

Cassini Ultraviolet Imaging Spectrograph  
UVIS HSP

Ring Stellar Occultation Atlas

Volume 2: Rev 031 – Rev 039

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  $\phi$ , 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.

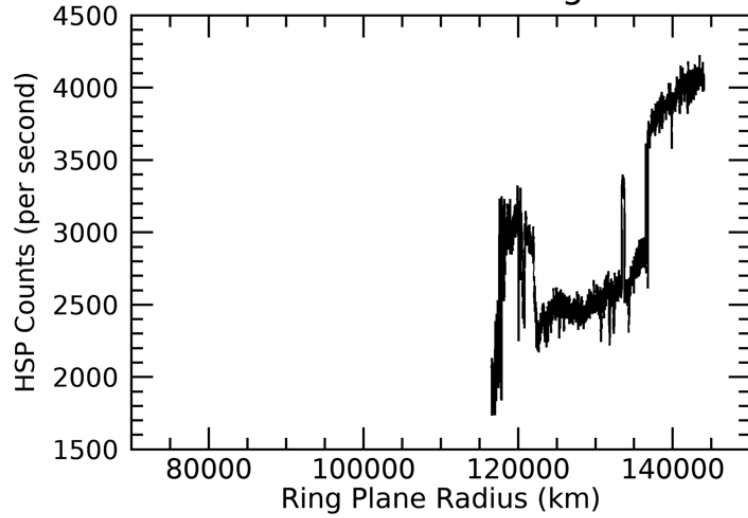
## References

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.

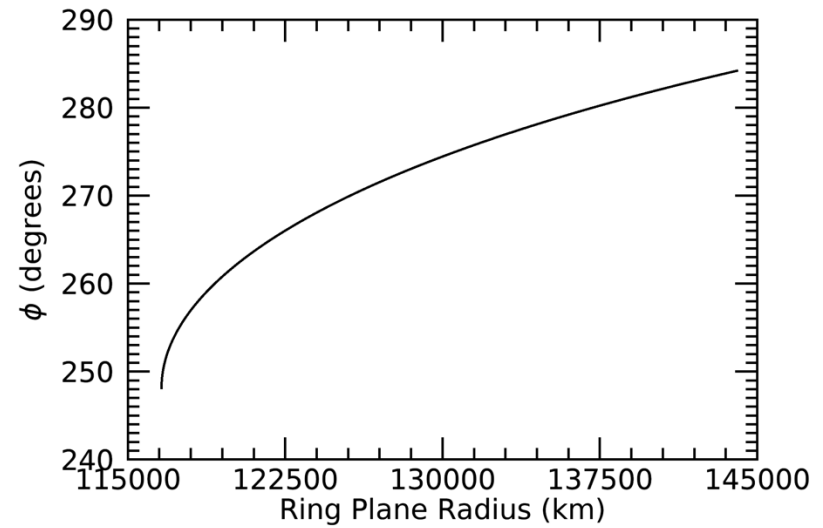
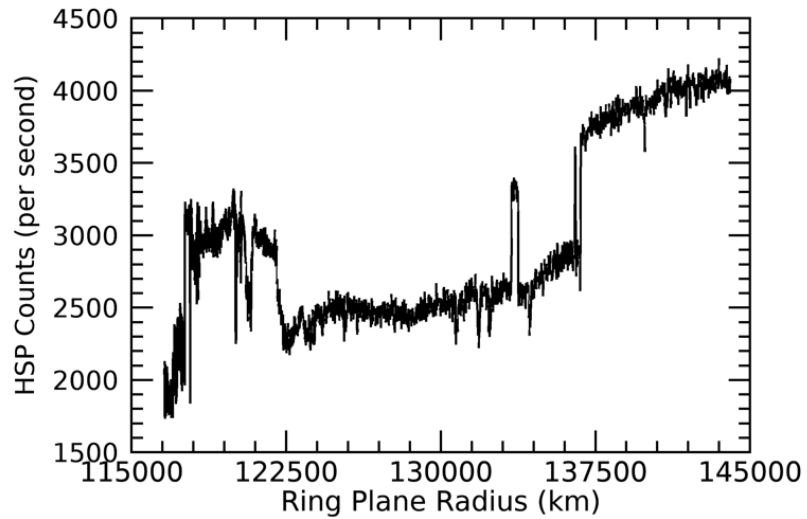
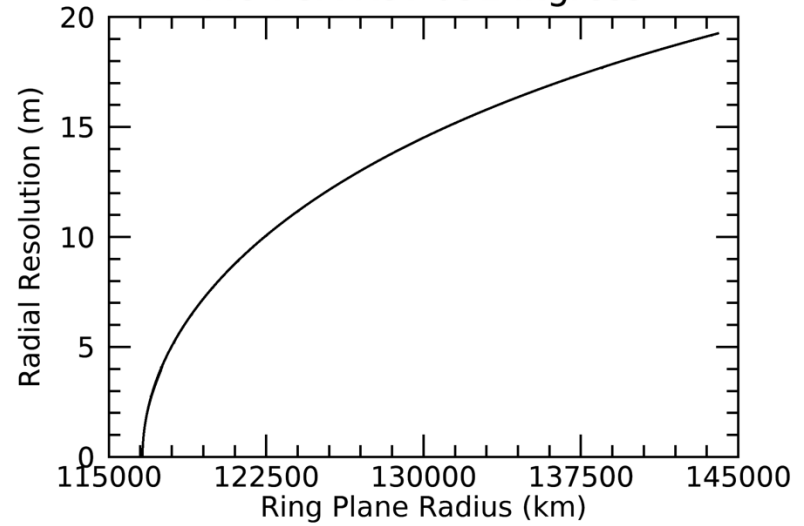


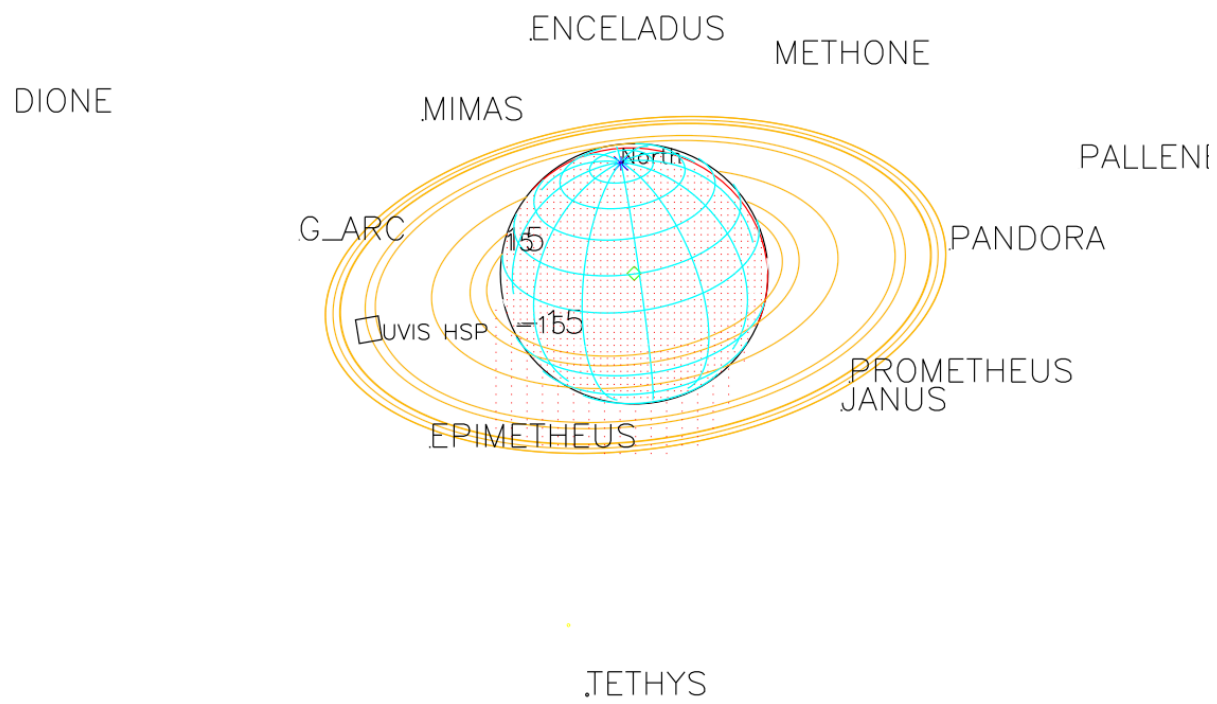
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$\mu$ PSA	31	I	2006-306	30.4	284.2-248.1	144032-116605	343.3
$\alpha$ ARA	32	I	2006-314	54.4	276.5-280.9	139784- 61331	253.9
$\gamma$ LUP	32	E	2006-313	47.4	26.3- 38.2	84310-136201	117.4
$\gamma$ PEG	32	I	2006-311	-20.3	149.5-110.6	155443-103921	128.5
$\mu$ PSA	32	E	2006-318	30.4	248.1-245.2	118449-118607	24.8
$\mu$ PSA	32	I	2006-318	30.4	282.6-248.1	143456-118449	328
$\alpha$ ARA	33	I	2006-325	54.4	276.6-280.8	145355- 65875	257.7
$\alpha$ VIR	34	E	2006-337	17.3	282.1-344.7	74536-160111	71.3
$\alpha$ VIR	34	I	2006-337	17.3	220.9-282.1	153653- 74536	67.7
$\eta$ LUP	34	E	2006-337	44.5	325.0- 7.9	106848-143846	208.6
$\eta$ LUP	34	I	2006-337	44.5	286.1-325.0	135360-106848	181
$\alpha$ ARA	35	E	2006-352	54.4	120.1-113.2	126866-173466	231.5
$\alpha$ ARA	35	I	2006-352	54.4	252.0-221.2	130424- 64855	377.1
$\kappa$ CEN	35	E	2006-350	48.5	108.9- 76.5	68852-146177	279.4
$\alpha$ ARA	36	E	2007-004	54.4	3.3- 55.5	70897-115412	420.5
$\alpha$ ARA	36	I	2007-004	54.4	311.6- 3.3	113951- 70897	412
$\delta$ PER	36	E	2006-364	-54	68.3- 65.7	66531-140901	138.5
$\varepsilon$ LUP	36	E	2007-003	51	36.7- 48.3	63449-148844	307.2
$\gamma$ PEG	36	E	2006-363	-20.3	101.6- 55.7	102295-146797	119.5
$\gamma$ PEG	36	I	2006-363	-20.3	156.6-101.6	178177-102295	165.7
$\kappa$ CEN	36	I	2007-002	48.5	237.8-250.0	156380- 63523	305.7
$\delta$ PER	37	I	2007-015	-54	258.2-281.1	142583- 60043	187.9
$\varepsilon$ LUP	37	E	2007-020	51	324.8- 10.9	99478-142940	363.2
$\varepsilon$ LUP	37	I	2007-020	51	284.8-324.8	129588- 99478	293.8
$\gamma$ ARA	37	E	2007-022	61	142.5-117.2	80500-155605	382.7
$\gamma$ ARA	37	I	2007-022	61	251.2-245.6	147952-121466	126.5
$\gamma$ GRU	37	E	2007-009	35.1	244.3-219.6	137189-150988	216.6
$\gamma$ GRU	37	I	2007-009	35.1	-1.0- -1.0	147326-137189	184.5
$\varepsilon$ PSA	38	E	2007-027	23.7	255.1-239.1	82194- 85530	43.5
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$\gamma$ ARA	38	I	2007-041	61	218.8-212.6	93028- 87182	47.7
$\psi$ CEN	38	I	2007-038	44.3	243.8-260.3	150171- 96418	205.6
$\chi$ CEN	39	I	2007-057	47.6	183.9-159.9	148429- 98598	269.8
$\delta$ PER	39	I	2007-049	-54	257.8-284.1	143283- 55504	218.8
$\varepsilon$ PSA	39	E	2007-045	23.7	255.0-233.6	86909- 93340	55.9
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MU PSA Rev 031 Ingress



MU PSA Rev 031 Ingress





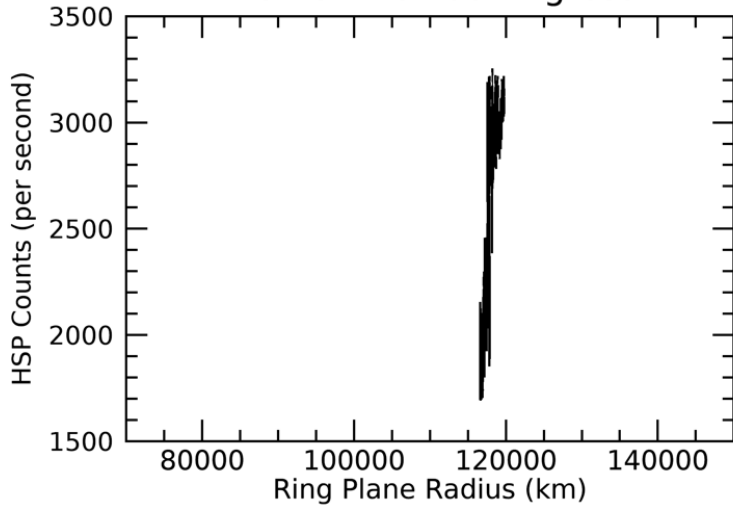
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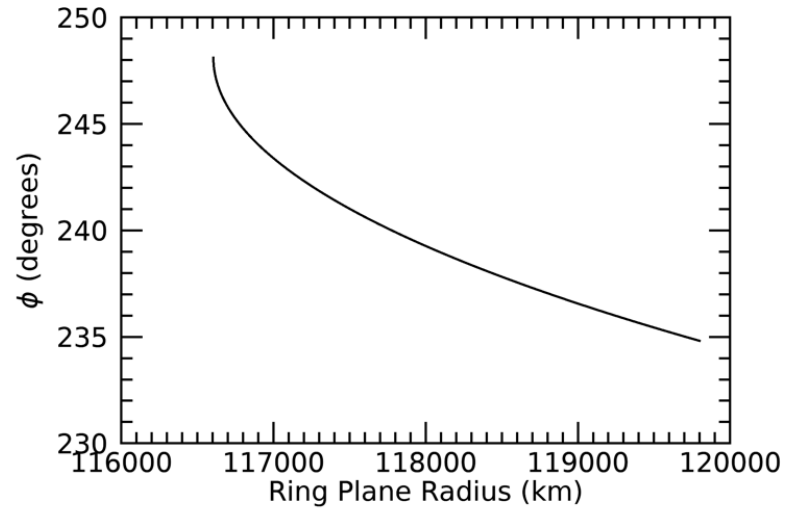
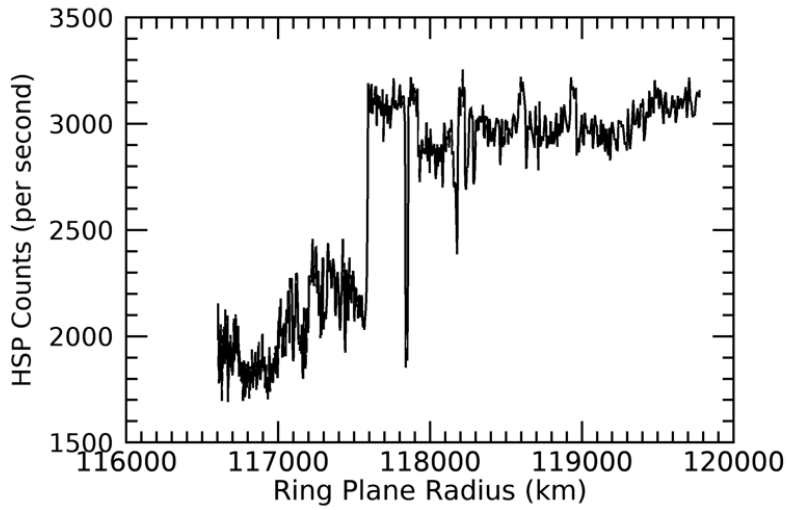
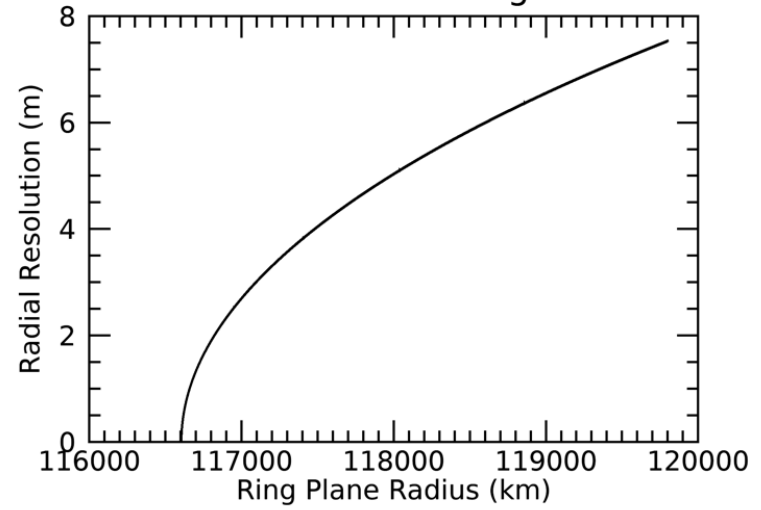
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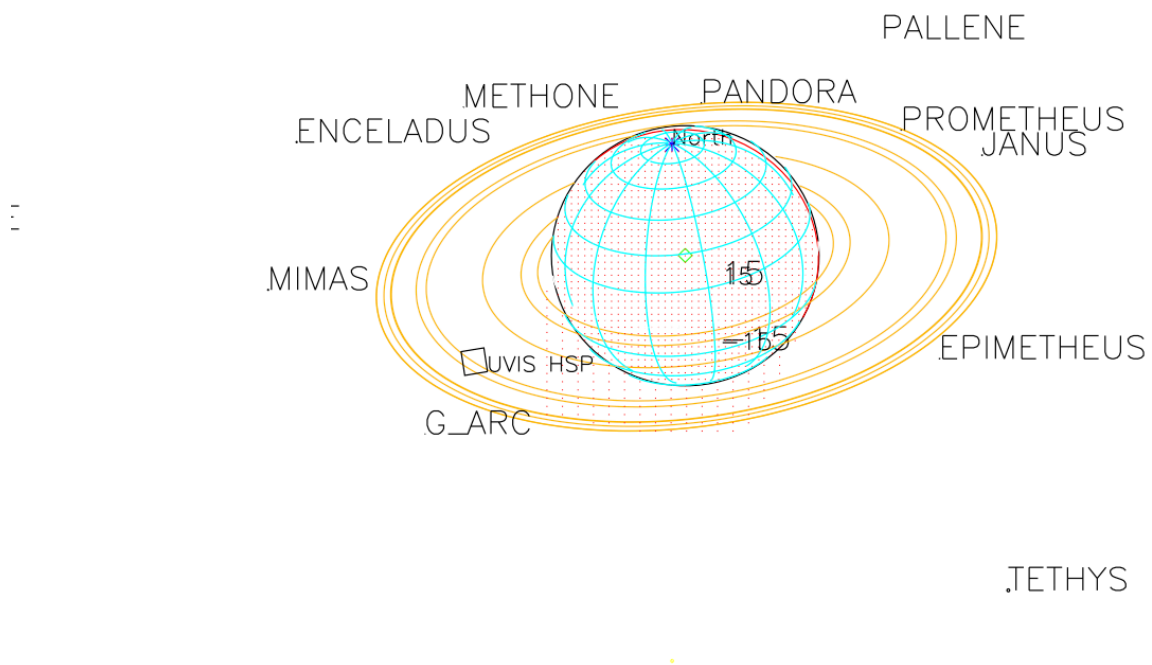
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MU PSA Rev 031 Egress



MU PSA Rev 031 Egress



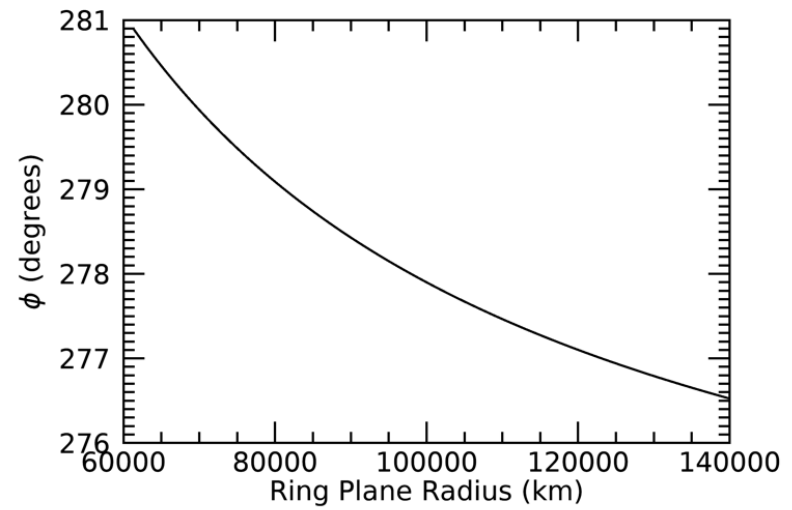
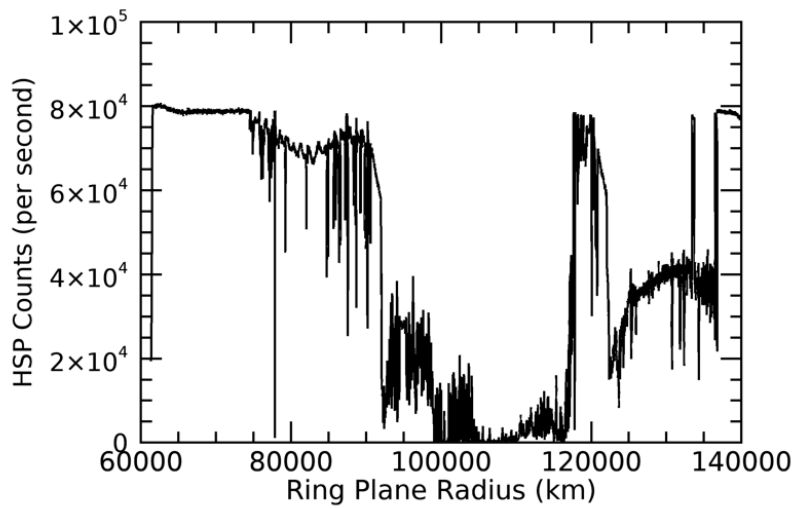
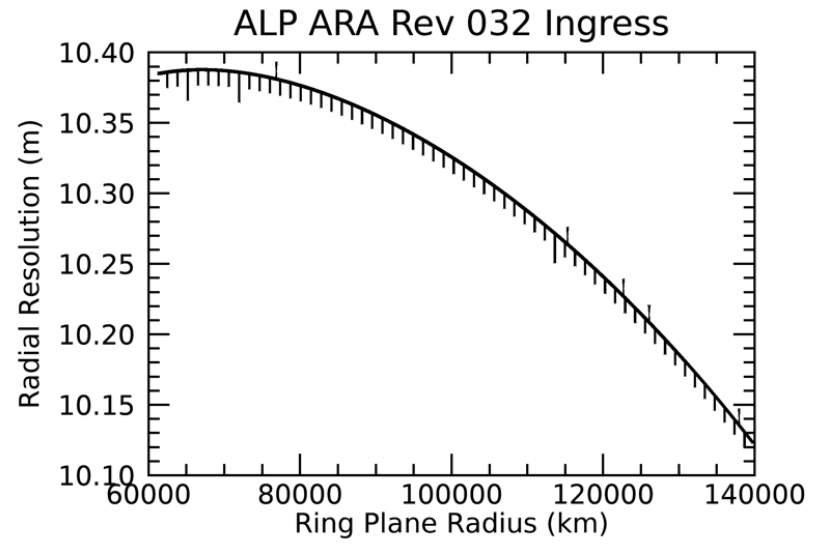
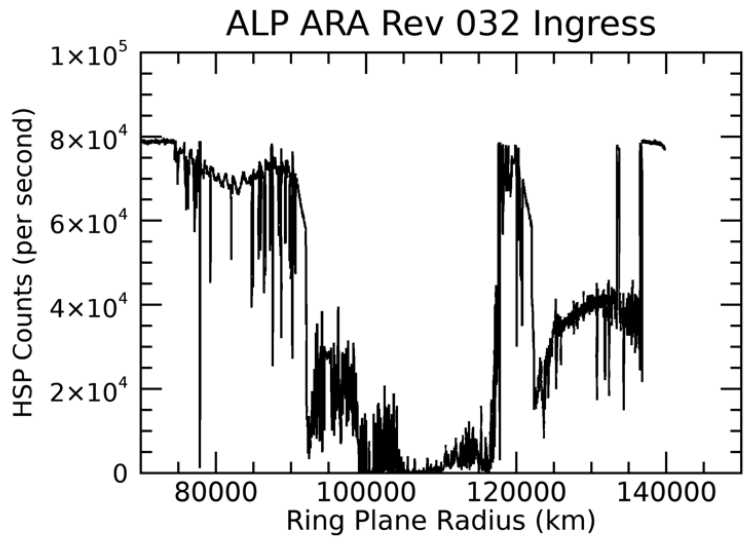


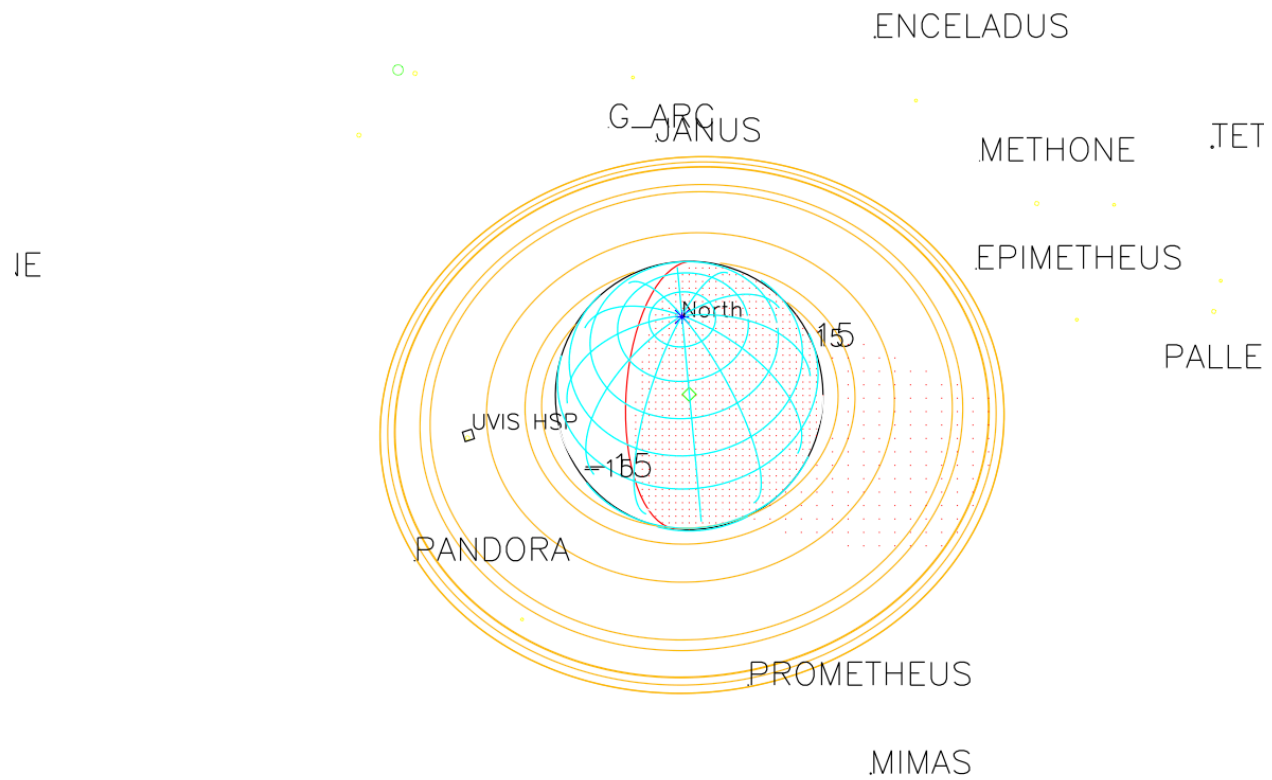
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Sub-s/c lat/lon: 24.79, -128.99



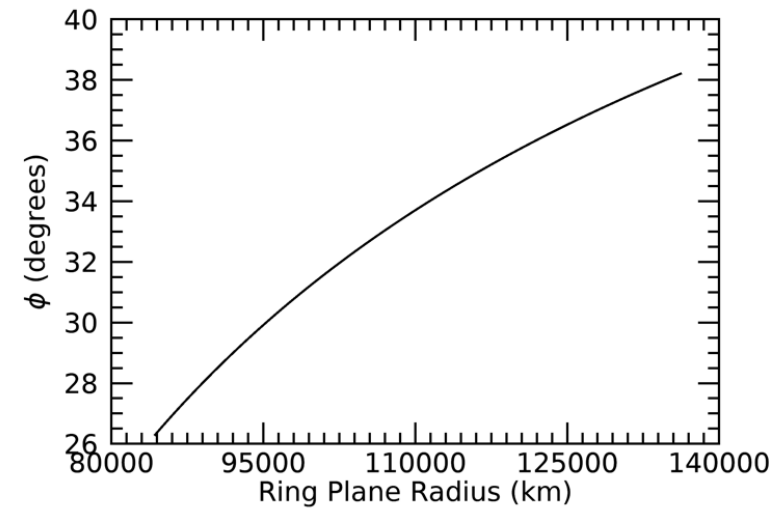
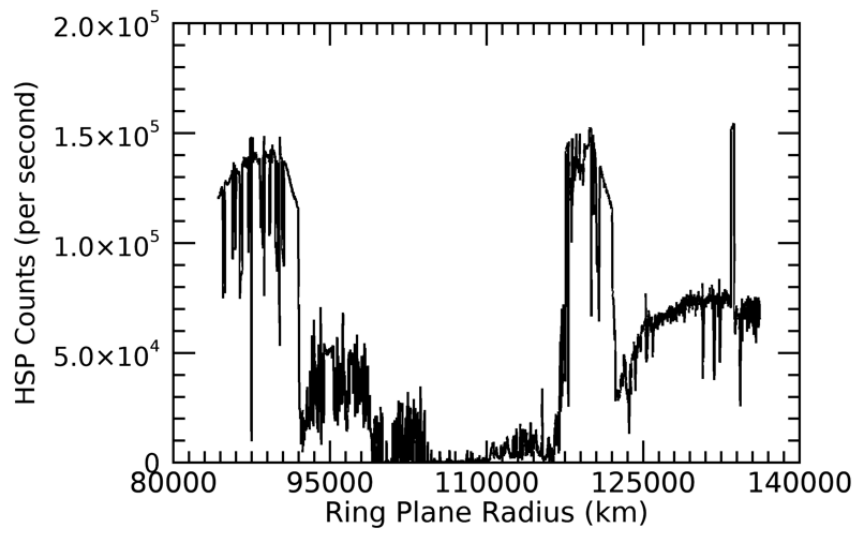
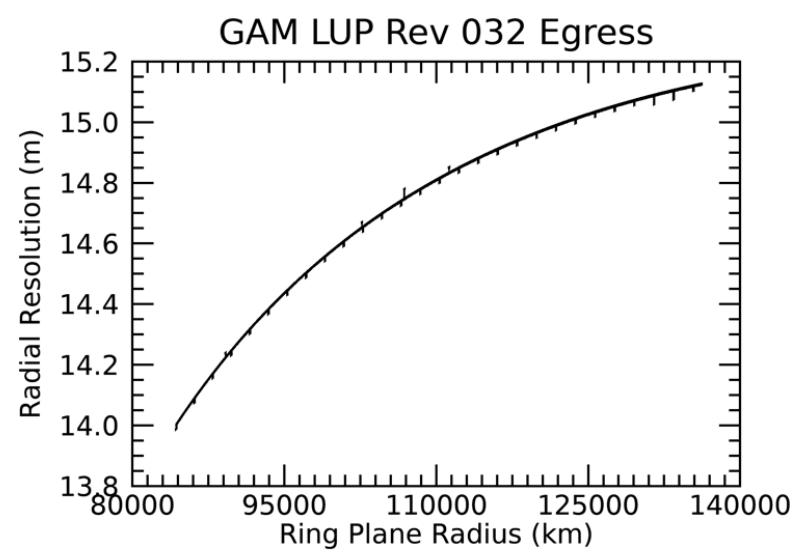
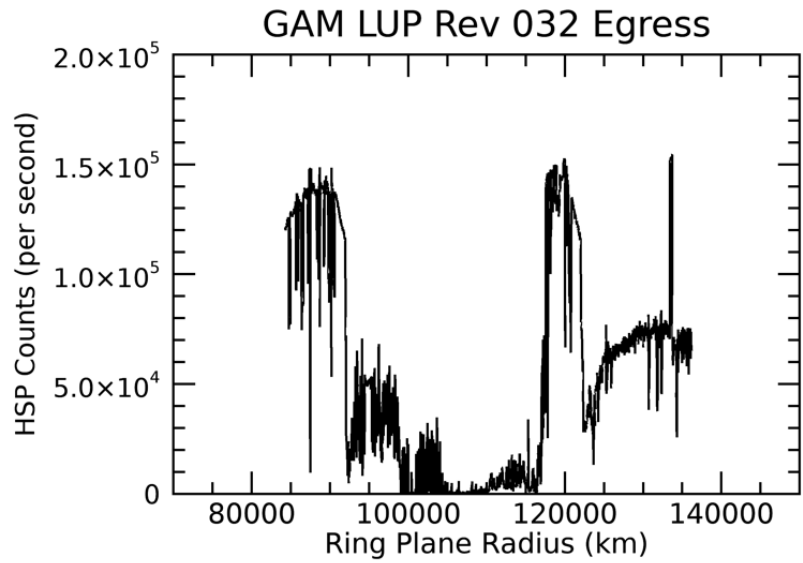


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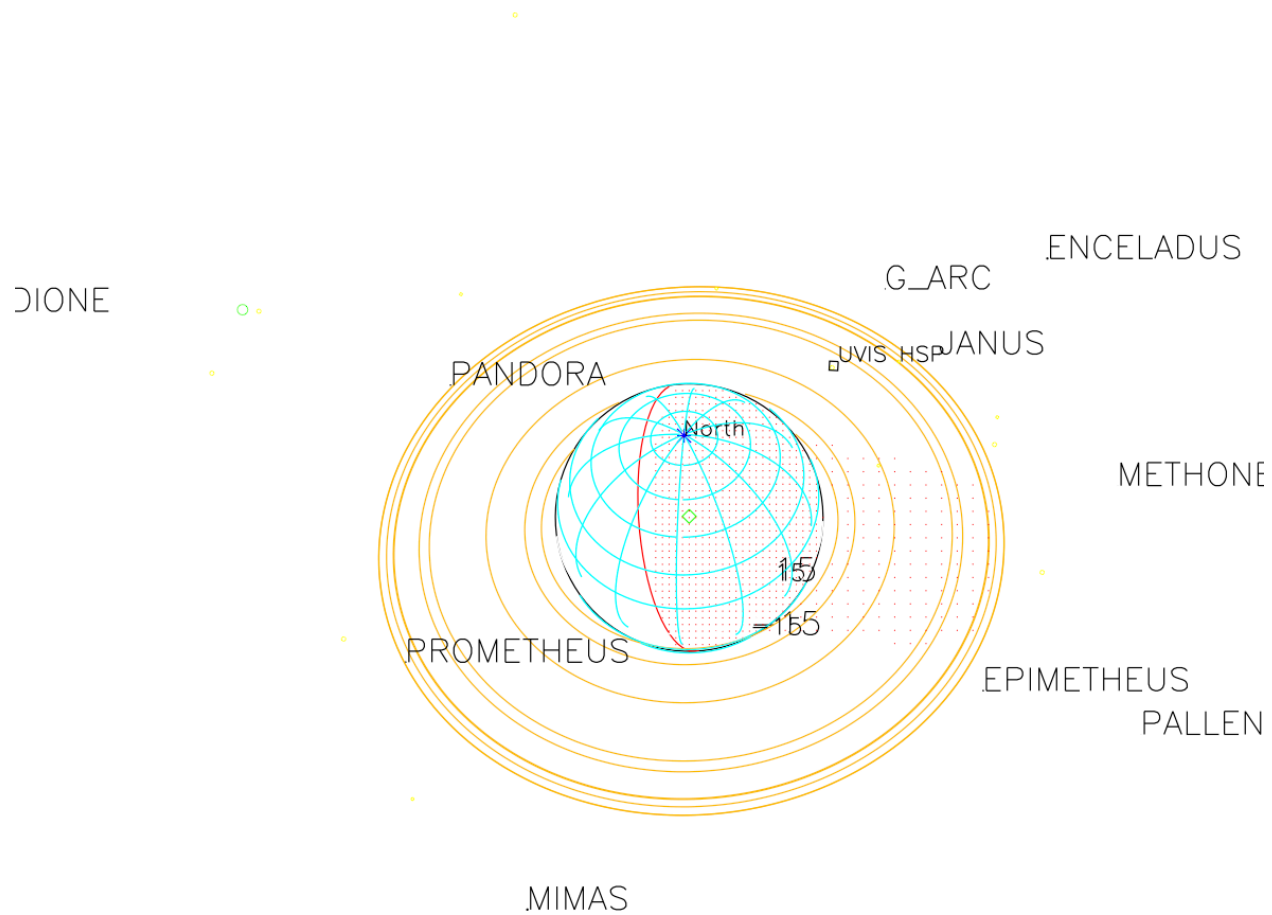
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Sub-s/c lat/lon: 49.26, 89.91





