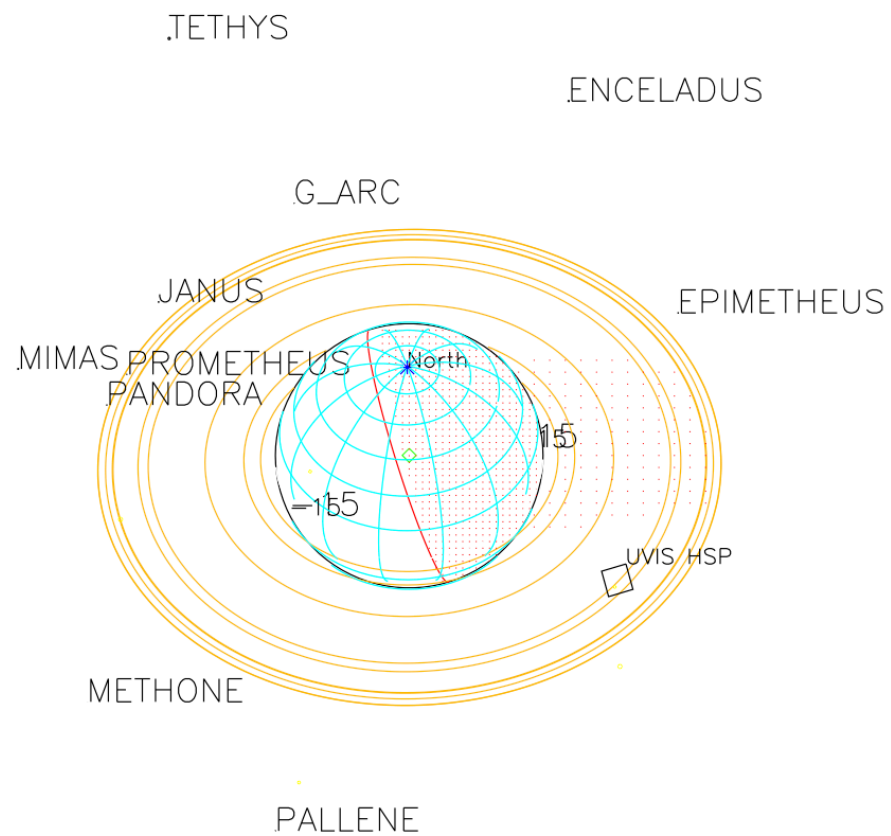
Sub-s/c lat/lon: 40.22, -36.08

KAP CEN Rev 042 Egress



KAP CEN Rev 042 Egress



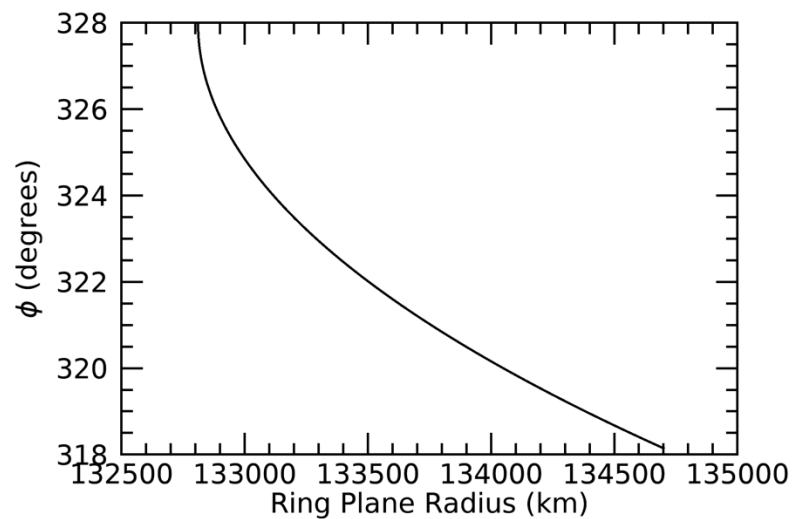
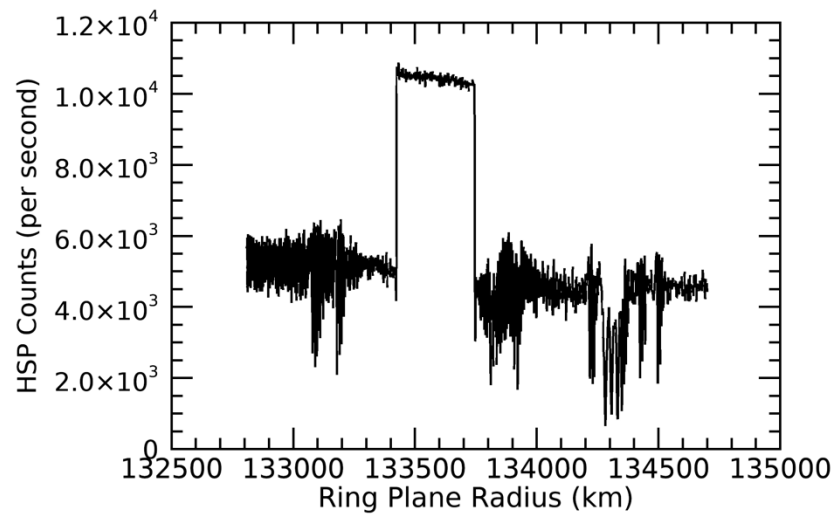
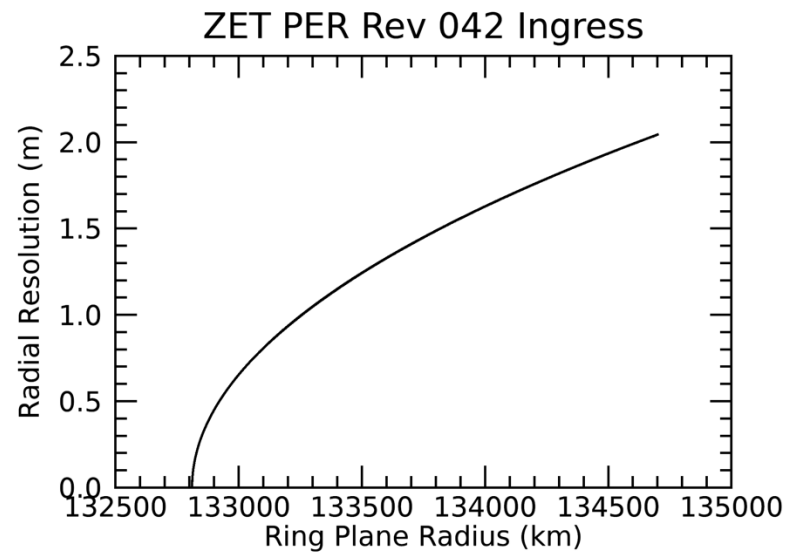
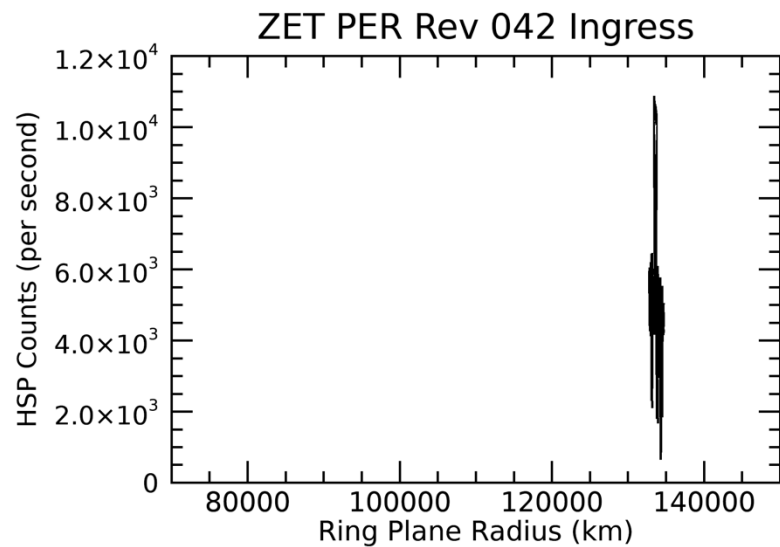


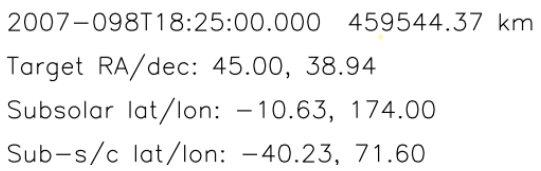
2007-092T17:41:00.000 1893793.8 km

Target RA/dec: 228.56, -40.45

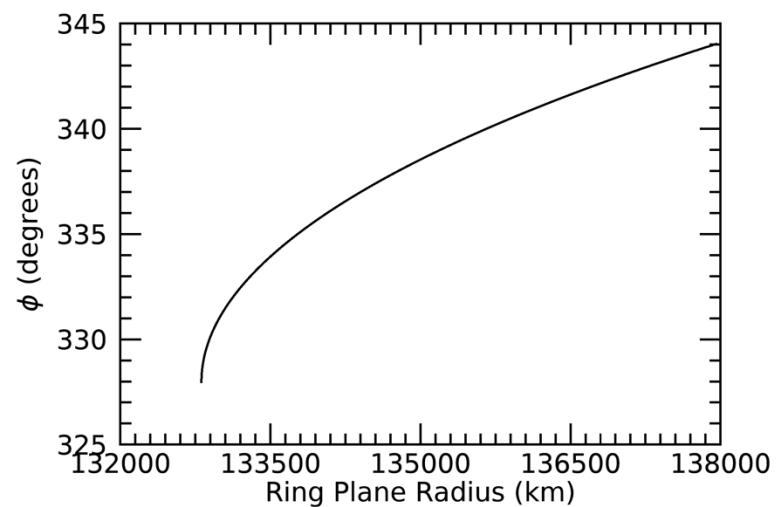
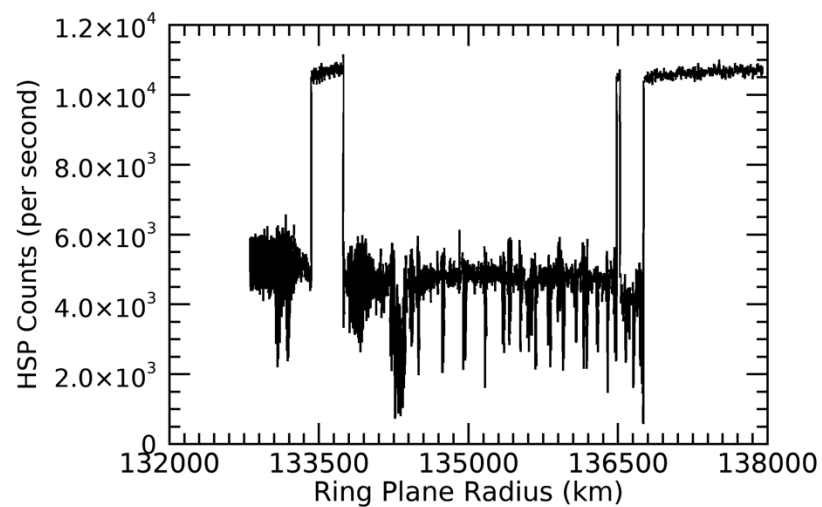
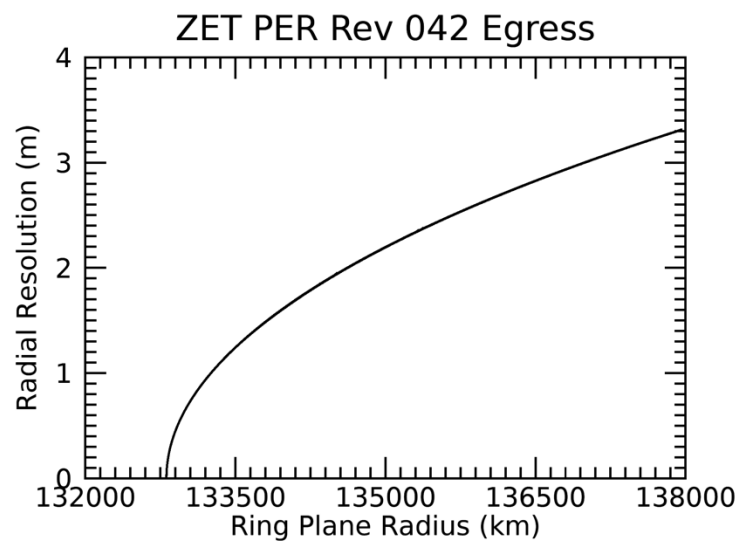
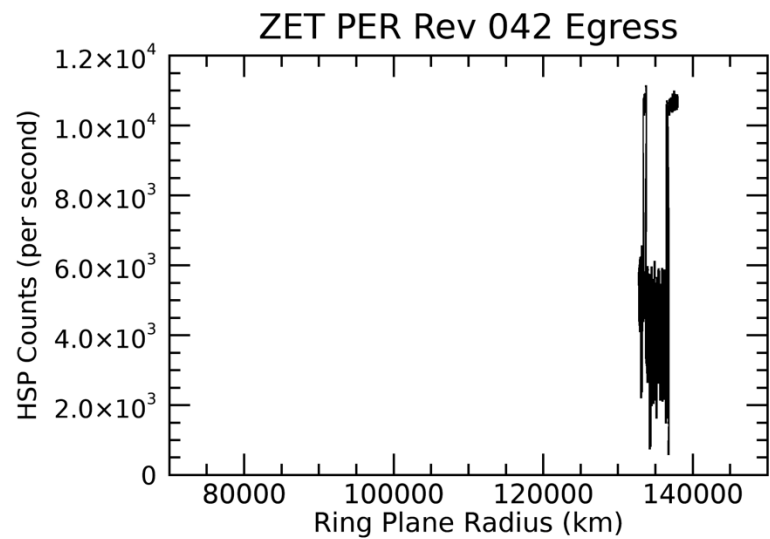
Subsolar lat/lon: -10.70, 23.38

