Introduction to Chapter 2

This chapter gives an overview of the NIMS observations in the J0 Orbit.

The text on pages 3 and 4 summarizes the NIMS science objectives for J0.

The table on page 5 is a time-ordered listing of the NIMS Oapels for J0.

The plot on page 6 shows the geometry of the NIMS observations using a north trajectory pole view projection.

The table on page 7 lists the NIMS J0 observing parameters: target latitude/longitude, range, cone angle, incidence angle (light), emission angle (view) and phase angle.

The NIMS J0 mosaic designs are summarized on pages 8 and 9 in time-order.

Chapter 2 - Orbit Overview

Contents

NIMS J0 Science Overview

NIMS has a total of 17 observations planned for J0E: 6 Jupiter observations, 1 Europa observation and 10 Io observations. The NIMS Jupiter observations target the region of the Probe Entry Site (PES). The NIMS Europa observation targets the south polar region of Europa. The NIMS Io observations take advantage of the only Io encounter planned for the entire mission.

Jupiter Science

The NIMS Jupiter observations, along with concurrent observations by PPR, SSI and UVS, will characterize the PES and PES latitude region over the full suite of Galileo wavelengths. This will allow full-up complementary analysis of the vertical structure of Jupiter’s atmosphere at the PES for correlation with the probe data. The NIMS observations consist of 6 spectral maps (5 dayside and 1 nightside) in short map and long map modes.

Europa Science

The one NIMS Europa observation will take advantage of the unique orbital inclination during J0E to map the south polar region of Europa in full map mode. The main objective of this observation is to search for non-water ice volatiles, which can only exist in the polar regions due to the lower sublimation rates. Detection of any non-water ice volatiles would be strong evidence for volcanism on Europa.

Io Science

Galileo’s best opportunities for observing Io will occur during J0E when the spacecraft flies by Io at an altitude of 1000 km. NIMS will make ten close-range observations of Io during this time (Table 1). The objectives of these observations can be summarized as:

1) Obtain global coverage at the maximum feasible spectral and spatial resolutions given the downlink capabilities: Observations 1 (HRSPEC) and 2 (GLOBAL) address this objective. Both are spectral maps of Io’s dayside, with HRSPEC obtaining high spectral resolution (50% 408 and 50% 204 wavelengths) at spatial resolutions of about 50 km/NIMS pixel, and GLOBAL being a complementary observation obtaining higher spatial resolution (about 25 km/NIMS pixel) but with modest spectral coverage (17 wavelengths). Wavelengths for GLOBAL will be chosen to map out selected species while the wide wavelength coverage in HRSPEC will allow NIMS to map both known and as yet unknown spectral features.

NIMS J0 Science Overview

2) Map selected areas at high spatial resolution (a few km per NIMS pixel) and medium to high spectral resolution (102 to 204 wavelengths). NIMS will take advantage of the spacecraft's close flyby of Io to make observations 3, 4, 6, 7 and 8. Areas targeted were selected to sample a variety of terrain types in order to investigate their different mineralogies. The Prometheus and Maui region observation (HRCHEM) includes samples of dark and light terrains shown in Voyager images. A higher spatial resolution observation of the Prometheus vent (PROMVT) will be made at a closer range to sample the vent area and plume in more detail. Prometheus is a persistent-type plume and it is reasonable to expect that it will still be active at the time of Galileo's JOI. Other terrain samples include the mountain and mesa region on the northwestern edge of Colchis Regio (MTMESA), the Volund vent area, which is a hot spot observed by Voyager IRIS (VOLUND), and the Colchis Regio (COLCHIS), where lava flows were identified from Voyager data. The Prometheus vent, mountain/mesa, Volund and Colchis regions will also be observed by Galileo's Solid State Camera (SSI) almost concurrently.