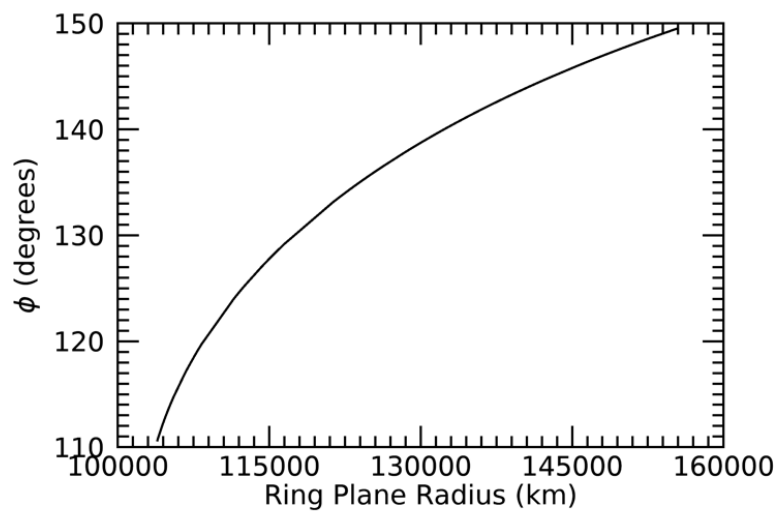
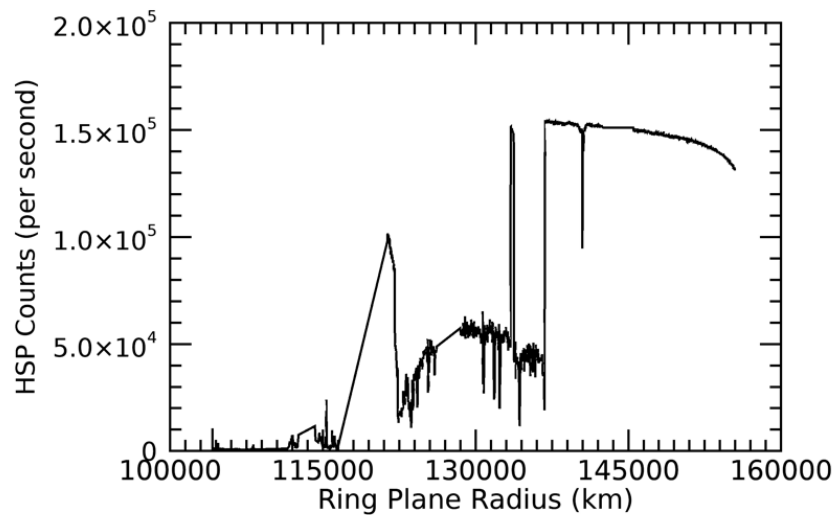
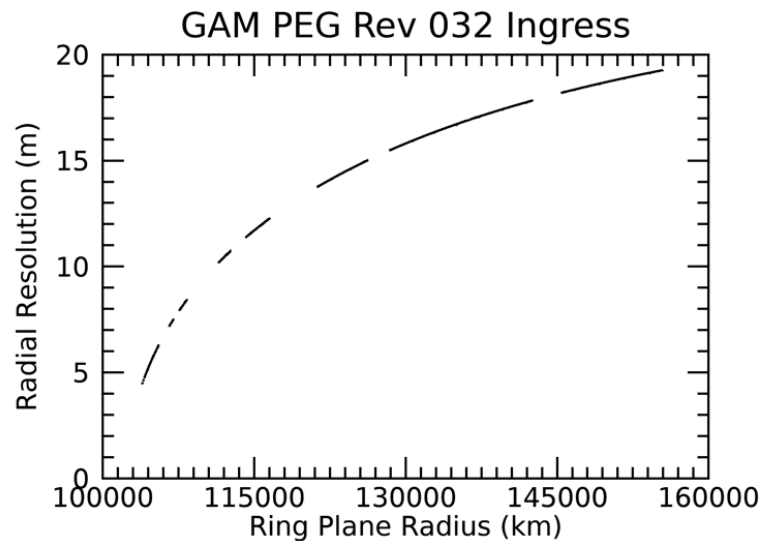
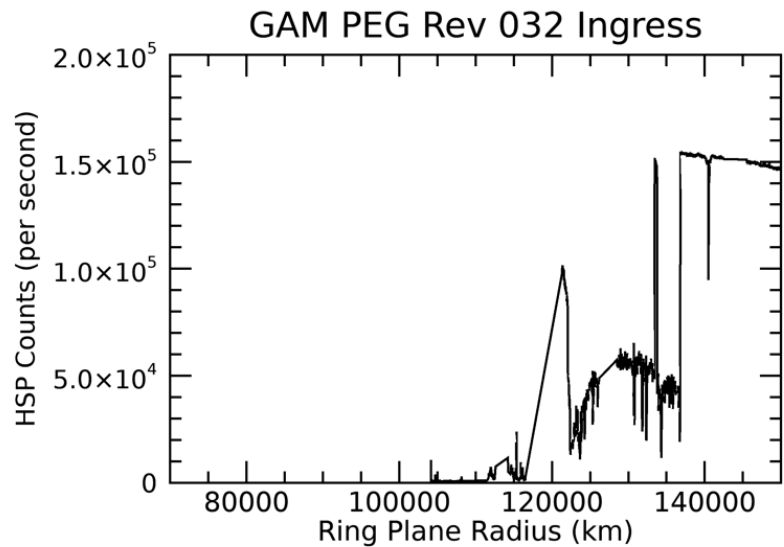


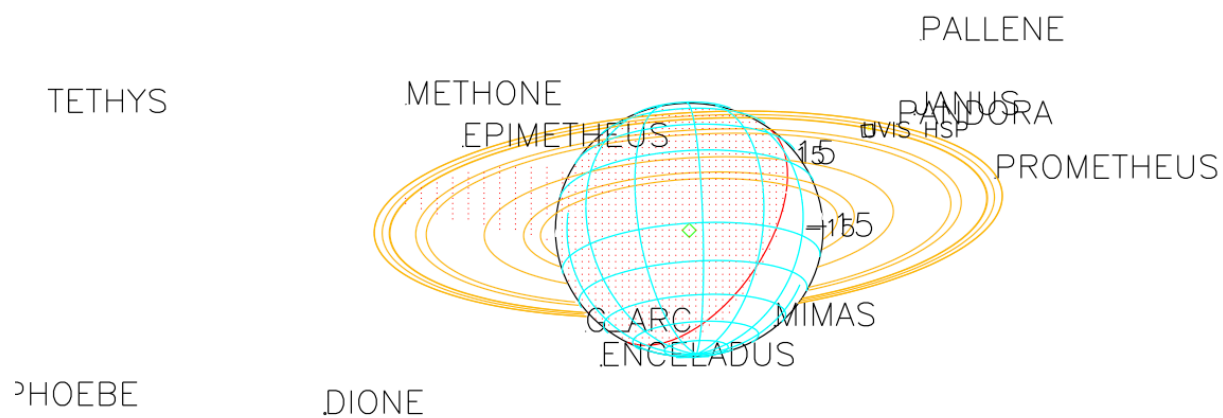
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Sub-s/c lat/lon: 47.88, -171.81



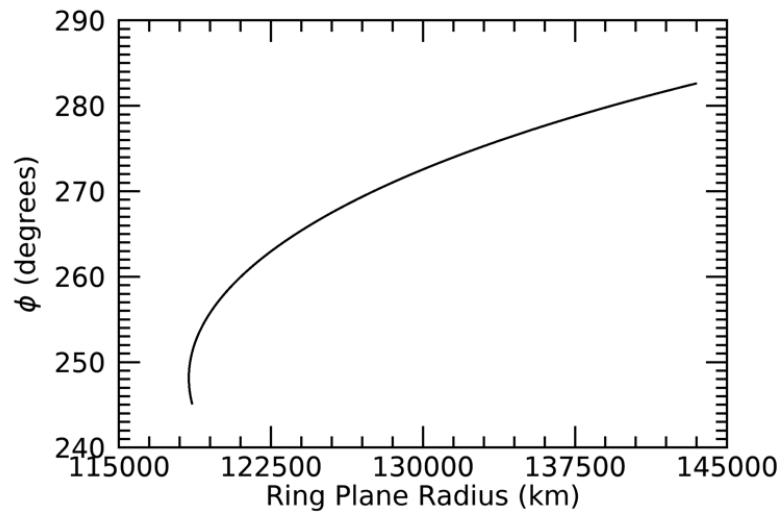
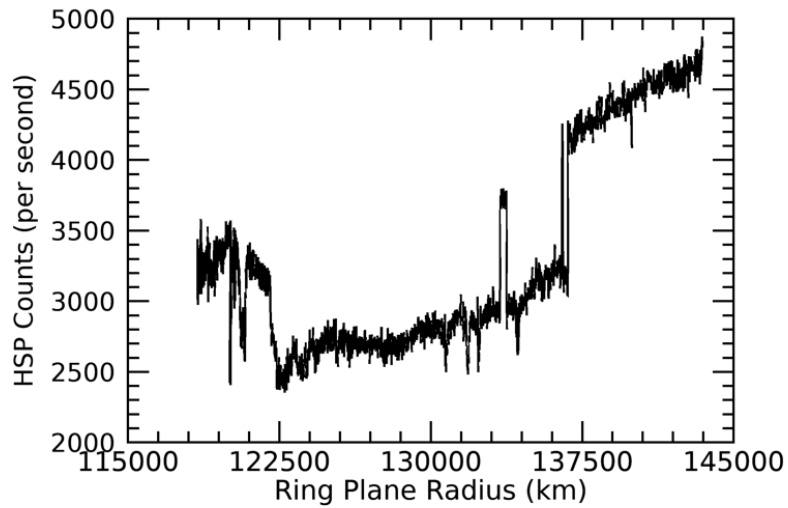
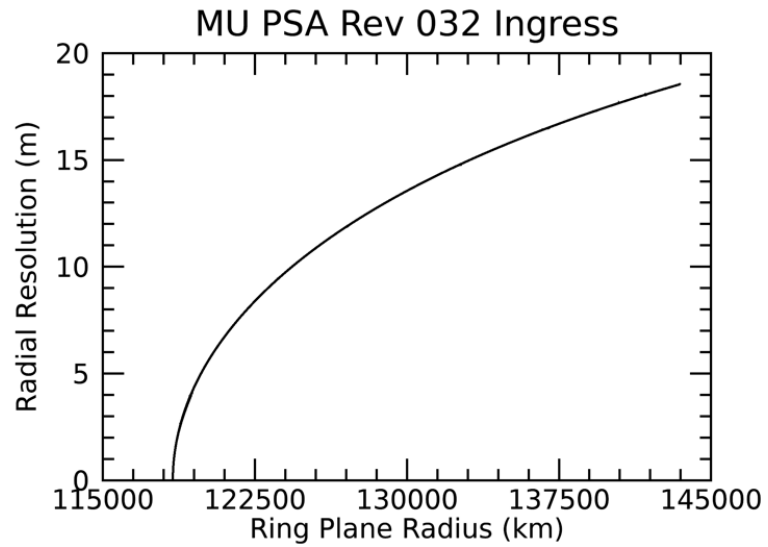
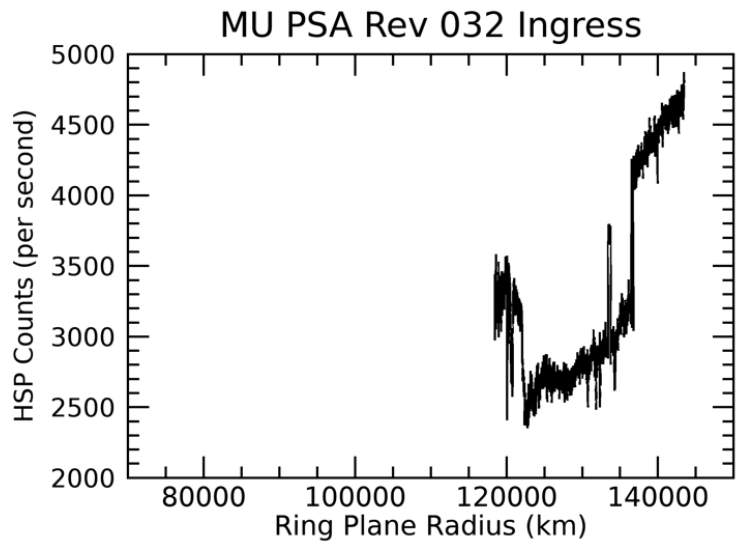


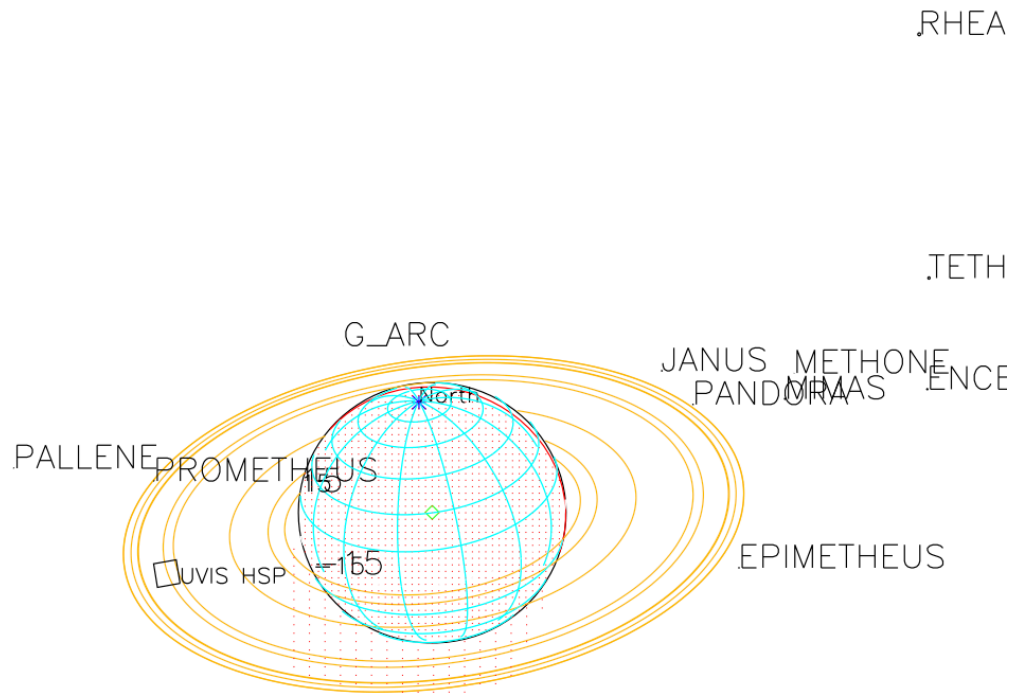
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Target RA/dec: 8.99, 12.26

Subsolar lat/lon: -12.41, -81.78

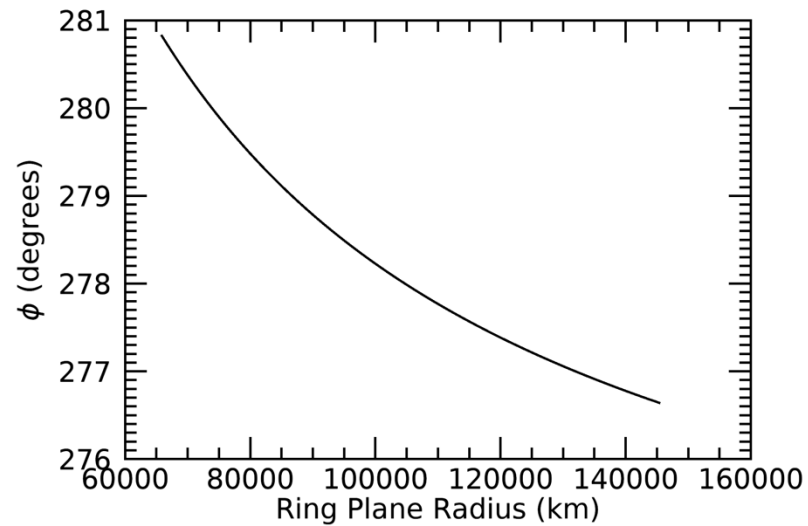
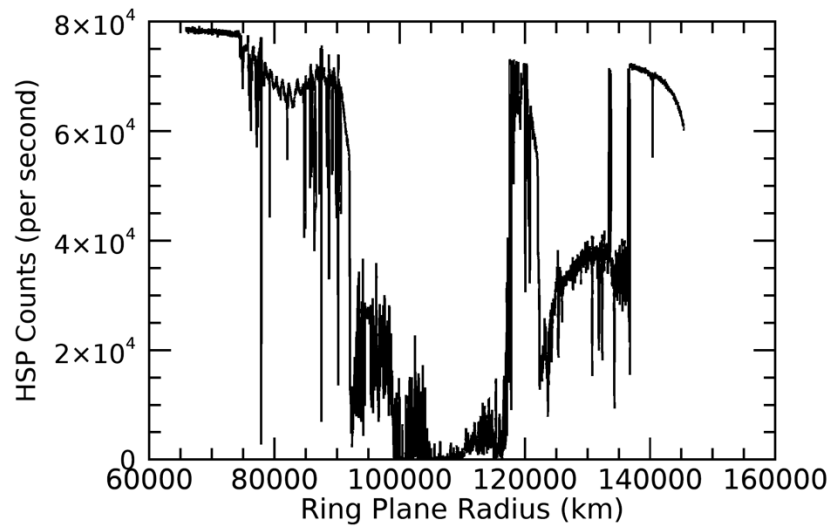
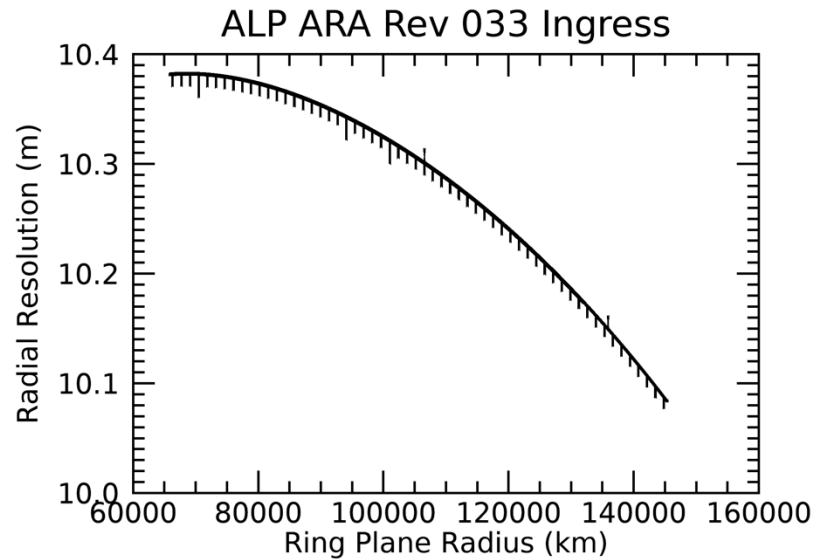
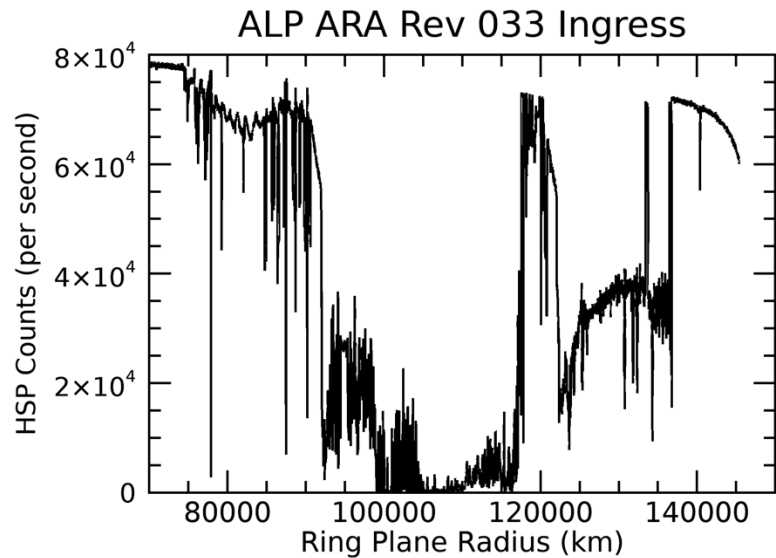
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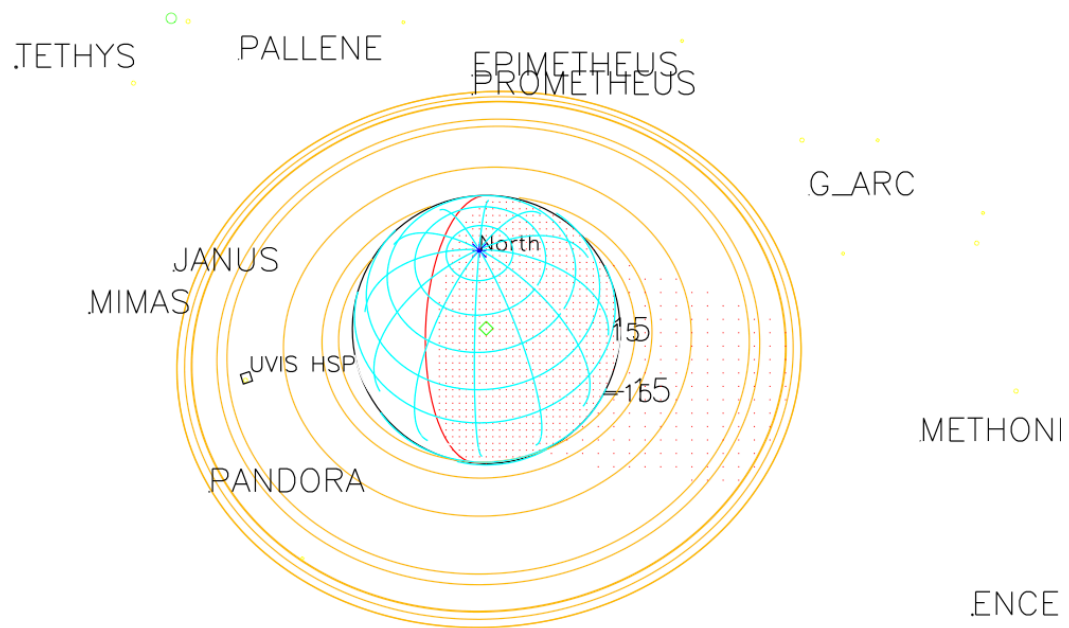




2006-318T03:26:00.000 1712416.0 km  
 Target RA/dec: 327.24, -32.25  
 Subsolar lat/lon: -12.33, 160.36  
 Sub-s/c lat/lon: 25.48, -11.58

DIONE





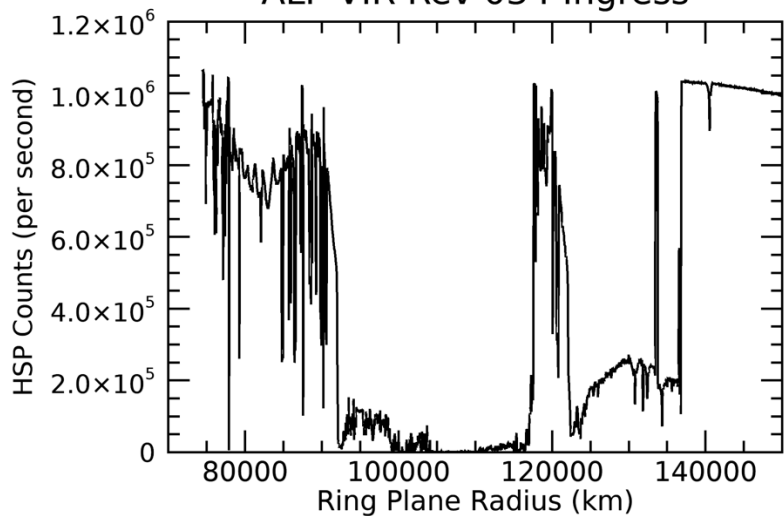
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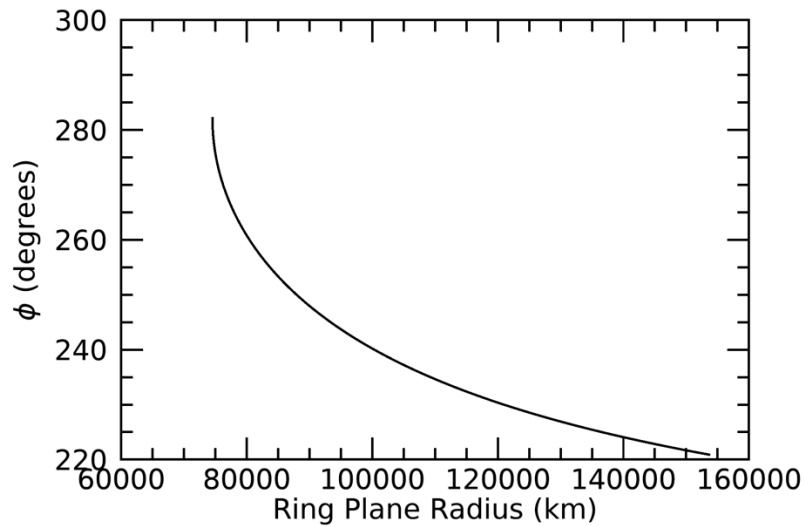
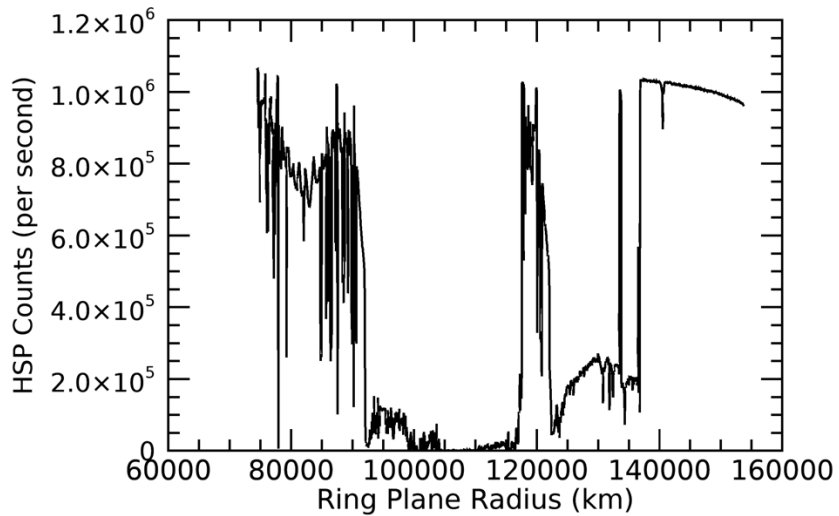
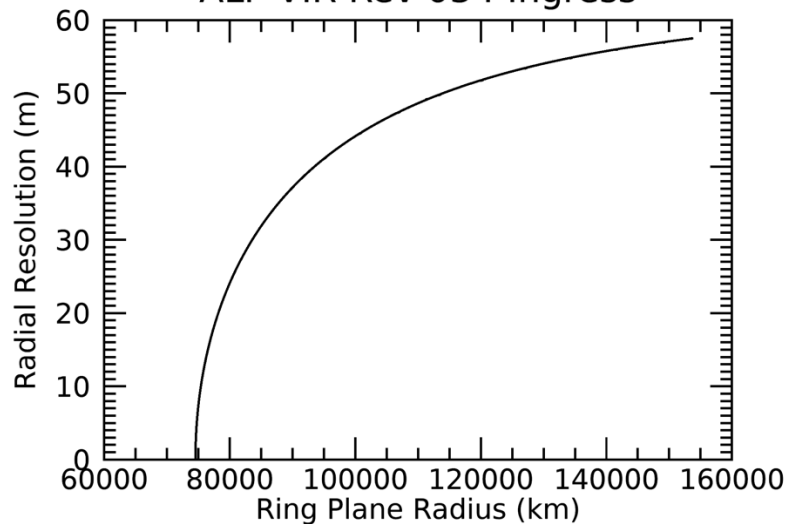
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Sub-s/c lat/lon: 49.17, 128.48

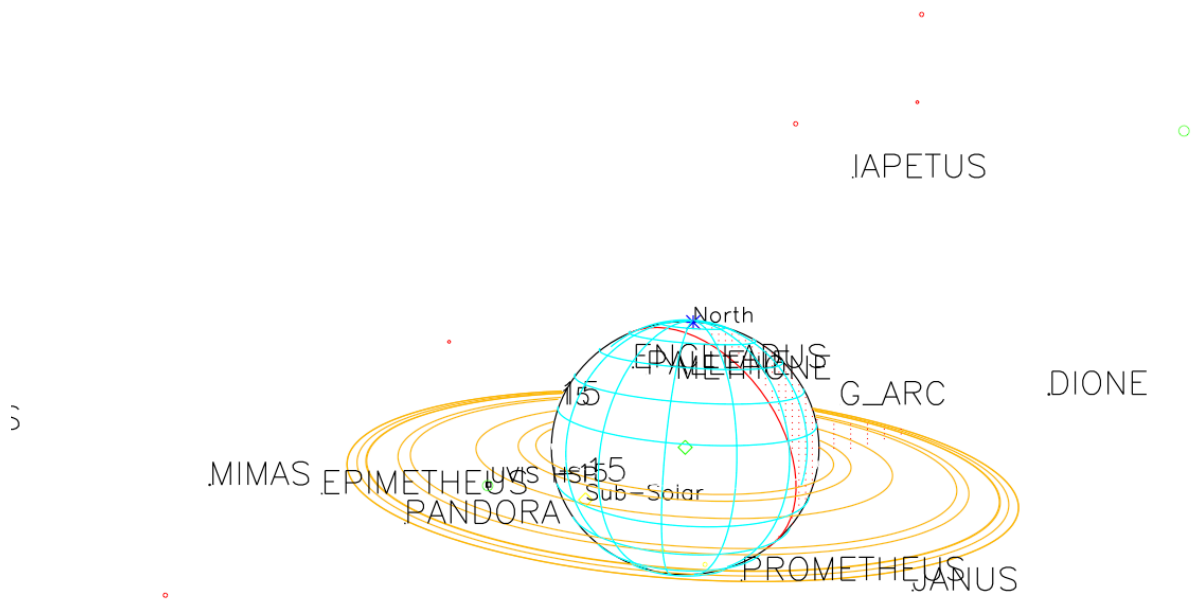
ALP VIR Rev 034 Ingress



ALP VIR Rev 034 Ingress







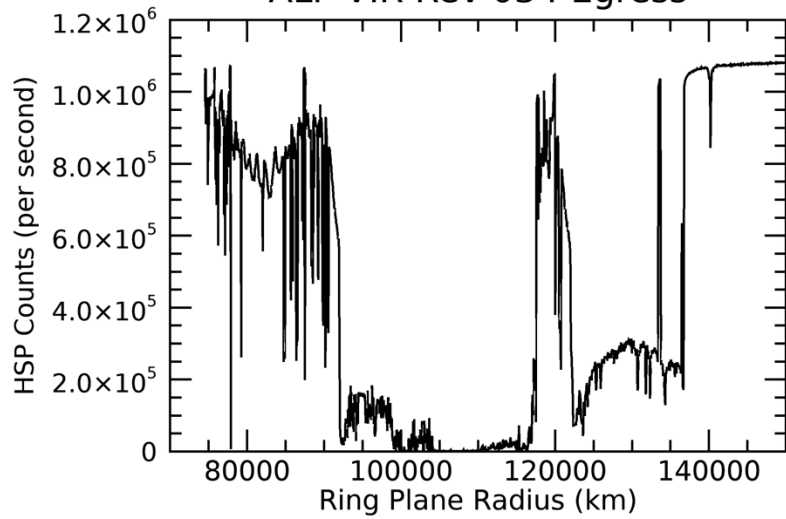
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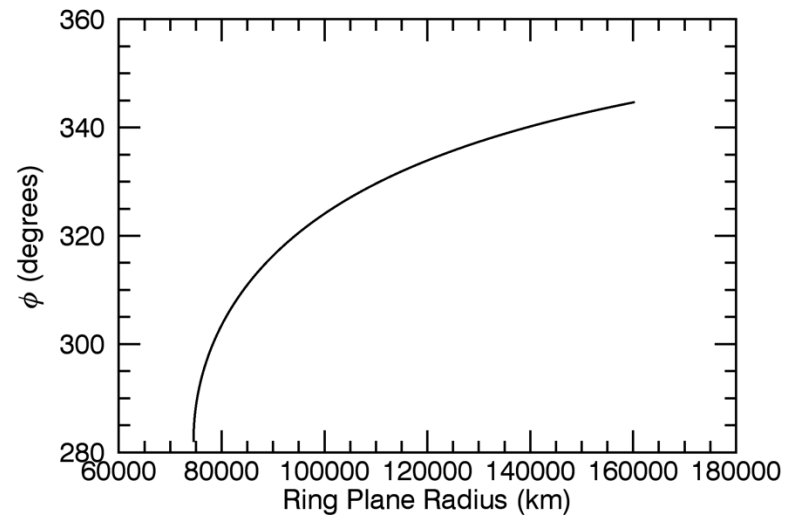
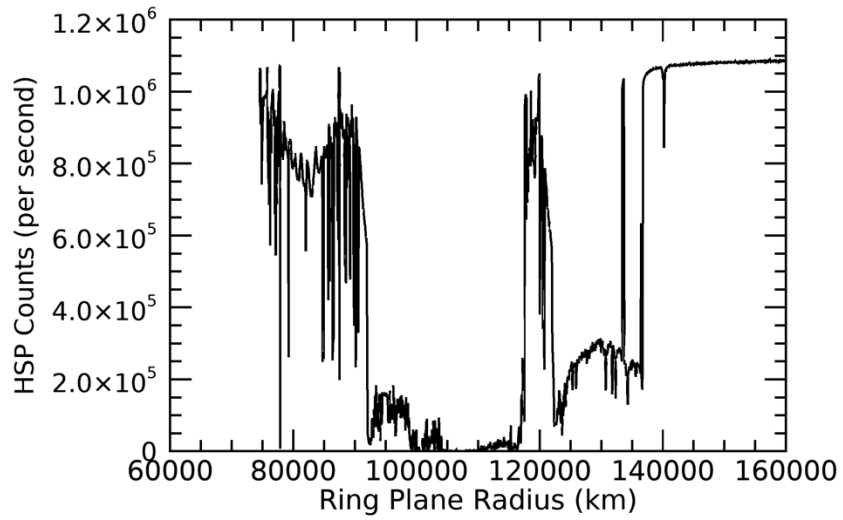
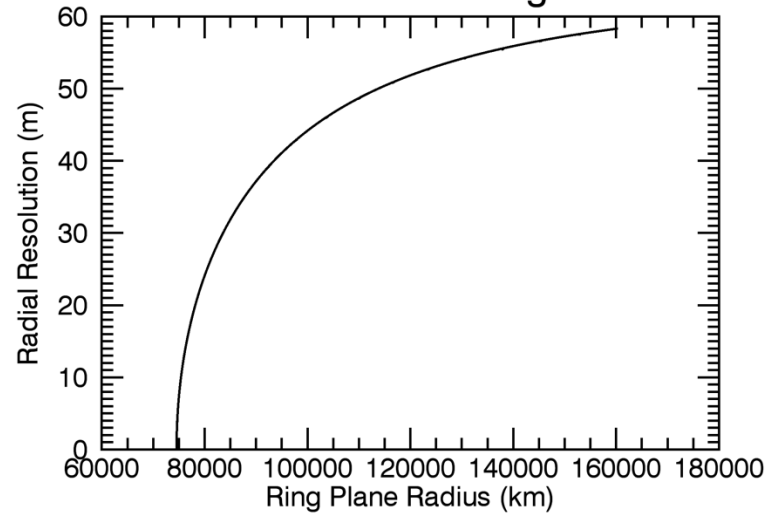
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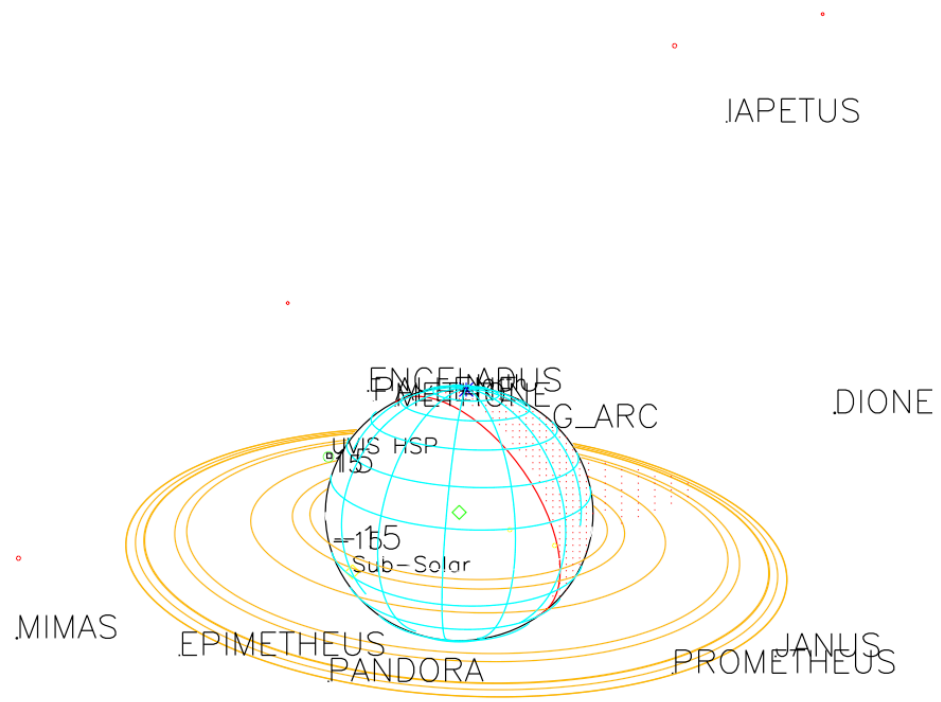
Sub-s/c lat/lon: 11.80, -51.85