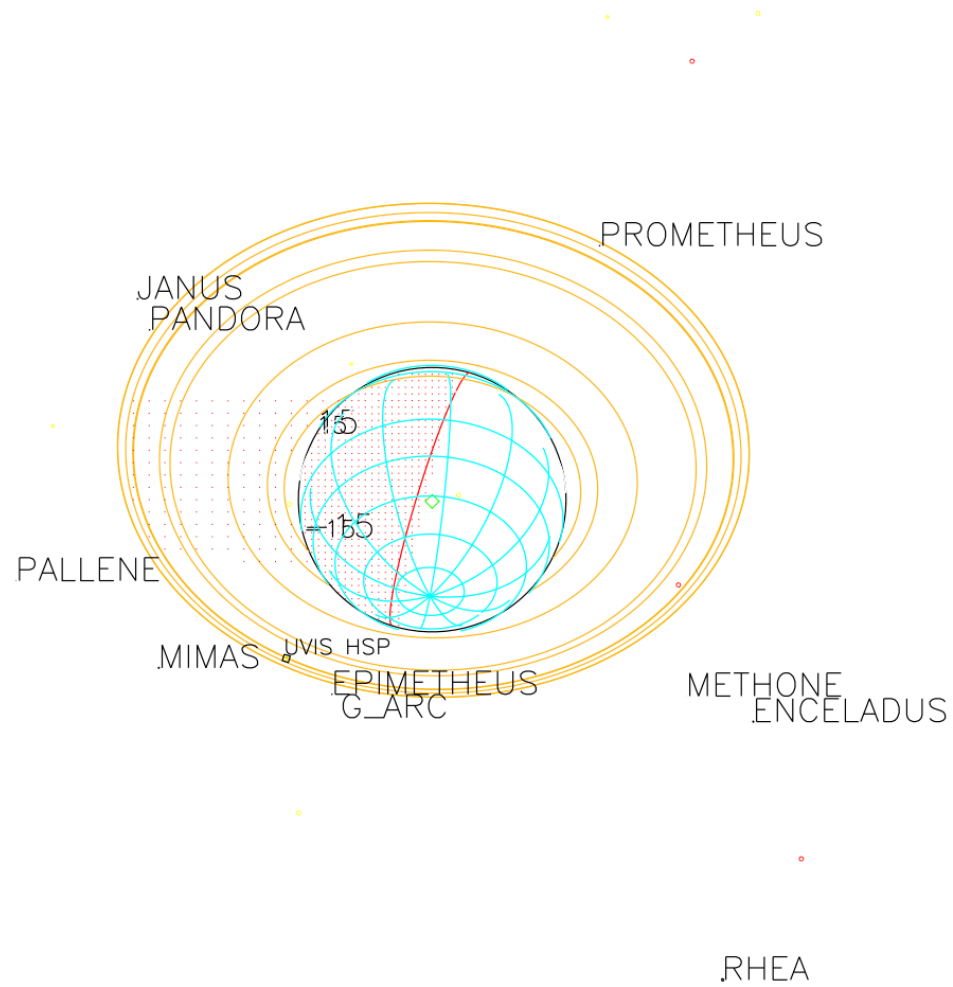
Sub-s/c lat/lon: 41.13, 105.18





Sub-s/c lat/lon: -40.23, 71.60



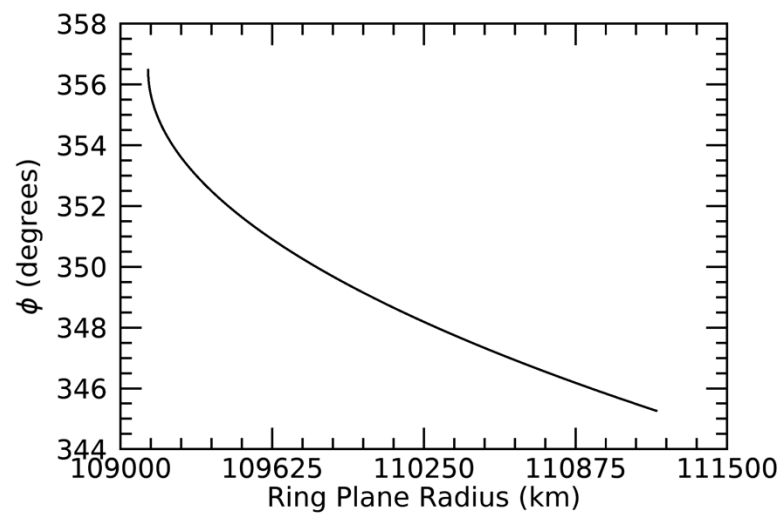
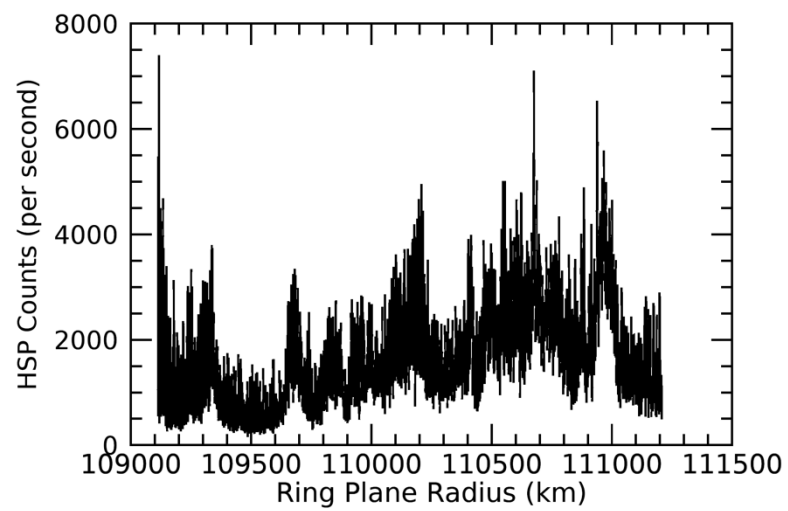
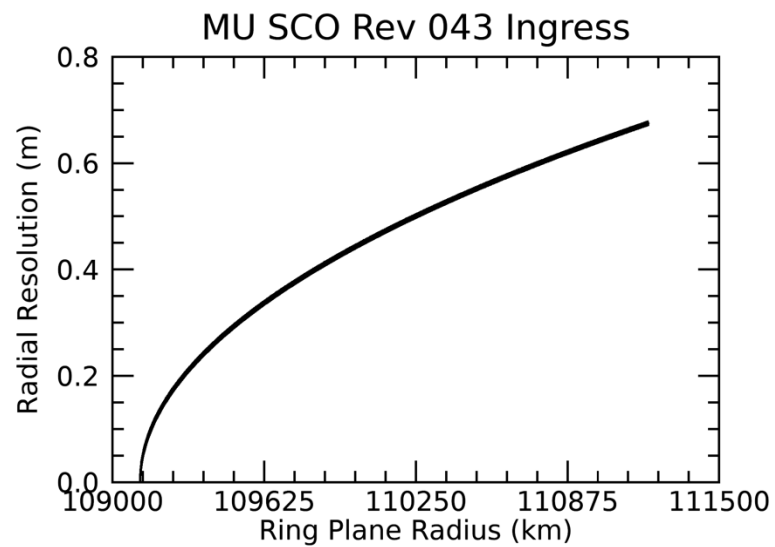
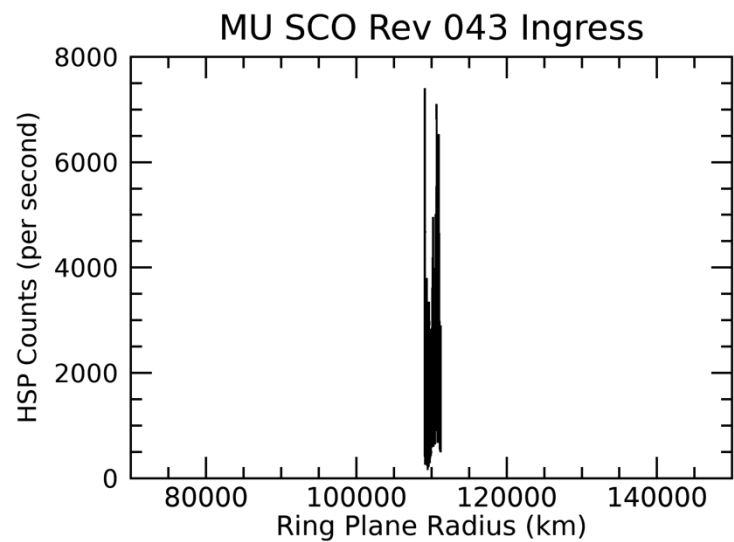


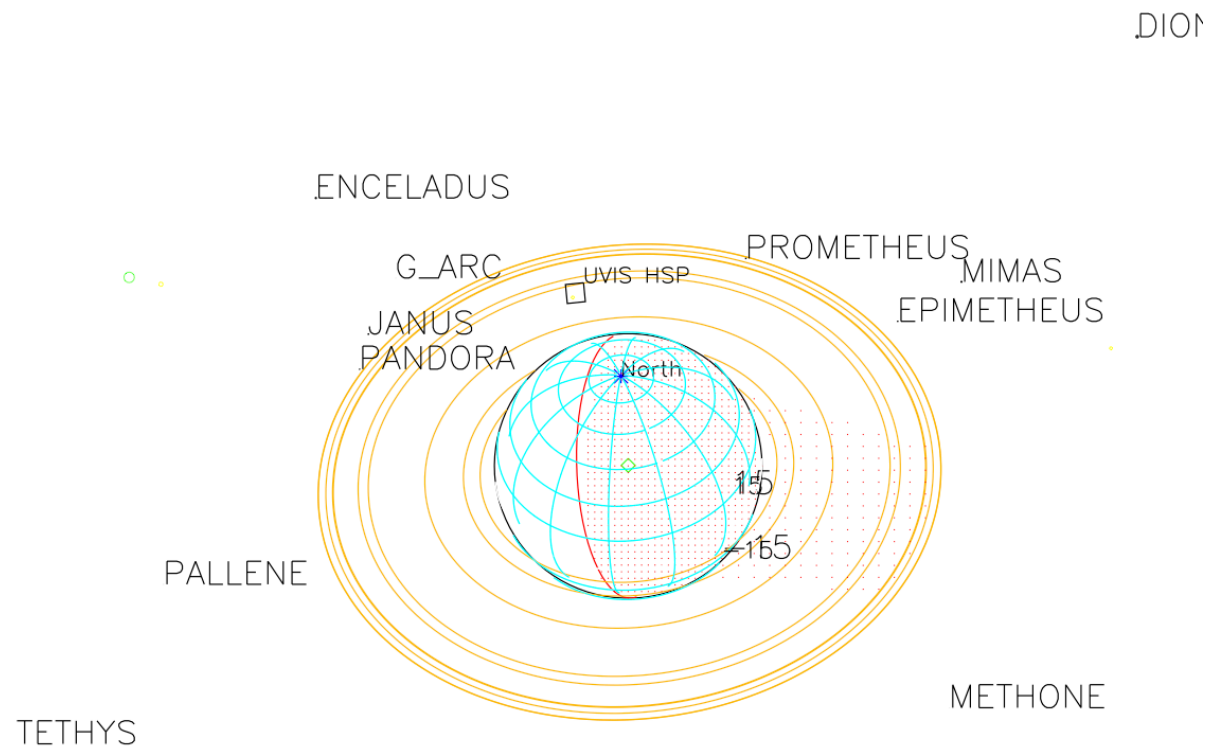
2007-098T19:06:00.000 461937.47 km

Target RA/dec: 49.01, 40.64

Subsolar lat/lon: -10.63, 150.92

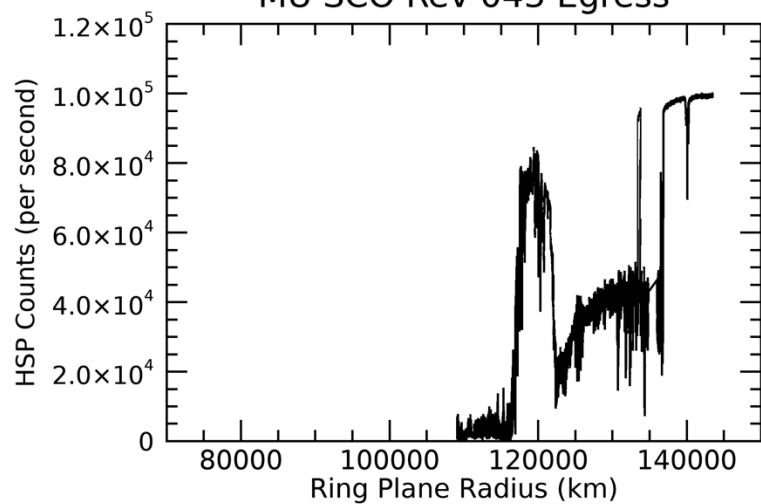
Sub-s/c lat/lon: -41.86, 53.02



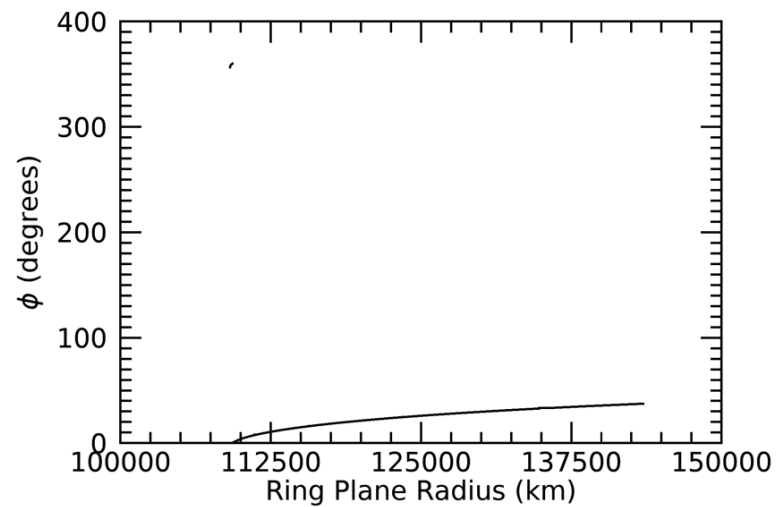
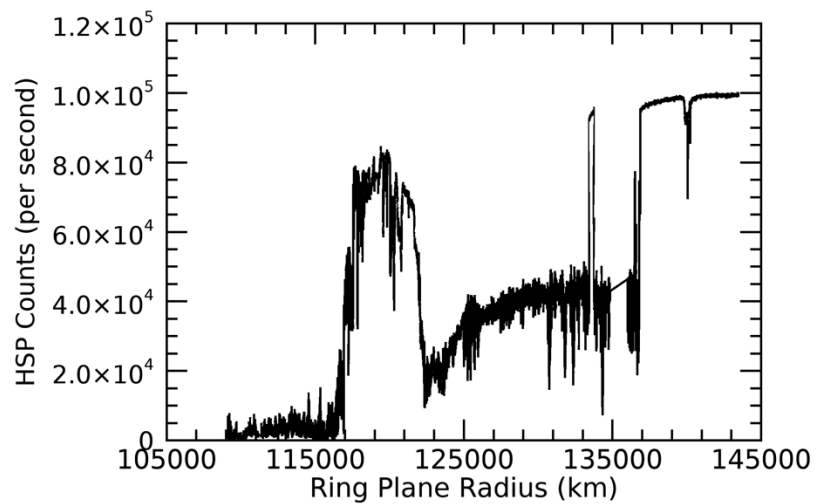
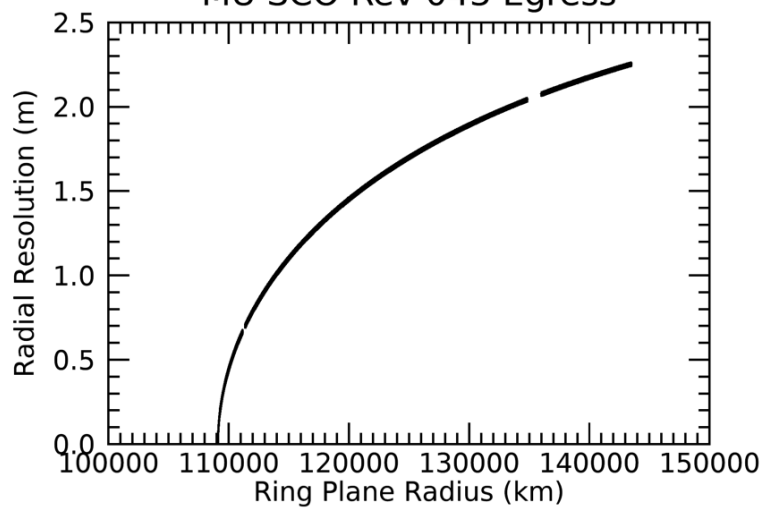


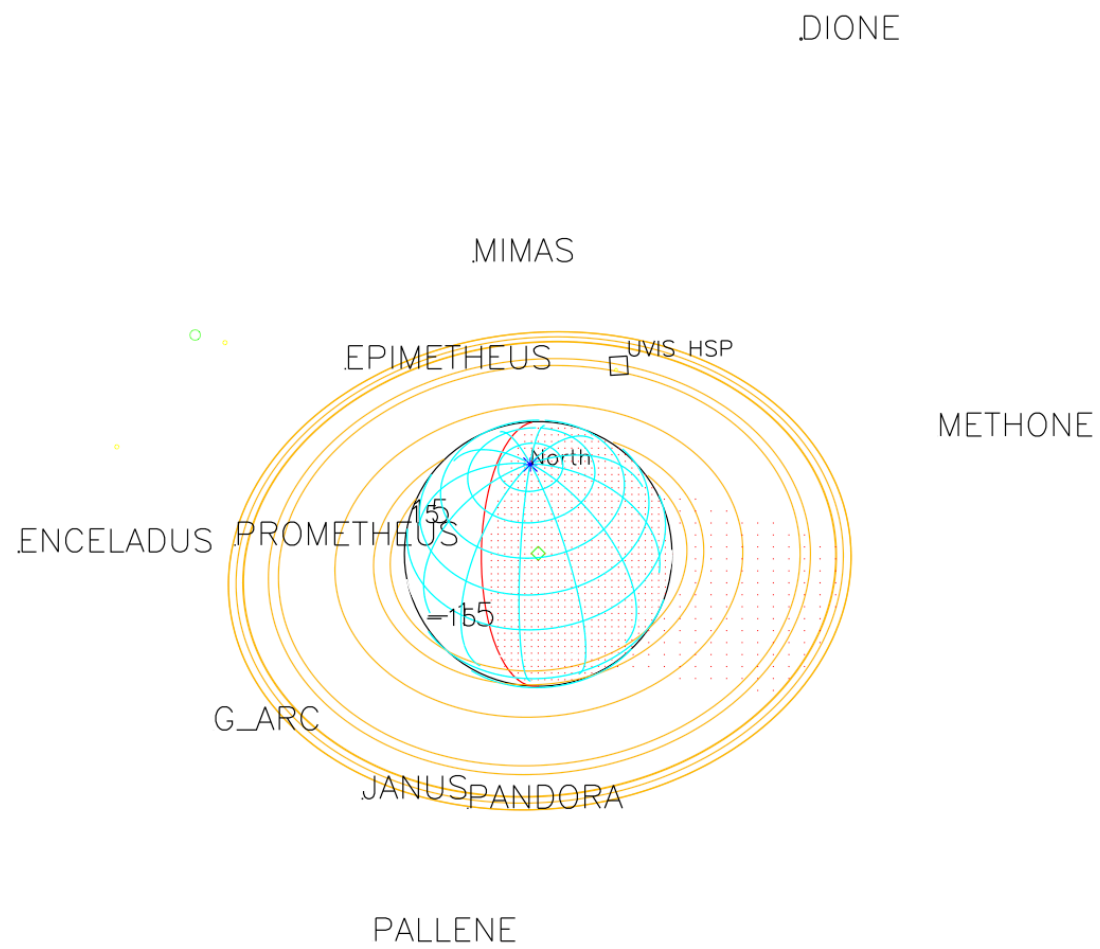
2007-112T05:38:00.000 1362092.9 km
 Target RA/dec: 251.63, -41.10
 Subsolar lat/lon: -10.47, 55.23
 Sub-s/c lat/lon: 40.89, 161.90