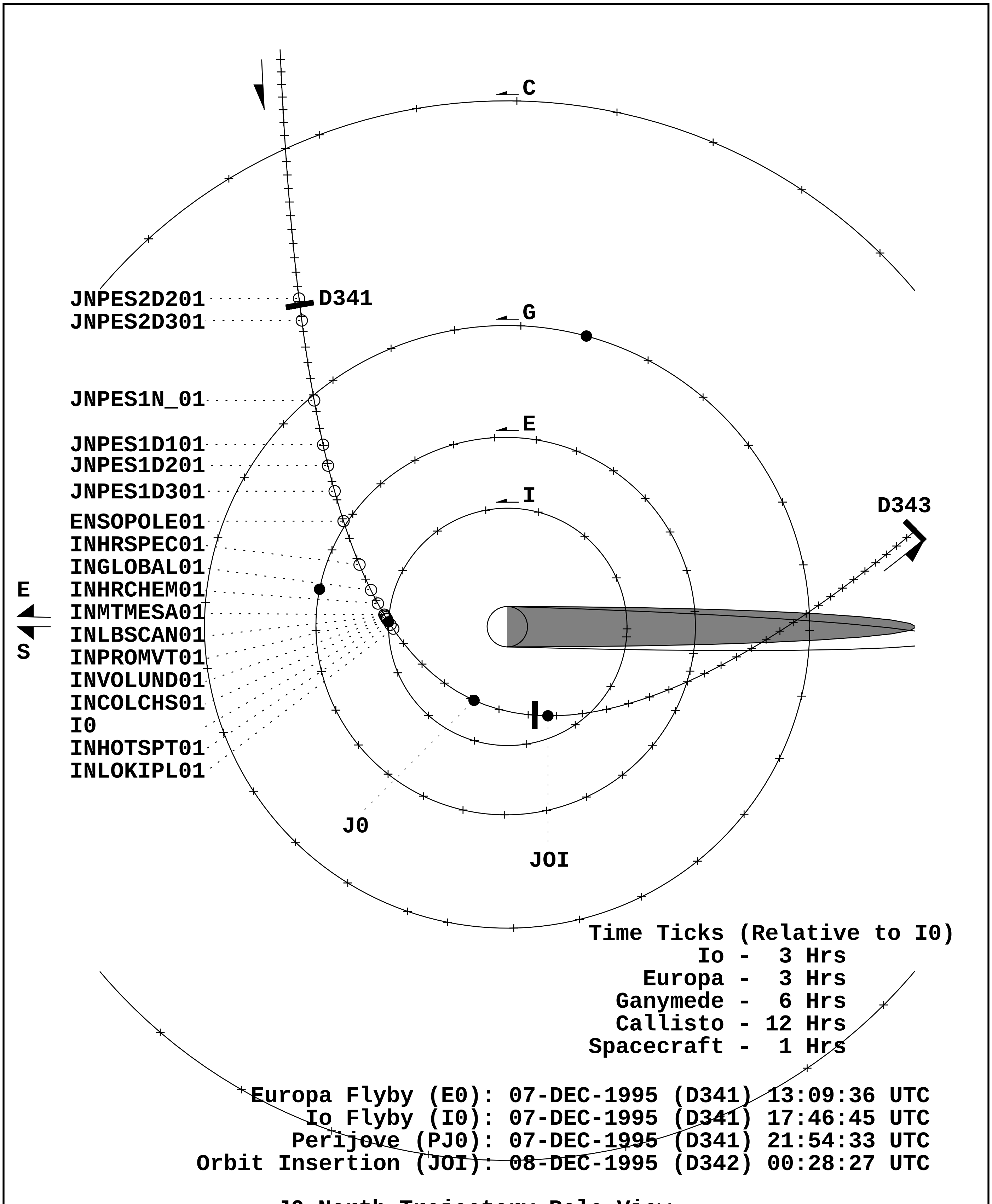
3) Map part of Io's nightside and Loki plume using the NIMS thermal channels together with Galileo's Photopolarimeter Radiometer (PPR). Observation 9 (HOTSPT) will map the Kanehekili hot spot region and characterize the local temperature distribution. Observation 10 (LOKIPL) consists of three limbscans from the surface to about 200 km altitude to characterize the plume's temperature distribution.

4) Limb scans to detect SO2 in Io's atmosphere. Observation 5 (LBSCAN) will consist of three limb scans in Fixed Spectrometer mode to attain very high spatial resolution; one near the sub-solar point, one over an active region (Amarani Maui) and one in between. The objective is to determine whether atmospheric SO2 is due to volcanic plumes or to sublimation.