ALP VIR Rev 034 Egress



ALP VIR Rev 034 Egress





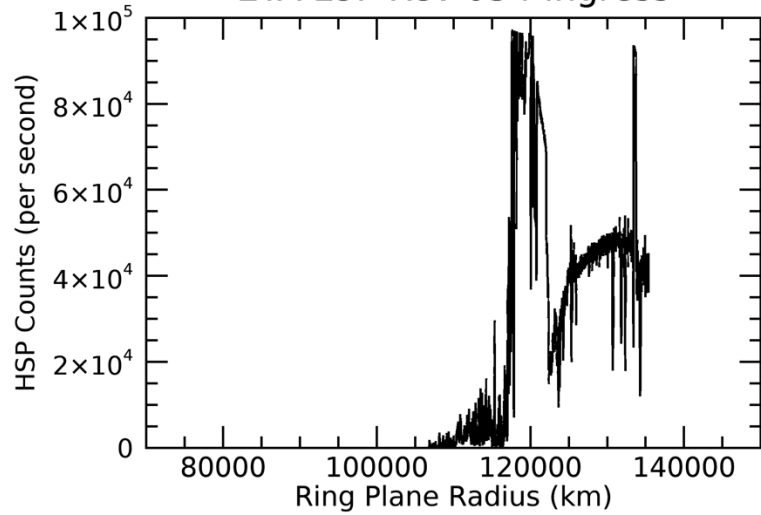
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Target RA/dec: 191.42,  $-15.31$

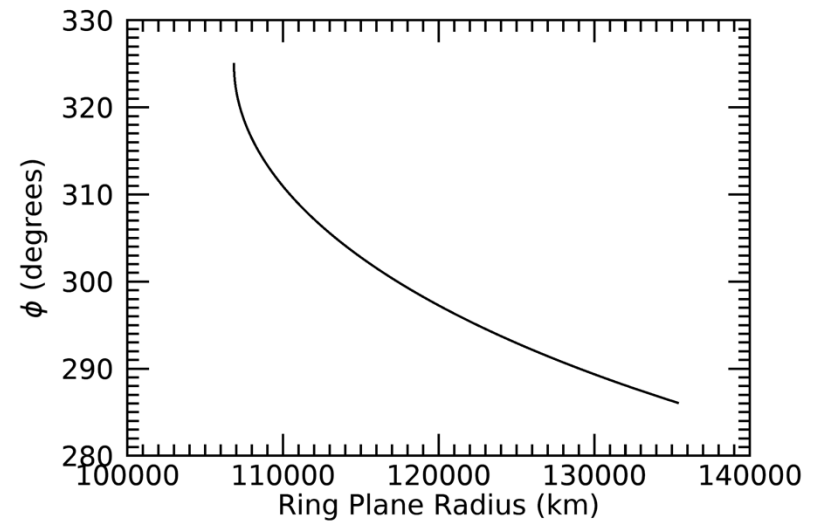
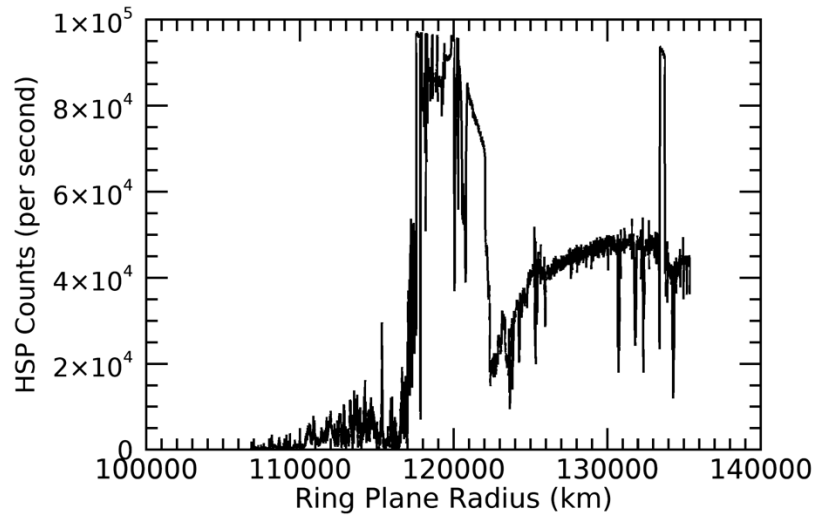
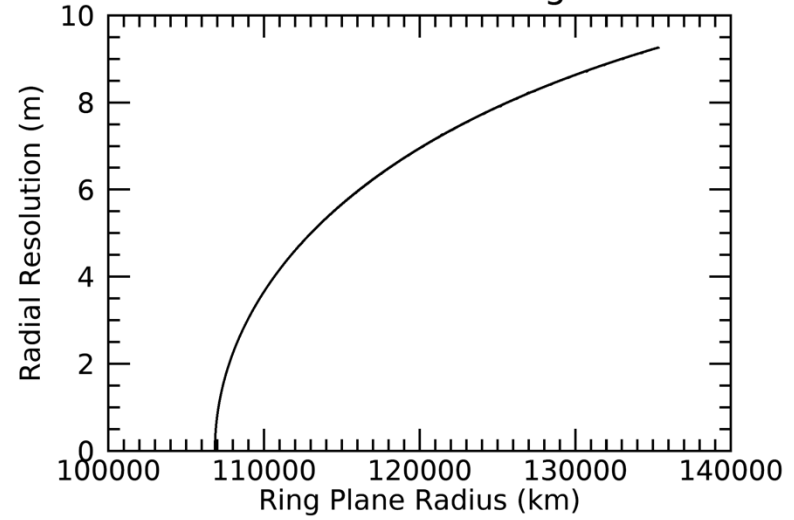
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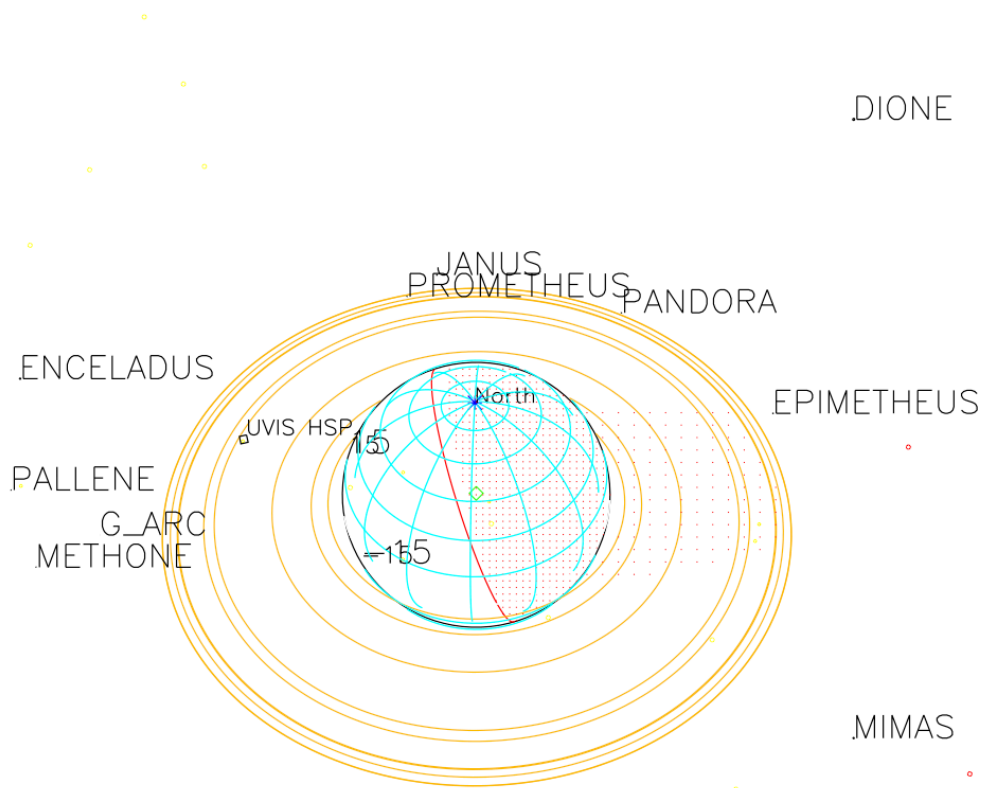
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ETA LUP Rev 034 Ingress

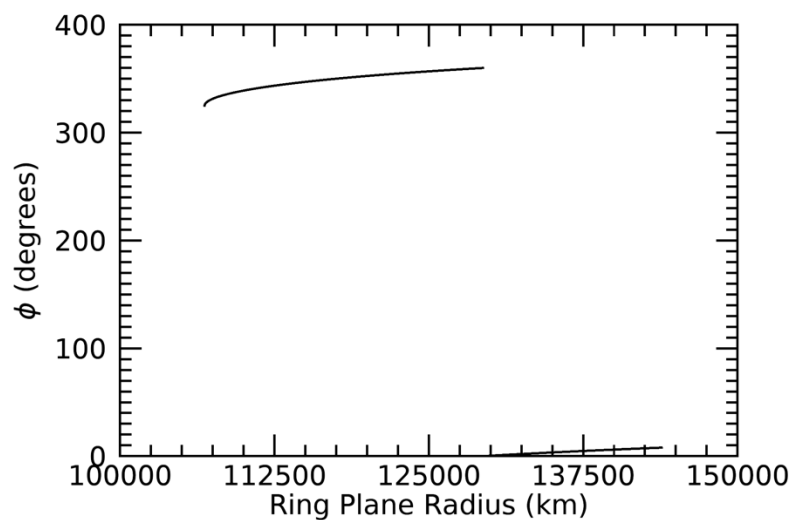
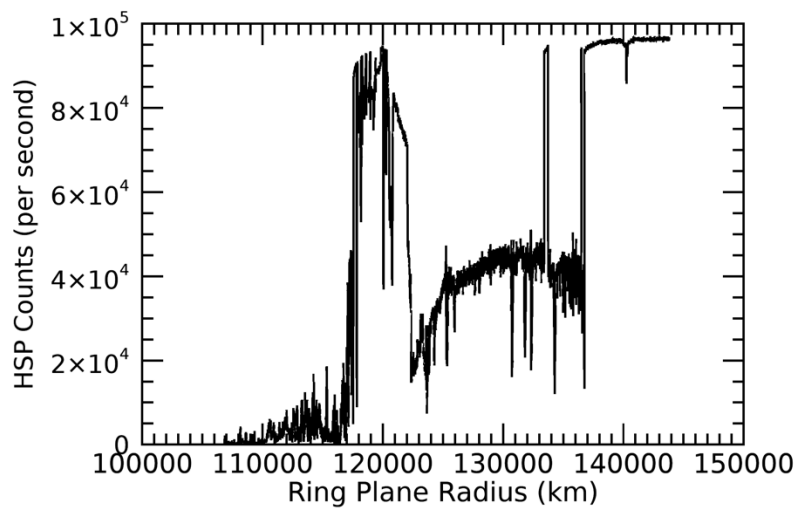
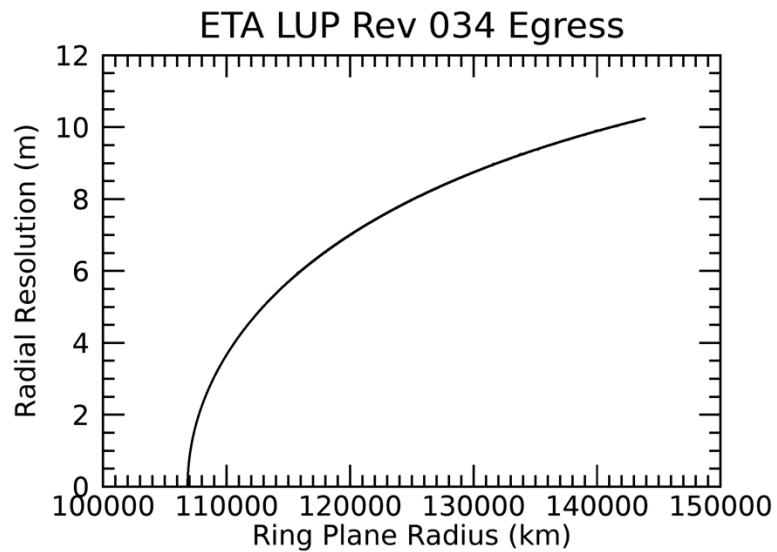
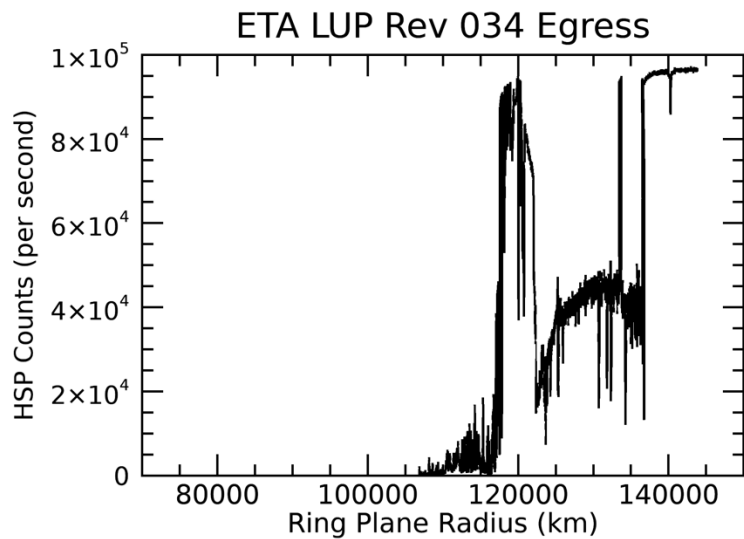


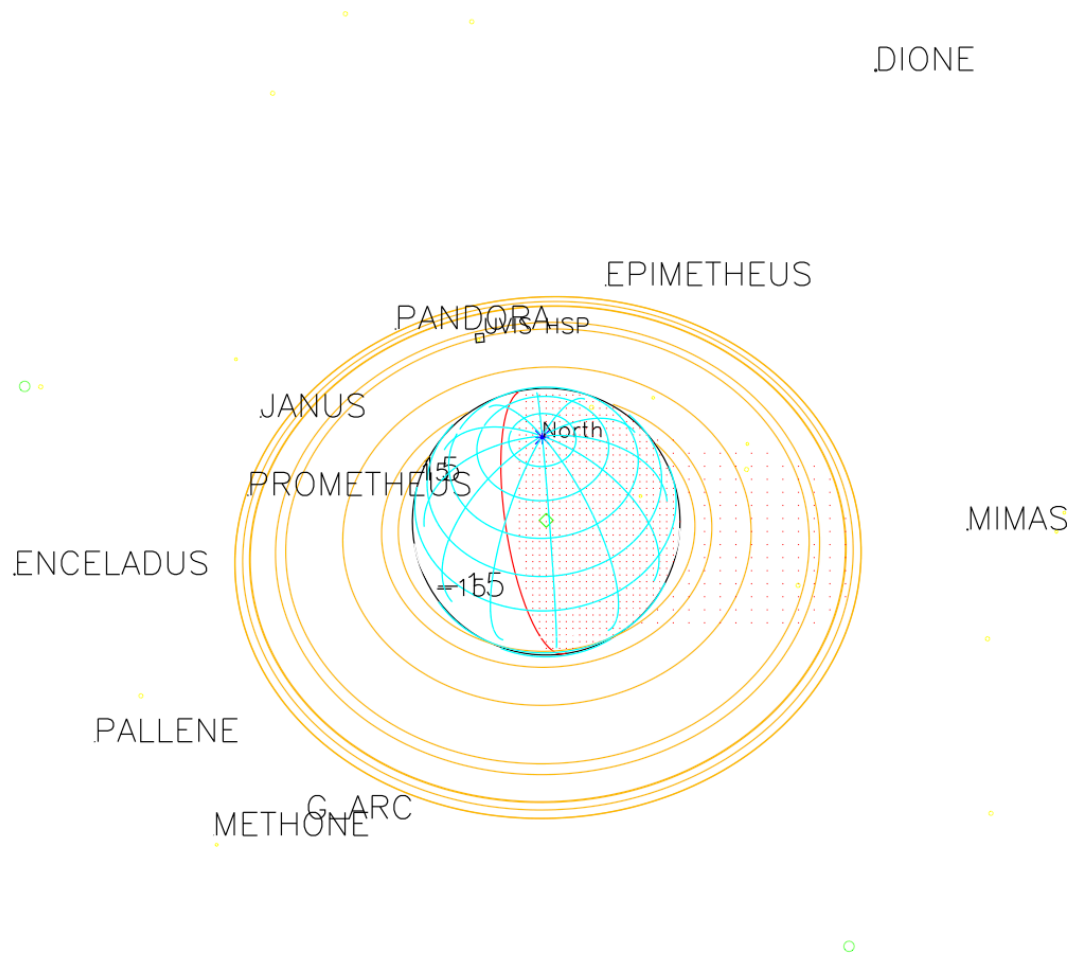
ETA LUP Rev 034 Ingress





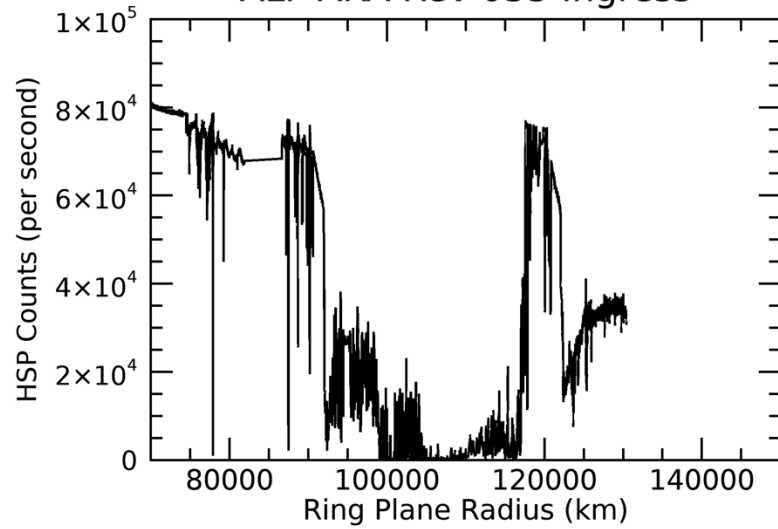
2006-337114:53:00.000 532017.94 km  
 Target RA/dec: 225.65, -41.72  
 Subsolar lat/lon: -12.11, -49.56  
 Sub-s/c lat/lon: 42.90, 33.13



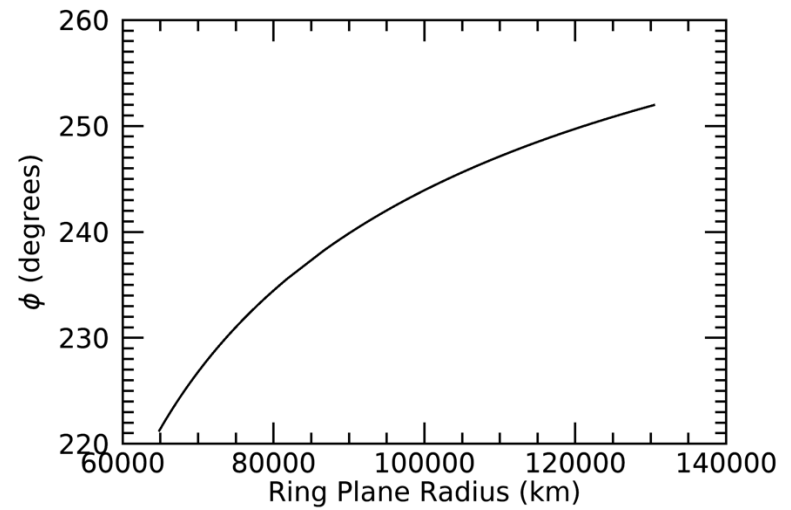
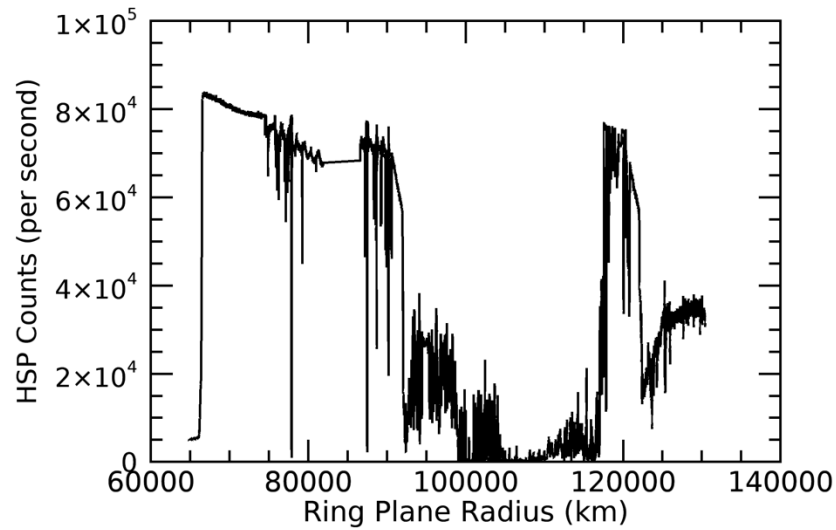
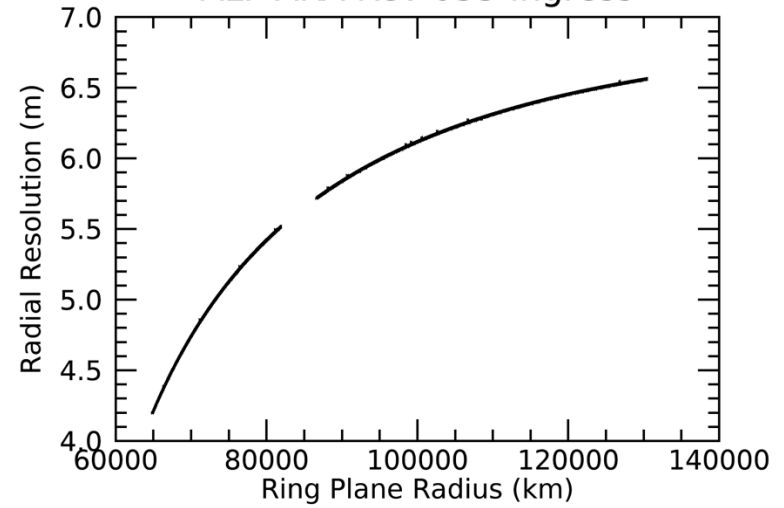


2006-337T15:04:00.000 603611.84 km  
 Target RA/dec: 236.36, -45.83  
 Subsolar lat/lon: -12.11, -157.10  
 Sub-s/c lat/lon: 4674, -62.14

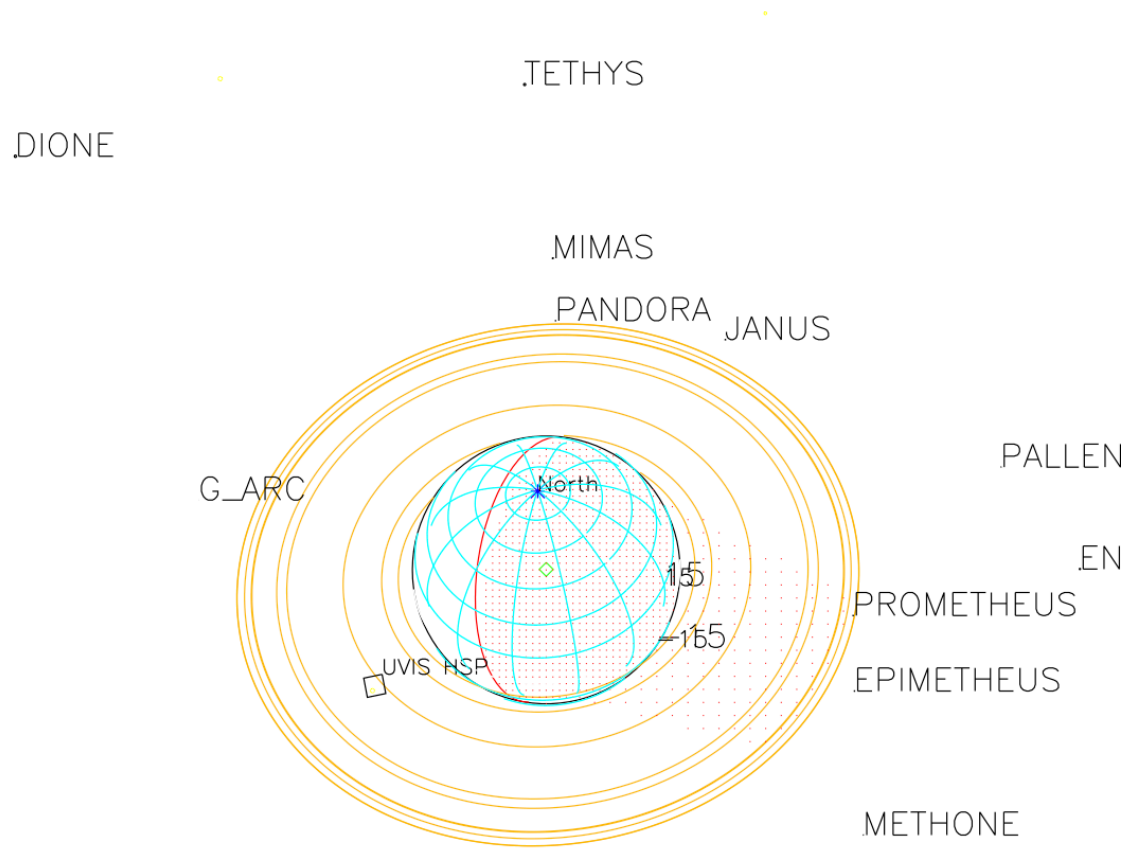
ALP ARA Rev 035 Ingress



ALP ARA Rev 035 Ingress





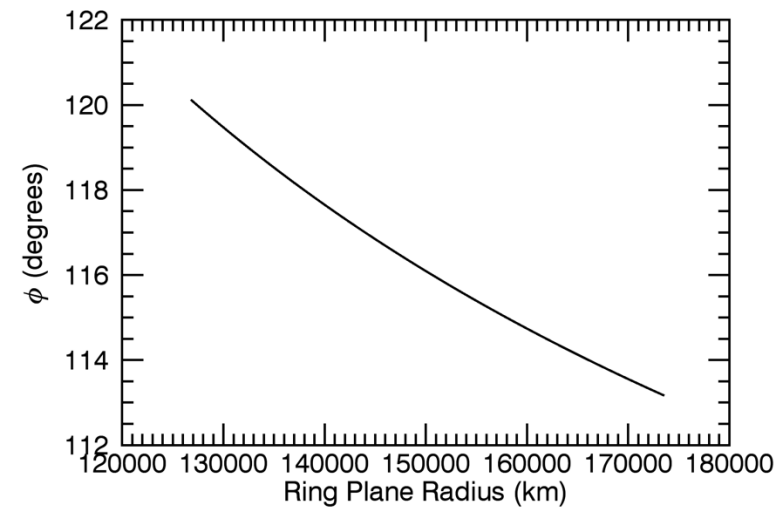
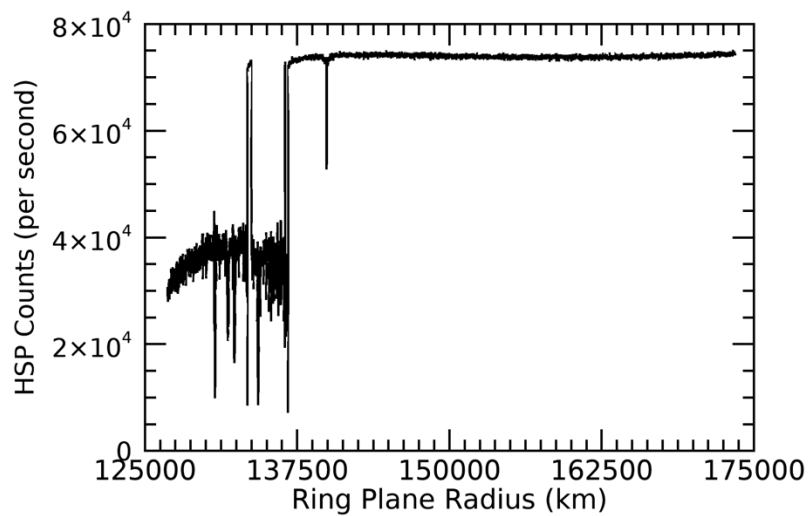
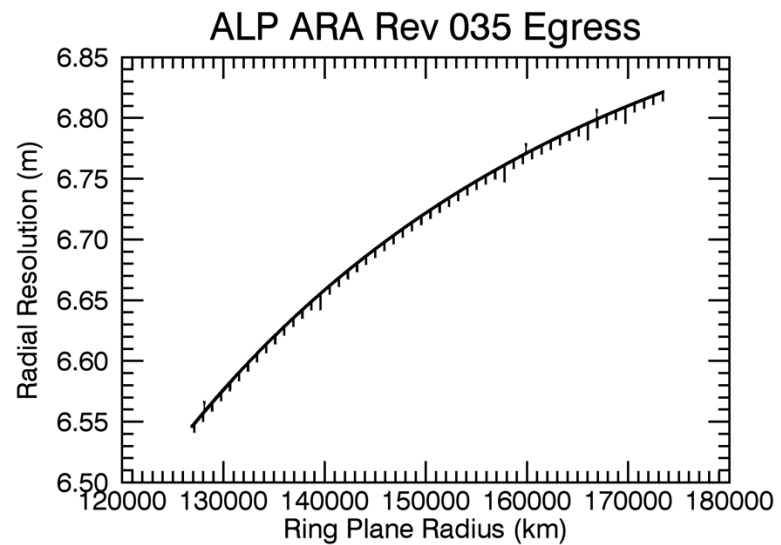
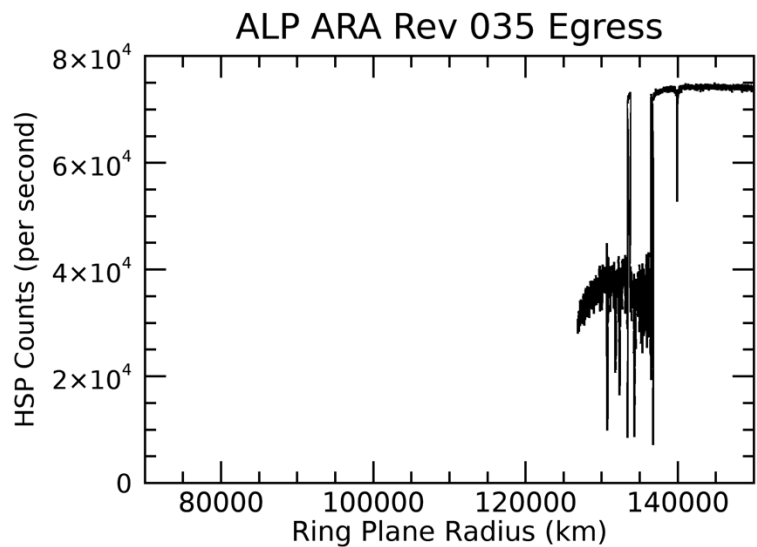