MU SCO Rev 043 Egress

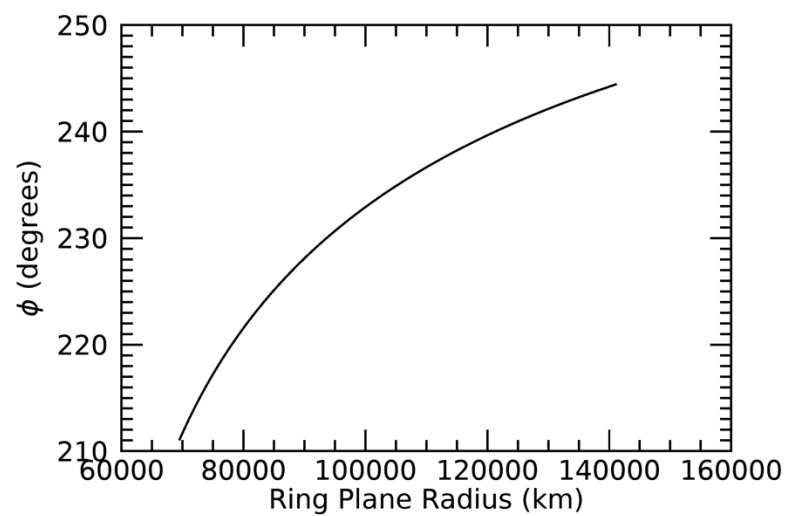
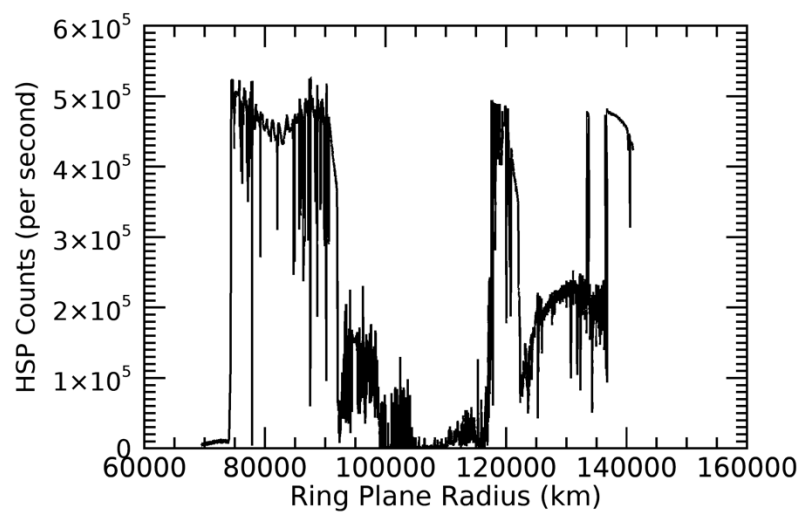
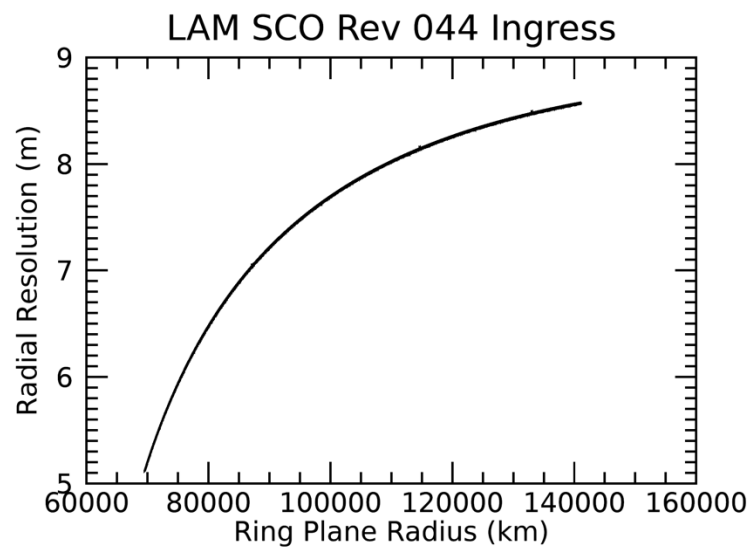
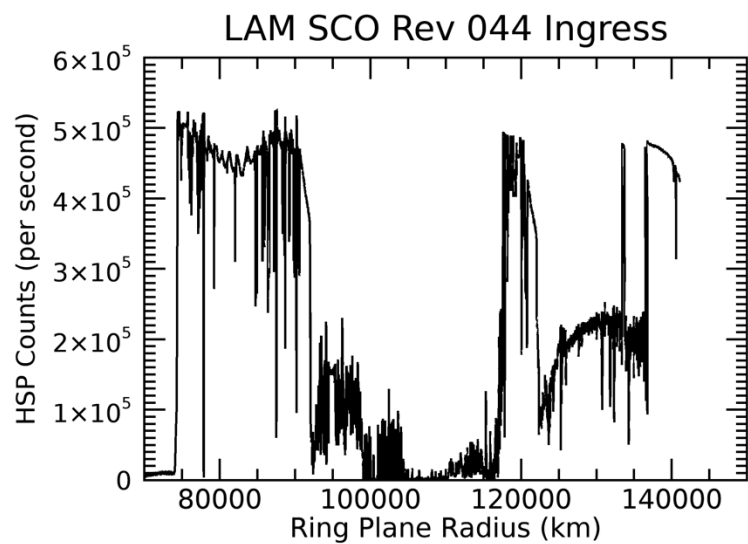


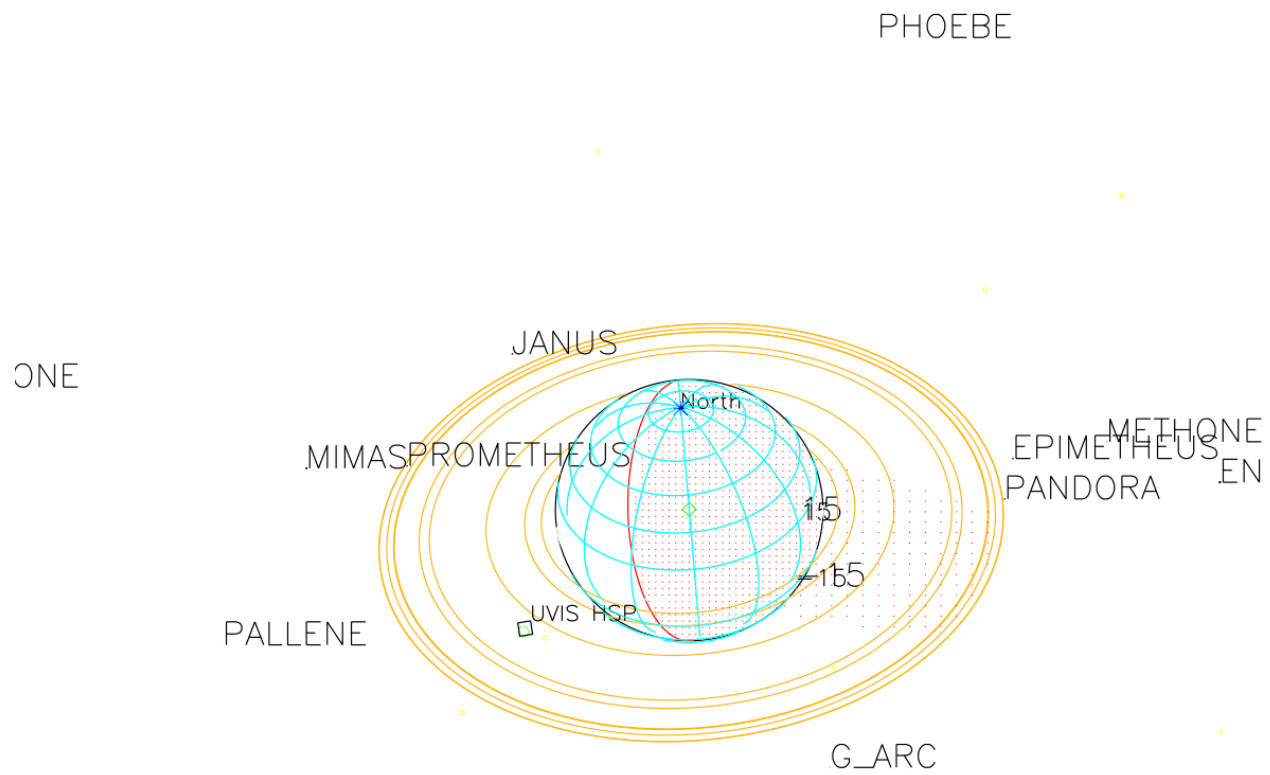
MU SCO Rev 043 Egress





2007-112T10:11:00.000 - 1702618.1 km
 Target RA/dec: 254.92, -41.54
 Subsolar lat/lon: -10.47, -98.48
 Sub-s/c lat/lon: 41.13, 11.82





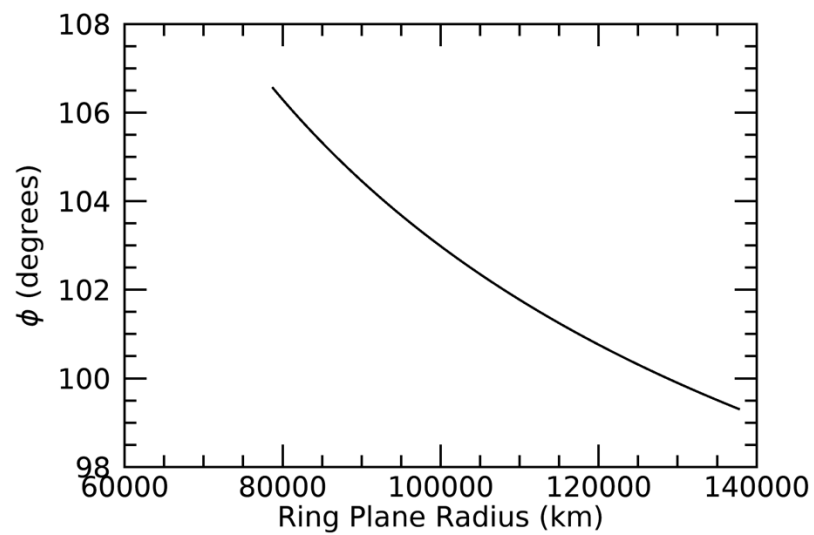
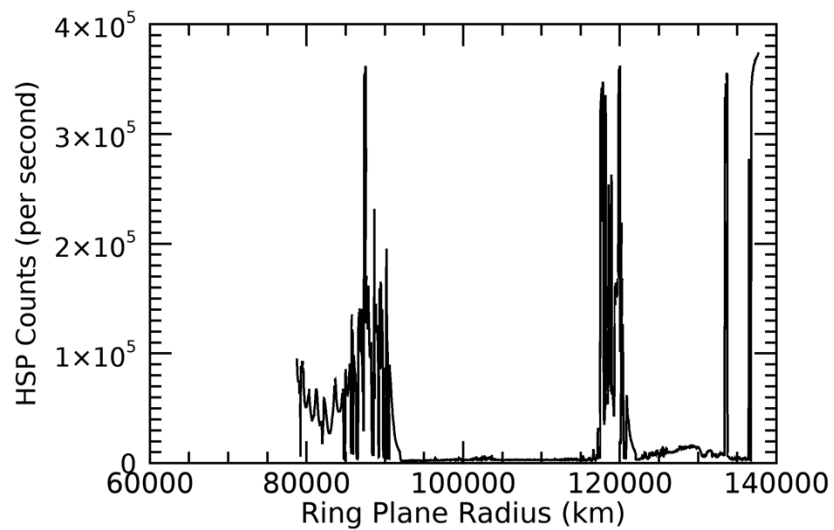
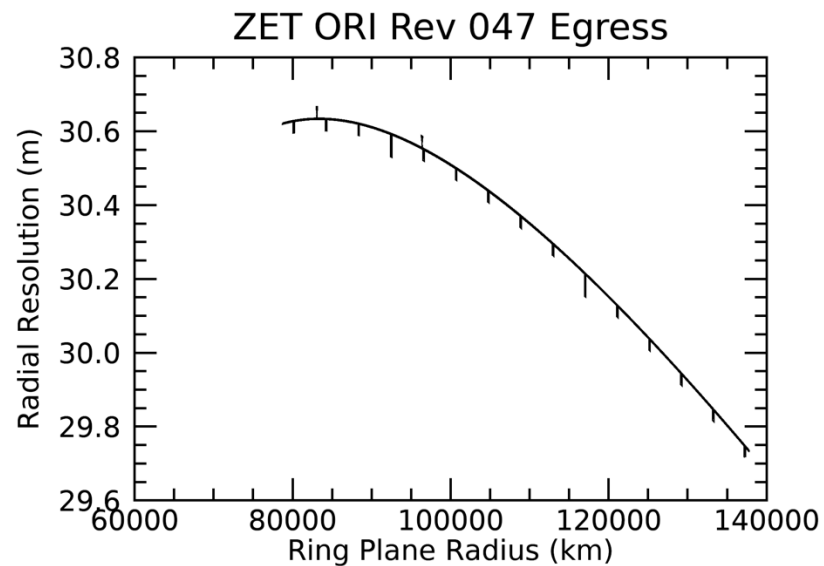
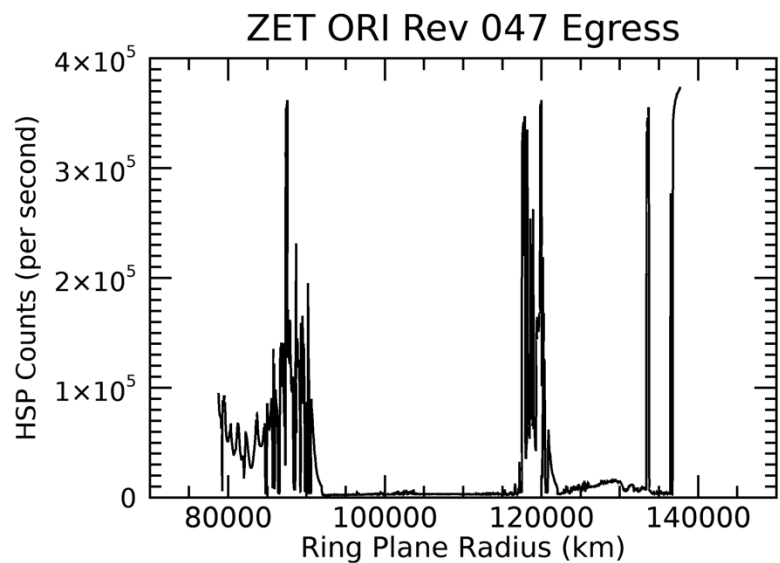
2007-129T13:45:00.000 966022.77 km