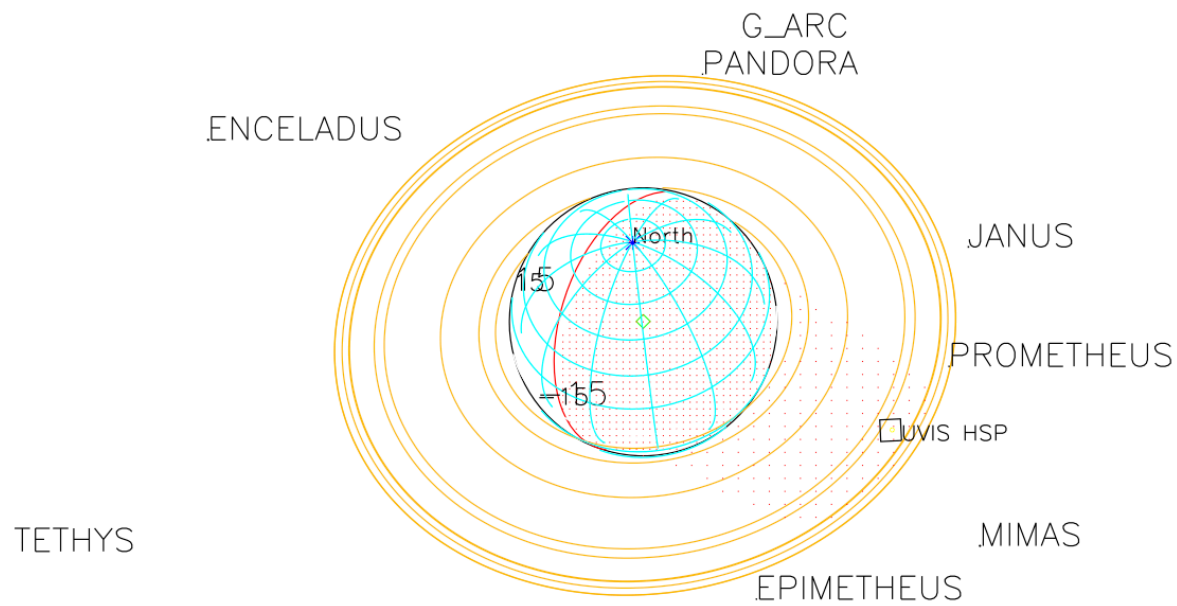
2006-352T01:27:00.000 1403947.4 km

Target RA/dec: 258.01, -47.85

Subsolar lat/lon: -11.94, 21.53

Sub-s/c lat/lon: 47.24, 140.48





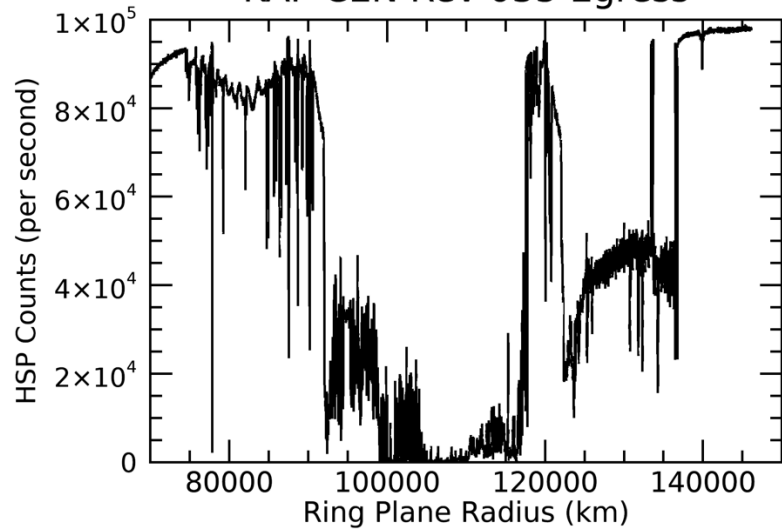
2006-352T16:36:00.000 1551332.9 km

Target RA/dec: 269.38, -48.33

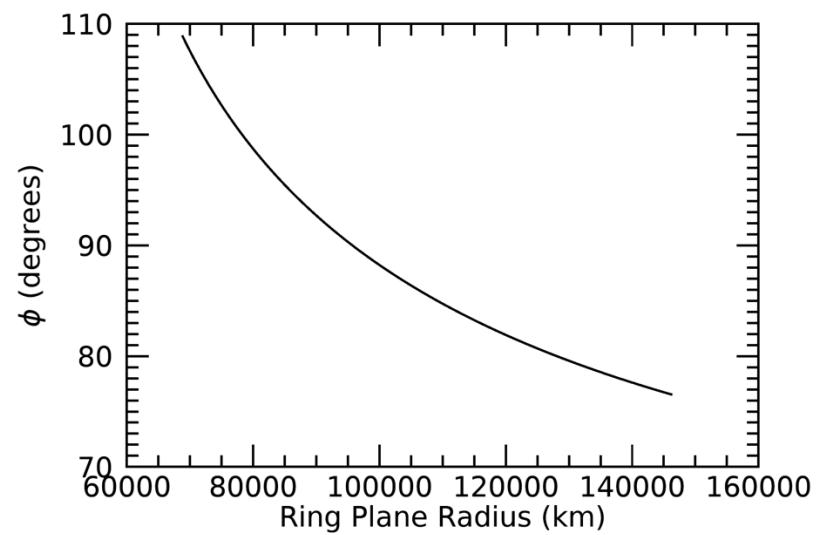
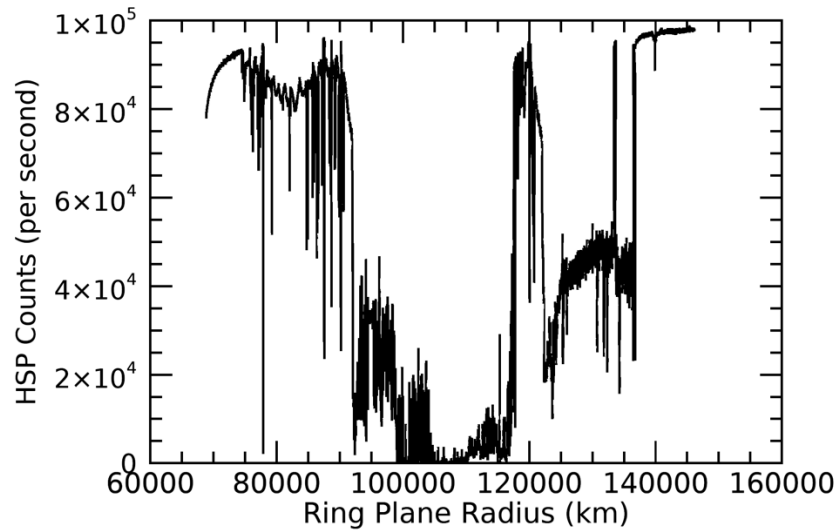
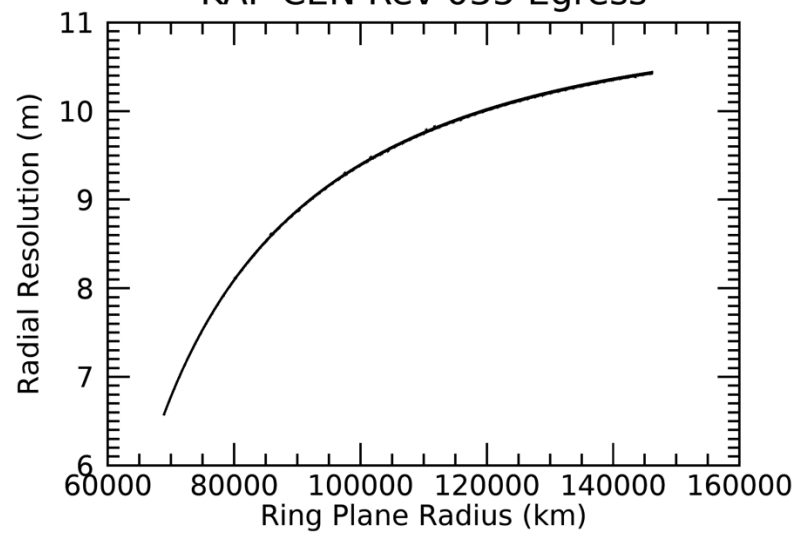
Subsolar lat/lon: -11.93, -130.26

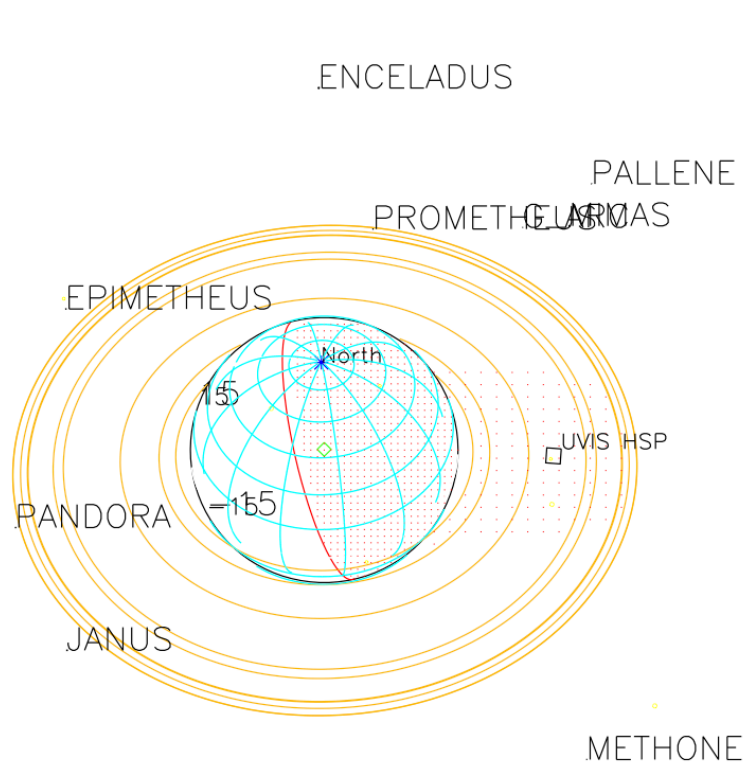
Sub-s/c lat/lon: 46.72, 1.18

KAP CEN Rev 035 Egress



KAP CEN Rev 035 Egress





2006-350T22:47:00.000 1077798.1 km

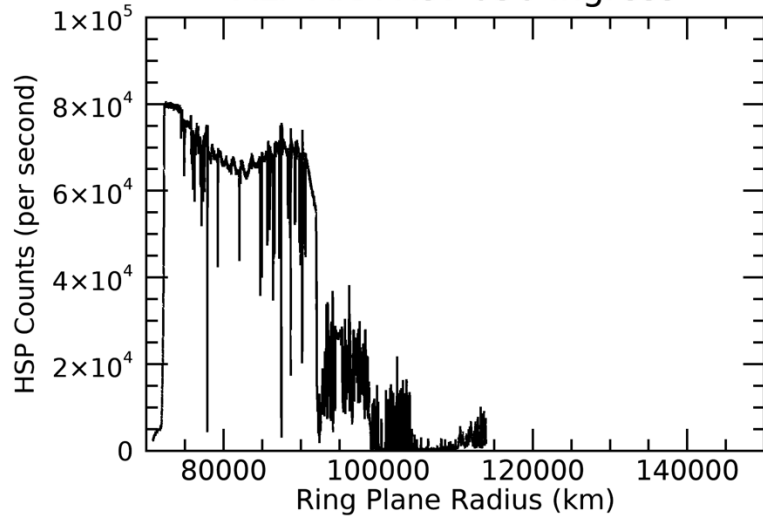
Target RA/dec: 232.10, -42.12

Subsolar lat/lon: -11.95, -157.63

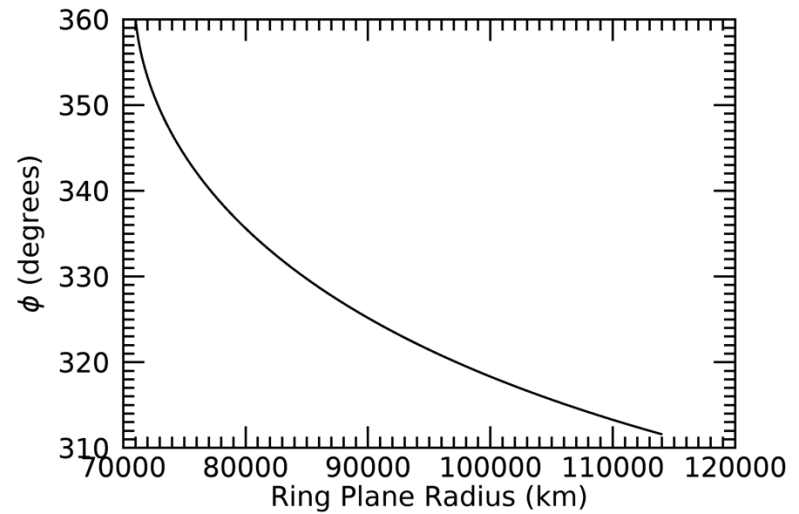
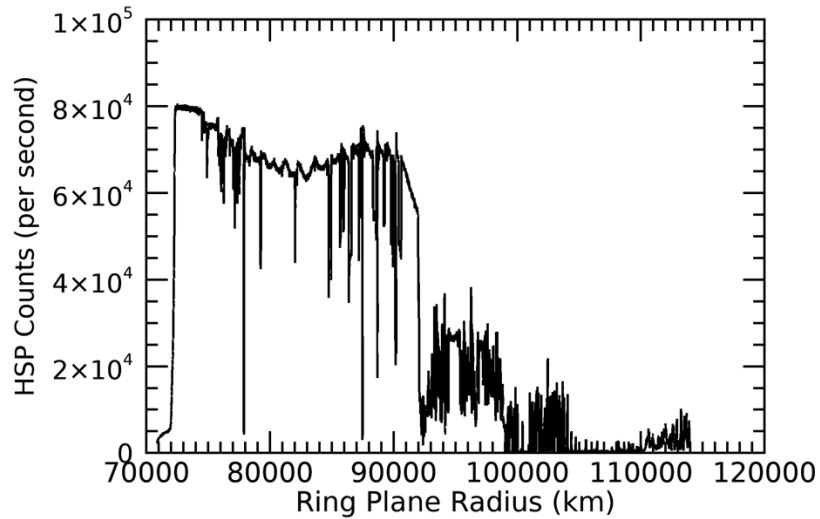
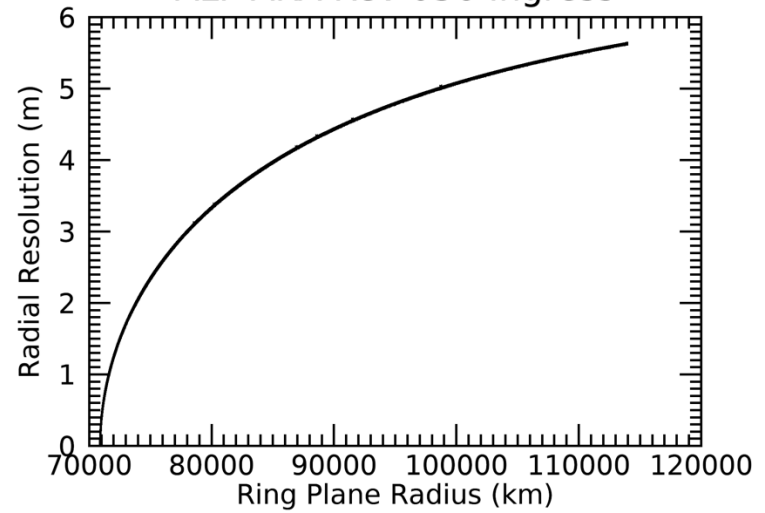
Sub-s/c lat/lon: 42.85, -68.18

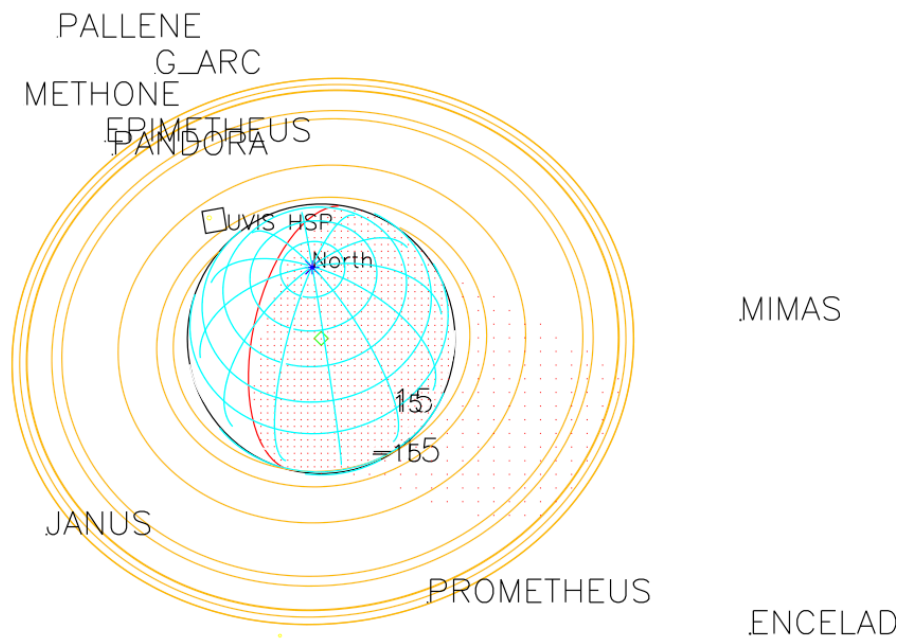
TETHYS

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ALP ARA Rev 036 Ingress





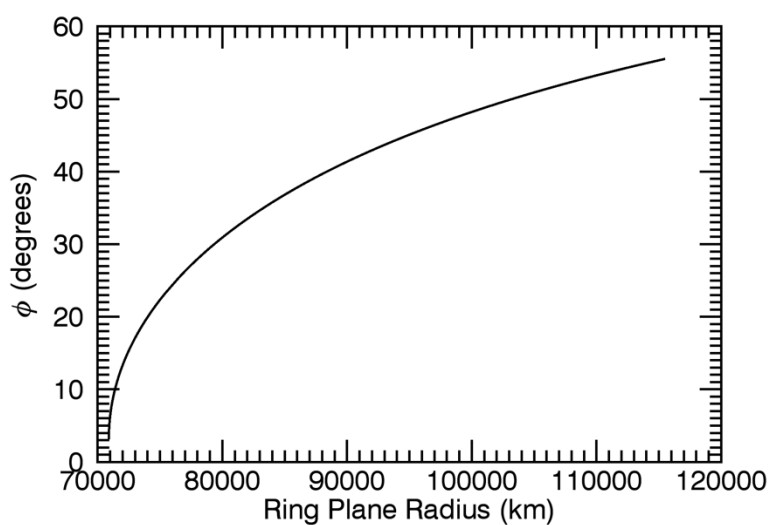
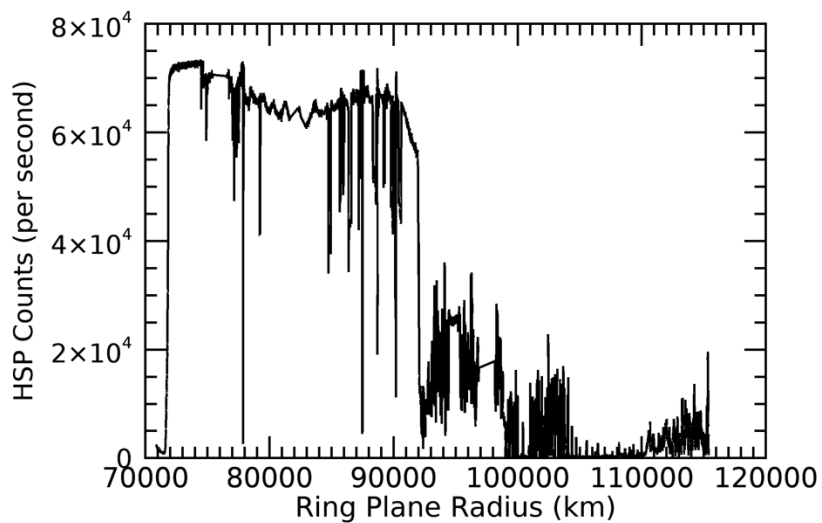
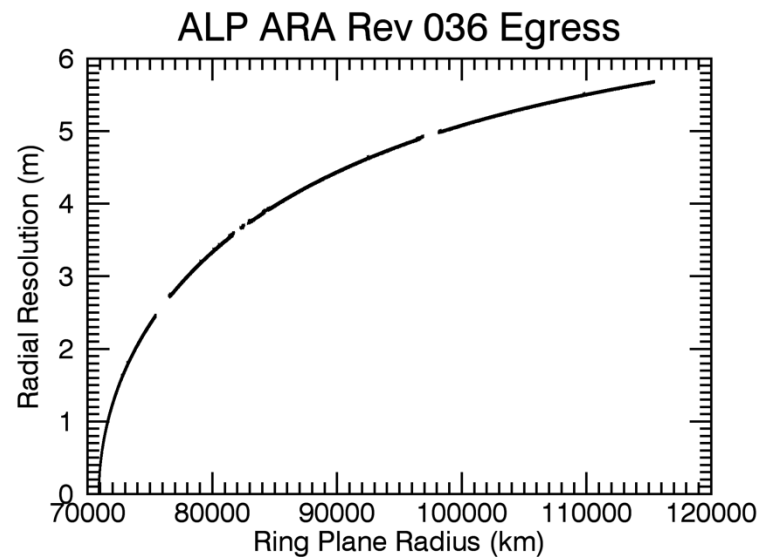
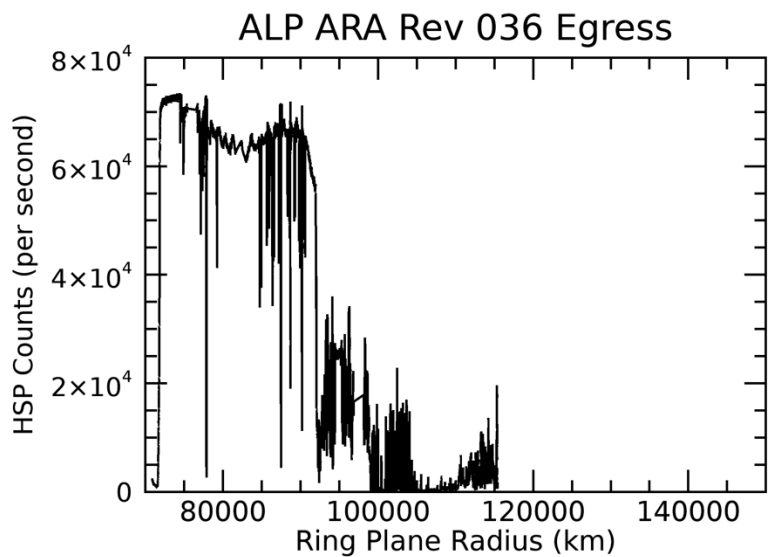
.JETHYS

2007-004T17:48:00.000 1591729.8 km

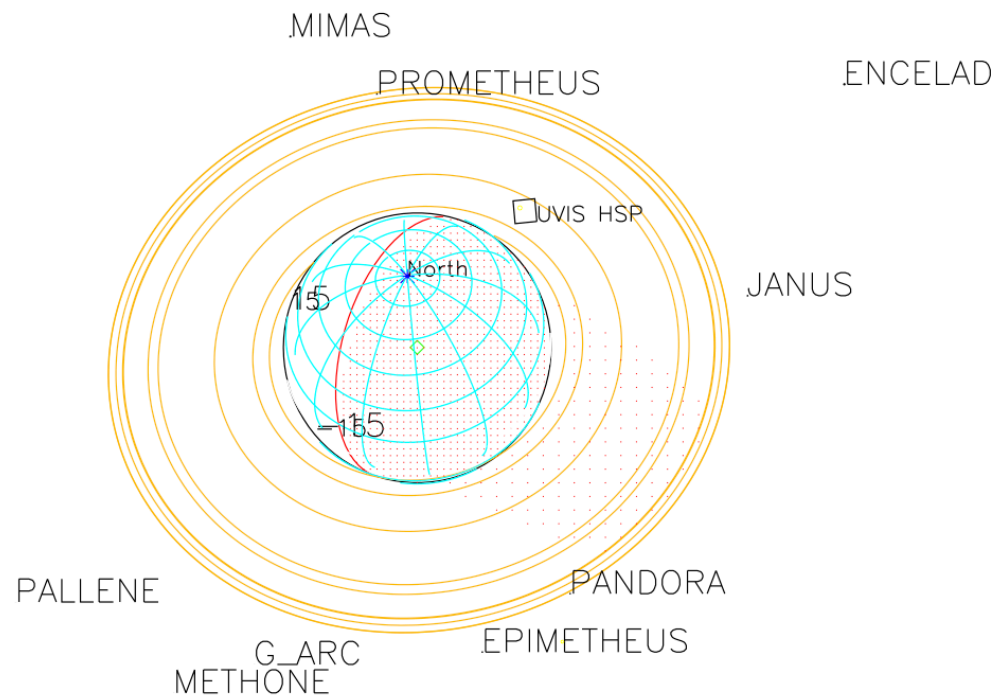
Target RA/dec: 260.14, -51.78

Subsolar lat/lon: -11.74, 86.30

Sub-s/c lat/lon: 51.13, -152.17







2007-005T00:56:00.000 1635429.3 km

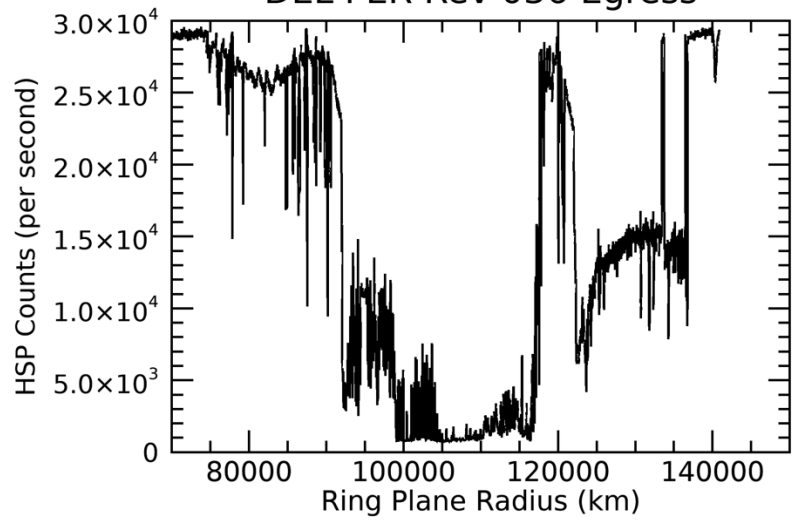
Target RA/dec: 265.47, -52.01

Subsolar lat/lon: -11.73, -154.68

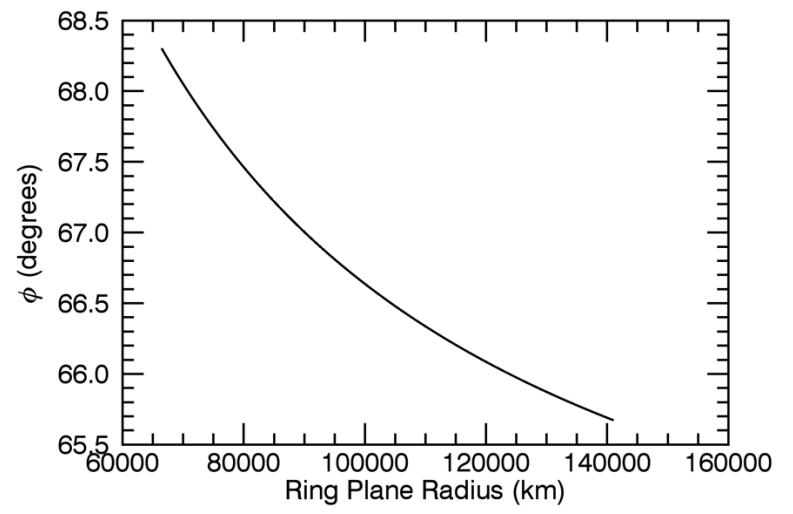
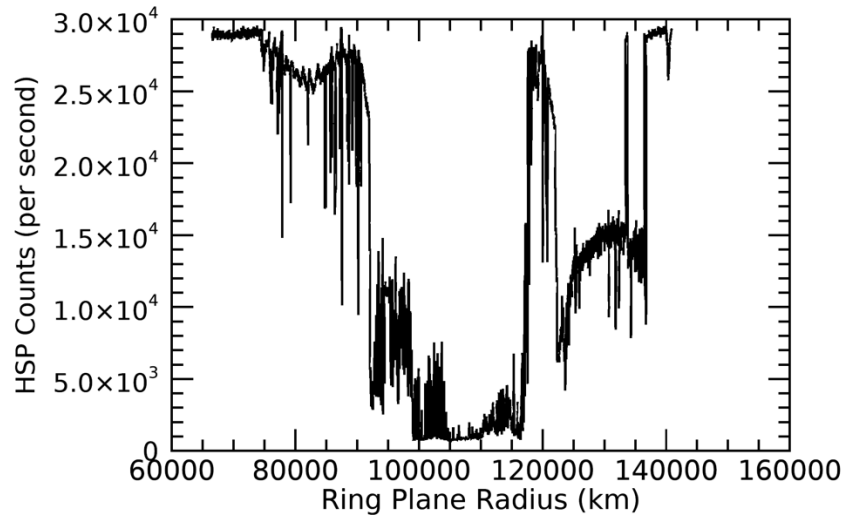
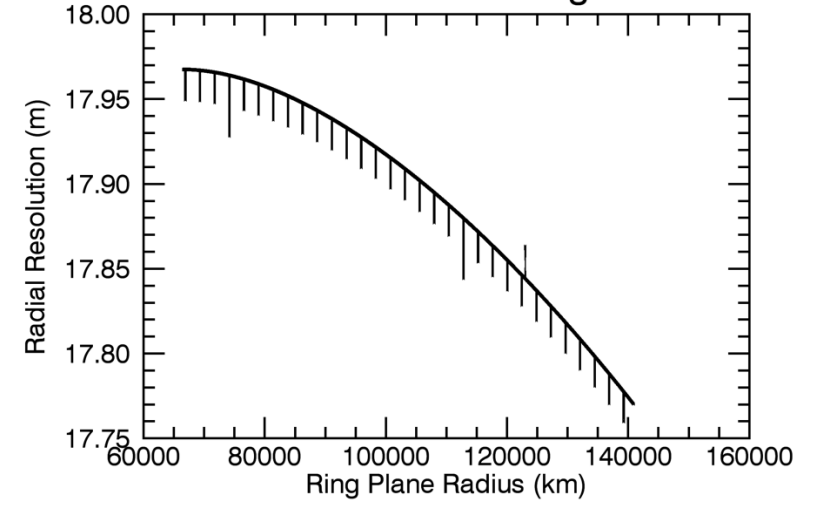
Sub-s/c lat/lon: 50.89, -27.20

TETHYS

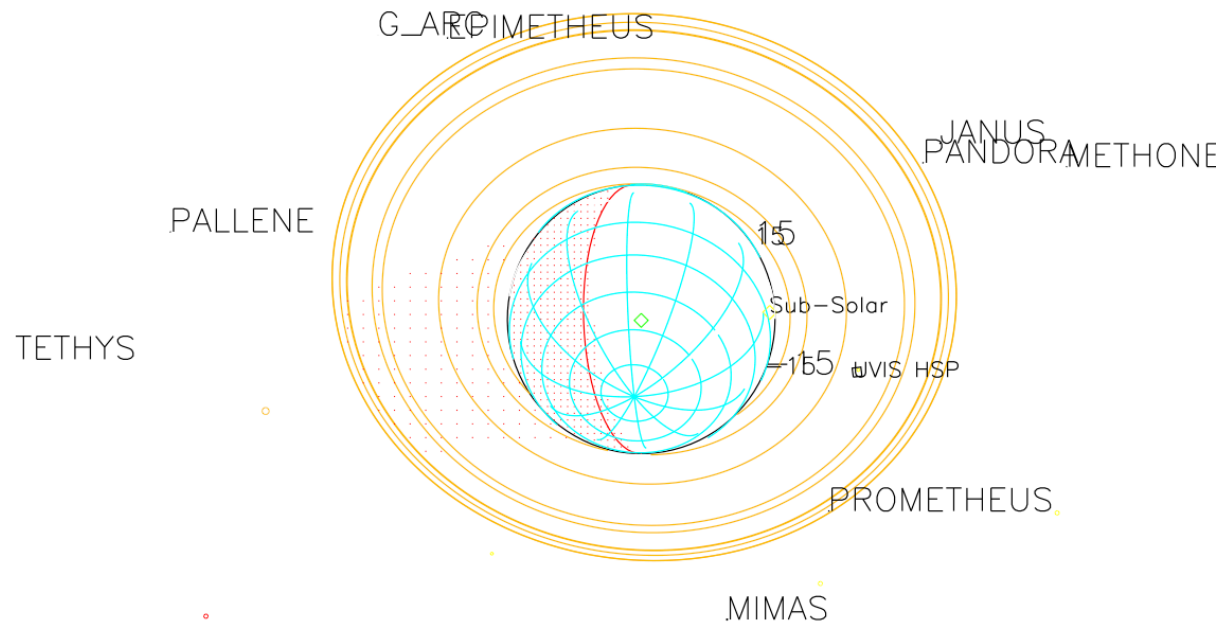
DEL PER Rev 036 Egress



DEL PER Rev 036 Egress



# ENCELADUS

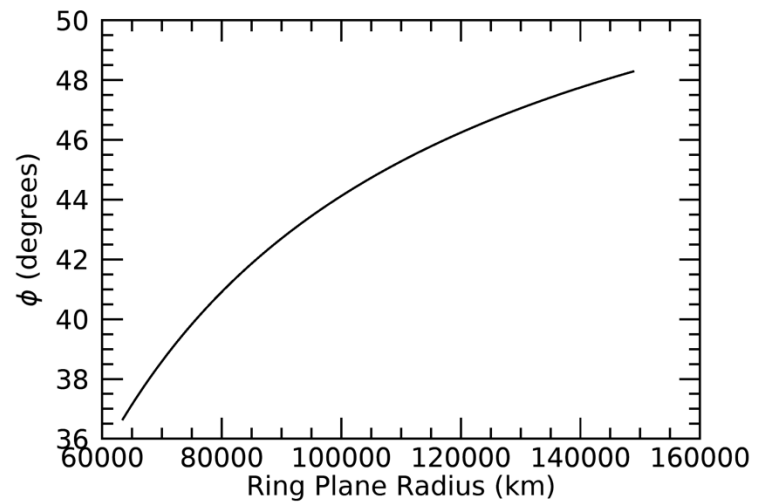
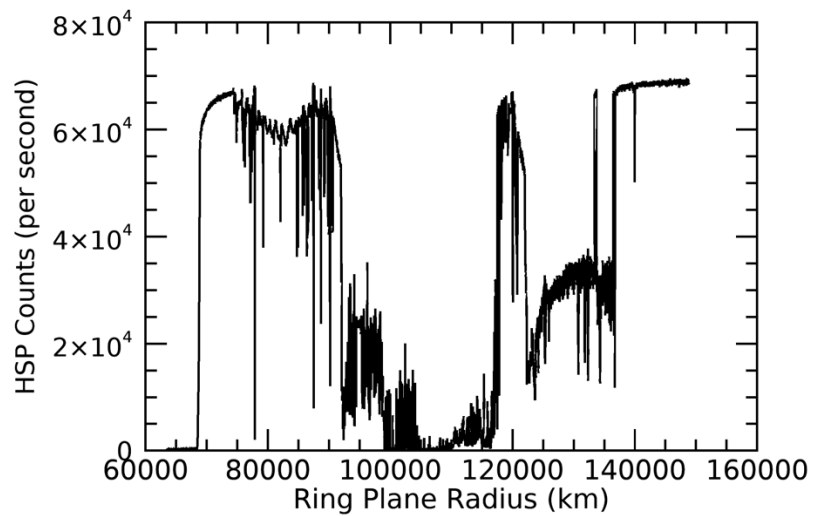
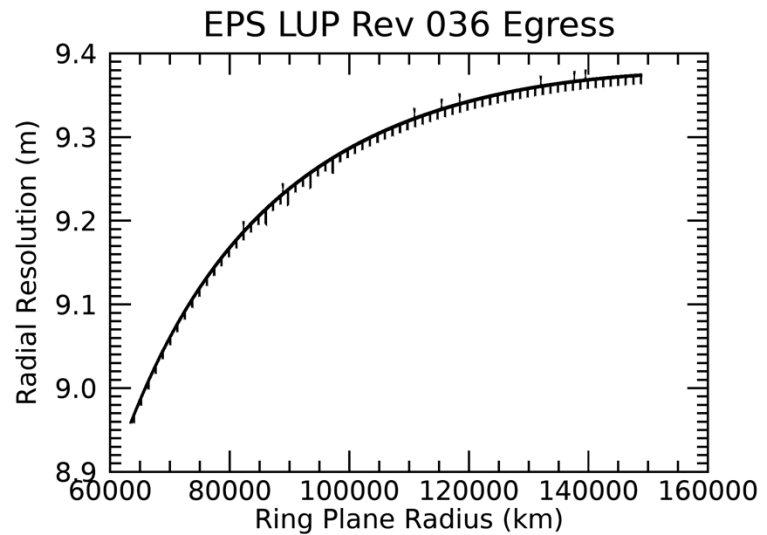
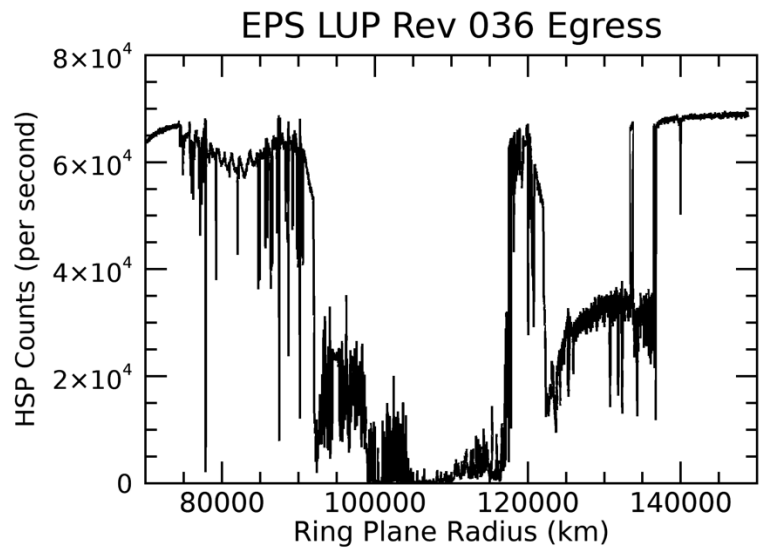


2006-364T17:10:00.000 641610.70 km

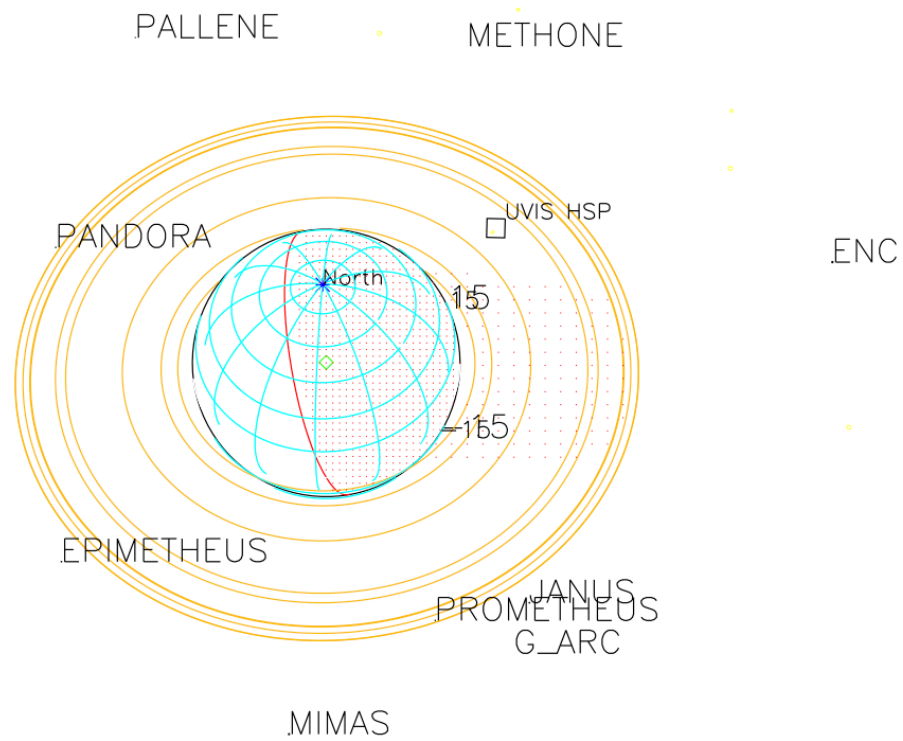
Target RA/dec: 68.73, 50.44

Subsolar lat/lon: -11.80, -158.54

Sub-s/c lat/lon: -50.90, 130.06



ONE



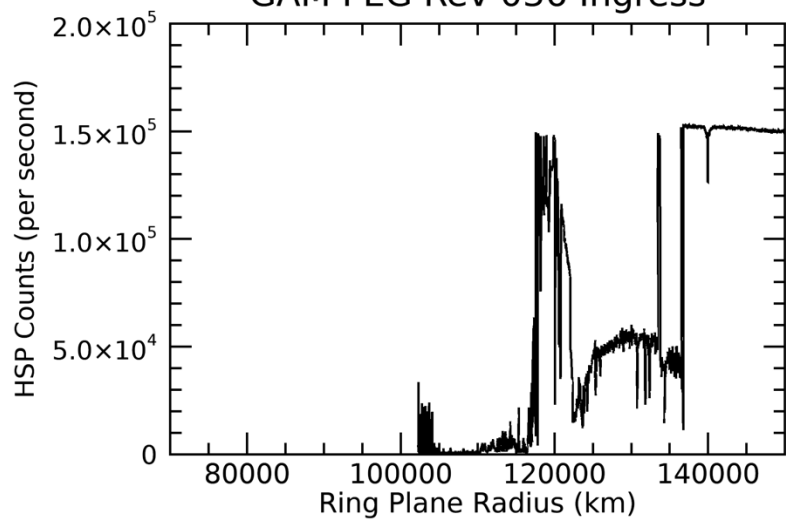
2007-003T11:22:00.000 1355878.4 km

Target RA/dec: 235.13, -47.15

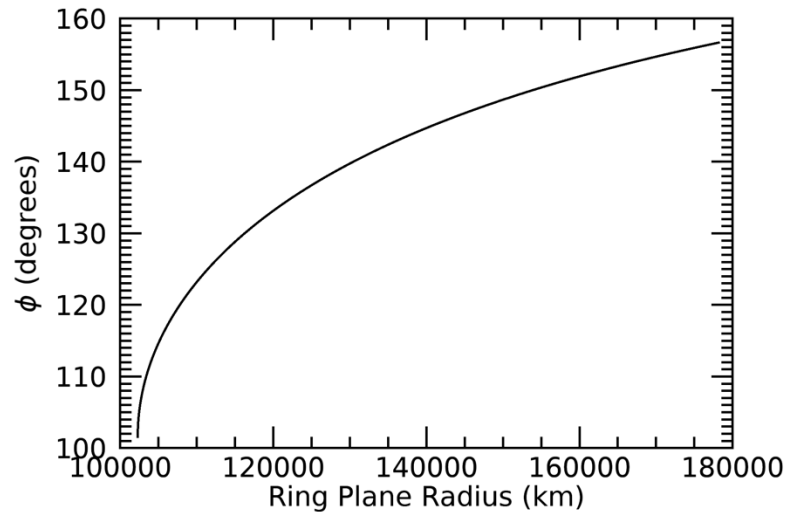
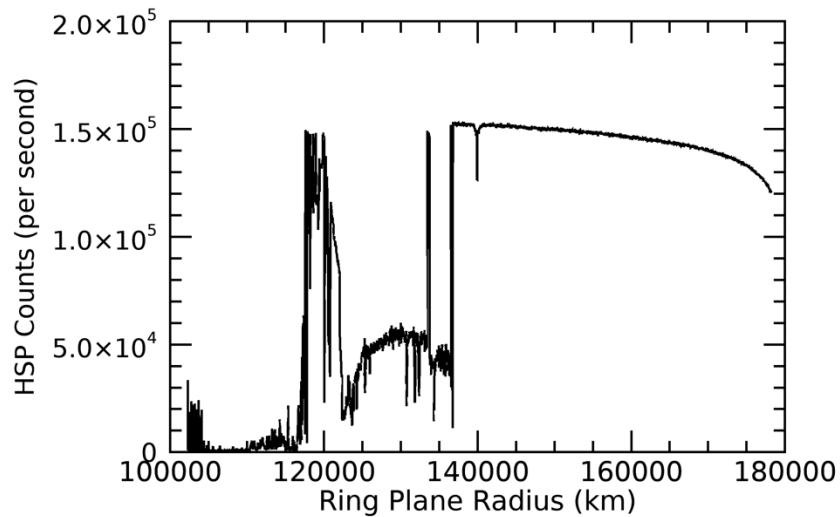
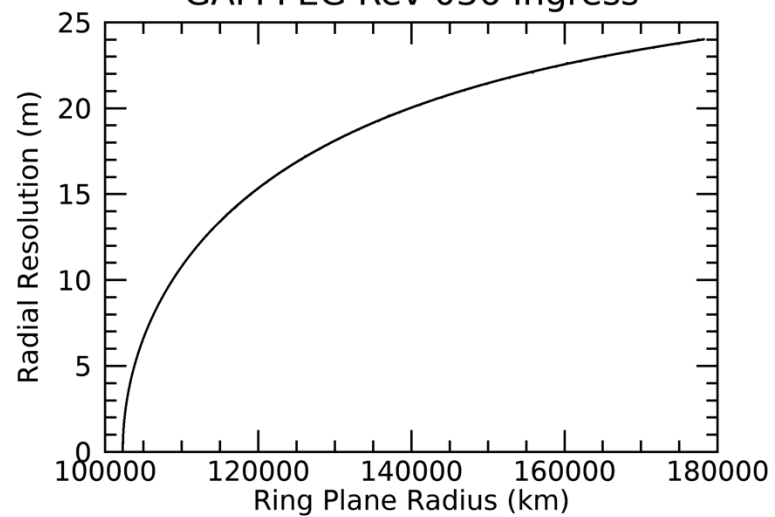
Subsolar lat/lon: -11.75, 34.38

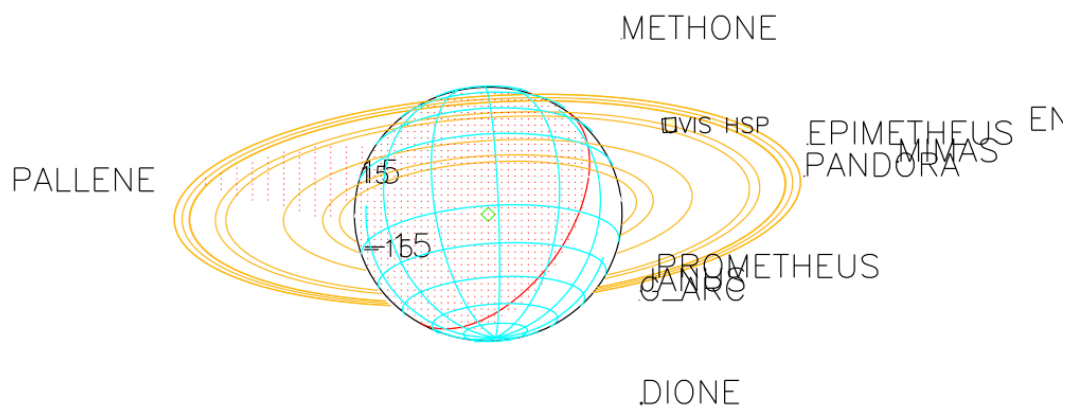
Sub-s/c lat/lon: 47.84, 126.97

GAM PEG Rev 036 Ingress



GAM PEG Rev 036 Ingress





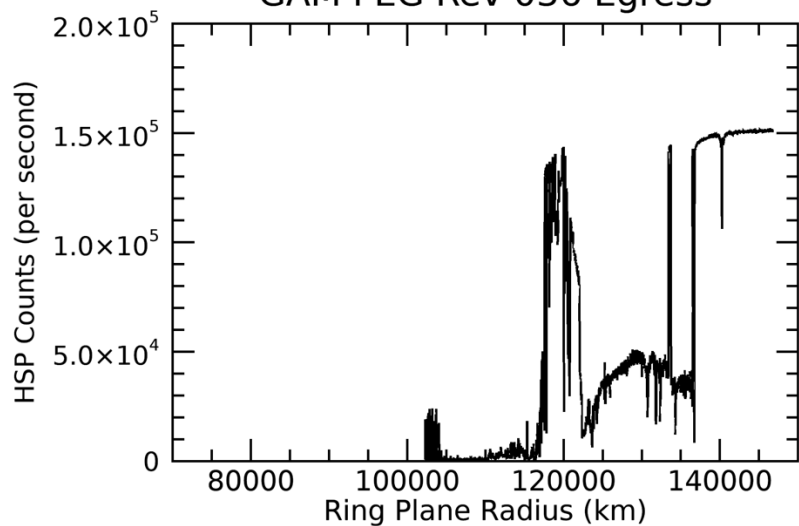
2006-363T09:28:00.000 993620.14 km

Target RA/dec: 8.23, 12.94

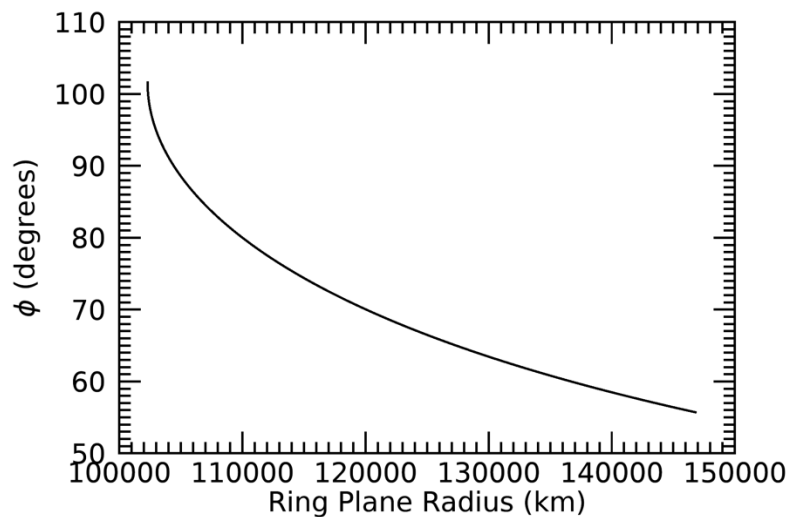
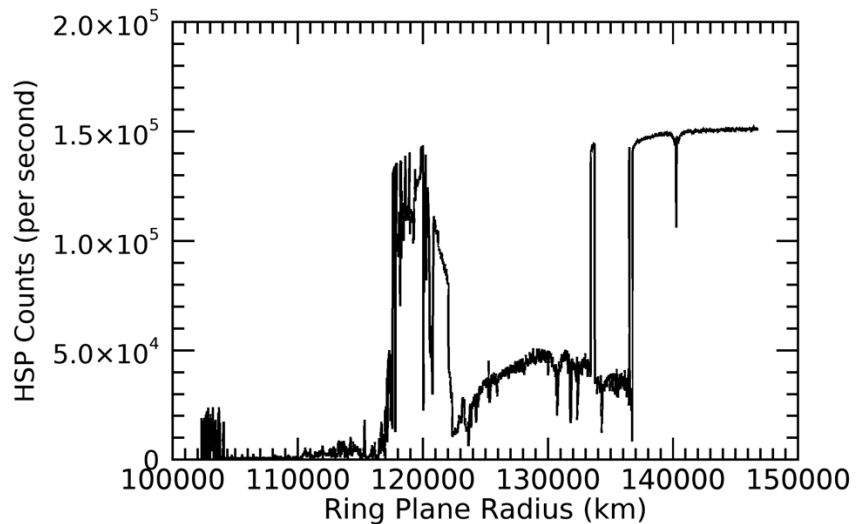
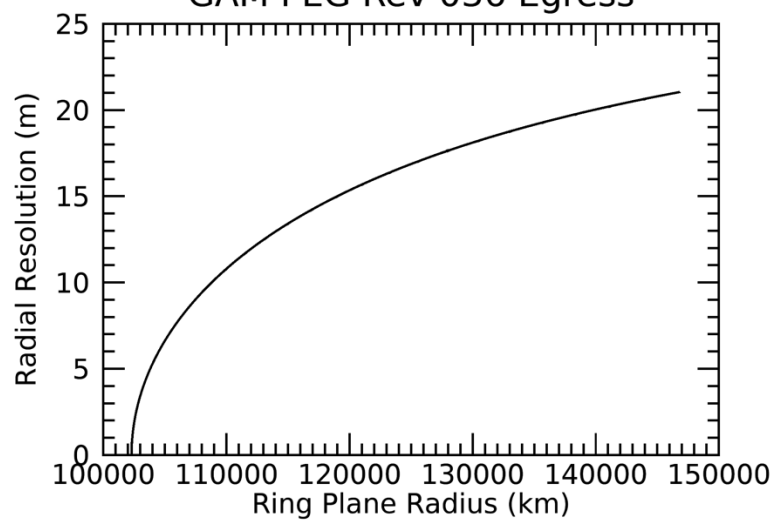
Subsolar lat/lon: -11.81, -167.65

Sub-s/c lat/lon: -15.29, 55.14

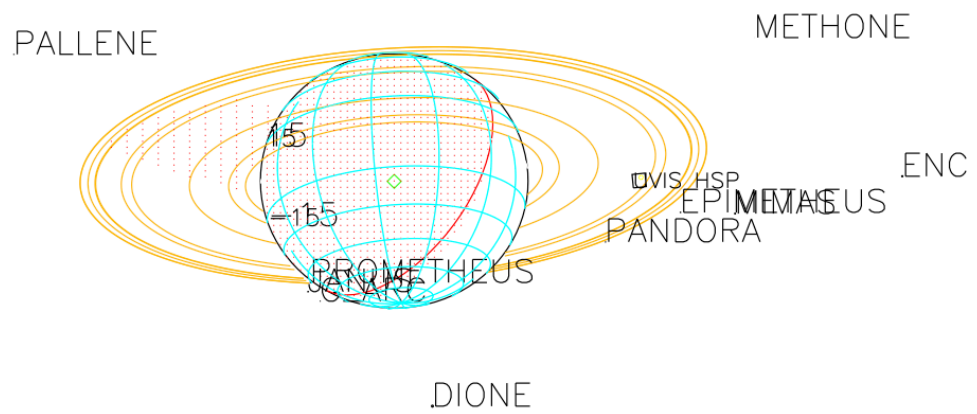
GAM PEG Rev 036 Egress



GAM PEG Rev 036 Egress







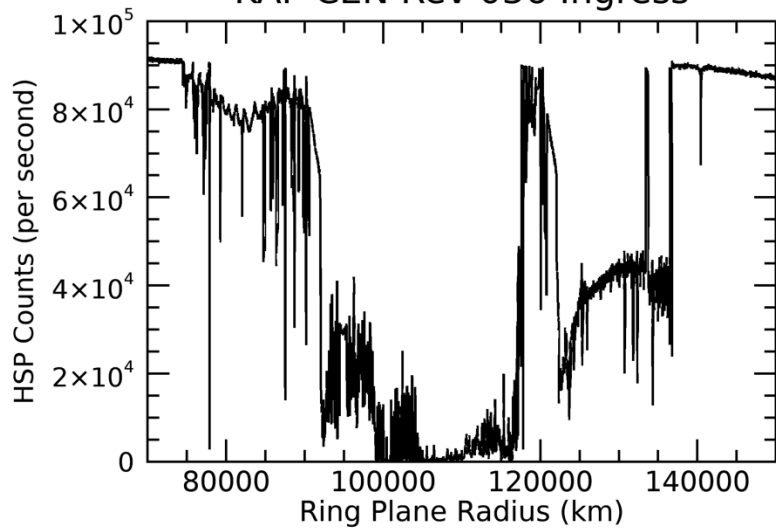
2006-363T11:47:00.000 966041.70 km

Target RA/dec: 10.12, 15.19

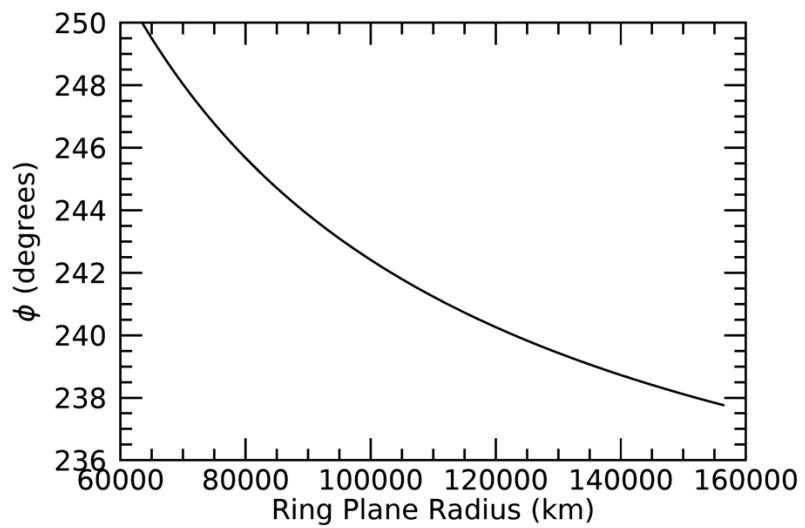
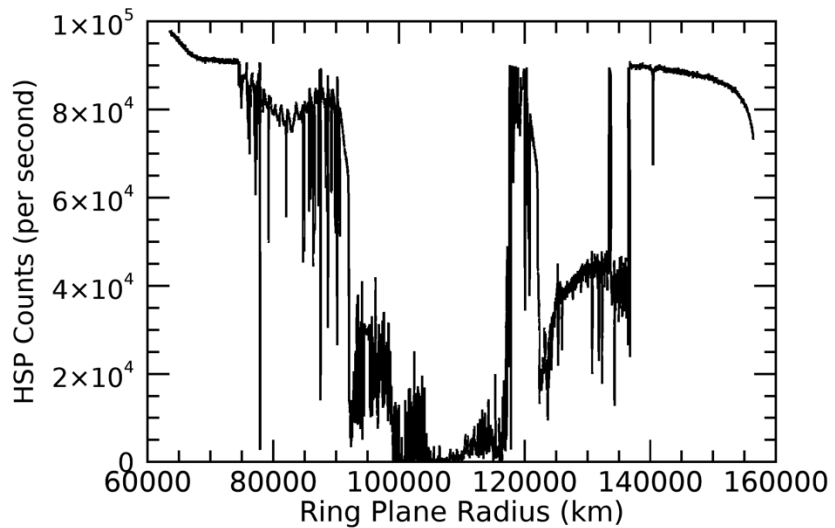
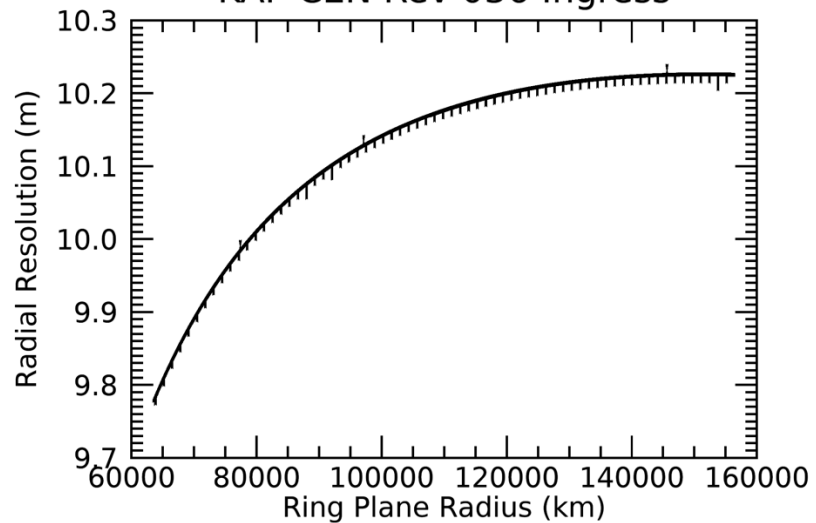
Subsolar lat/lon: -11.81, 114.09

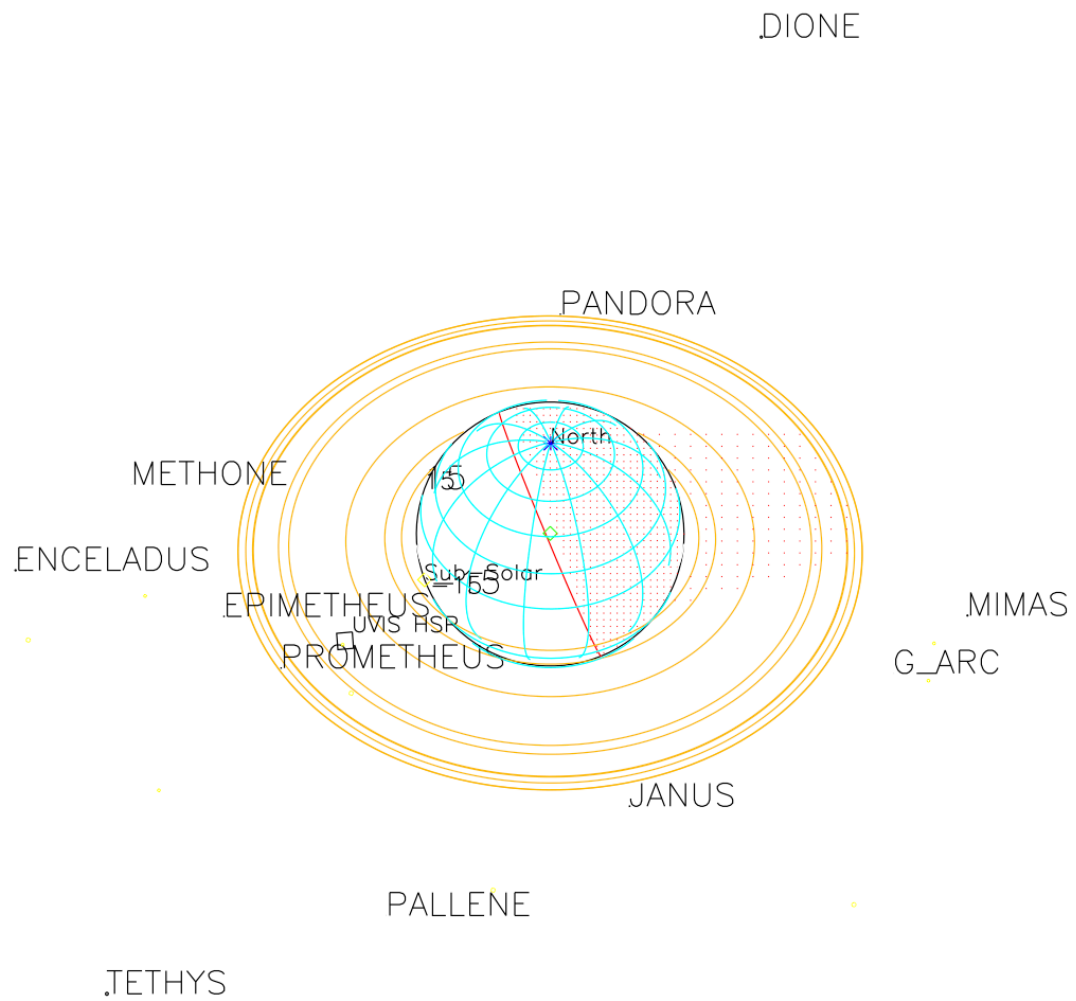
Sub-s/c lat/lon: -17.31, -21.32

KAP CEN Rev 036 Ingress



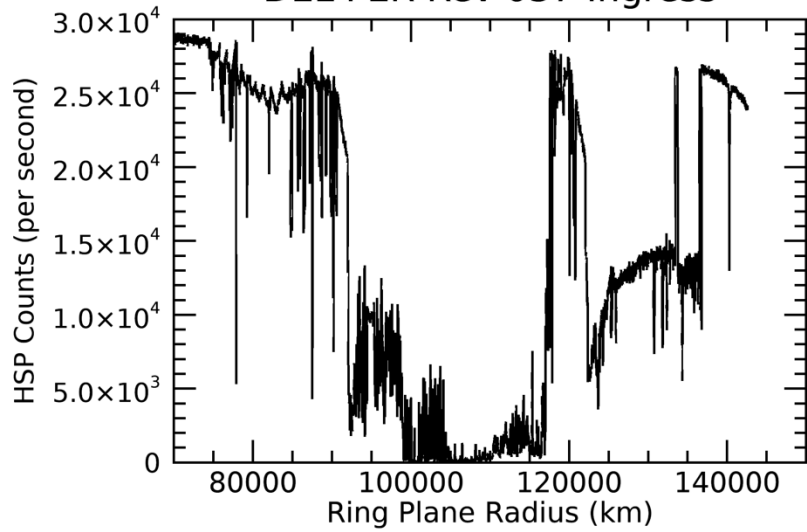
KAP CEN Rev 036 Ingress



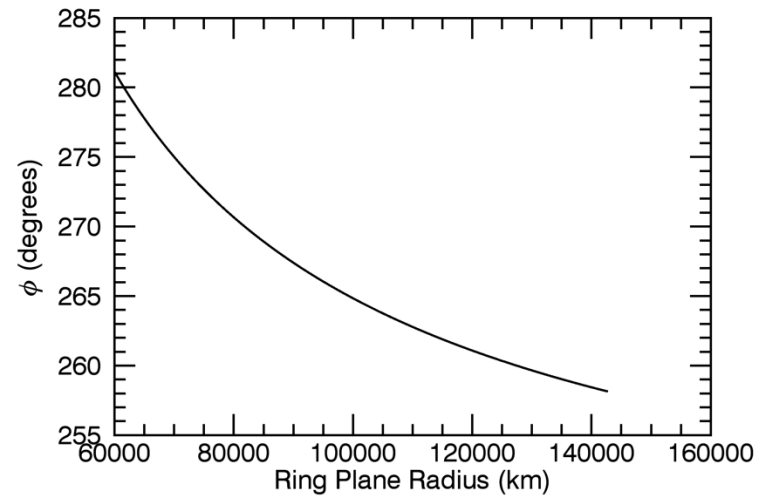
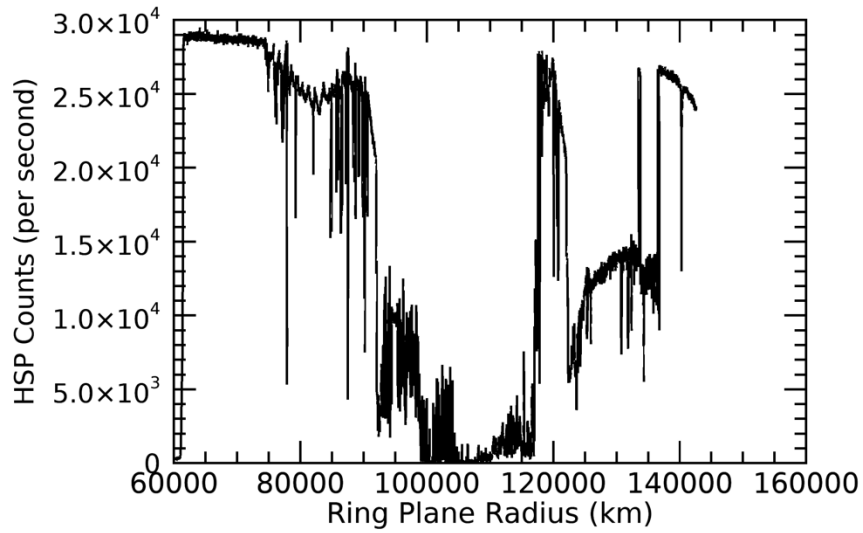
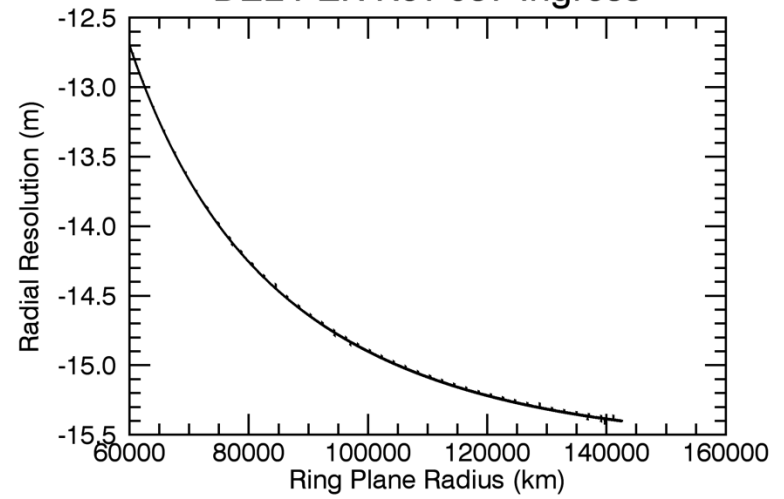


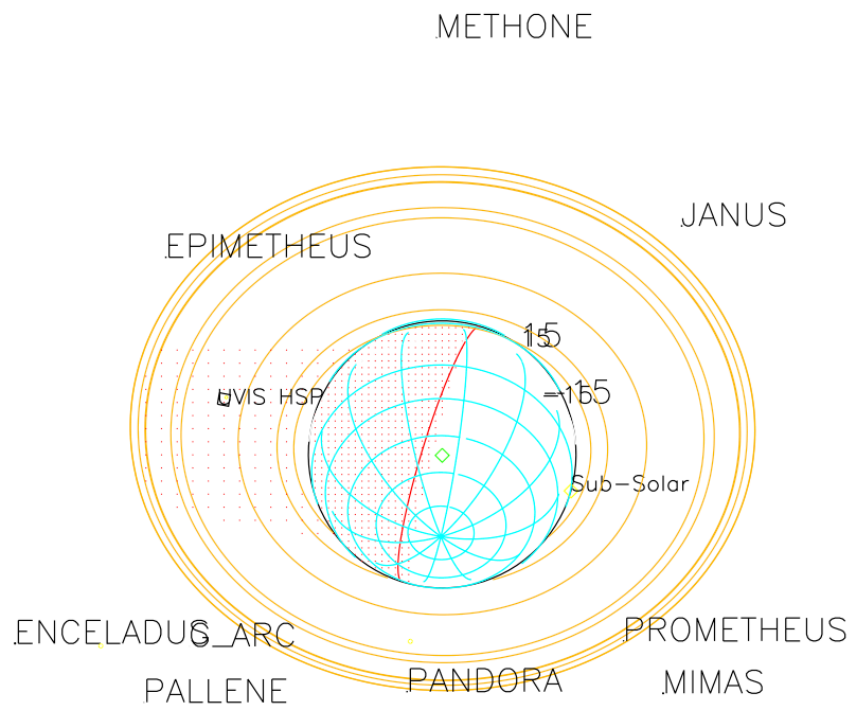
2007-002T16:54:00.000 1172450.2 km  
 Target RA/dec: 218.64, -39.92  
 Subsolar lat/lon: -11.76, -61.79  
 Sub-s/c lat/lon: 40.78, 12.03