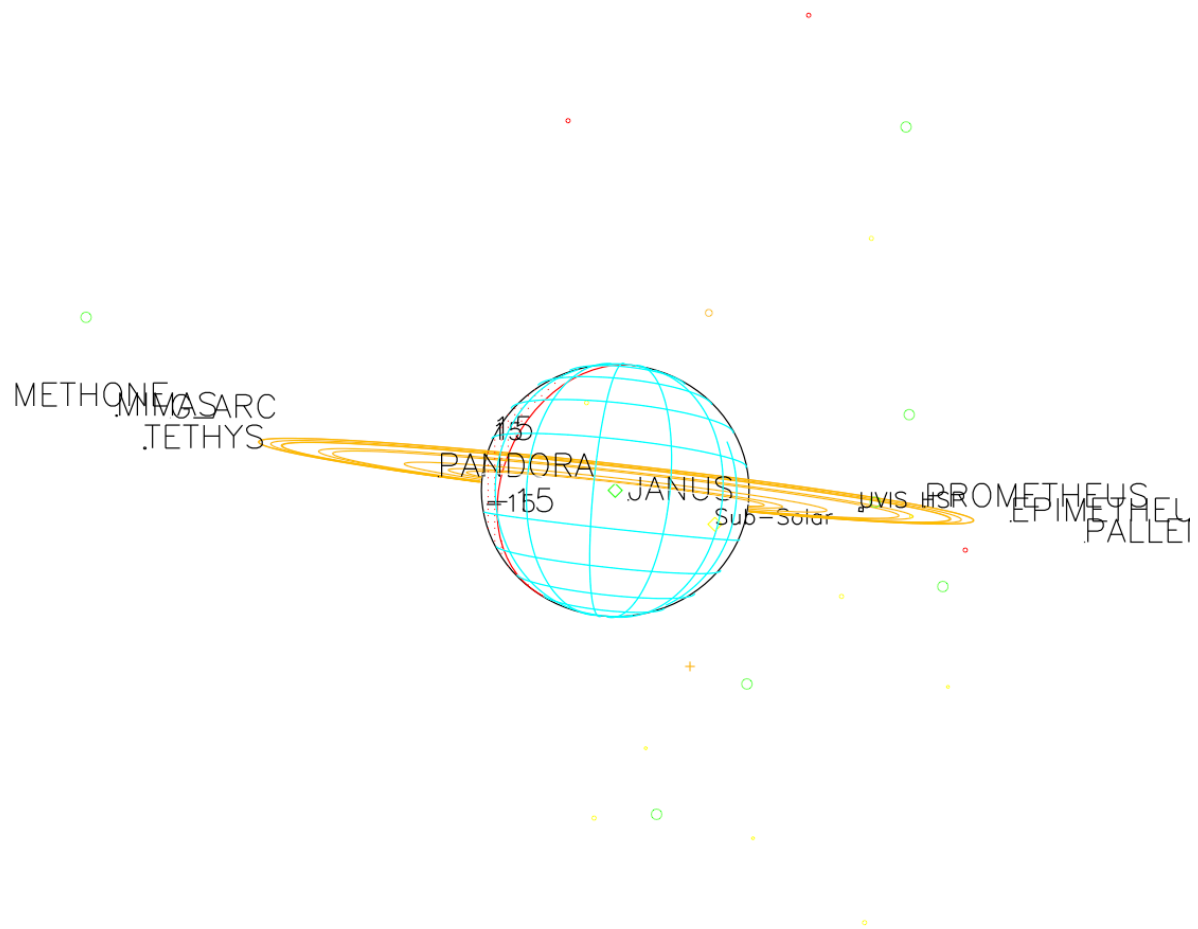
Target RA/dec: 257.86, -34.10

Subsolar lat/lon: -10.26, 38.10

Sub-s/c lat/lon: 33.84, 150.06

TETHYS



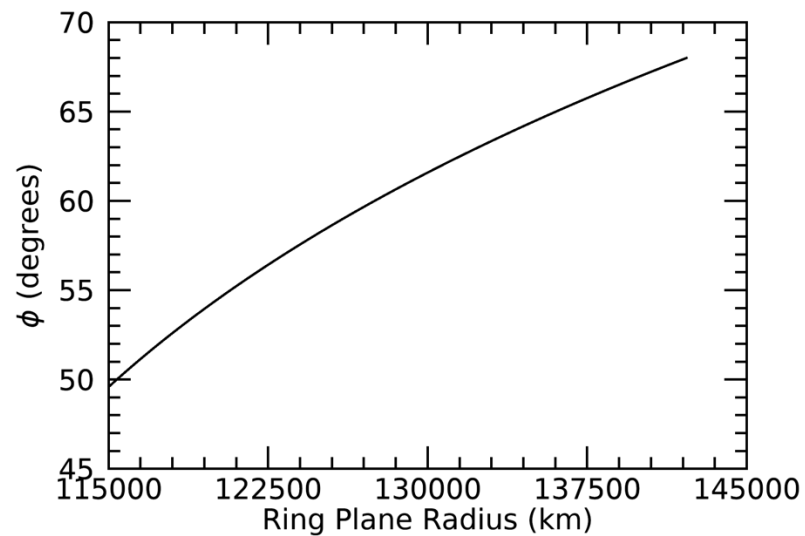
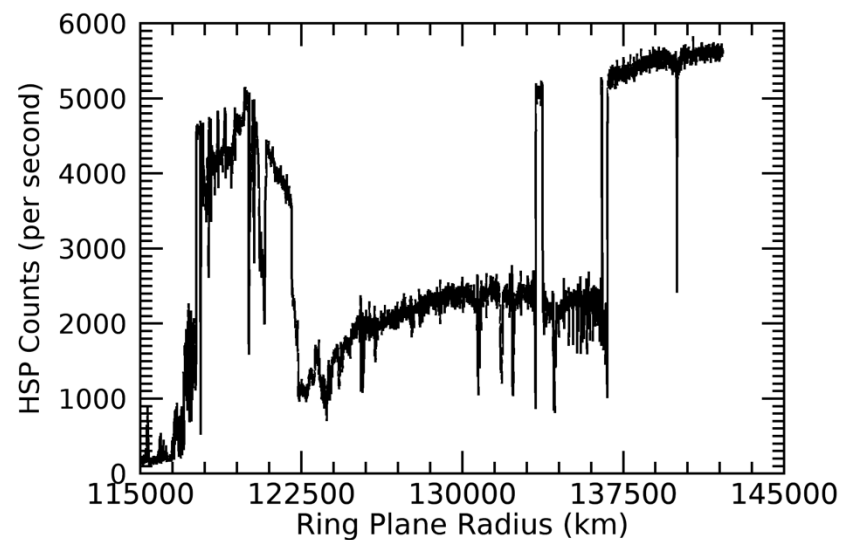
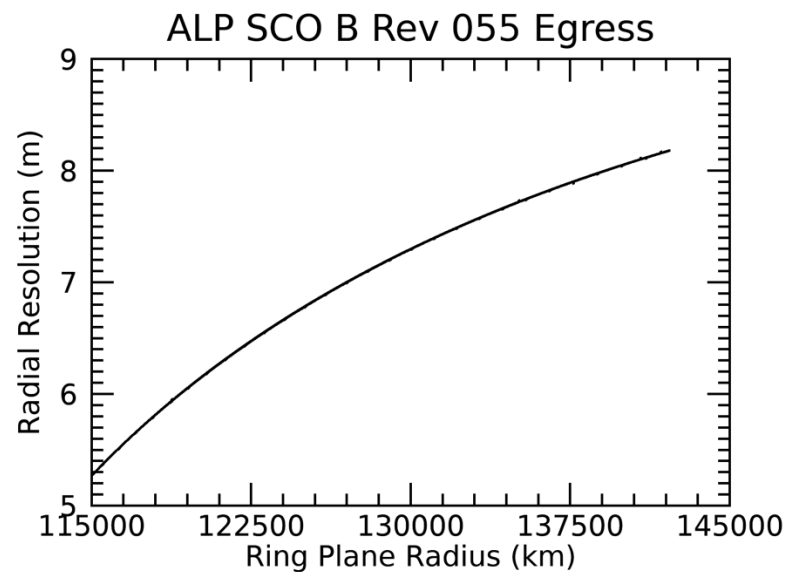
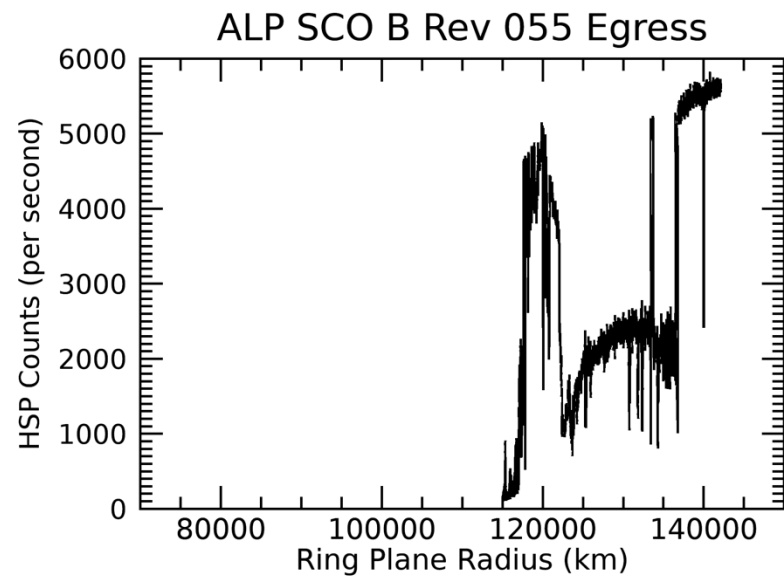


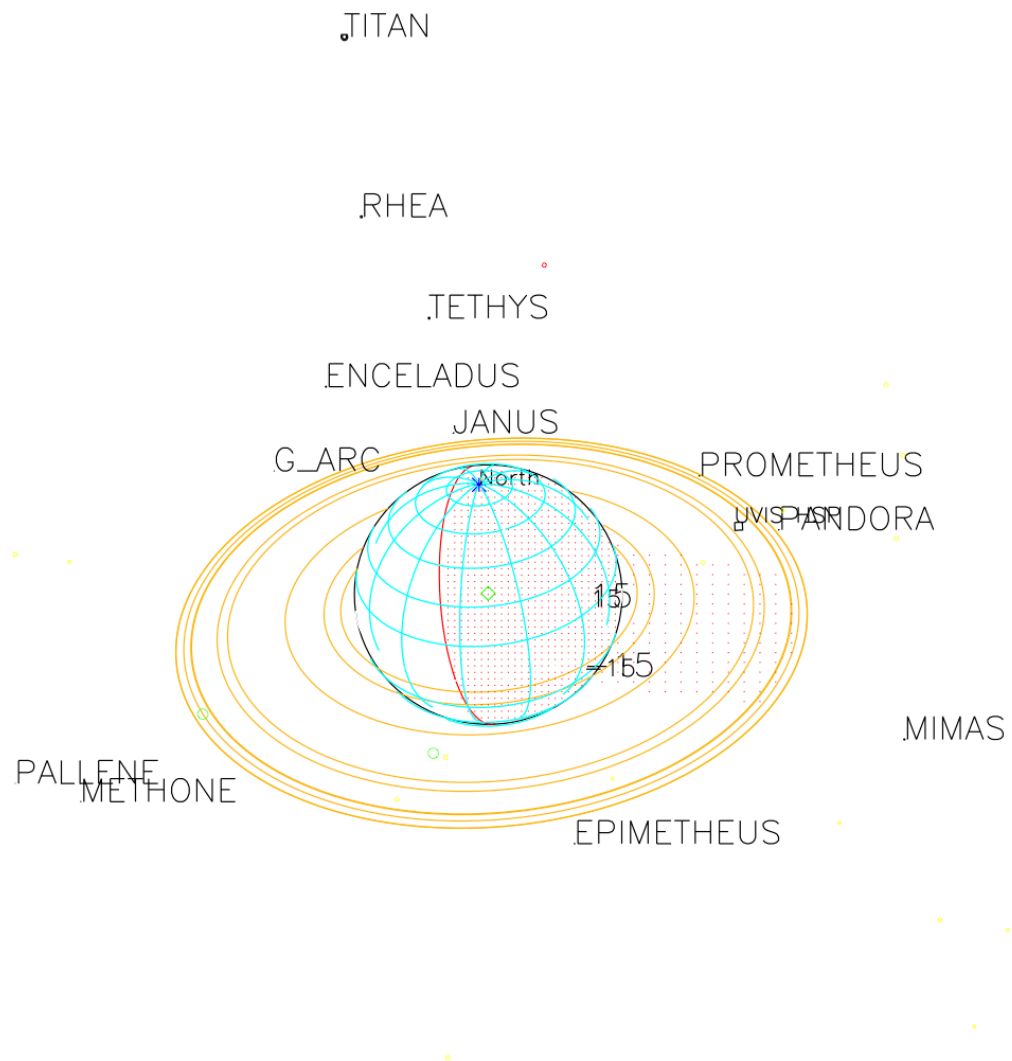
2007-179T05:10:00.000 260367.01 km

Target RA/dec: 108.87, -0.18

Subsolar lat/lon: -9.67, 110.02

Sub-s/c lat/lon: -1.88, 68.42



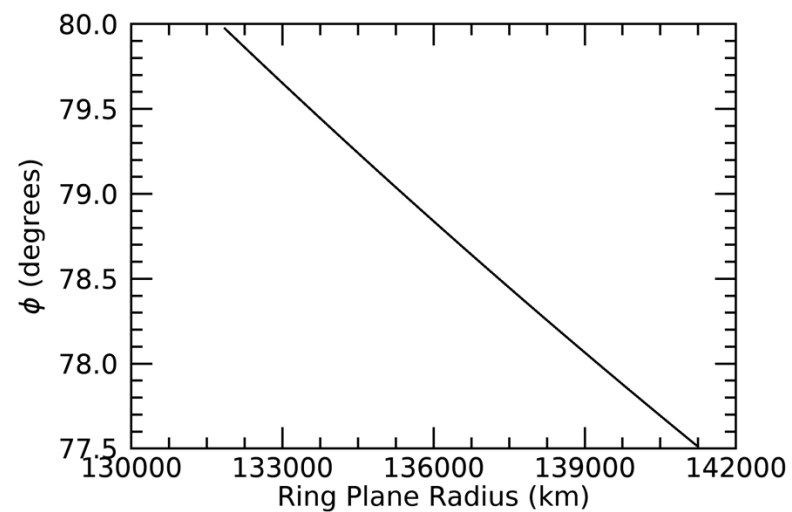
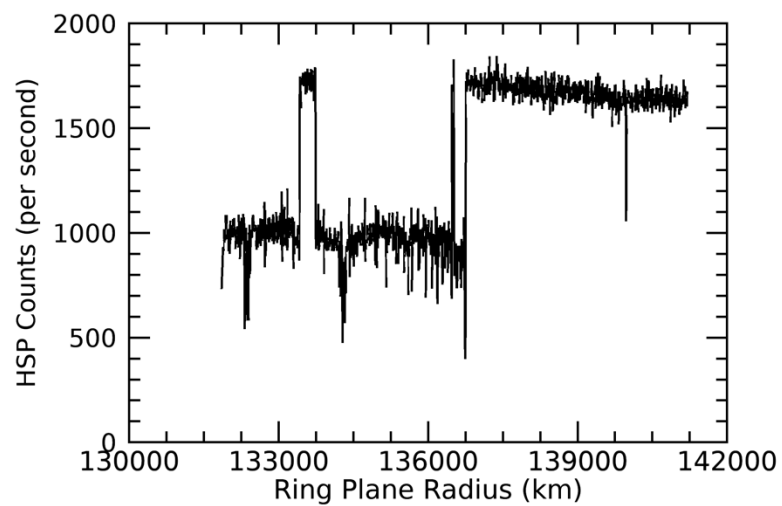
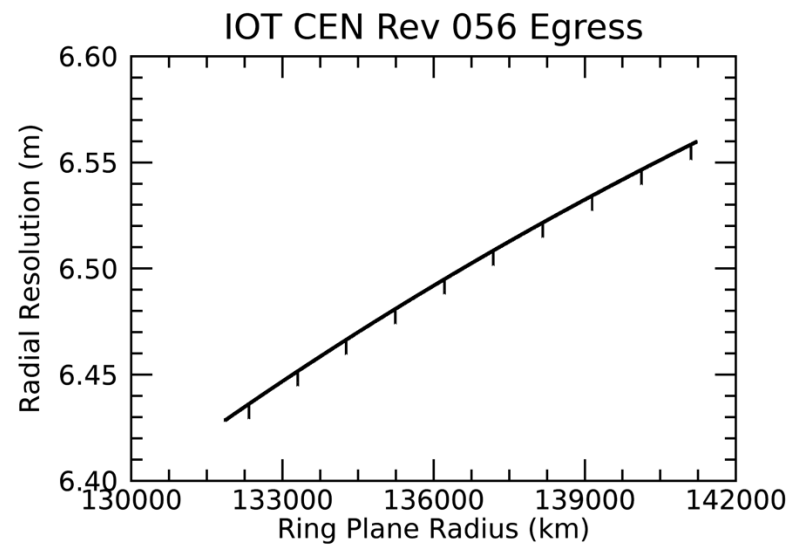
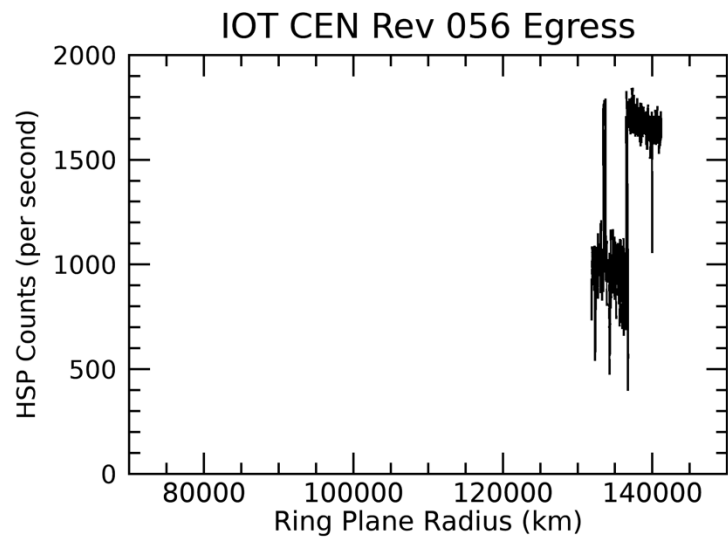