DEL PER Rev 037 Ingress



DEL PER Rev 037 Ingress





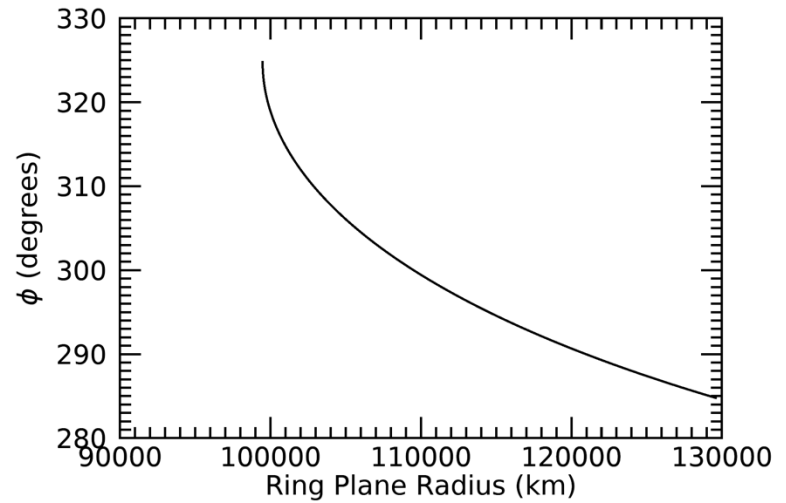
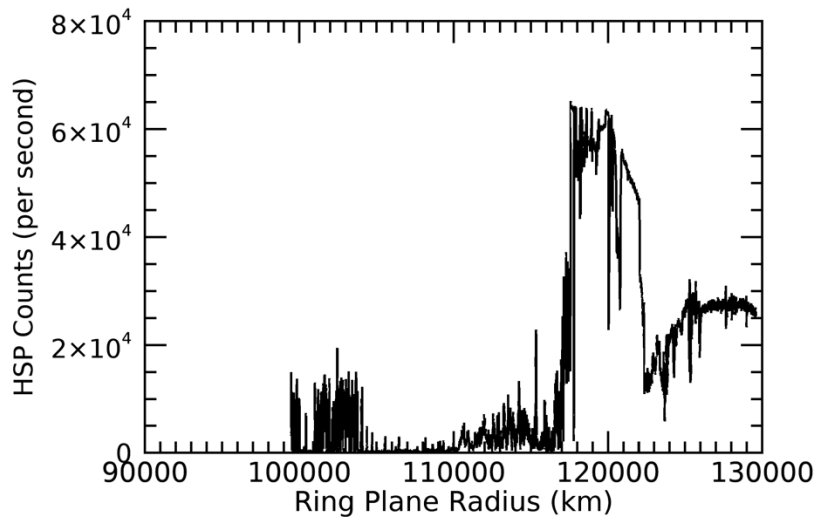
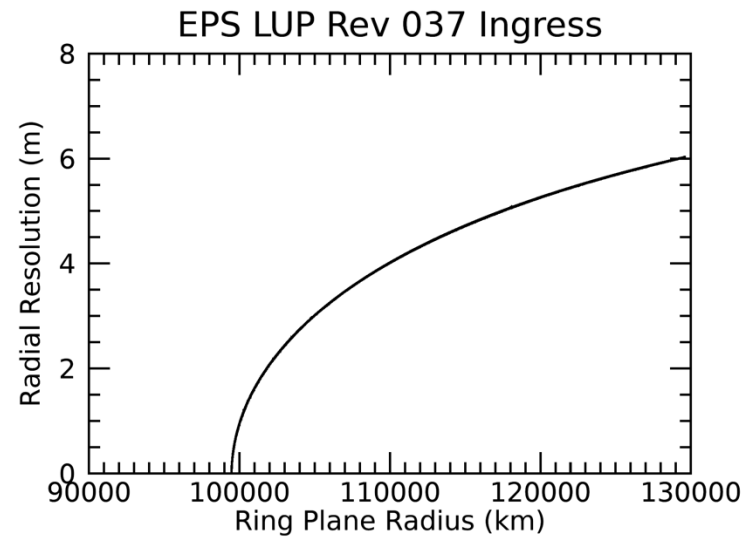
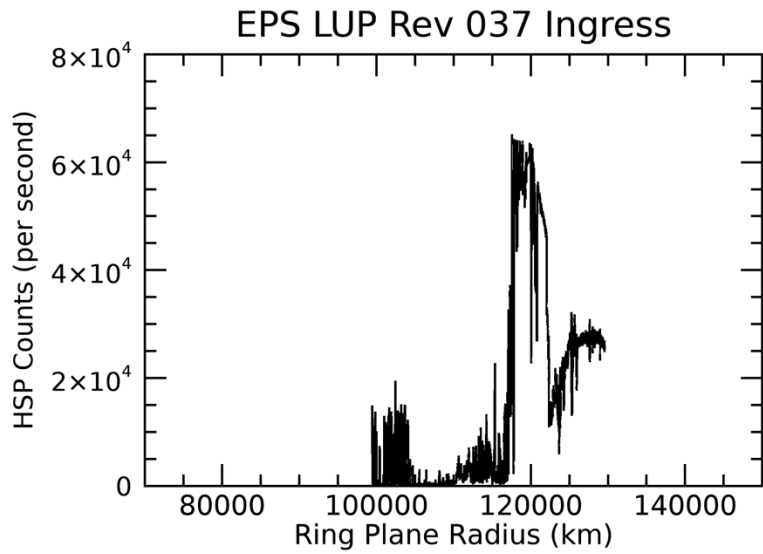
DIONE

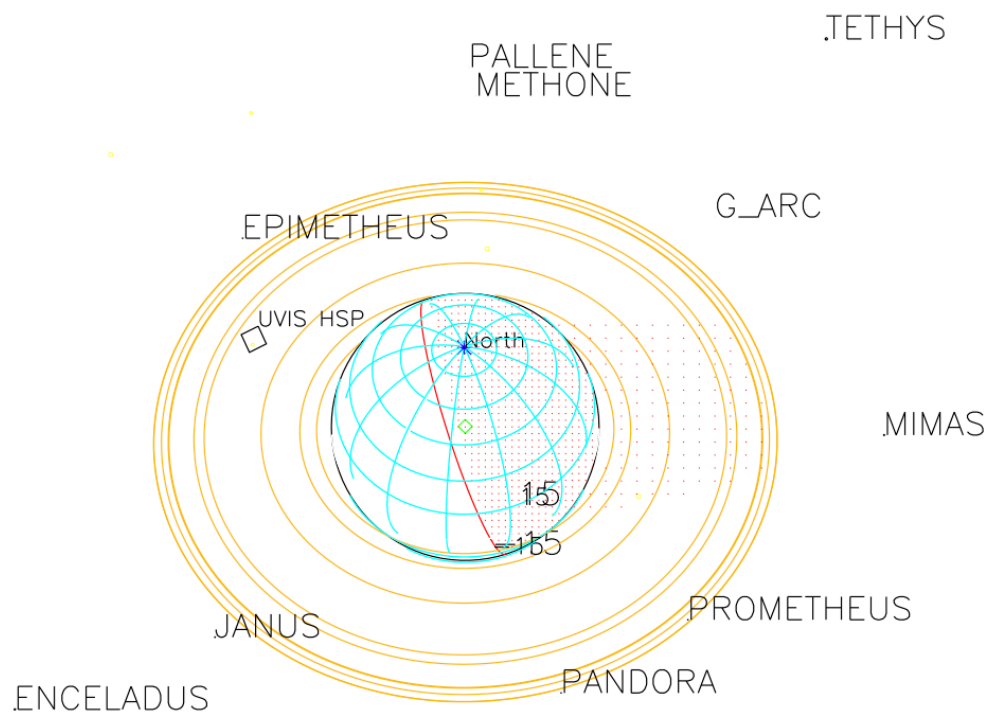
2007-015T14:50:00.000 829382.65 km

Target RA/dec: 45.73, 46.50

Subsolar lat/lon: -11.61, -91.86

Sub-s/c lat/lon: -47.53, 169.56





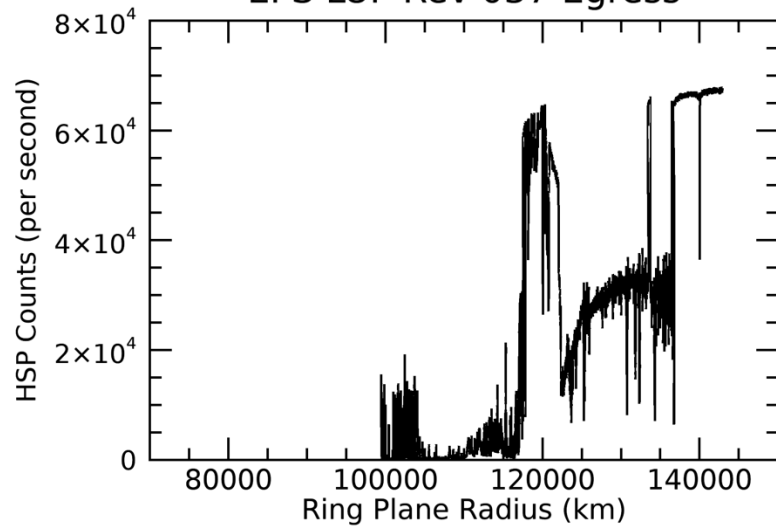
2007-020T15:53:00.000 1405291.4 km

Target RA/dec: 225.18, -46.25

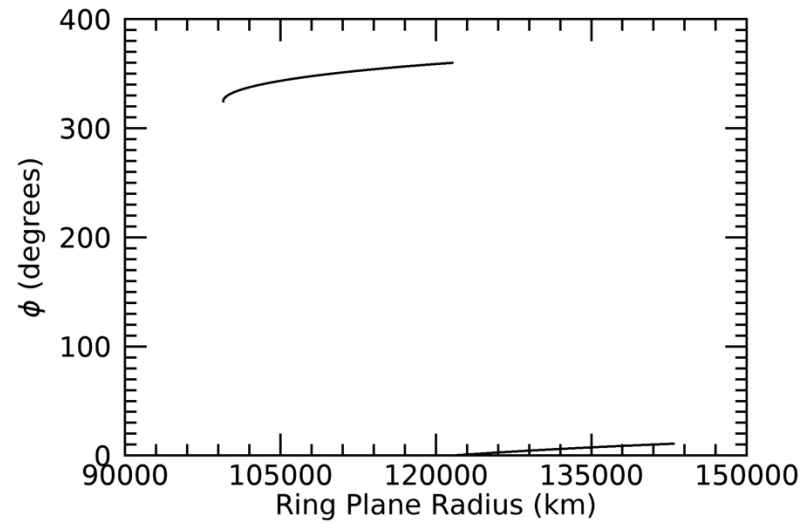
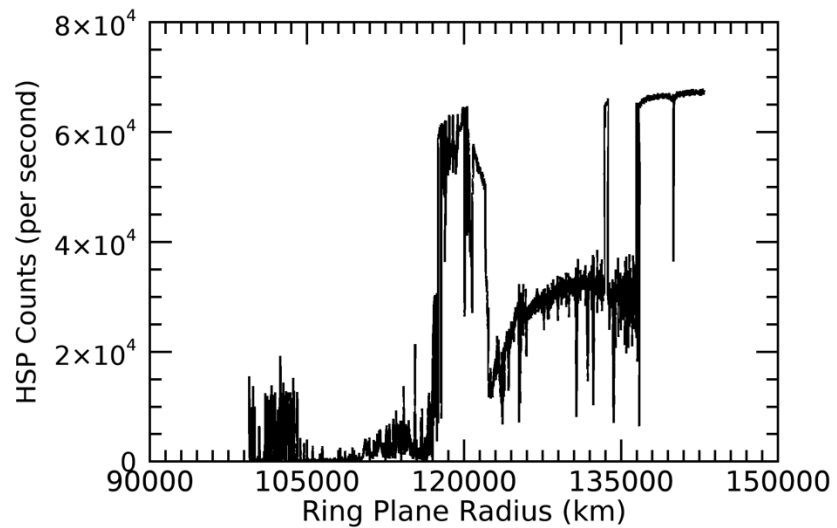
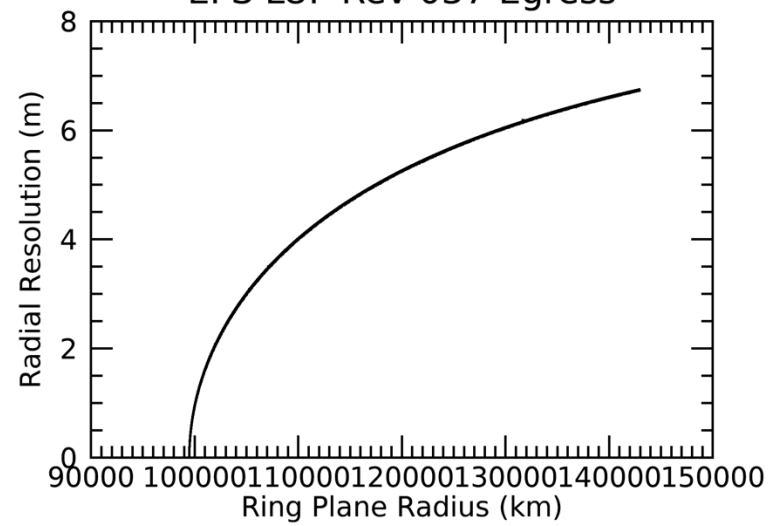
Subsolar lat/lon: -11.55, 138.88

Sub-s/c lat/lon: 47.12, -140.50

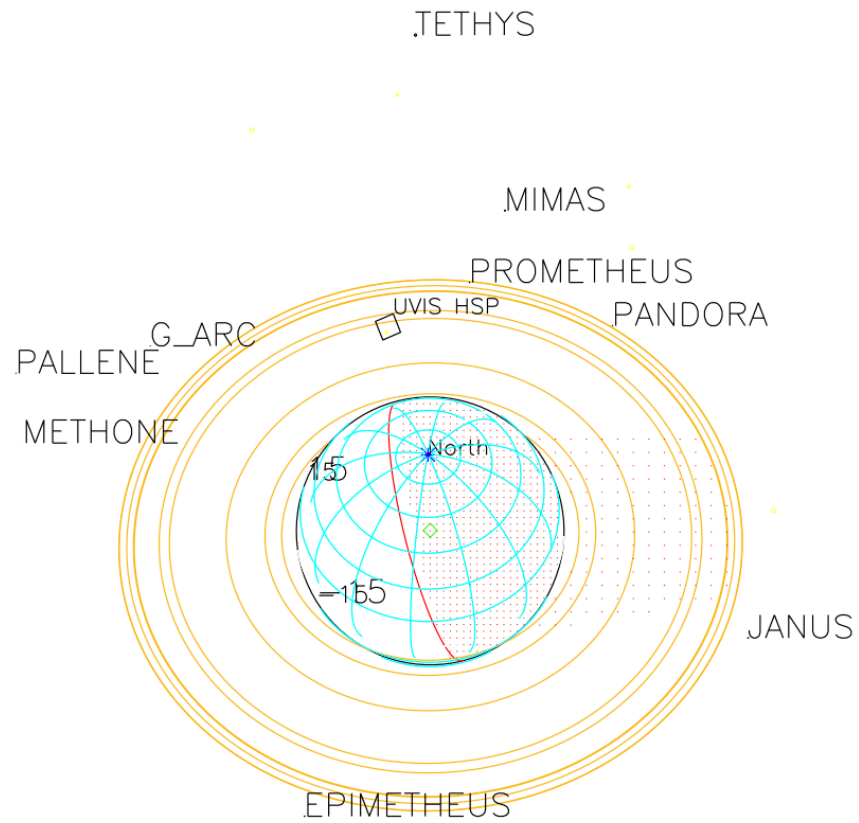
EPS LUP Rev 037 Egress



EPS LUP Rev 037 Egress







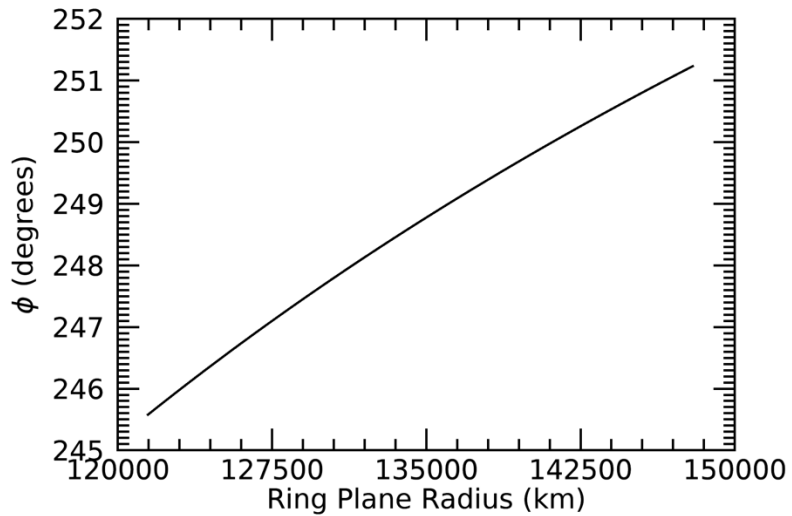
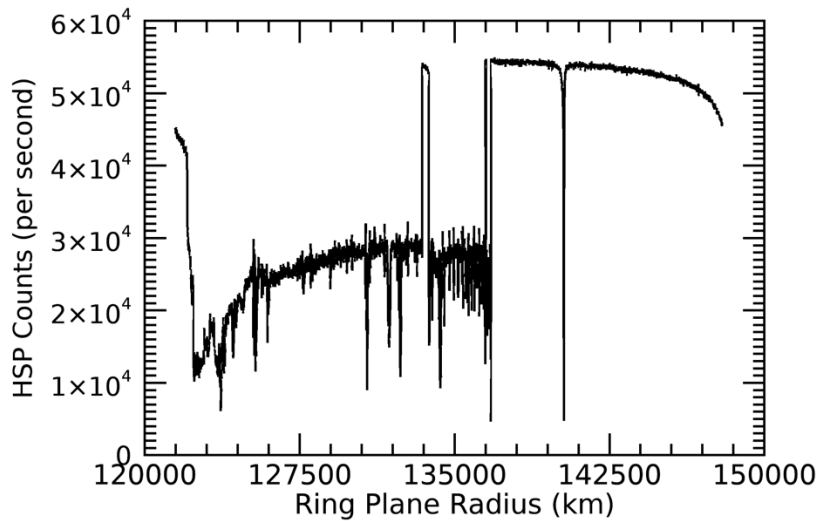
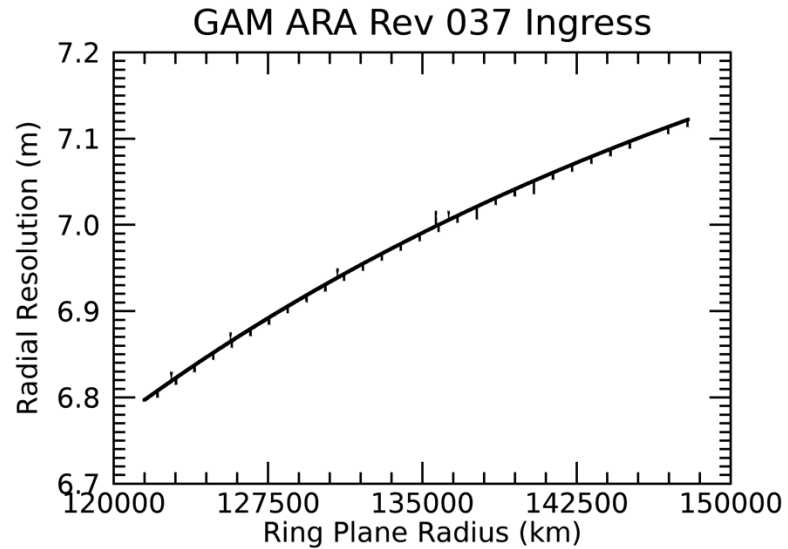
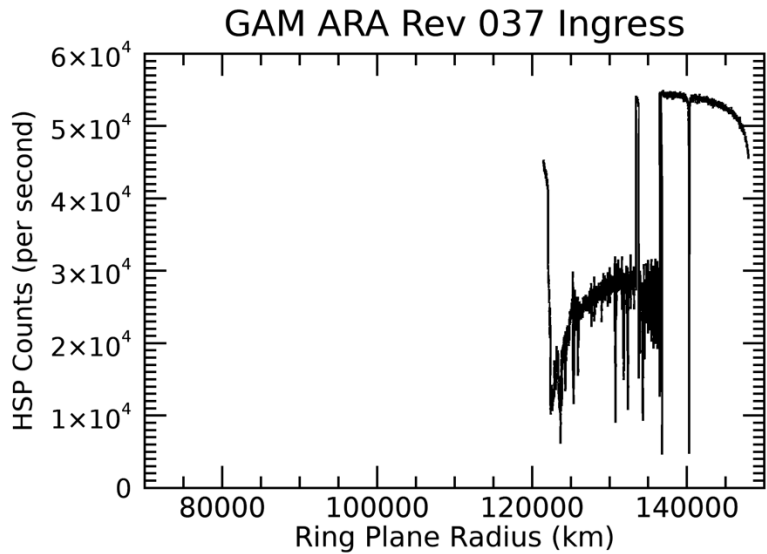
2007-020T21:20:00.000 1437722.8 km

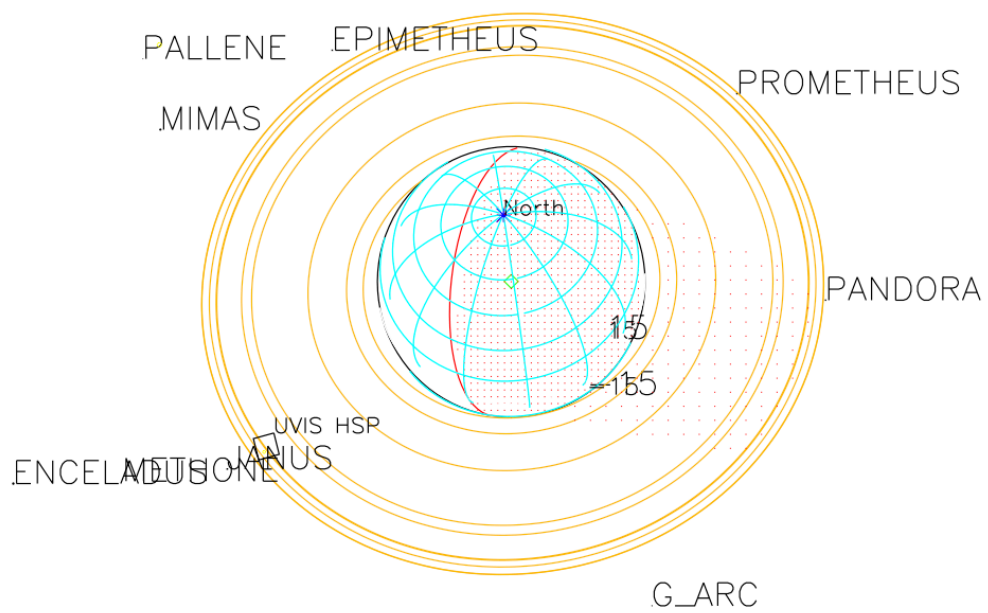
Target RA/dec: 229.57, -48.09

Subsolar lat/lon: -11.55, -45.22

Sub-s/c lat/lon: 48.96, 40.48

.ENCELADUS





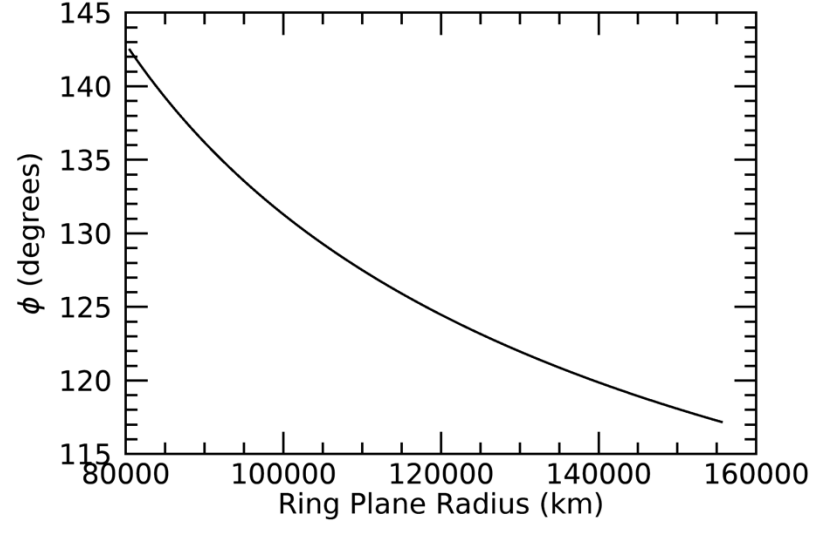
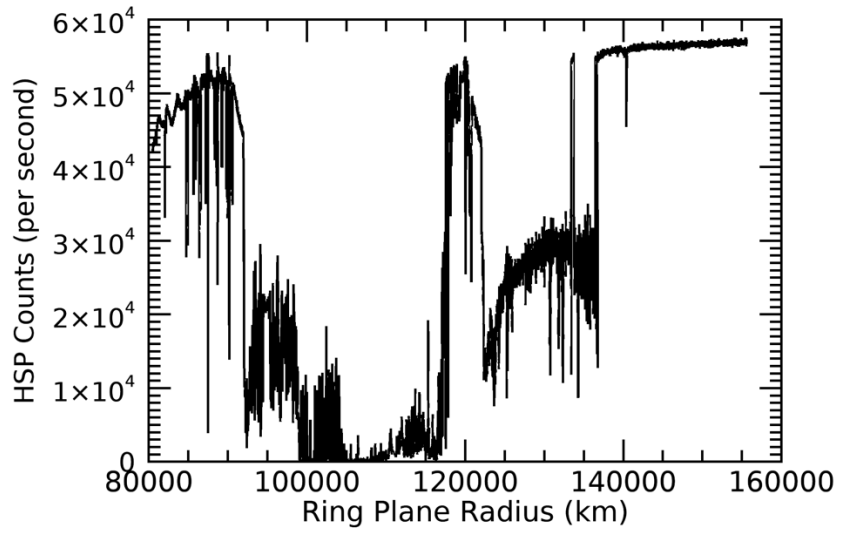
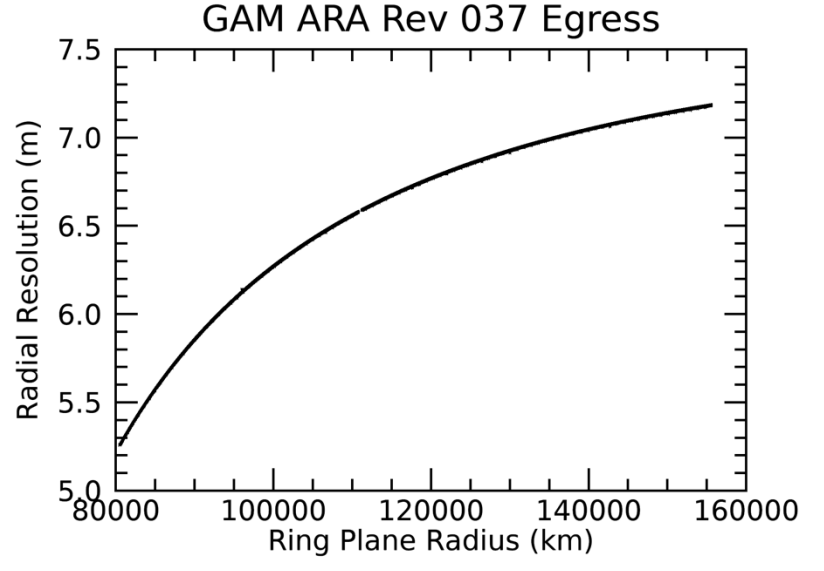
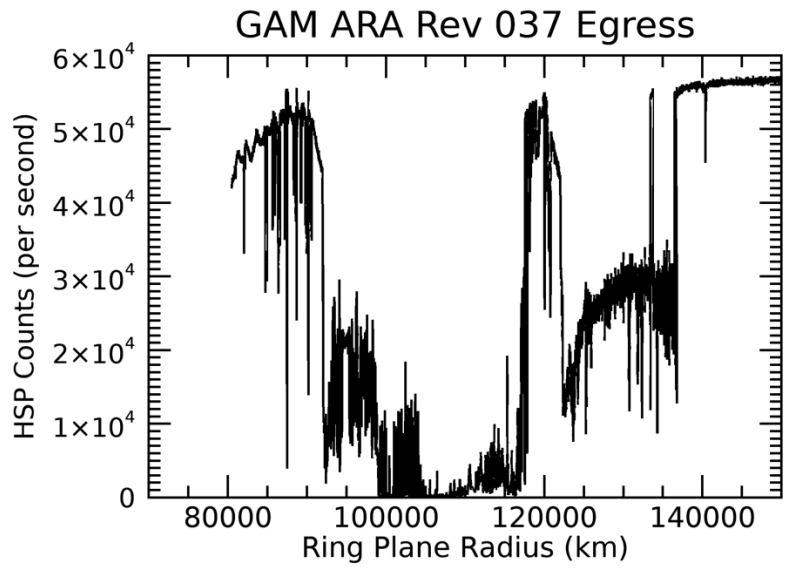
2007-022T02:05:00.000 1576339.9 km

Target RA/dec: 254.04, -53.92

Subsolar lat/lon: -11.53, 63.56

Sub-s/c lat/lon: 53.91, 178.14

TETHYS



DIONE

TETHYS

METHONE

EPIMETHEUS

PROMETHEUS

MIMAS

EN

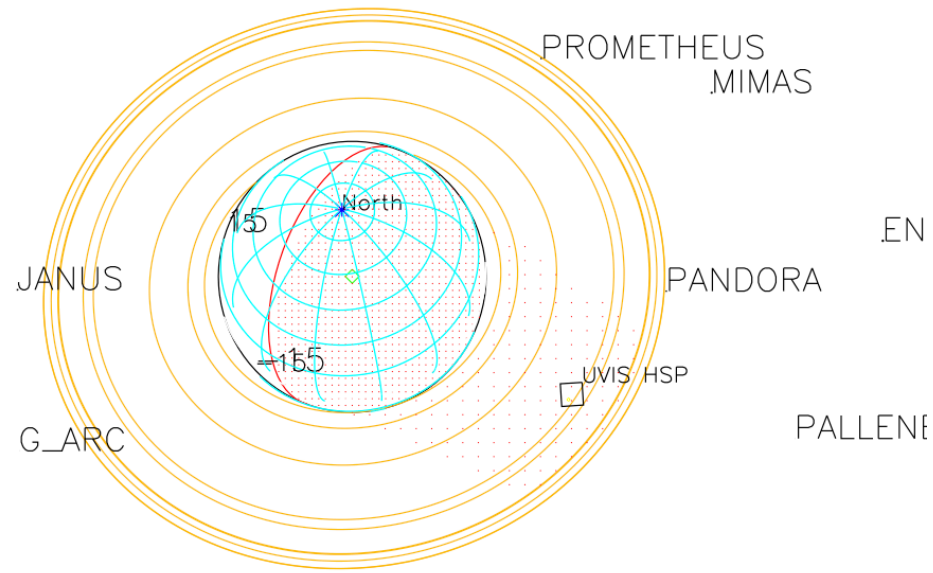
JANUS

PANDORA

UVIS HSP

PALLENÉ

G\_ARC



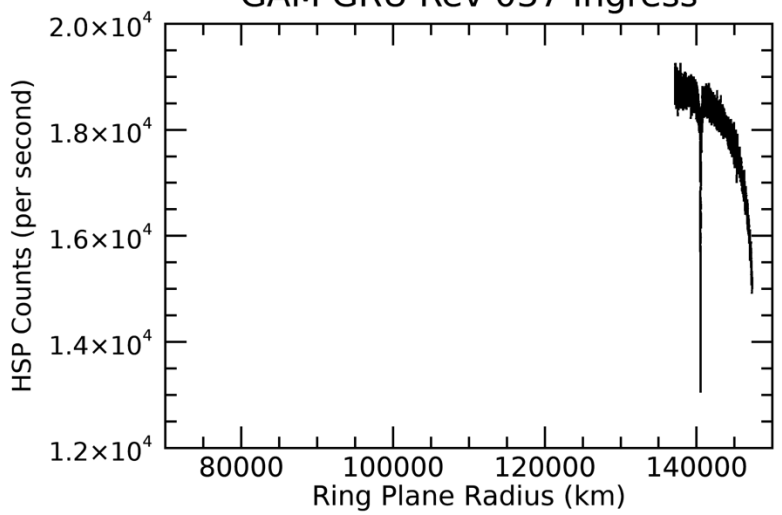
2007-022T17:44:00.000 1628583.1 km

Target RA/dec: 267.54, -54.66

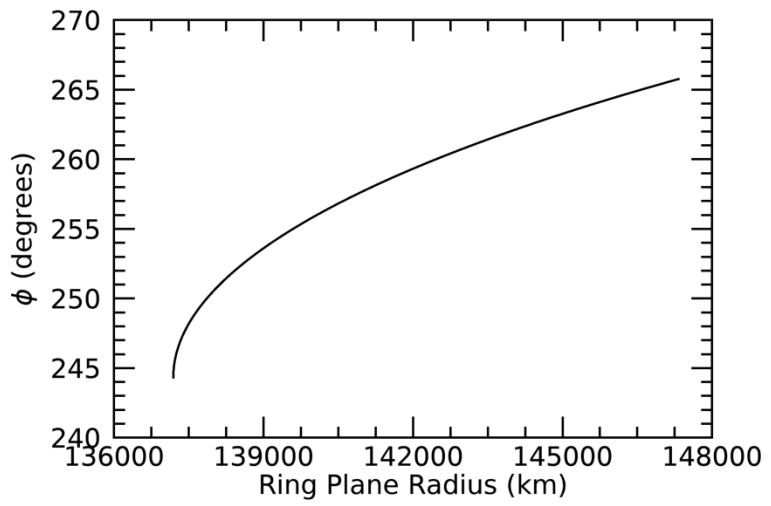
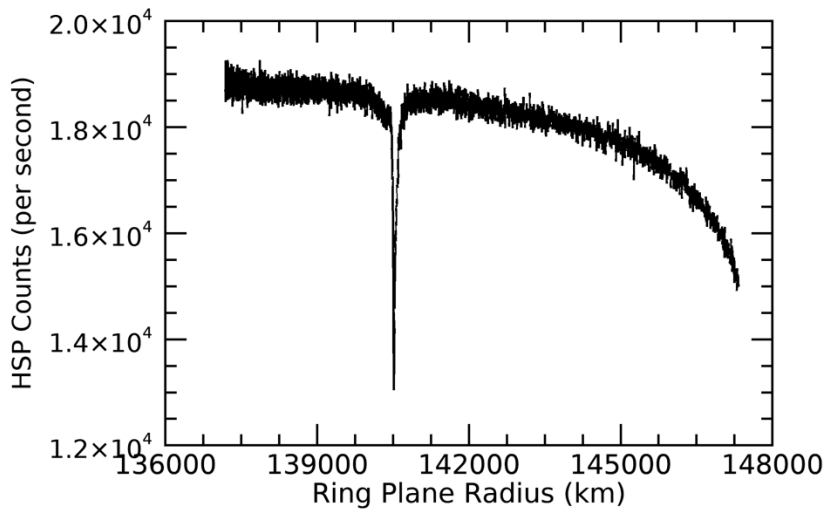
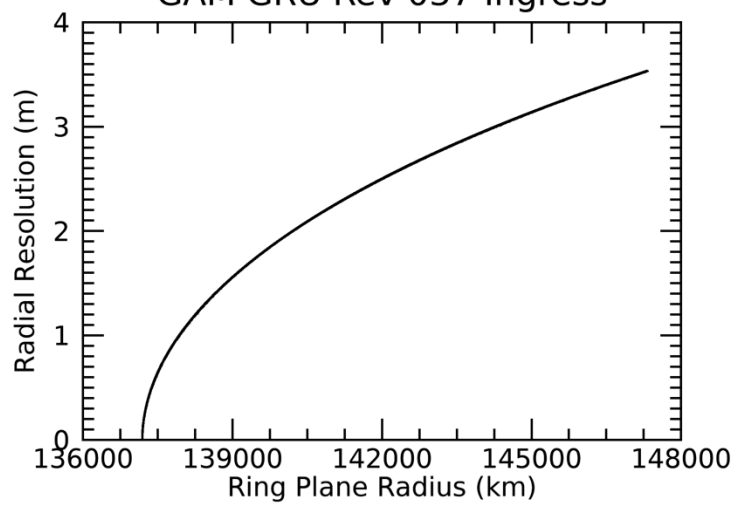
Subsolar lat/lon: -11.53, -105.12

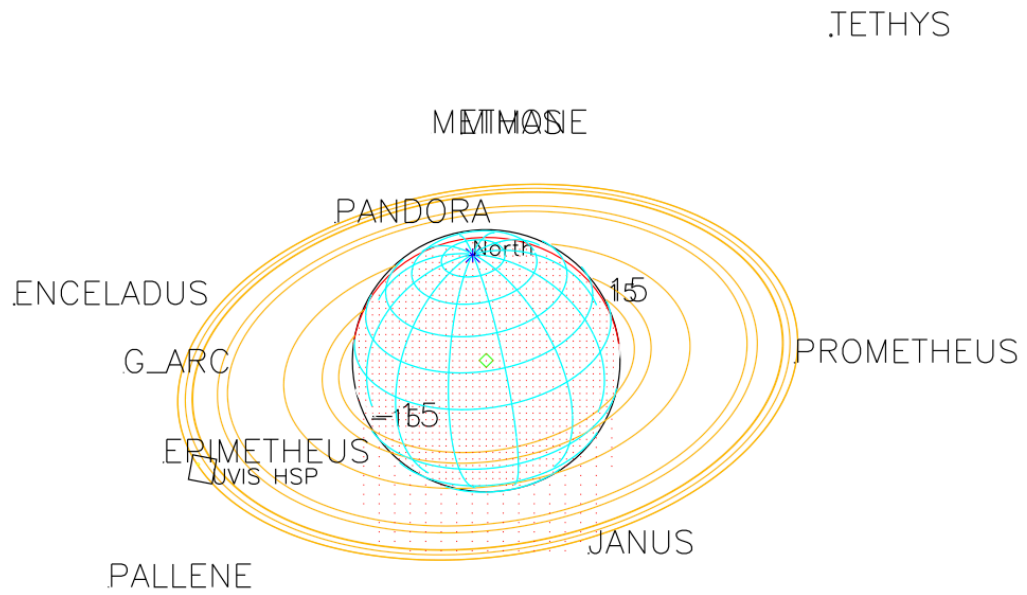
Sub-s/c lat/lon: 53.50, 24.77

GAM GRU Rev 037 Ingress



GAM GRU Rev 037 Ingress





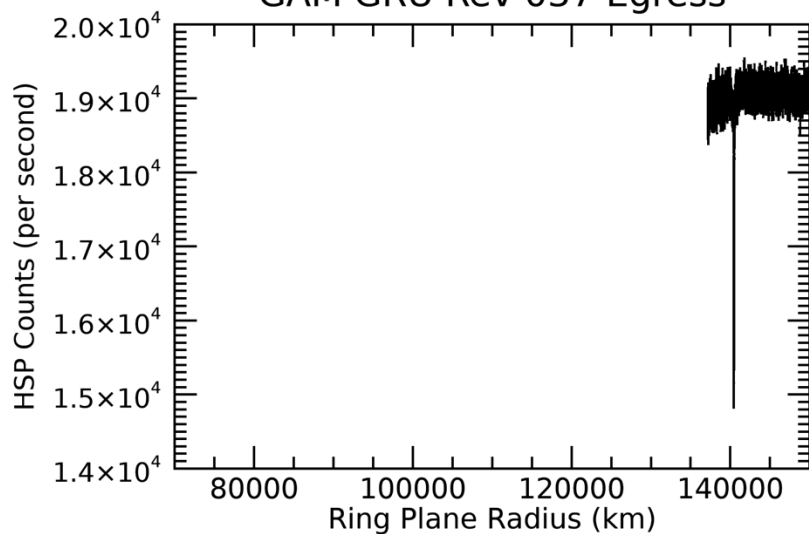
2007-009T20:36:00.000 1792295.8 km

Target RA/dec: 323.27, -36.05

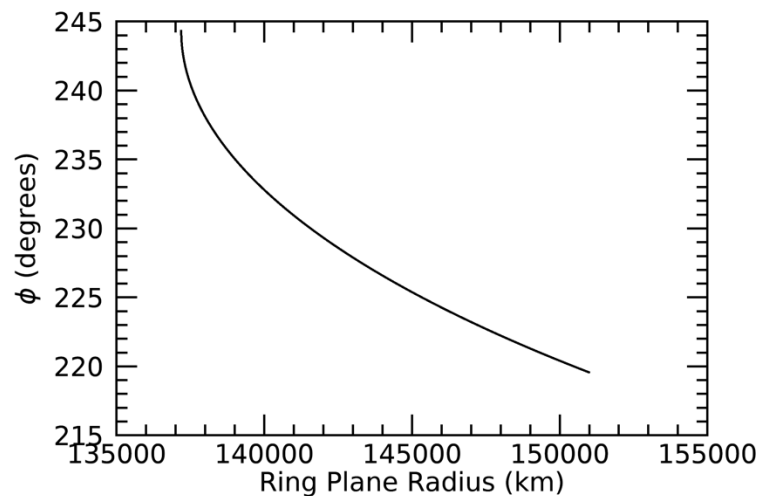
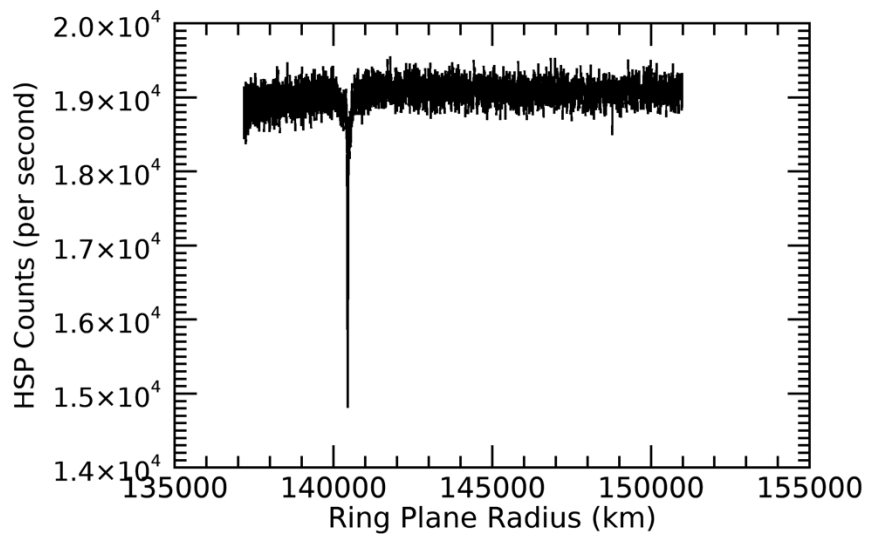
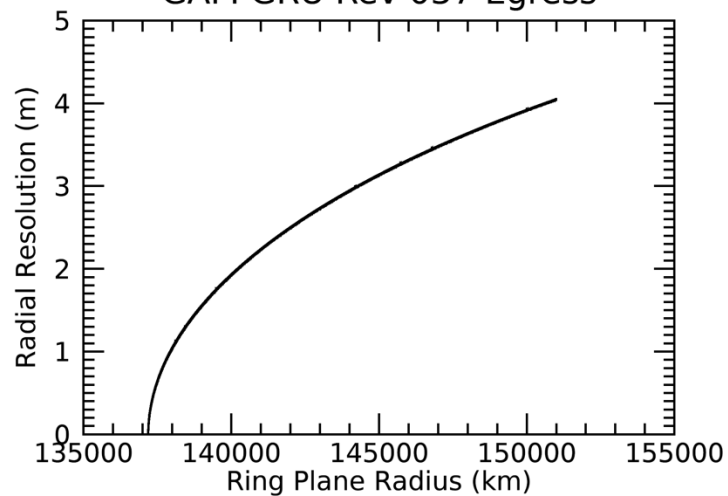
Subsolar lat/lon: -11.68, -102.08

Sub-s/c lat/lon: 29.26, 80.75

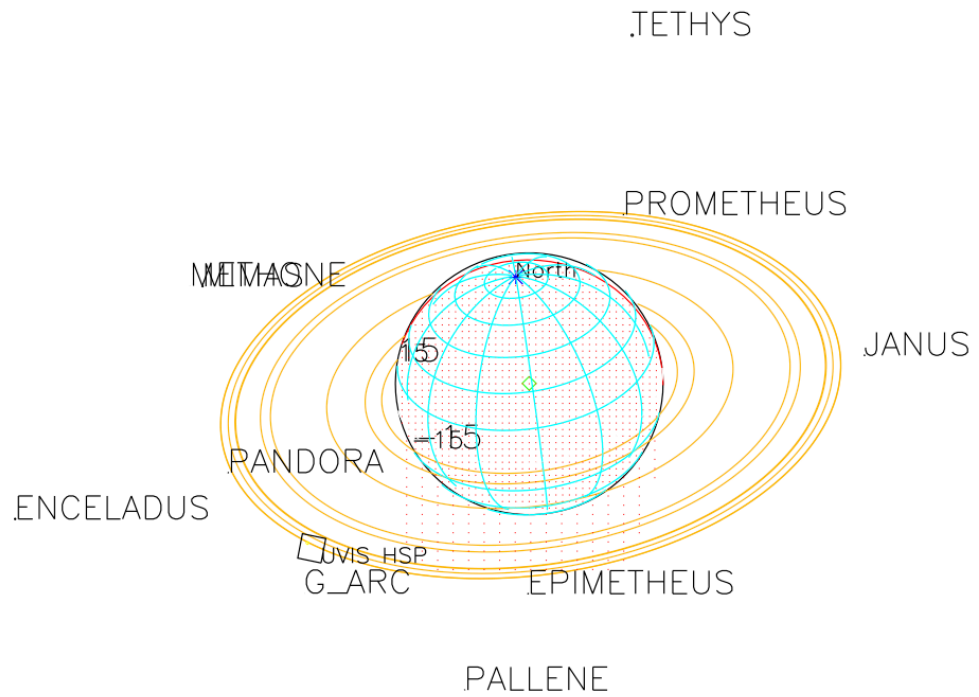
GAM GRU Rev 037 Egress



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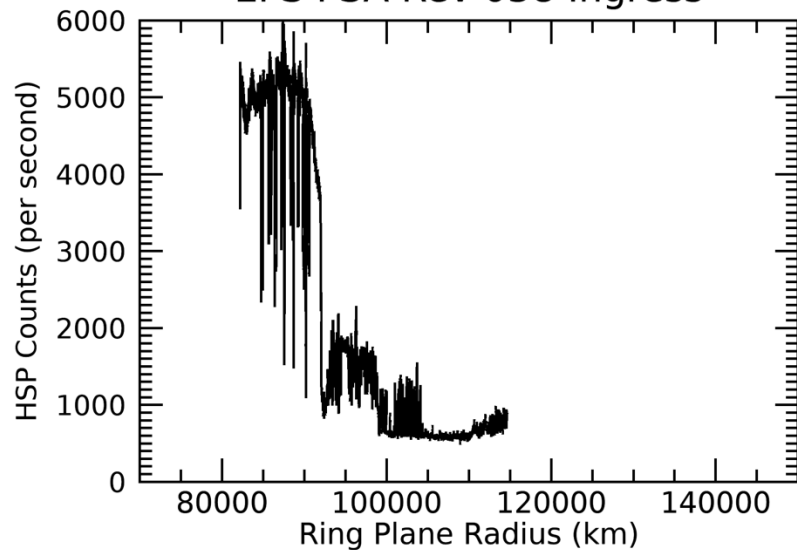
2007-009T23:57:00.000 1781858.3 km

Target RA/dec: 324.45, -35.22

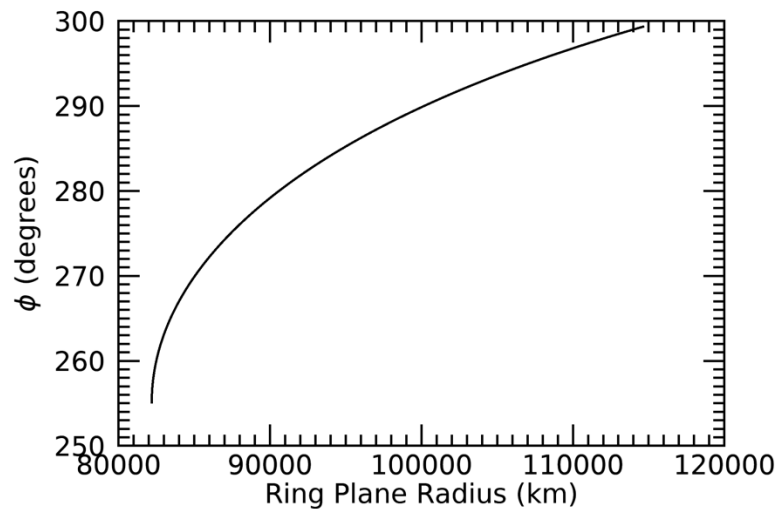
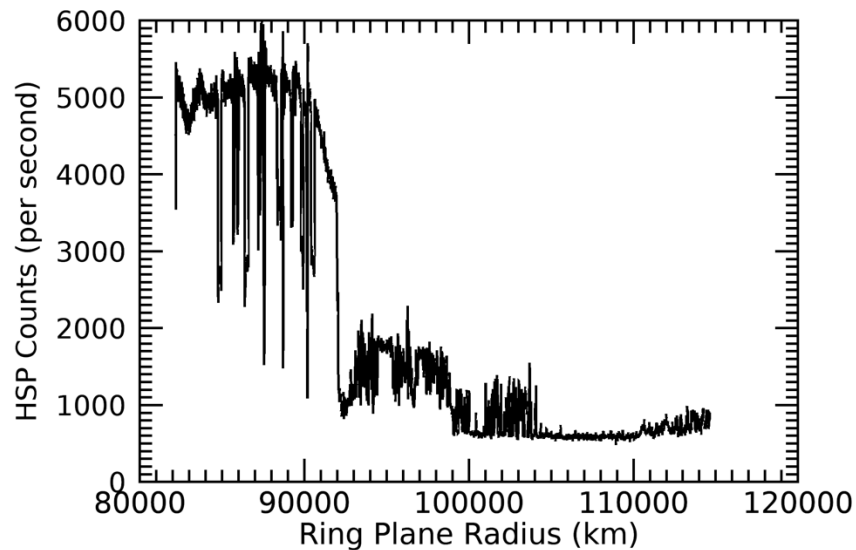
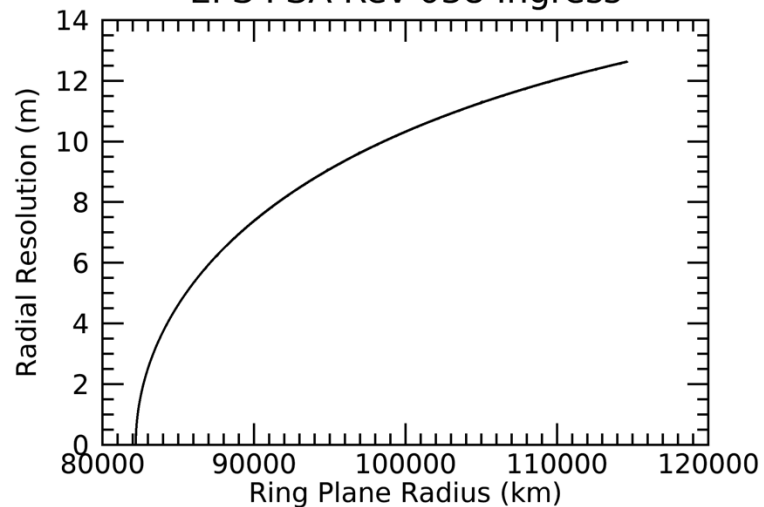
Subsolar lat/lon: -11.68, 144.75

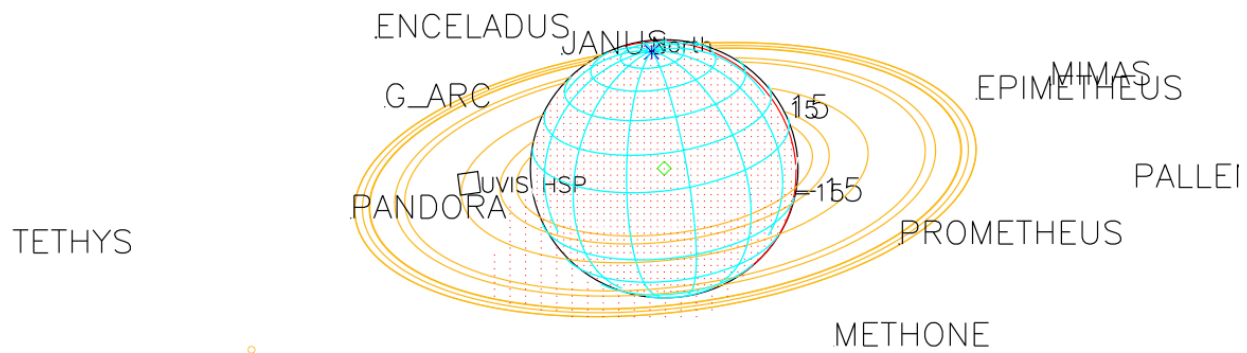
Sub-s/c lat/lon: 28.40, -31.41

EPS PSA Rev 038 Ingress



EPS PSA Rev 038 Ingress





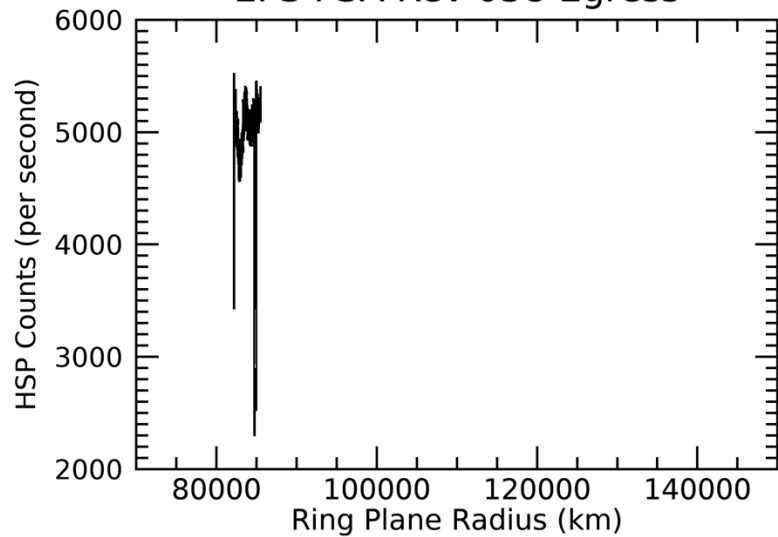
2007-027T14:21:00.000 1507088.2 km

Target RA/dec: 336.32, -26.90

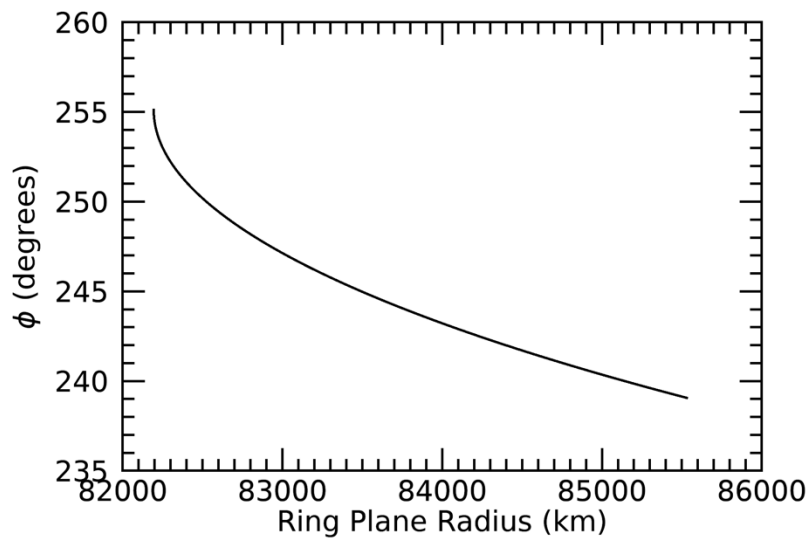
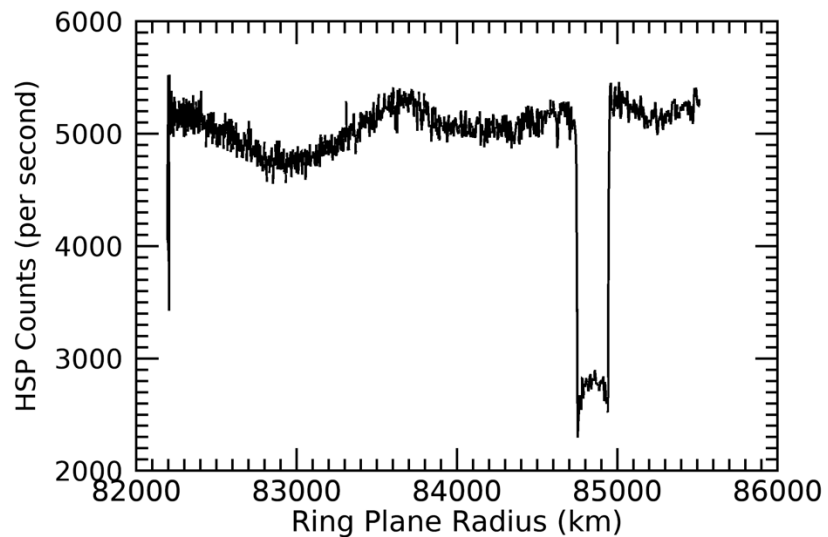
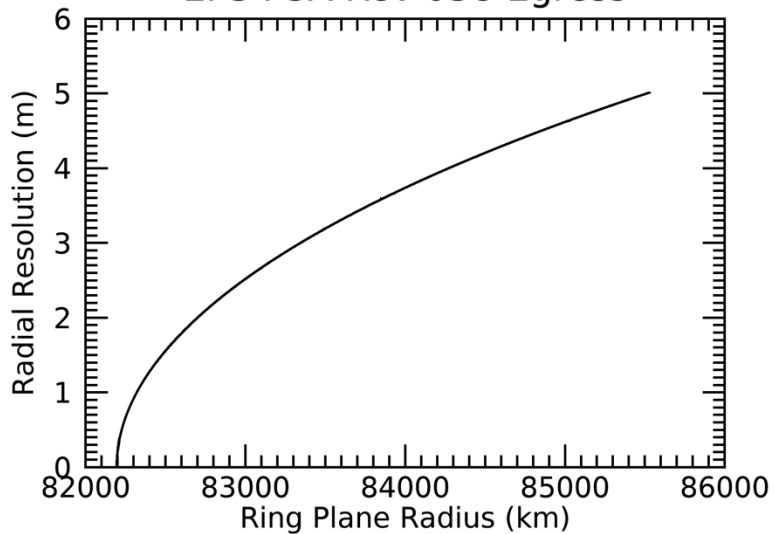
Subsolar lat/lon: -11.47, -84.63

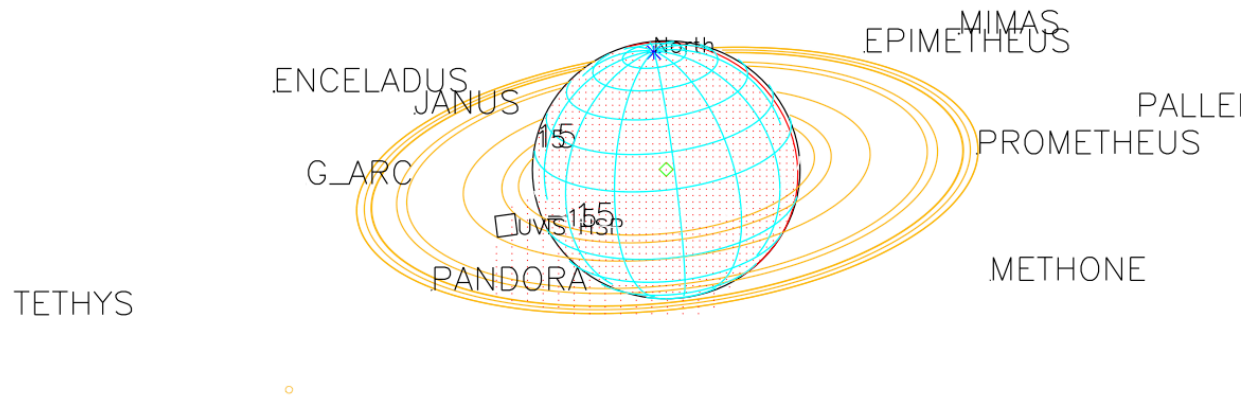
Sub-s/c lat/lon: 20.01, 108.98

EPS PSA Rev 038 Egress



EPS PSA Rev 038 Egress





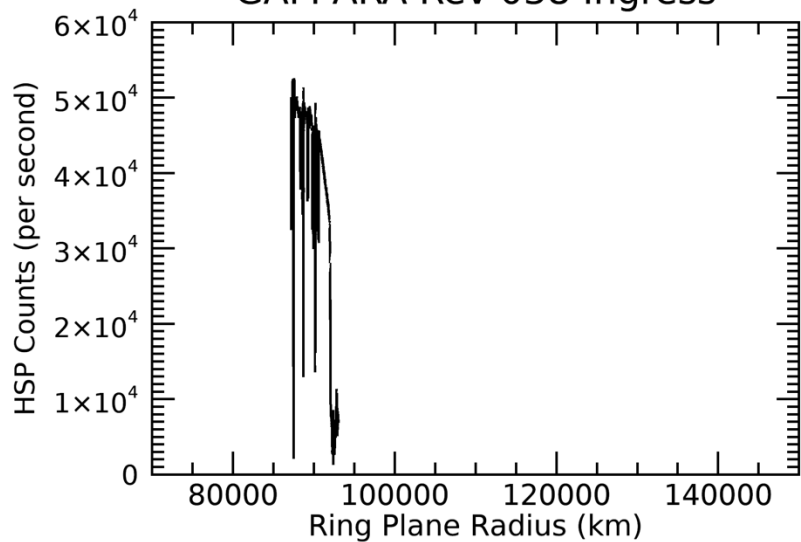
2007-027T15:56:00.000 1499220.9 km

Target RA/dec: 336.98, -26.20

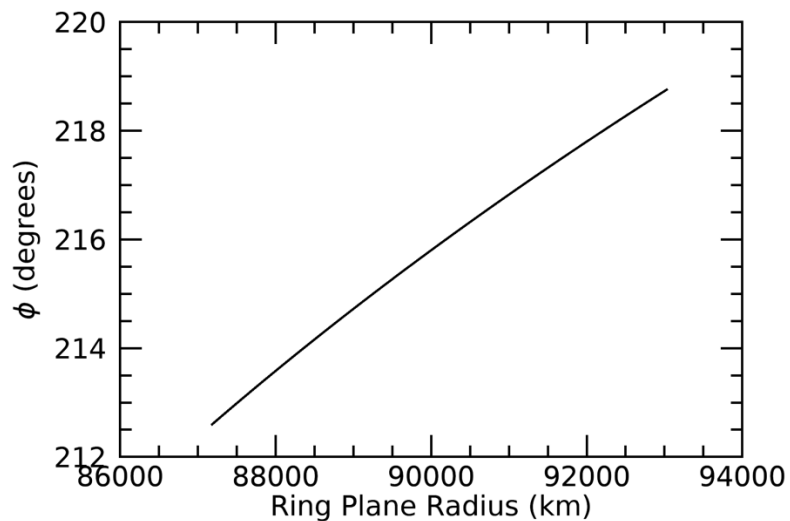
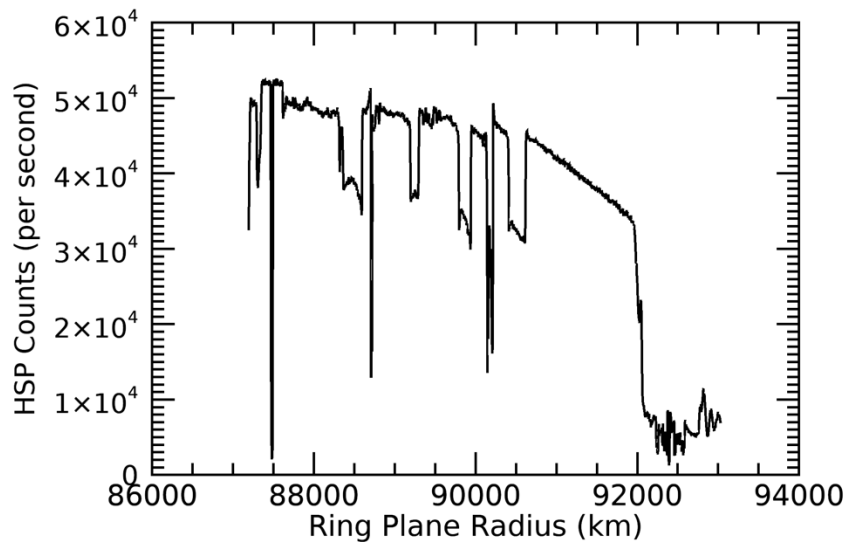
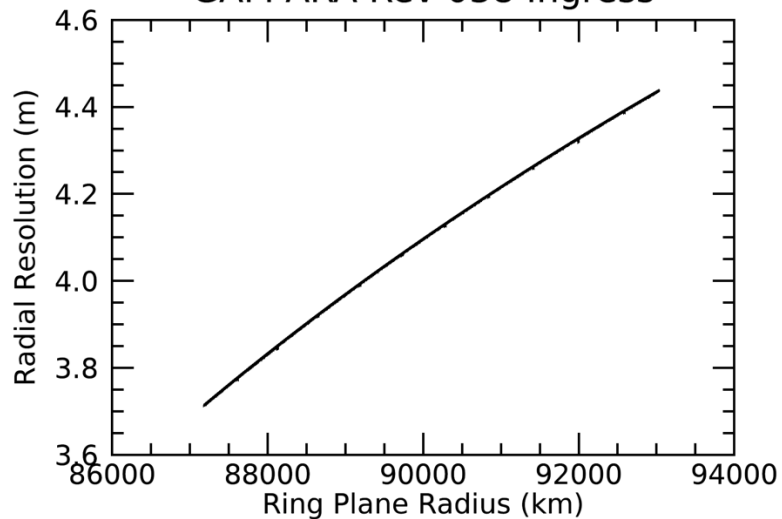
Subsolar lat/lon: -11.47, -138.12

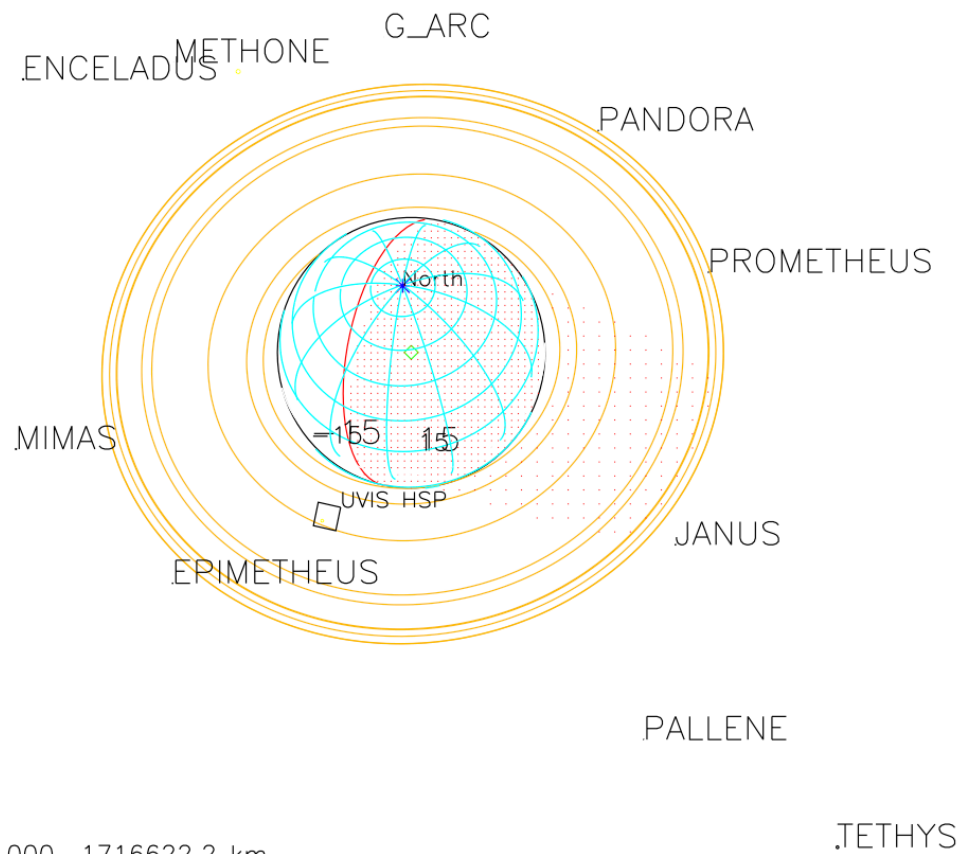
Sub-s/c lat/lon: 19.36, 56.04

GAM ARA Rev 038 Ingress



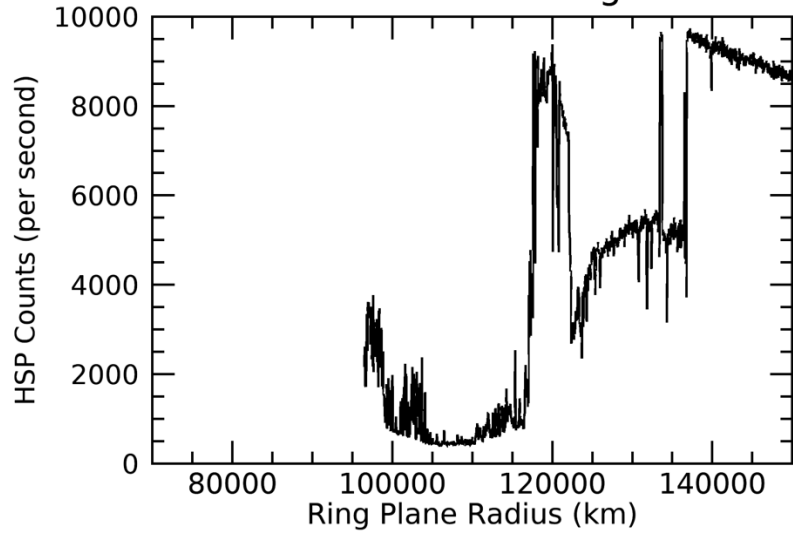
GAM ARA Rev 038 Ingress



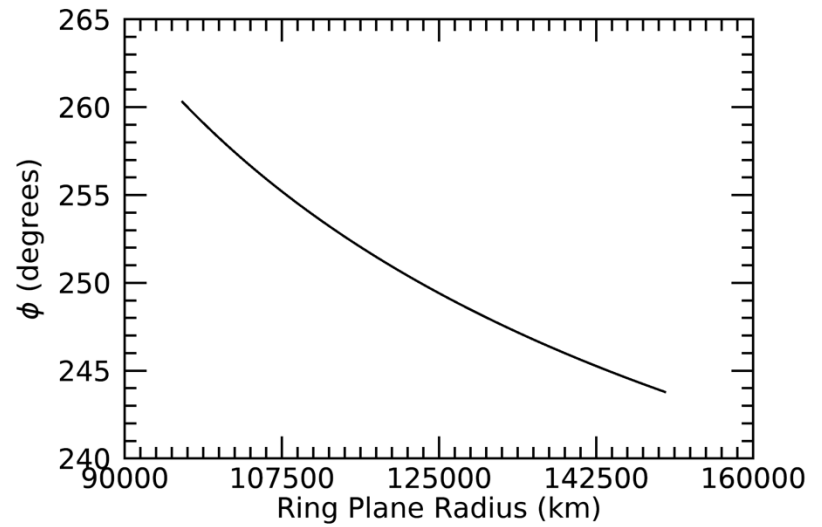
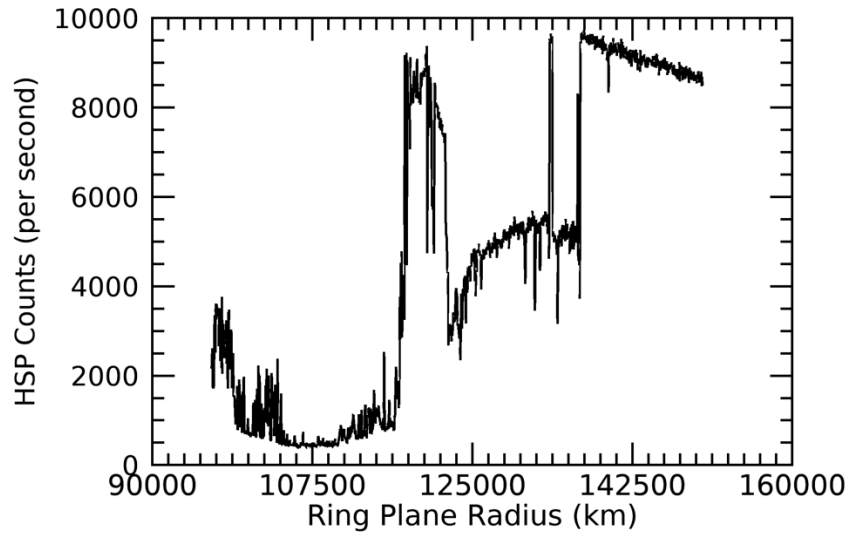
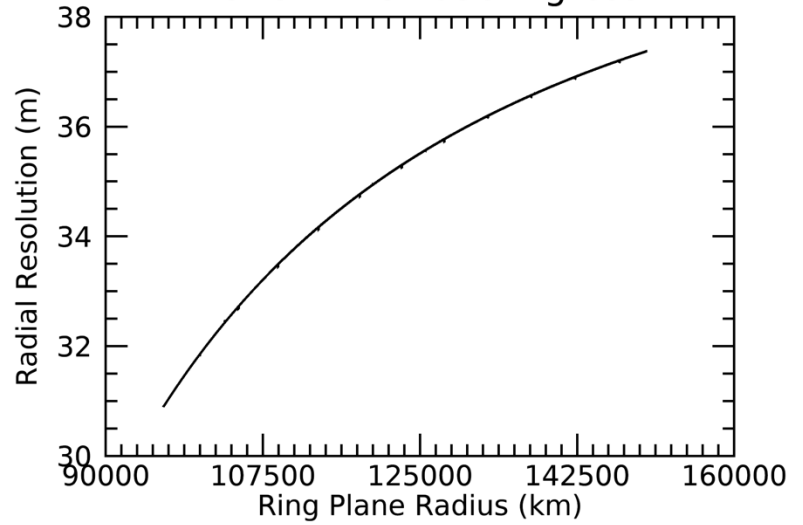