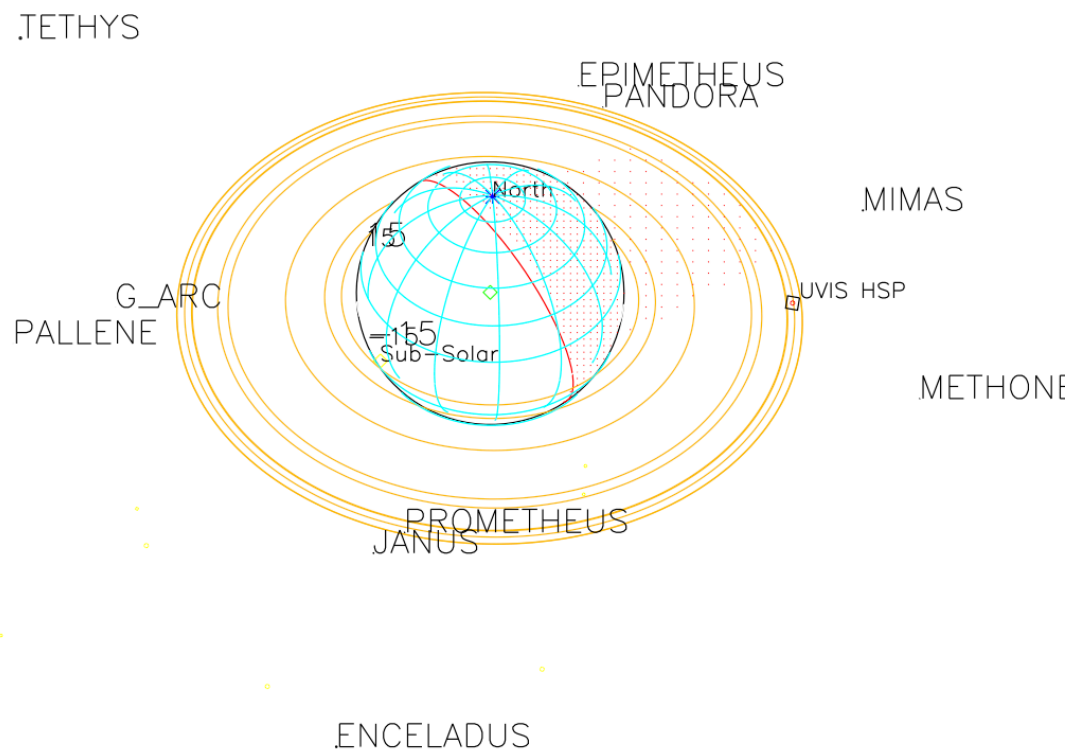
2008-003T10:26:00.000 557195.08 km

Target RA/dec: 260.22, -30.06

Subsolar lat/lon: -7.35, 58.28

Sub-s/c lat/lon: 30.13, 164.41



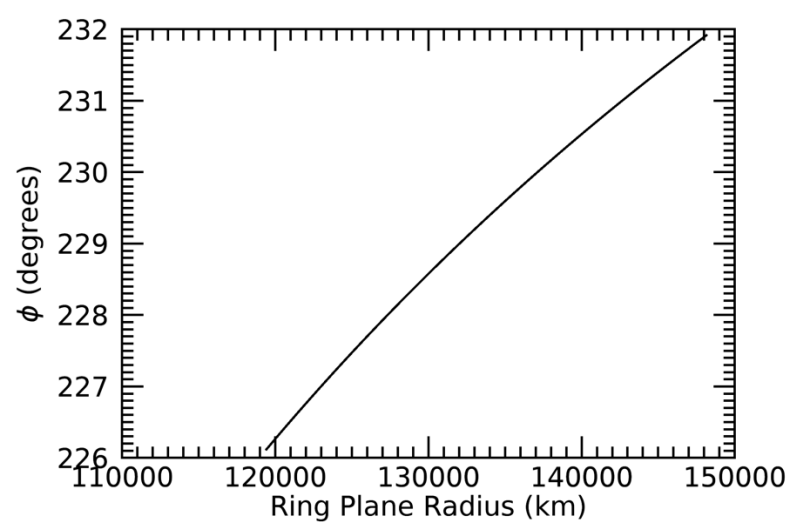
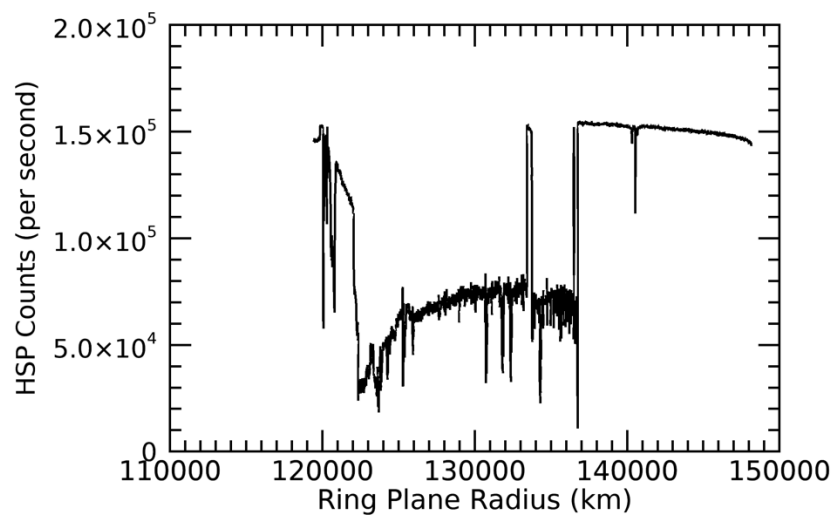
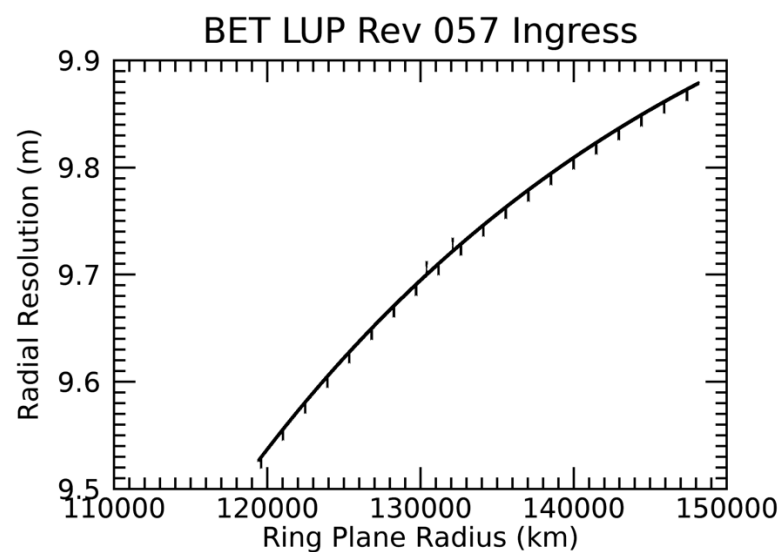
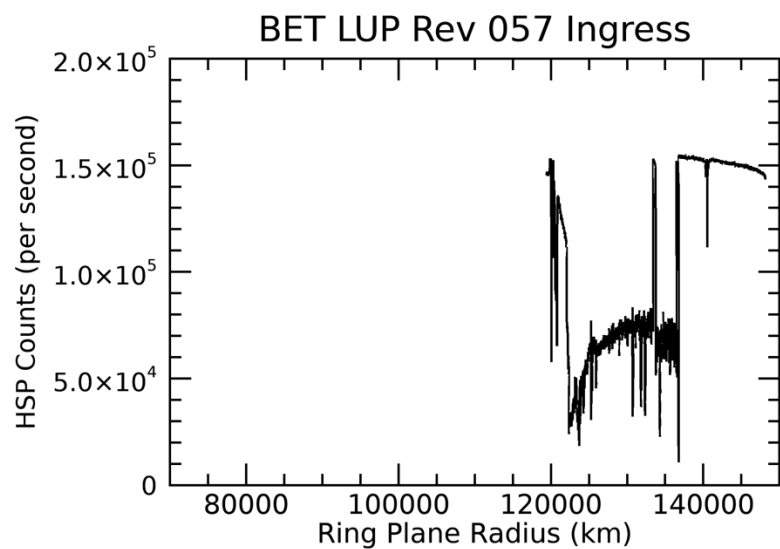


2008-014T18:04:00.000 887324.89 km

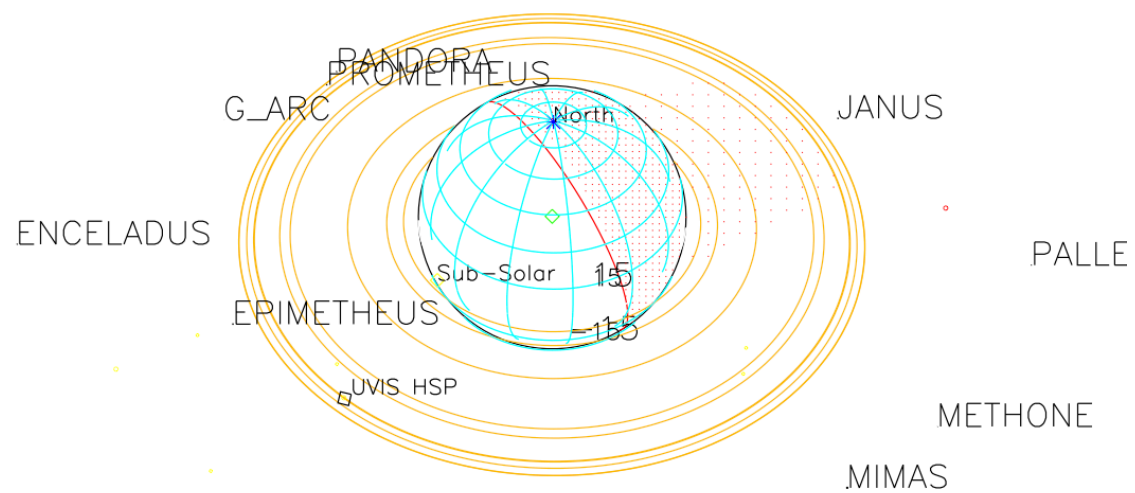
Target RA/dec: 211.08, -36.92

Subsolar lat/lon: -7.21, -117.96

Sub-s/c lat/lon: 37.83, -64.98



DIONE



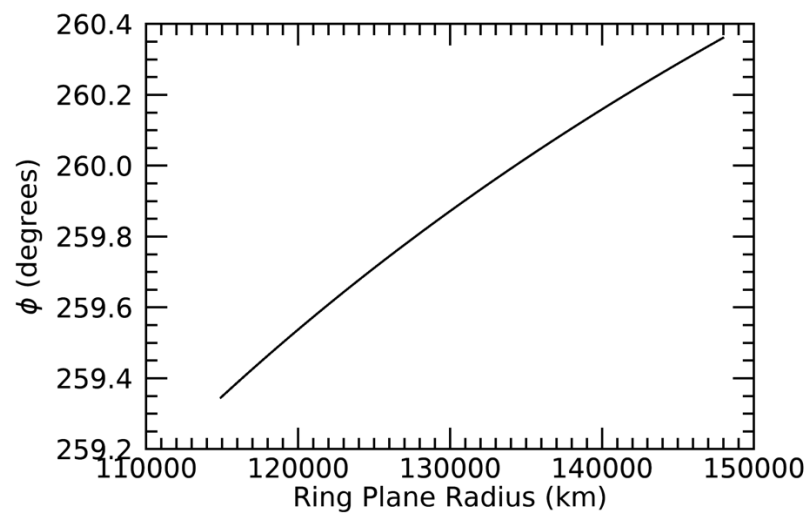
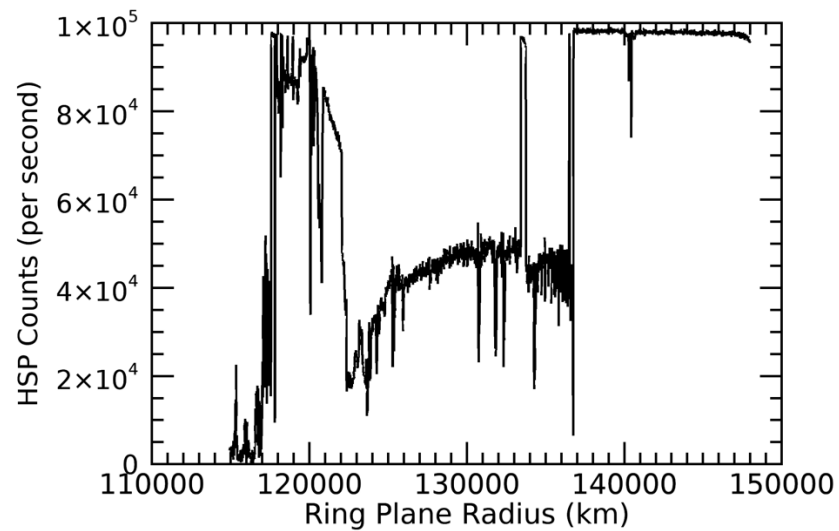
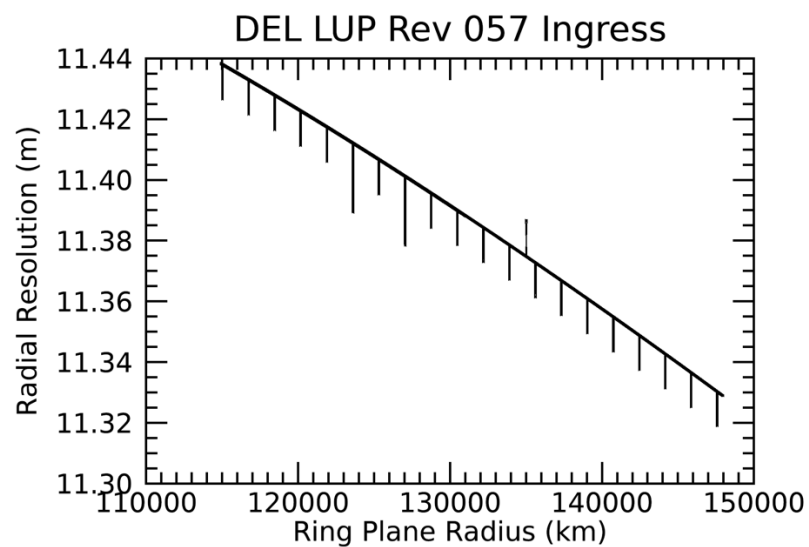
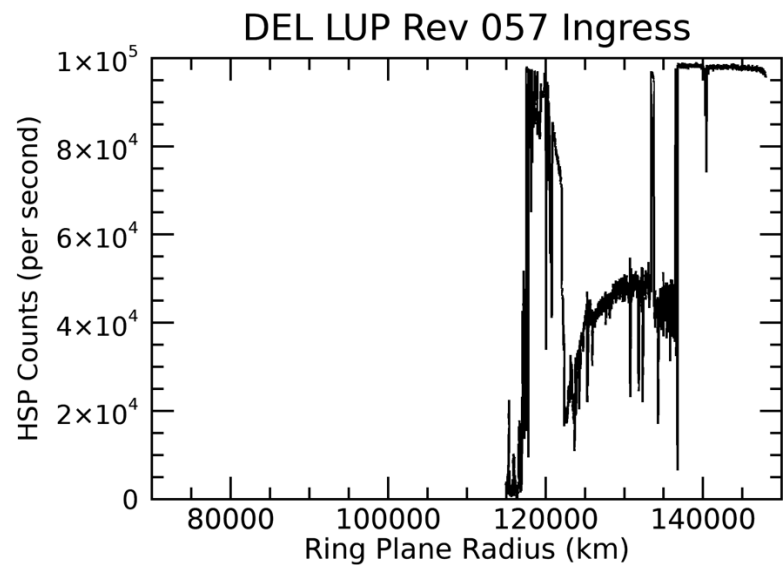
2008-026T19:51:00.000 812385.72 km

Target RA/dec: 215.60, -37.98

Subsolar lat/lon: -7.06, 172.66

Sub-s/c lat/lon: 38.97, -129.81

TETHYS



DIONE

JANUS

PALLINI

.METHON

.MIMAS



UVIS HSP

ENCELADUS

EPIMETHEUS

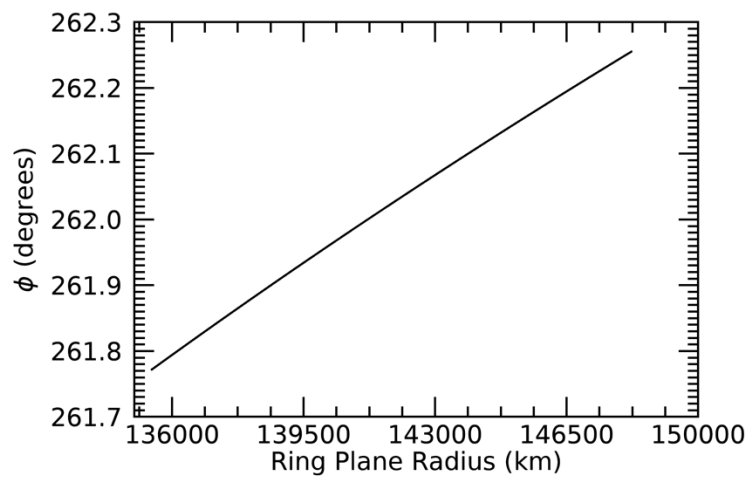
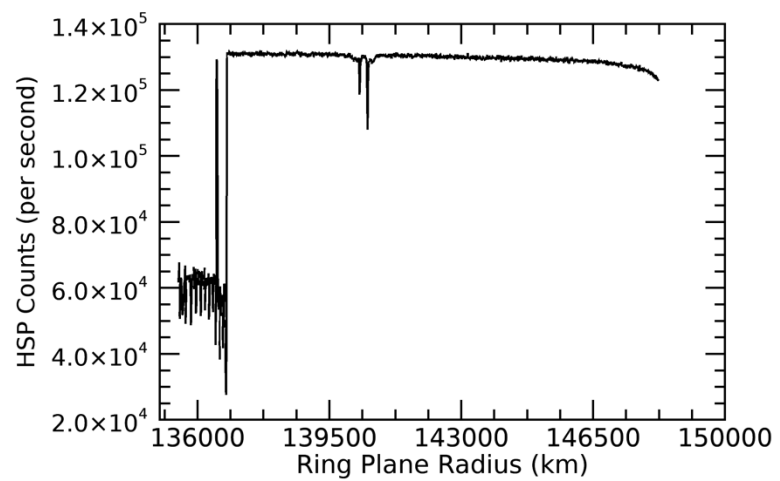
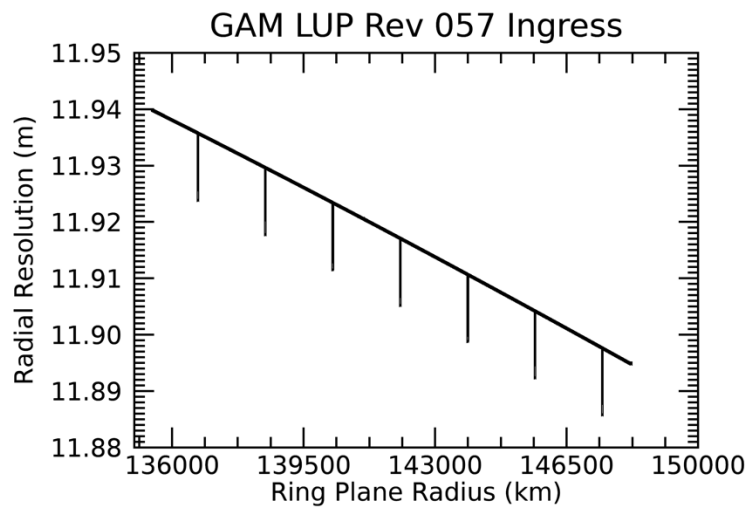
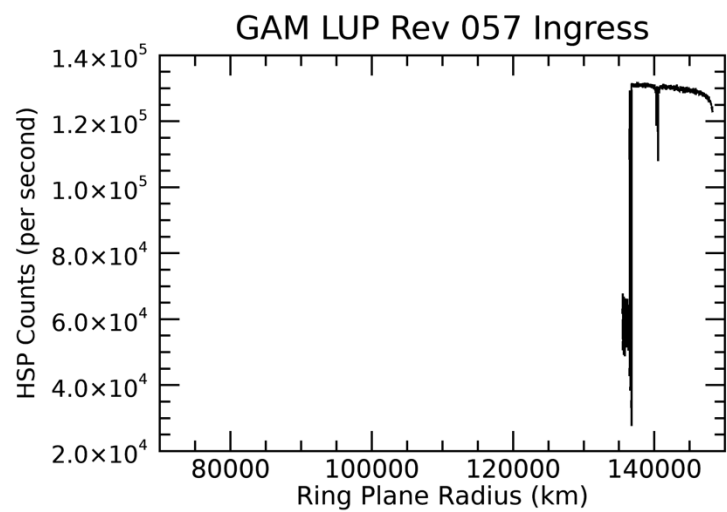
2008-026T21:31:00.000 776125.41 km