2007-041T01:14:00.000 1716622.2 km  
 Target RA/dec: 258.93, -53.98  
 Subsolar lat/lon: -11.31, 167.84  
 Sub-s/c lat/lon: 53.56, -72.67

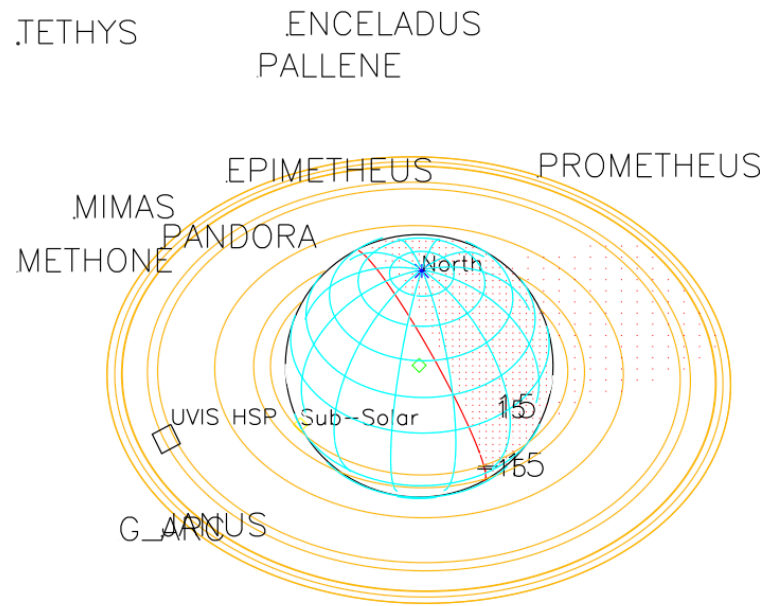
PSI CEN Rev 038 Ingress



PSI CEN Rev 038 Ingress







D

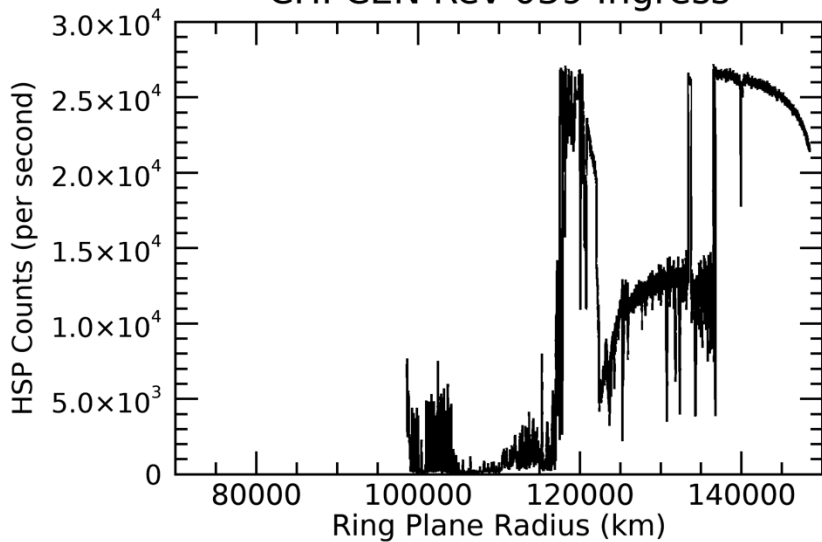
2007-037T23:47:00.000 1551827.2 km

Target RA/dec: 209.79, -36.74

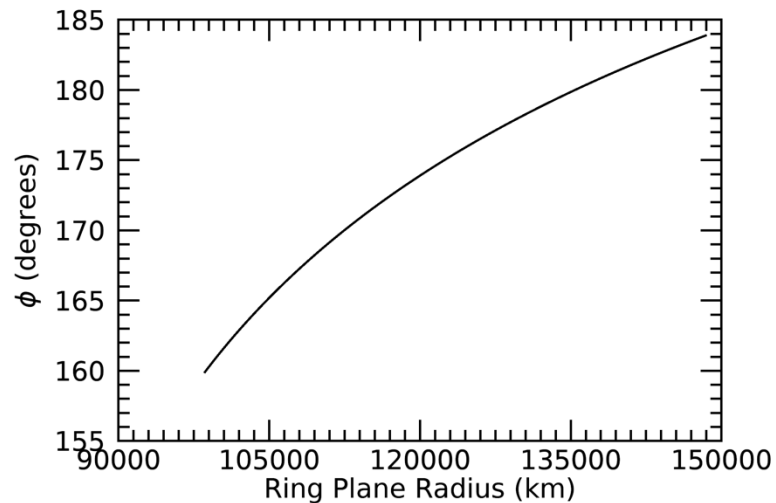
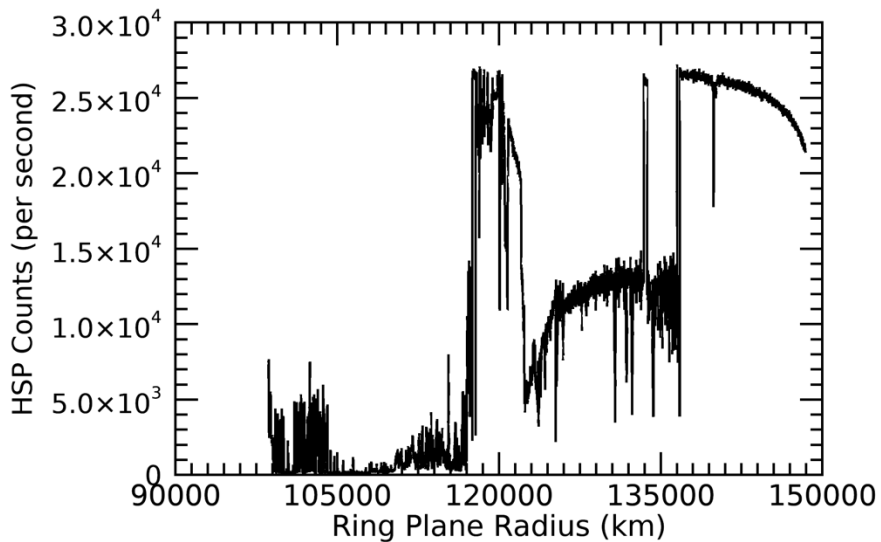
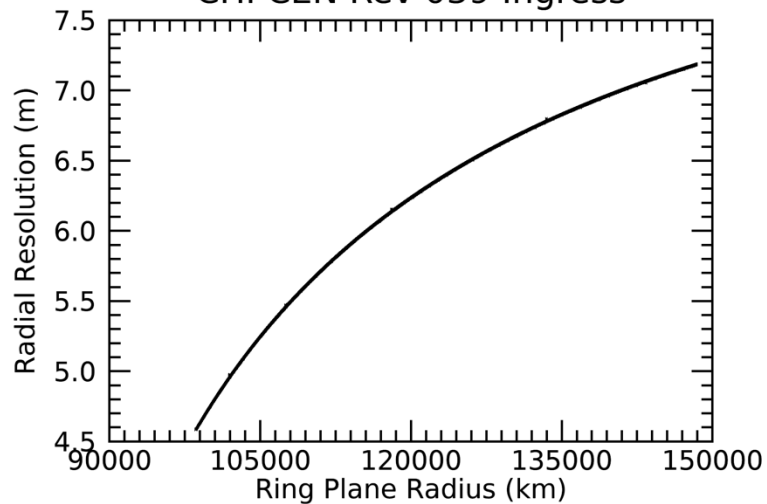
Subsolar lat/lon: -11.35, 129.10

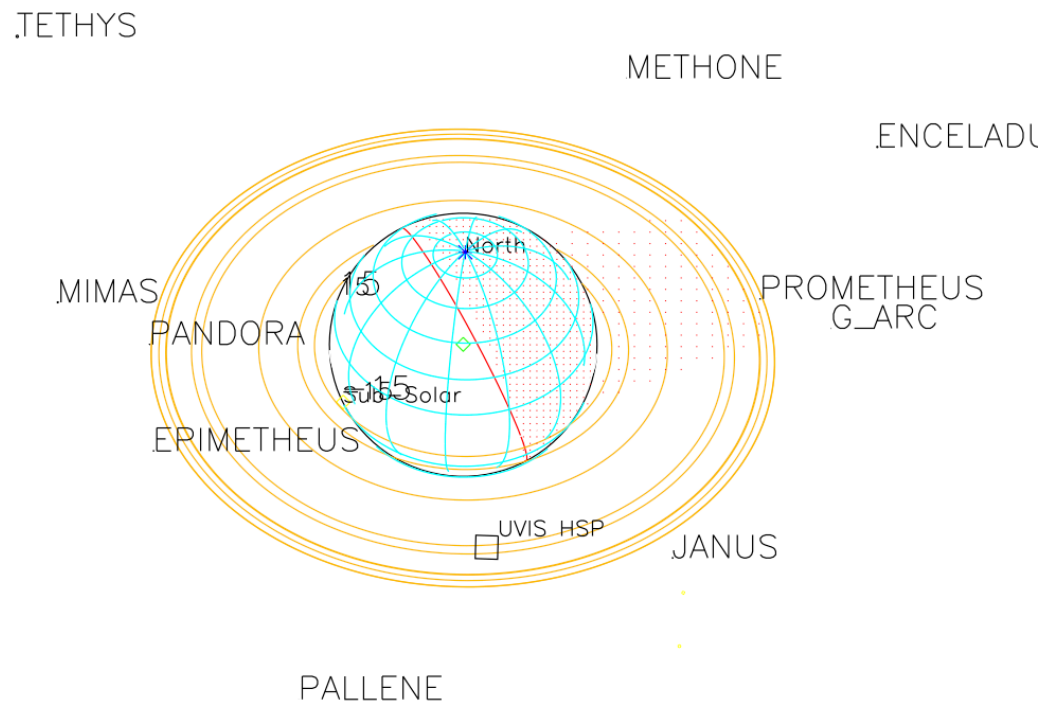
Sub-s/c lat/lon: 37.48, -167.98

CHI CEN Rev 039 Ingress



CHI CEN Rev 039 Ingress





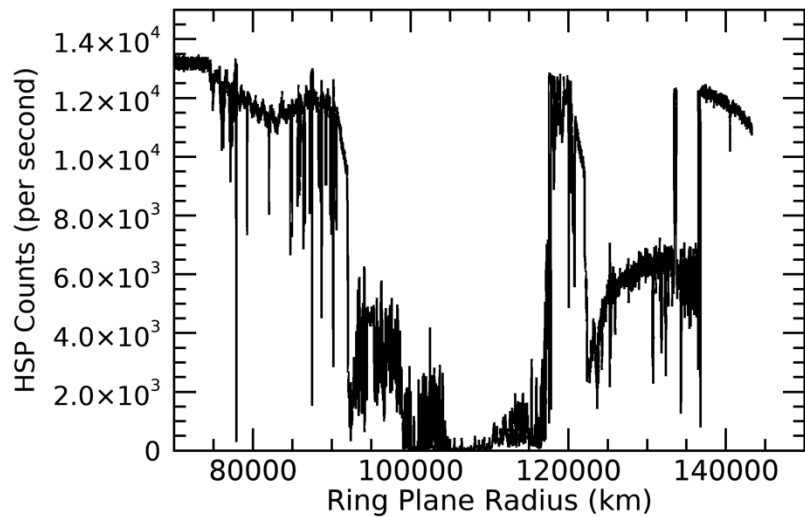
2007-056T21:46:00.000 1672156.2 km

Target RA/dec: 211.91, -38.11

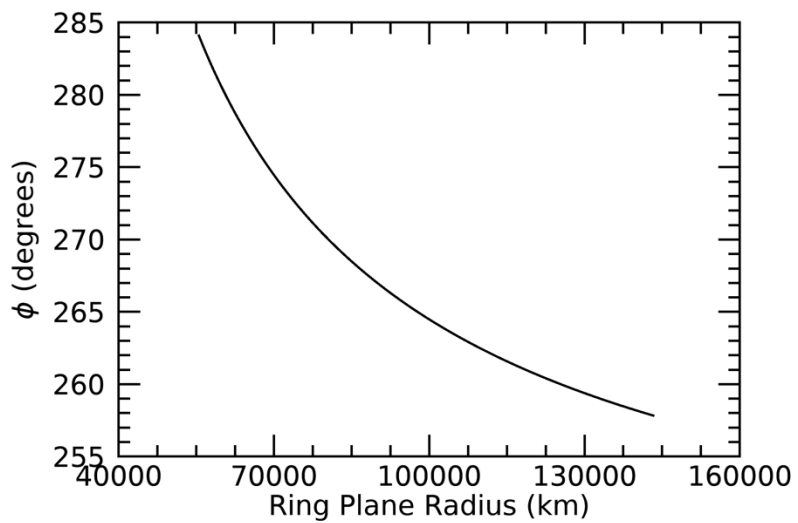
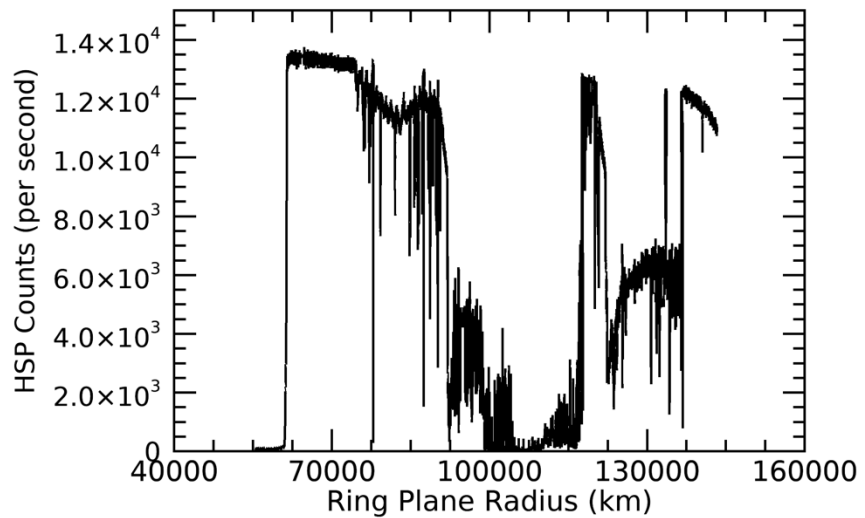
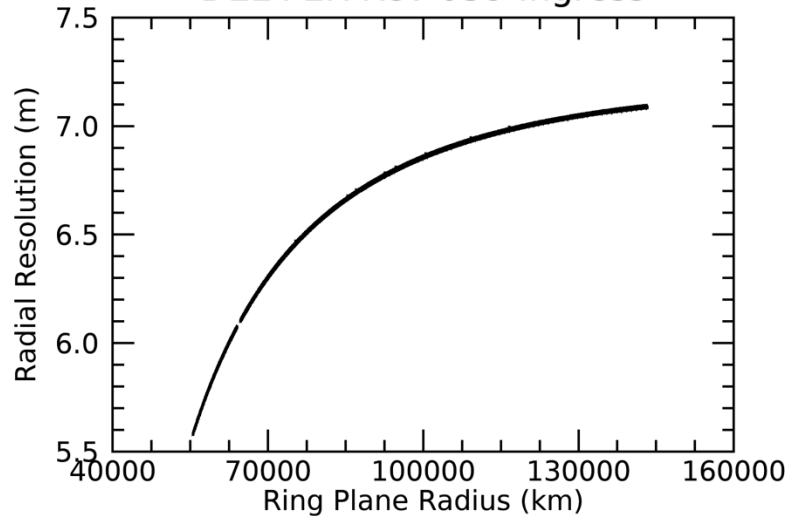
Subsolar lat/lon: -11.13, -87.21

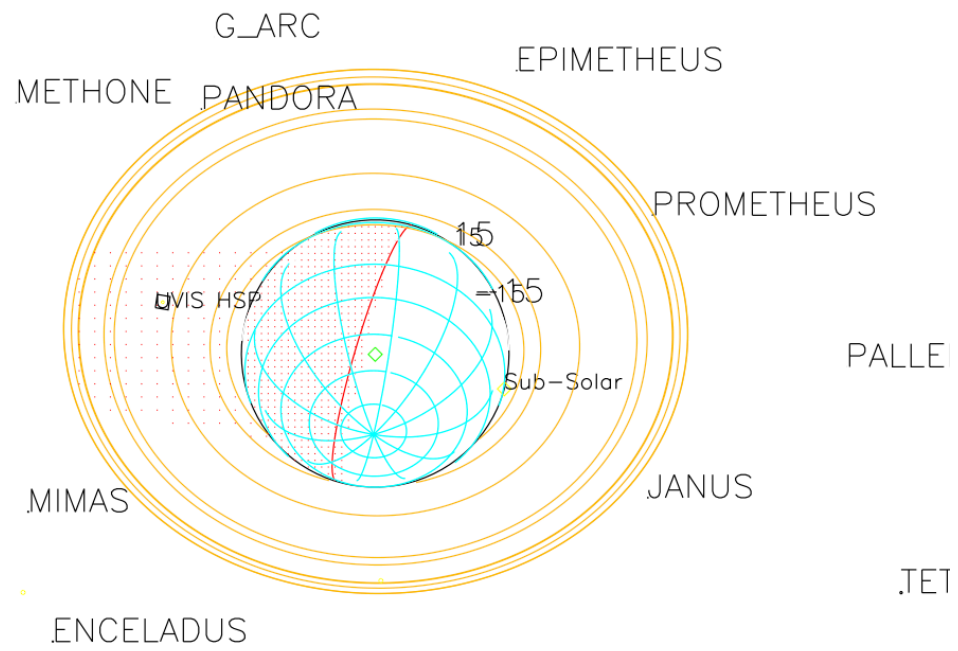
Sub-s/c lat/lon: 38.84, -22.65

DEL PER Rev 039 Ingress



DEL PER Rev 039 Ingress



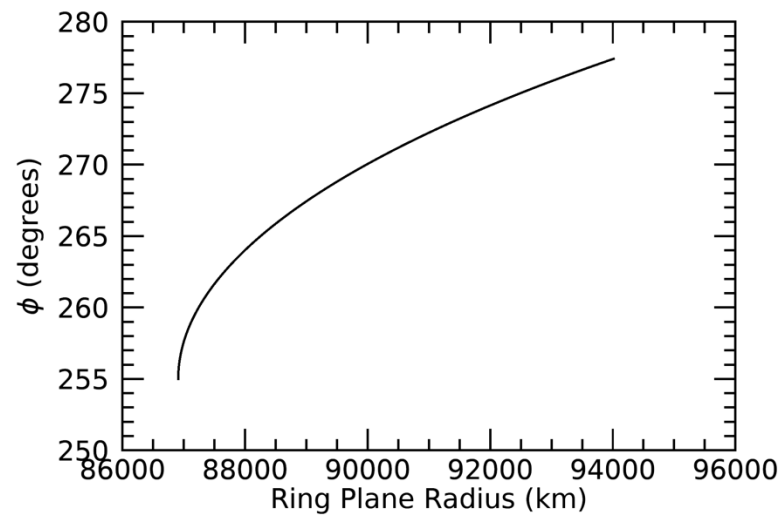
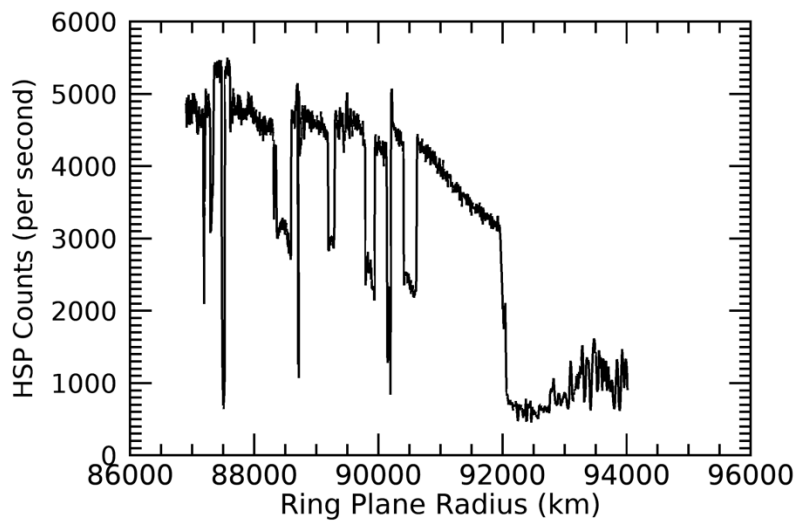
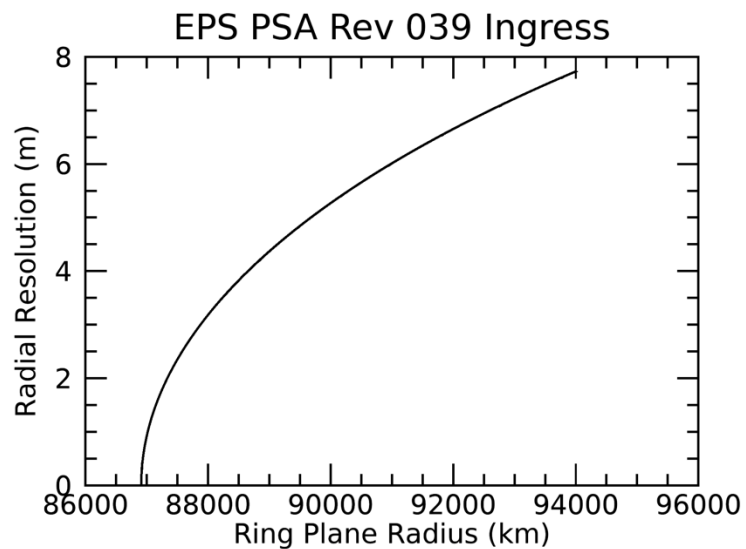
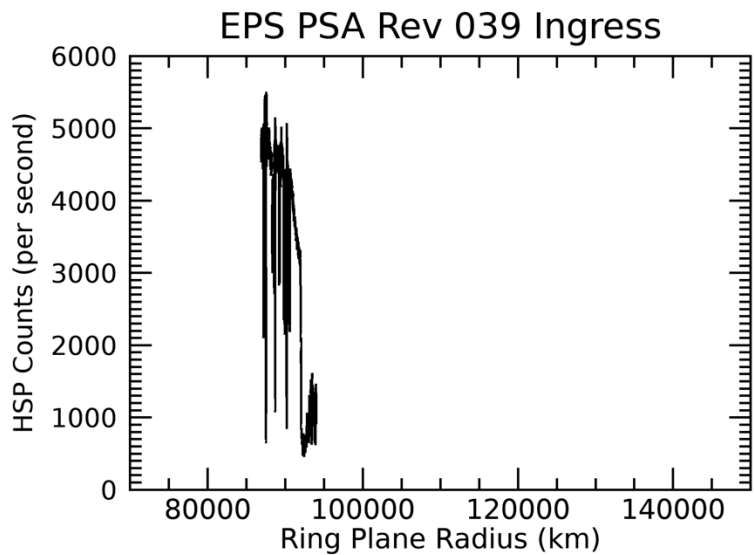


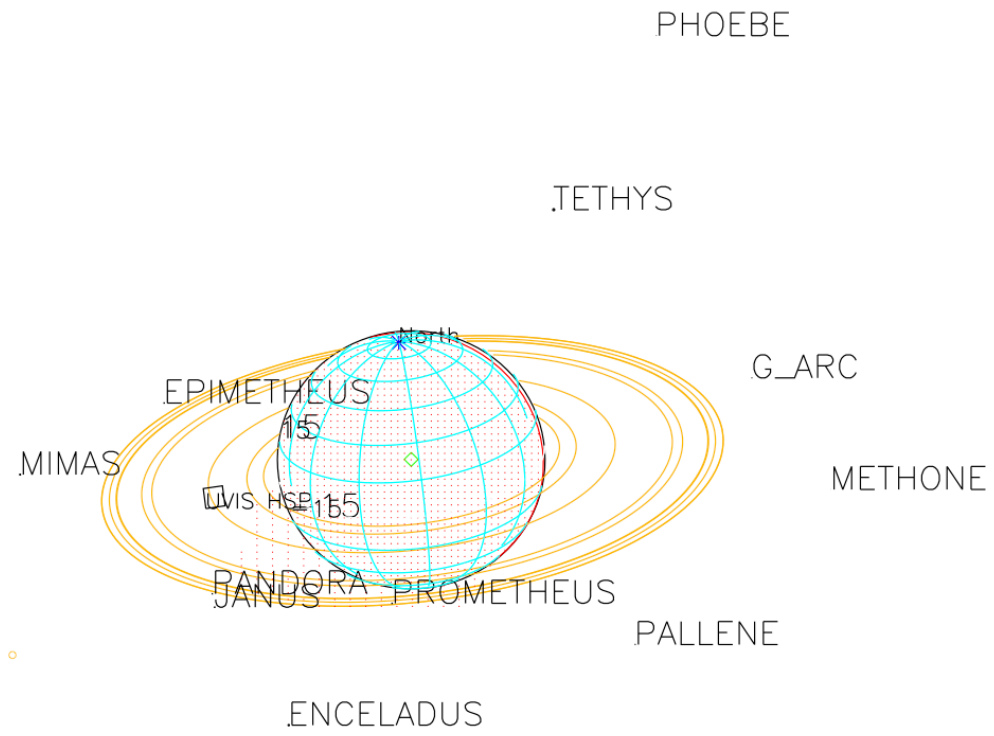
2007-049T19:24:00.000 961325.81 km

Target RA/dec: 47.24, 46.76

Subsolar lat/lon: -11.21, -91.96

Sub-s/c lat/lon: -47.73, 170.03



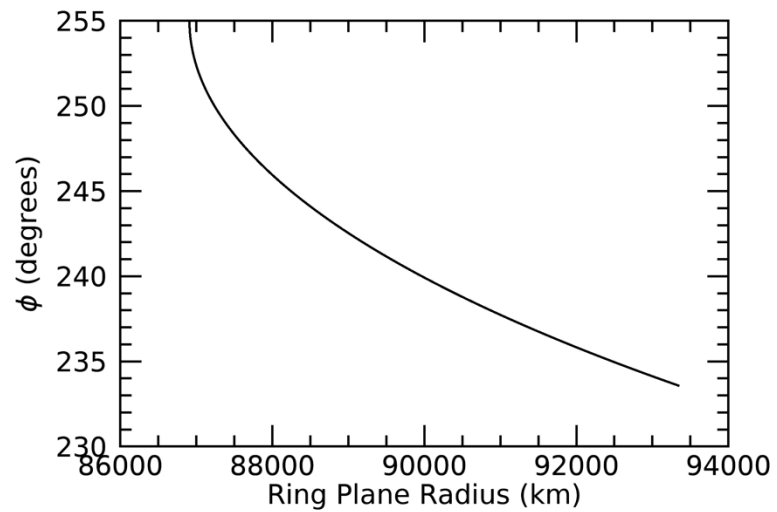
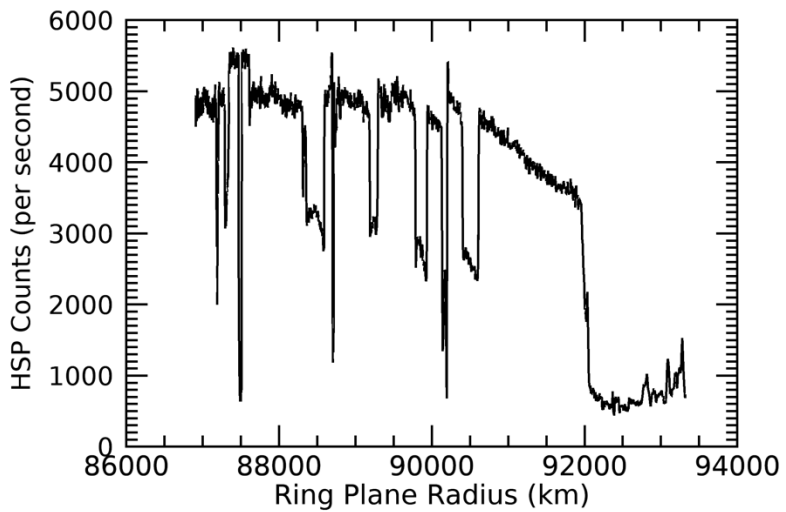
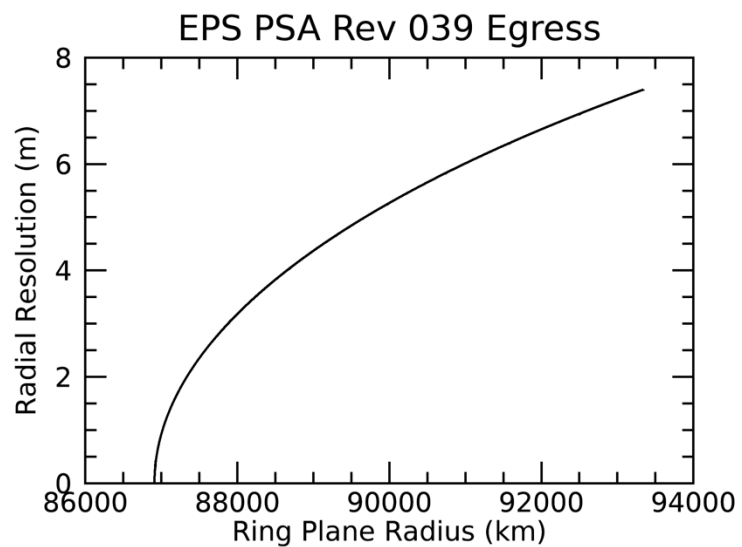
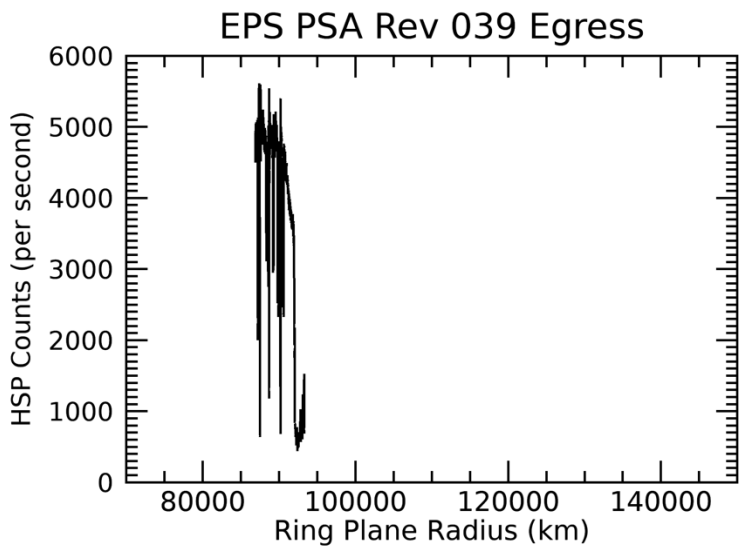


2007-045T21:42:00.000 1445866.8 km

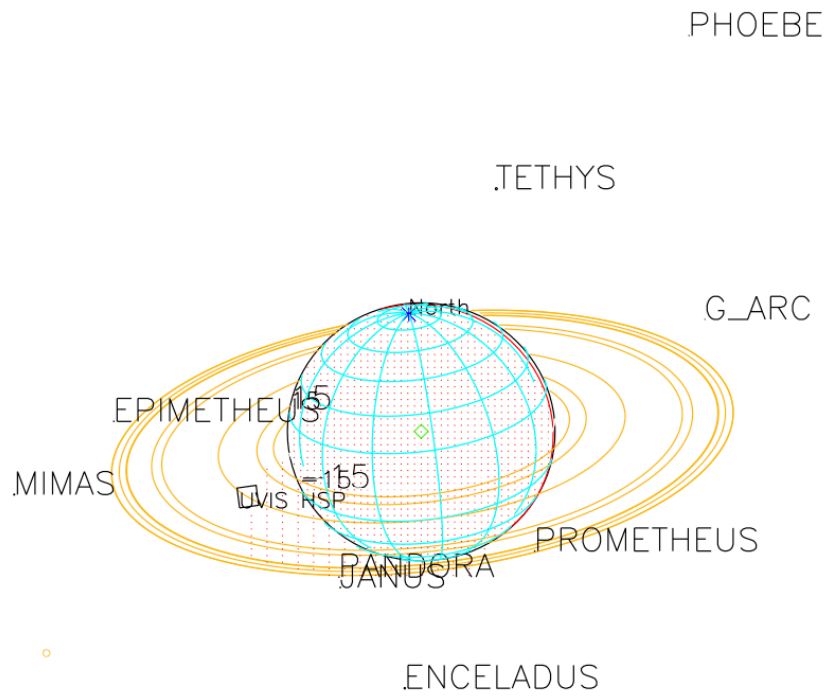
Target RA/dec: 336.27, -26.53

Subsolar lat/lon: -11.26, -166.60

Sub-s/c lat/lon: 19.71, 26.28







DIONE

2007-045T22:39:00.000 1441147.0 km

Target RA/dec: 336.73, -26.05

Subsolar lat/lon: -11.26, 161.30

Sub-s/c lat/lon: 19.25, -5.42