Target RA/dec: 218.07, -38.47

Subsolar lat/lon: -7.06, 116.35

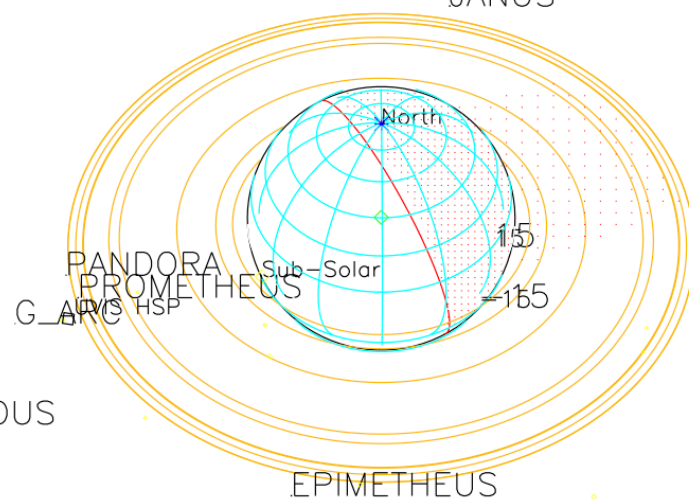
Sub-s/c lat/lon: 39.49, 176.61

TETHYS



DIONE

JANUS



MIMAS

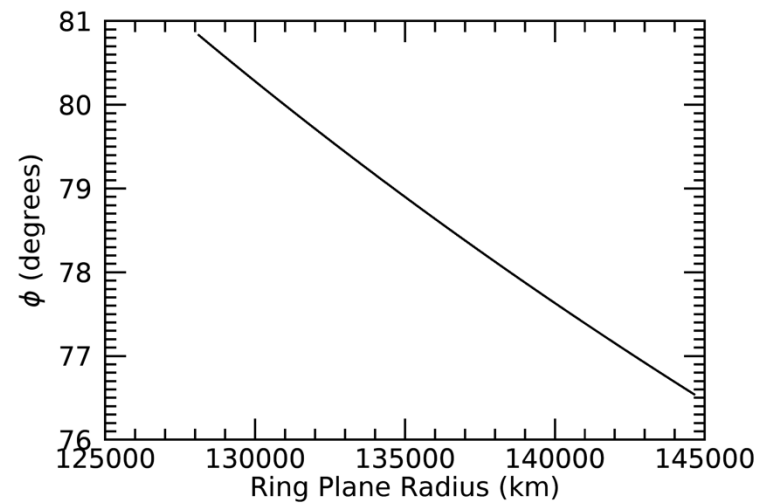
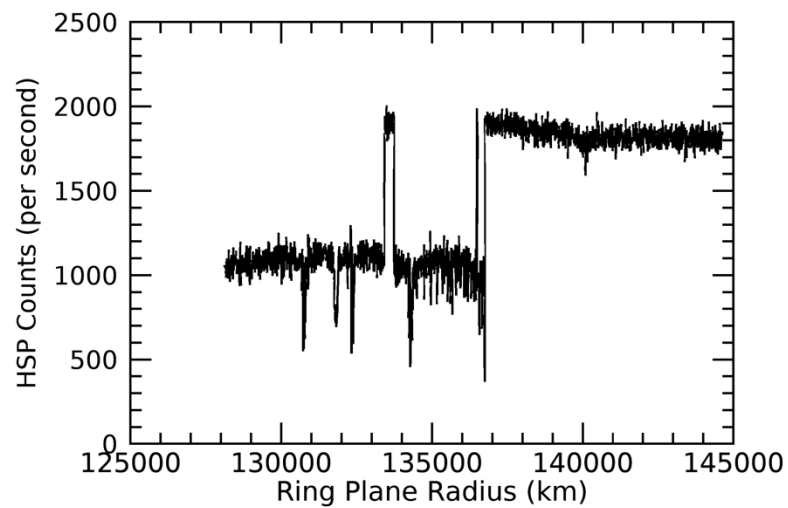
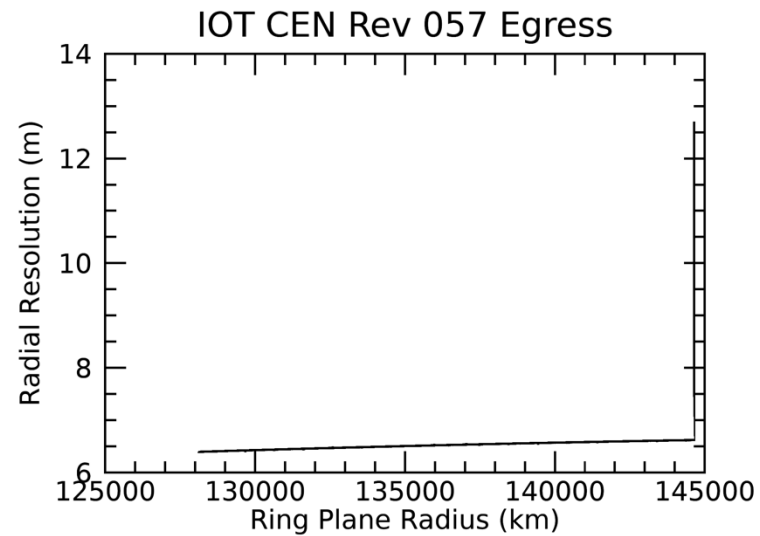
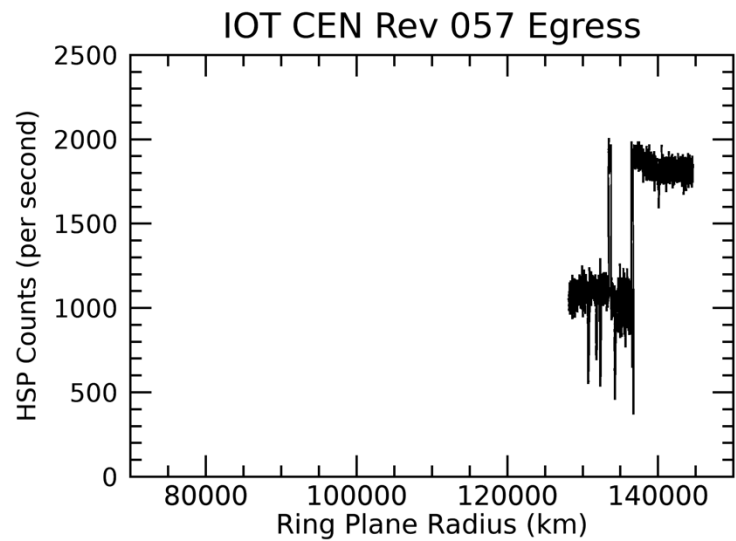
2008-026T22:22:00.000 757162.81 km

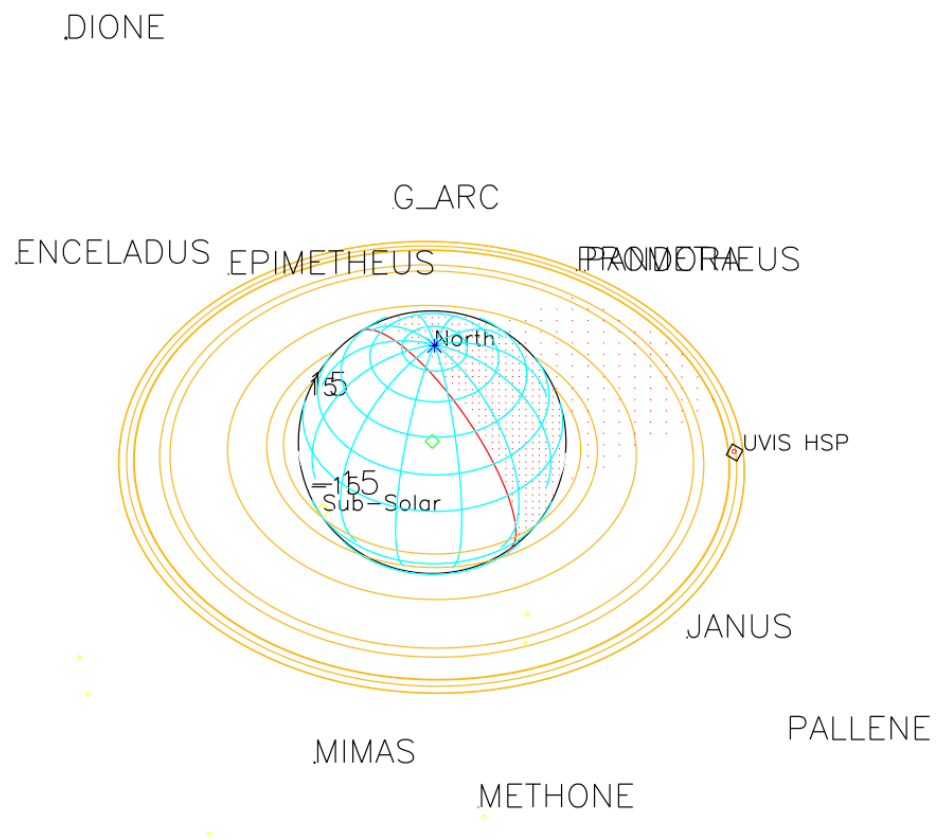
Target RA/dec: 219.44, -38.71

Subsolar lat/lon: -7.06, 87.64

Sub-s/c lat/lon: 39.74, 149.40

TETHYS





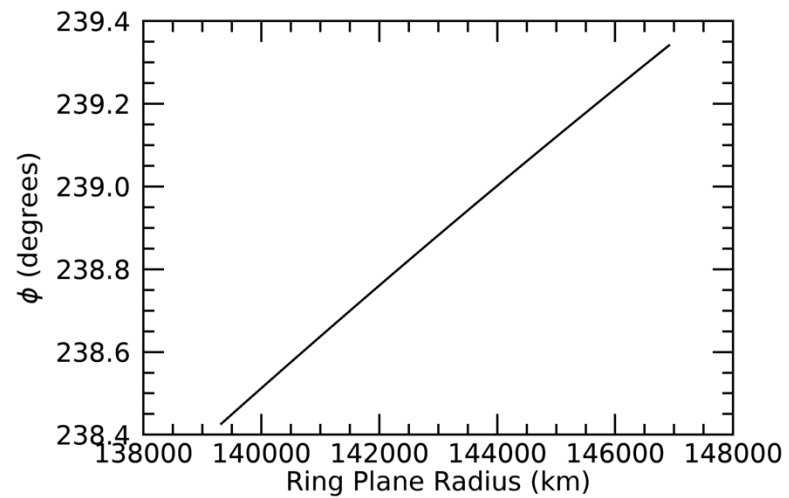
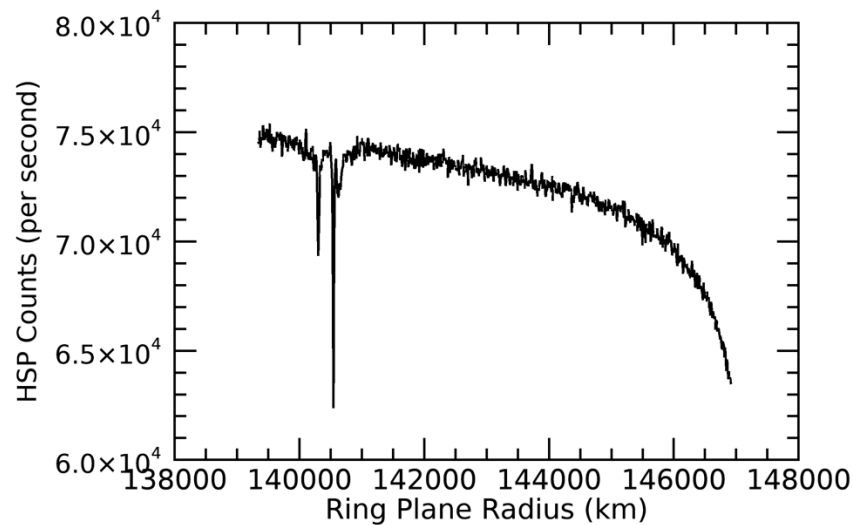
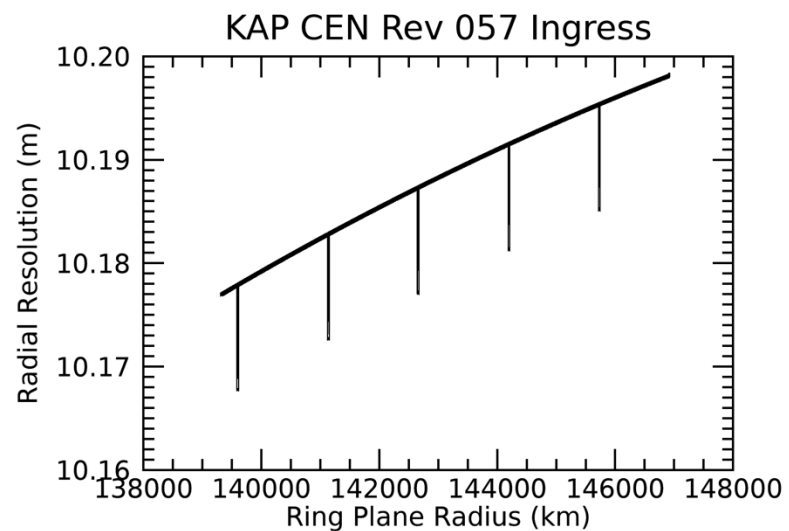
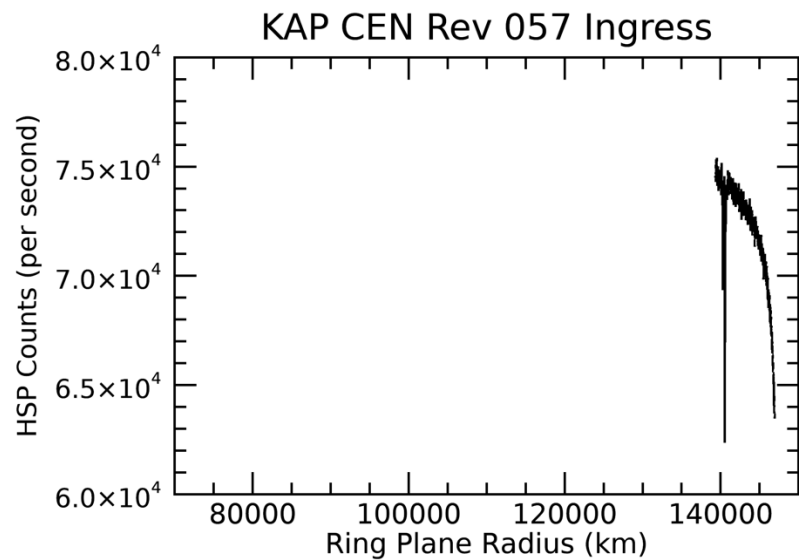
2008-026T16:17:00.000 886141.21 km

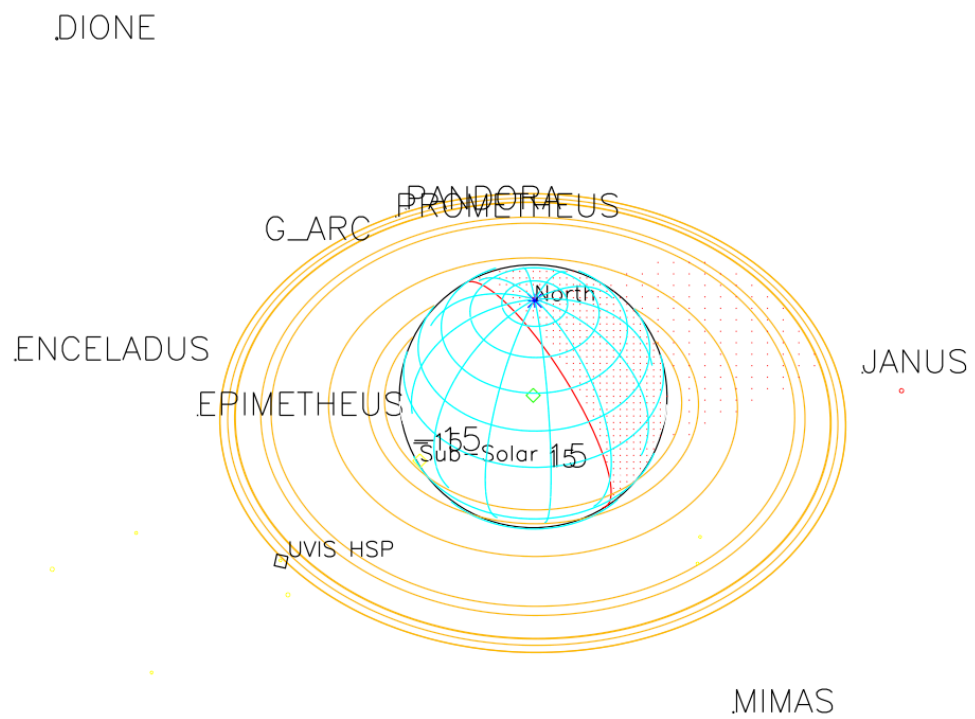
Target RA/dec: 211.07, -36.93

Subsolar lat/lon: -7.06, -66.85

Sub-s/c lat/lon: 37.85, -14.27

TETHYS





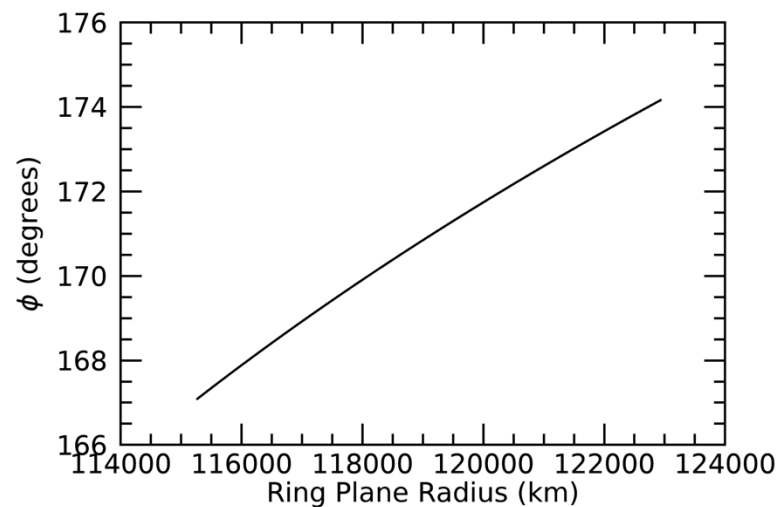
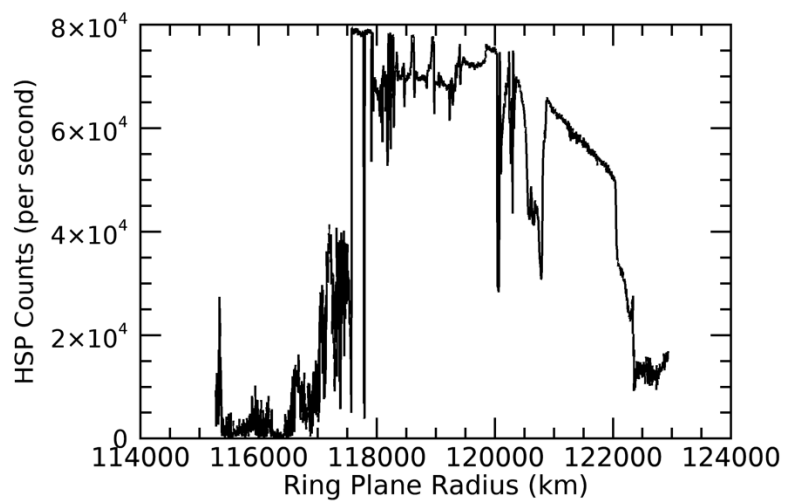
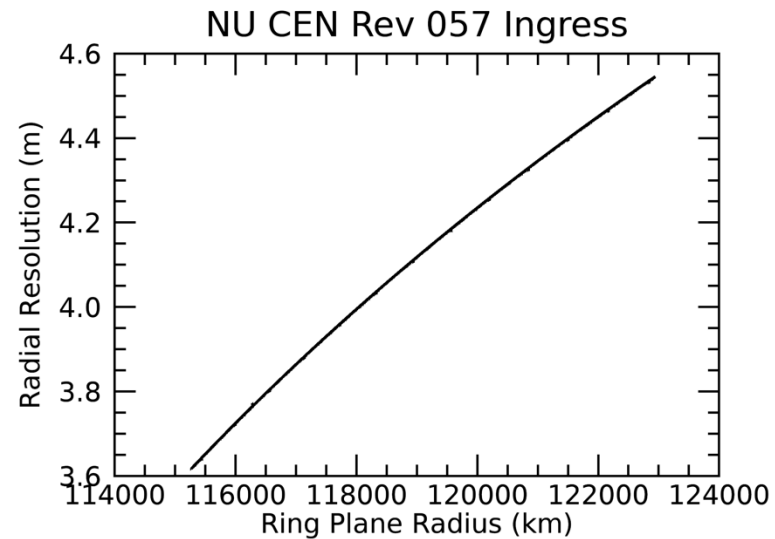
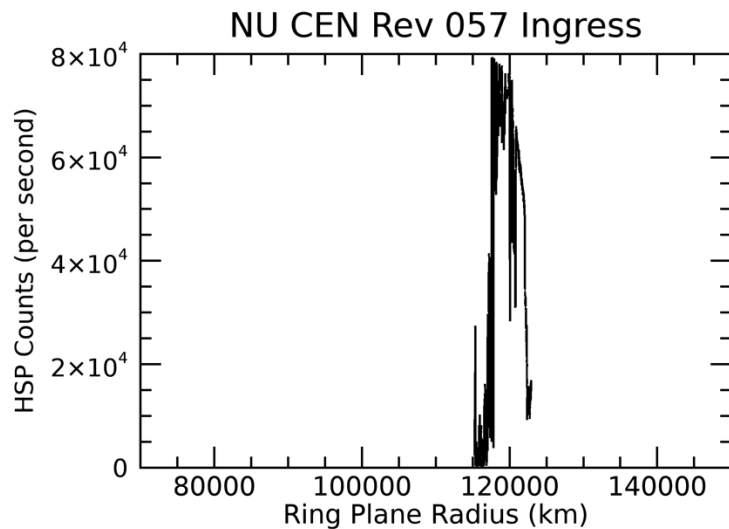
2008-026T18:53:00.000 832878.38 km

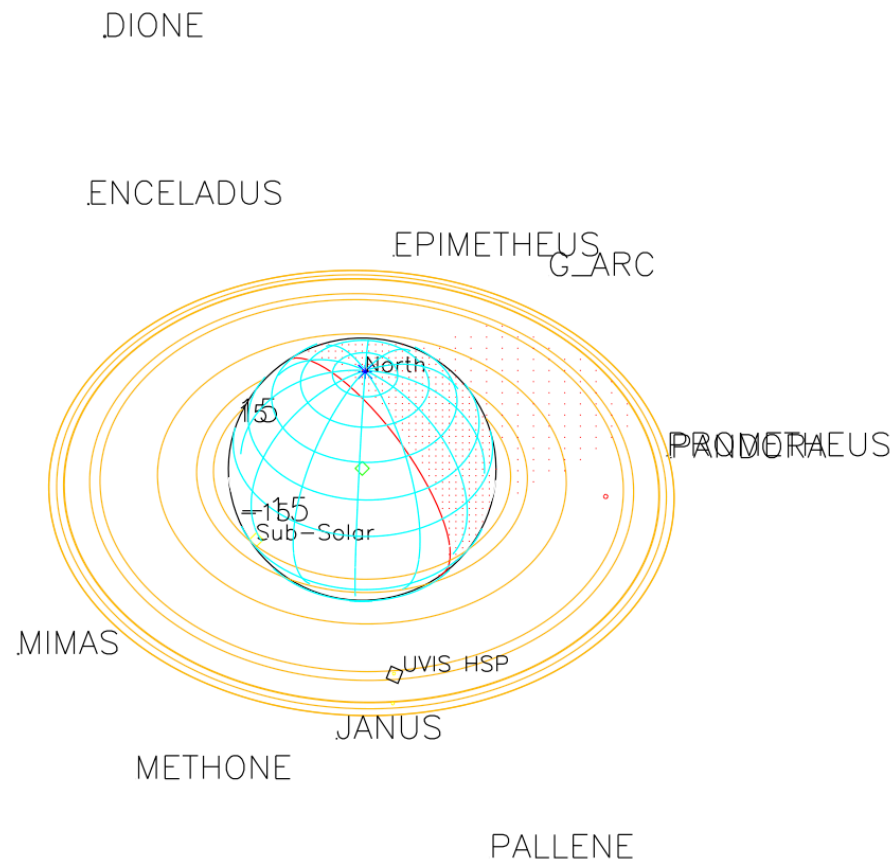
Target RA/dec: 214.28, -37.70

Subsolar lat/lon: -7.06, -154.69

Sub-s/c lat/lon: 38.67, -98.60

TETHYS



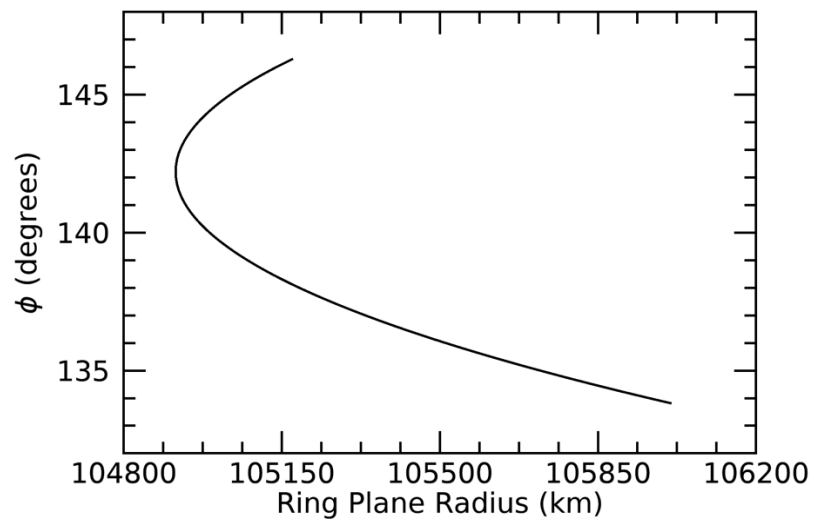
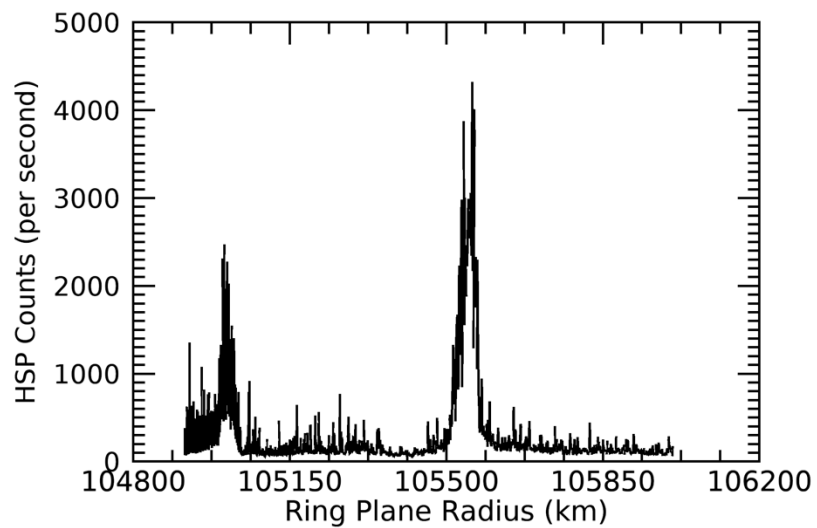
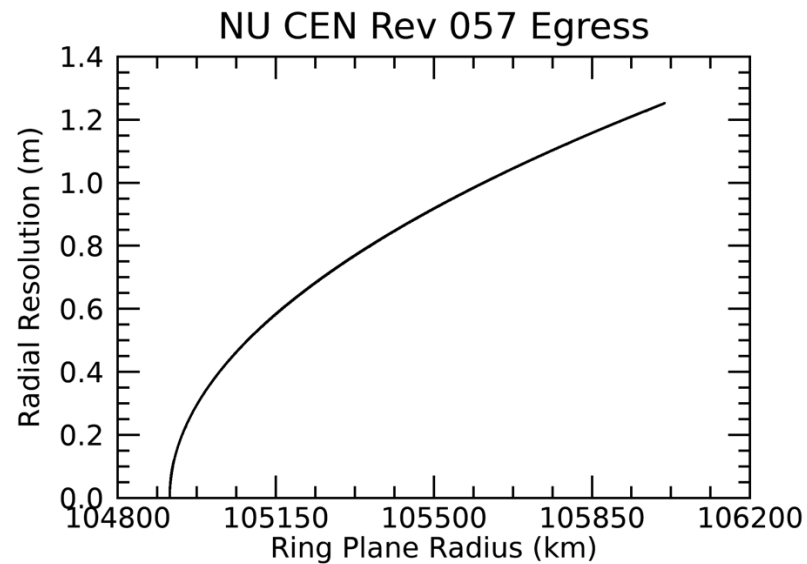
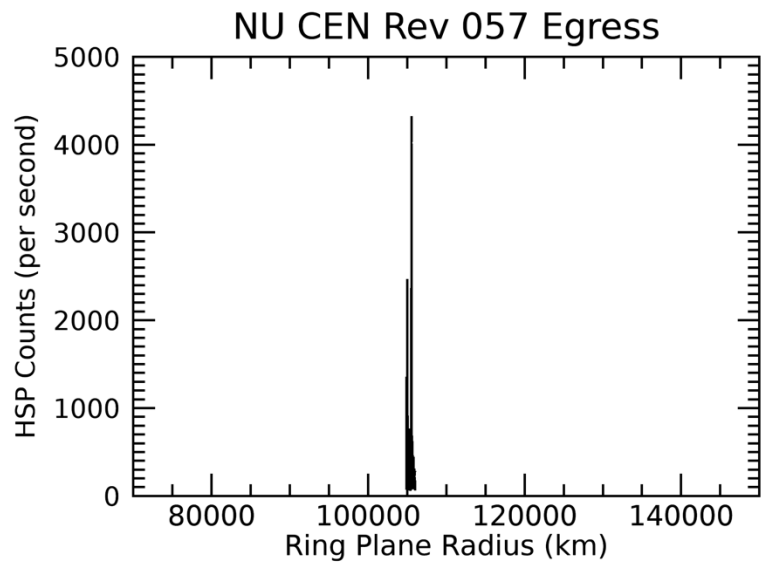


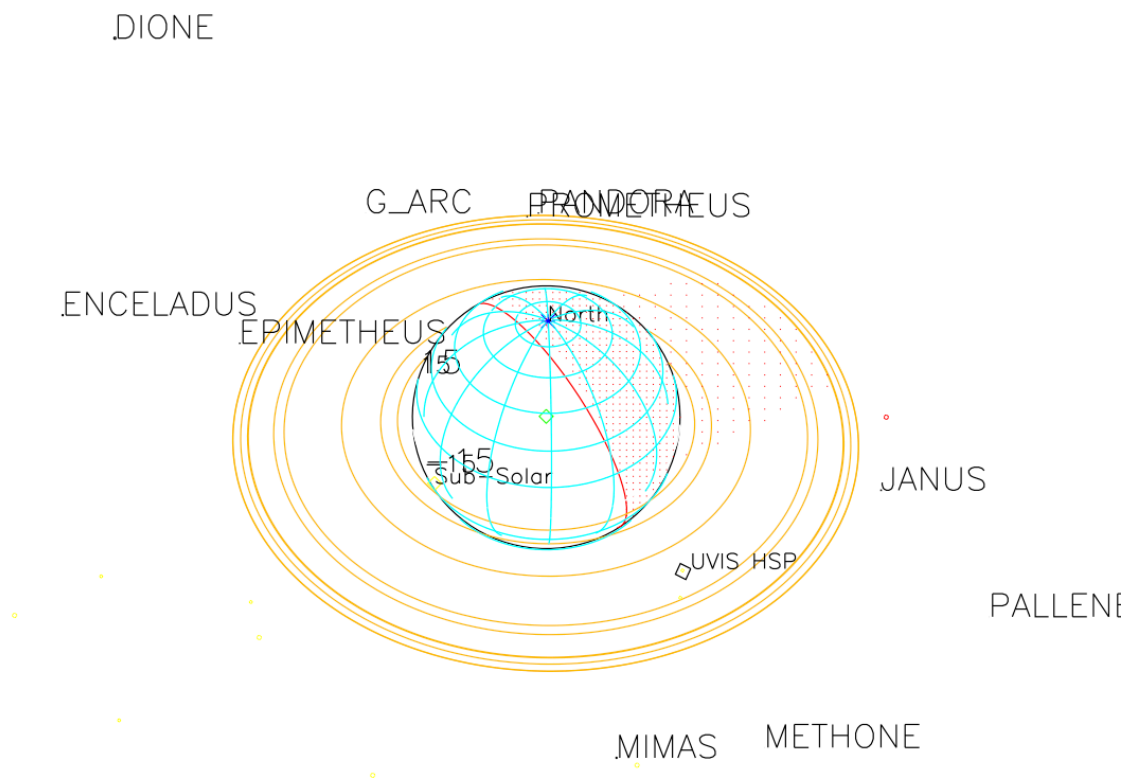
2008-026T13:57:00.000 DE 13:57 2.51 km

Target RA/dec: 208.55, -36.26

Subsolar lat/lon: -7.06, 11.97

Sub-s/c lat/lon: 37.12, 61.82





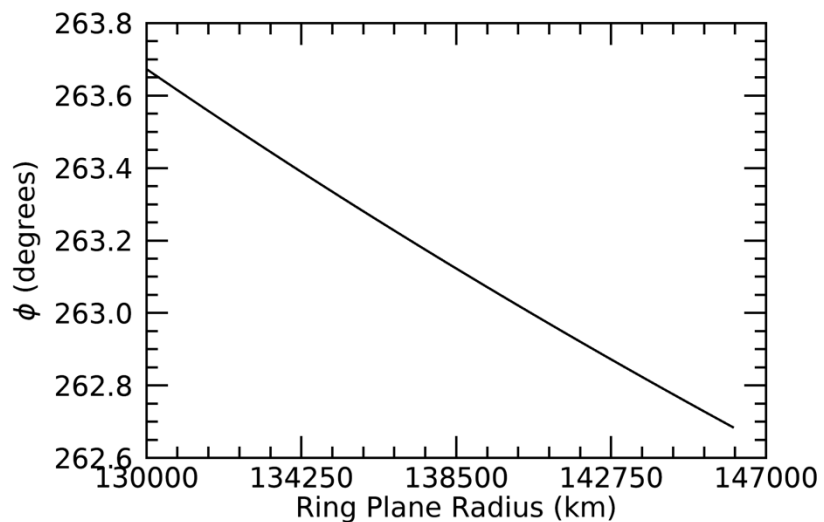
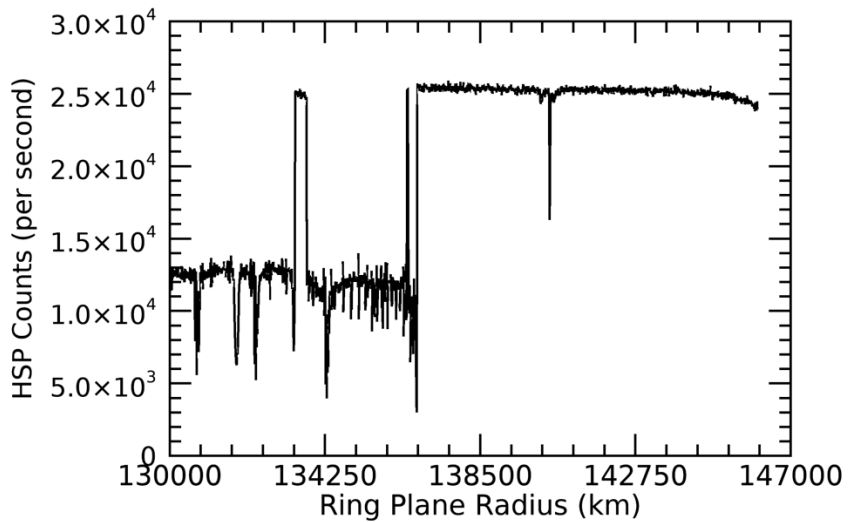
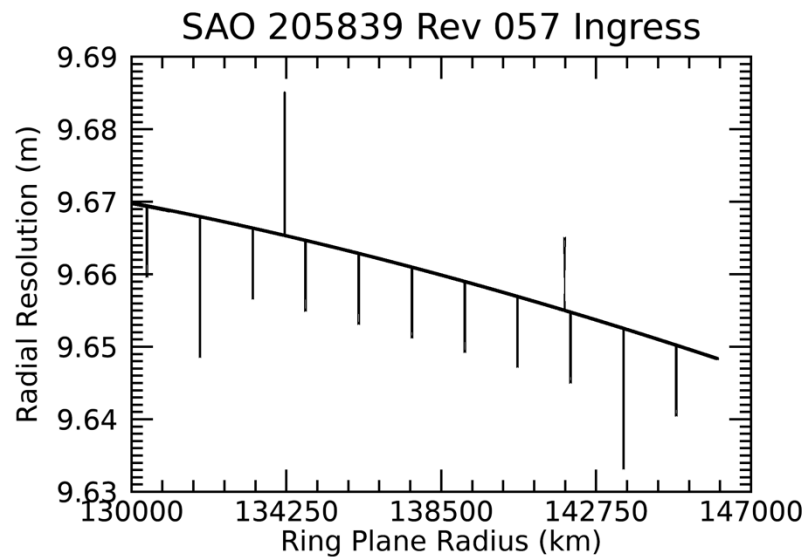
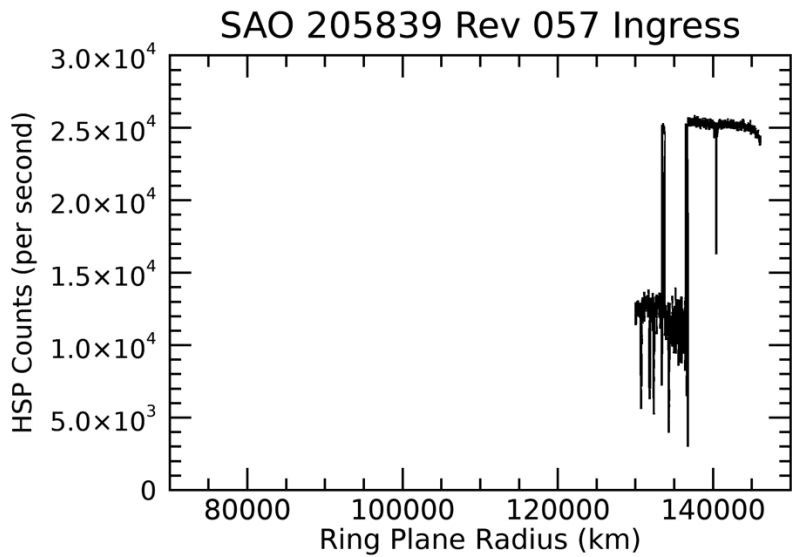
2008-026T17:47:00.000 855735.69 km

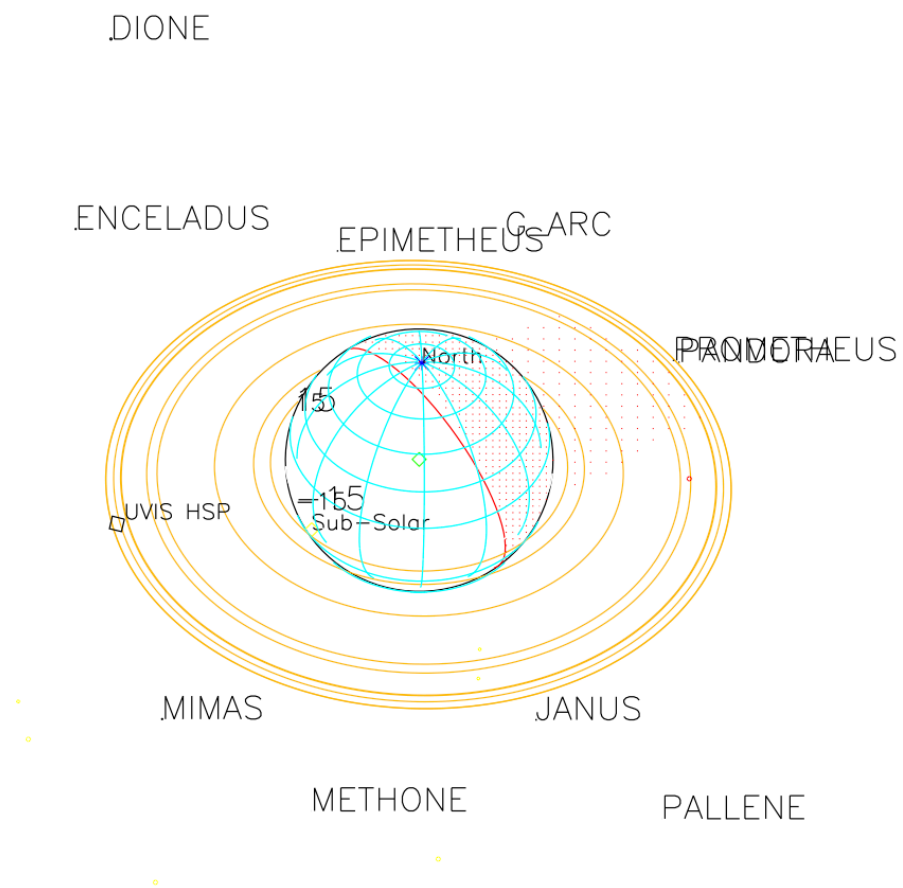
Target RA/dec: 212.87, -37.37

Subsolar lat/lon: -7.06, -117.53

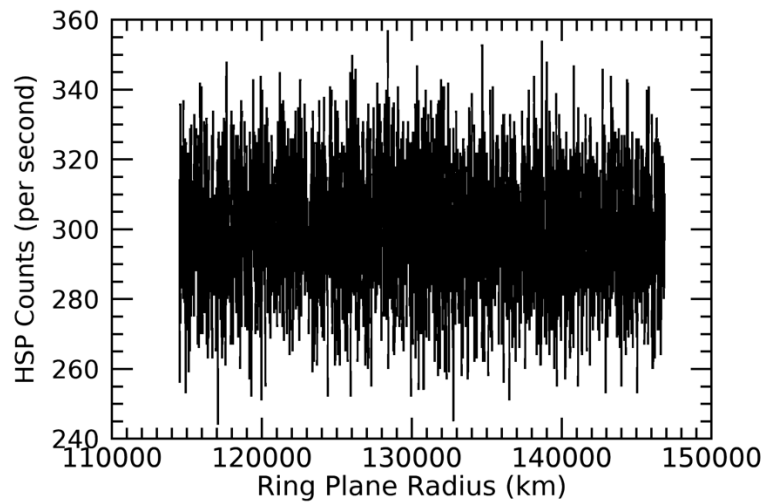
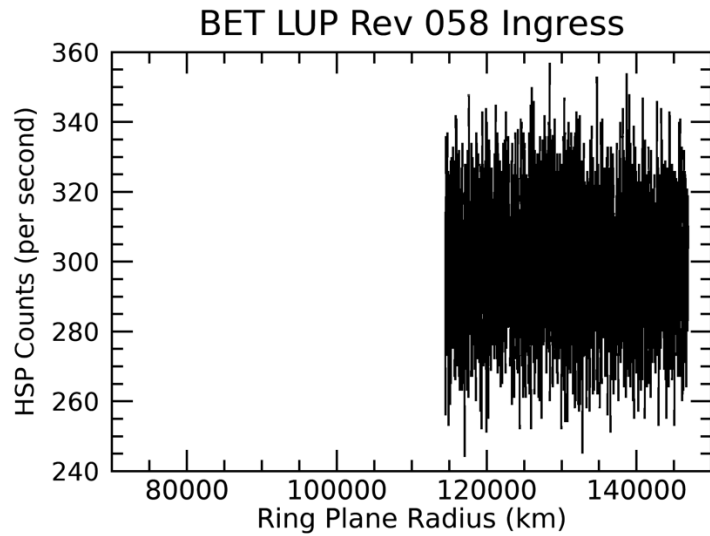
Sub-s/c lat/lon: 38.32, -62.98

TETHYS

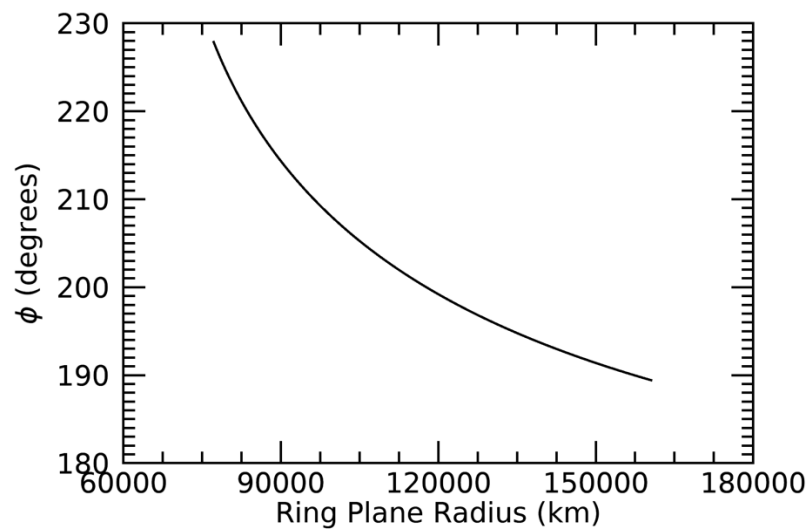
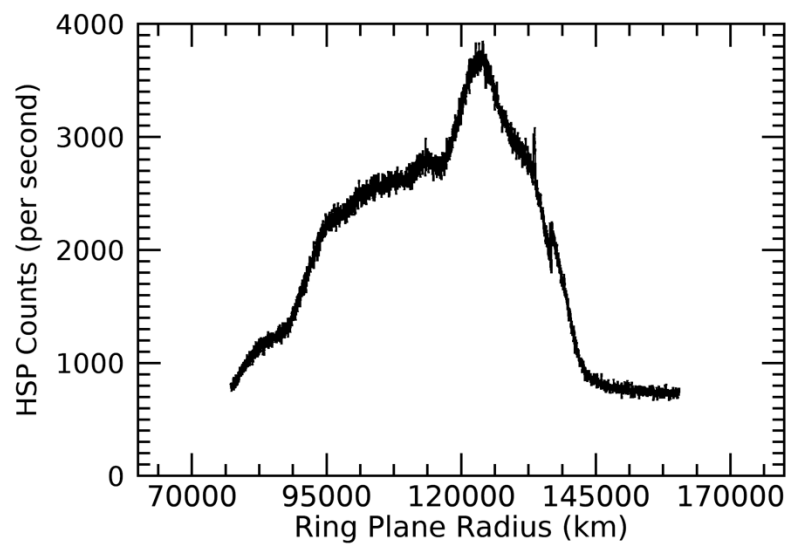
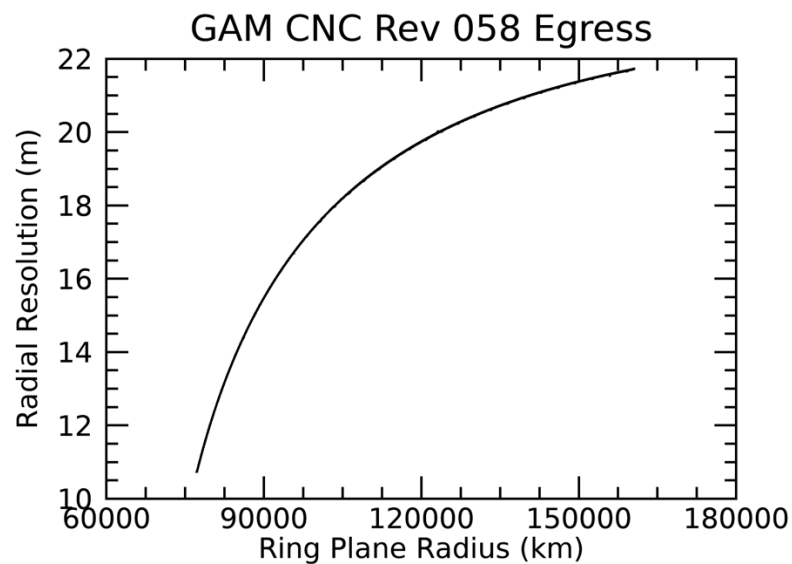
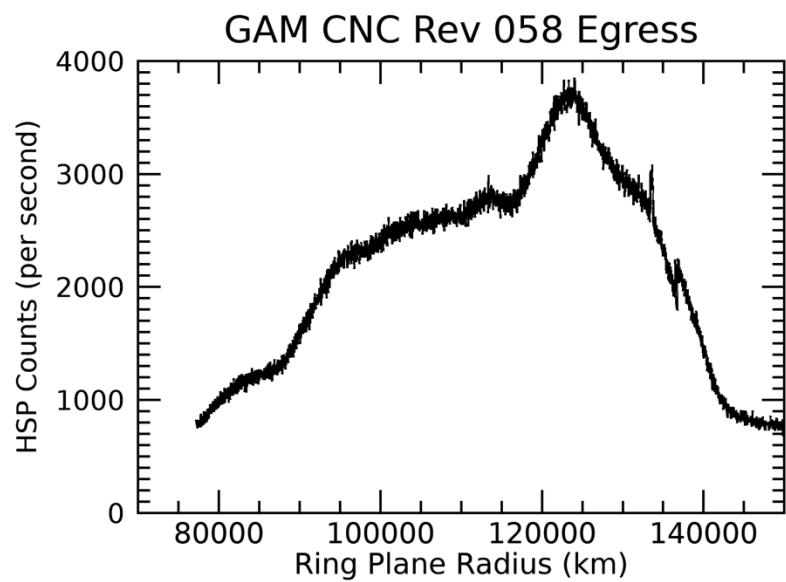


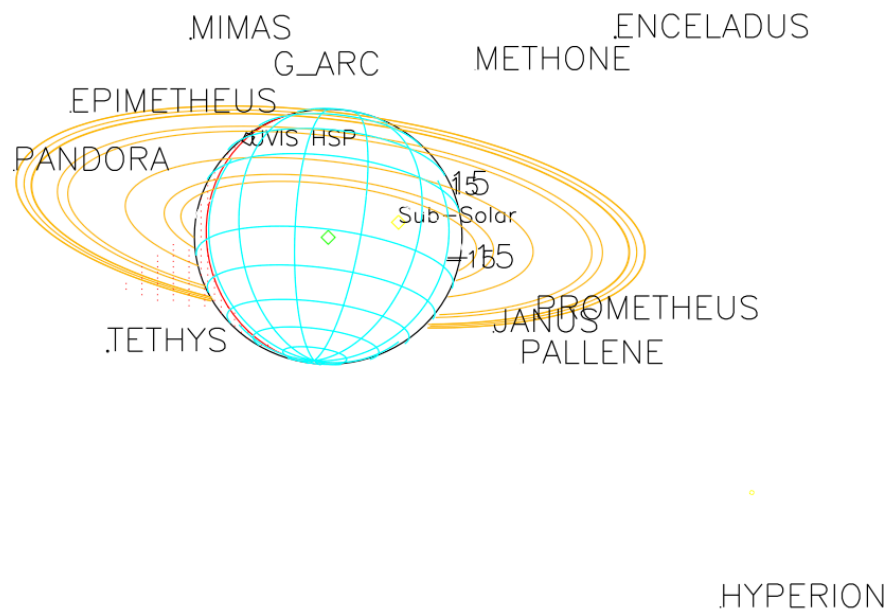


2008-026T15:01:00.000 911157.34 km
 Target RA/dec: 209.67, -36.57
 Subsolar lat/lon: -7.06, -24.06
 Sub-s/c lat/lon: 37.45, 26.99



Note: The pointing data was mis-entered for this observation. The spacecraft was not pointed at the star for this observation. The ring plane radii in these plots are where the star-to-Cassini vector crossed the rings, but the spacecraft was pointing the instrument in a different direction.





2008-040T14:28:00.000 679082.37 km

Target RA/dec: 127.51, 17.84

Subsolar lat/lon: -6.89, 163.85

Sub-s/c lat/lon: -15.11, 135.46