JA Time-Ordered Listing

OAPEL	Start (UTC)	End (UTC)	Duration
JAJNPES2D201-	95-340/23:34:54	95-340/23:41:54	000/00:07:00
JAJNPES2D301-	95-341/01:02:31	95-341/01:07:27	000/00:04:56
JAJNPES1N 01-	95-341/06:06:00	95-341/07:47:03	000/01:41:03
JAJNPES1D101-	95-341/08:43:13	95-341/08:53:13	000/00:10:00
JAJNPES1D201-	95-341/09:54:16	95-341/10:05:26	000/00:11:10
JAJNPES1D301-	95-341/11:18:03	95-341/11:28:03	000/00:10:00
JAENSOPOLE01-	95-341/12:53:00	95-341/13:17:46	000/00:24:46
JAINHRSPEC01-	95-341/15:04:57	95-341/16:00:16	000/00:55:19
JAINGLOBAL01-	95-341/16:17:48	95-341/16:25:52	000/00:08:04
JAINHRCHEM01-	95-341/16:55:48	95-341/17:04:28	000/00:08:40
JAINMTMESA01-	95-341/17:26:26	95-341/17:27:22	000/00:00:56
JAINLBSCAN01-	95-341/17:29:22	95-341/17:32:12	000/00:02:50
JAINPROMVT01-	95-341/17:33:31	95-341/17:35:28	000/00:01:57
JAINVOLUND01-	95-341/17:37:28	95-341/17:38:44	000/00:01:16
JAINCOLCHS01-	95-341/17:39:35	95-341/17:40:48	000/00:01:13
JAINHOTSPT01*	95-341/17:54:44	95-341/17:59:48	000/00:05:04
JAINLOKIPL01*	95-341/18:05:48	95-341/18:08:13	000/00:02:25

NIMS J0 OBSERVATIONS



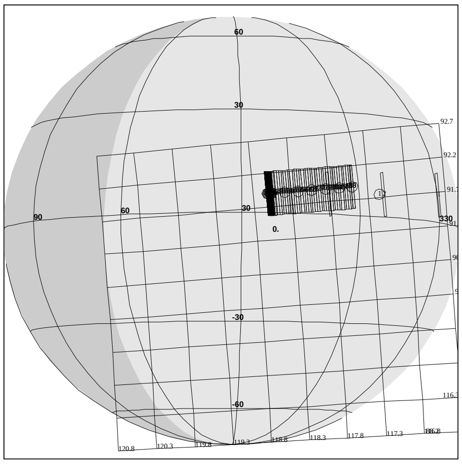
J0 North Trajectory Pole View

NIMS - FEL - 05/26/98

NIMS IO OBSERVATIONS DURING JUPITER ORBIT INSERTION

OBS NUMBER	ACTIVITY NAME	# WAVE-LENGTHS	DESCRIPTION	RESOLUTION (km)	PHASE ANGLE (deg)	INCIDENCE ANGLE (deg)	EMMISION ANGLE (deg)
1	HRSPEC	408 & 204	Global map of Io’s dayside at high spectral resolution (50% 408 and 50% 204 wavelength)	~60	14	11 to 103	8 to 90
2	GLOBAL	17	Global map of Io’s dayside at high spatial resolution	~25	13	10 to 100	6 to 90
3	HRCHEM	102	High spatial resolution amp of Prometheus and Maui regions	~15	10	8 to 59	21 to 74
4	MTMESA	204	Very high spatial resolution observation of Mountain/Mesa Region	~8	8	62	63
5	LBSCAN	2	Limb scans to detect SO2	~6	6	62 to 79	73 to 93
6	PROMVT	204	Very high spatial resolution observation of Prometheus vent	~5	6	24	28
7	VOLUND	204	Very high spatial resolution observation of Volund vent	~3	8	25	41
8	COLCHS	204	Very high spatial resolution observation of Colchis area	~2	13	13	33
9	HOTSPT	17	Darkside thermal map of of Kenehekili region	~4	148	134	23
10	LOKIPL	17	Limb scan of Loki plume and thermal map of Loki event	~8	156	113 to 139	66 to 92

J0 NIMS A



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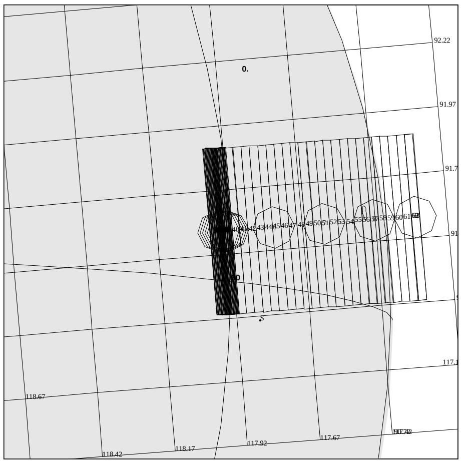

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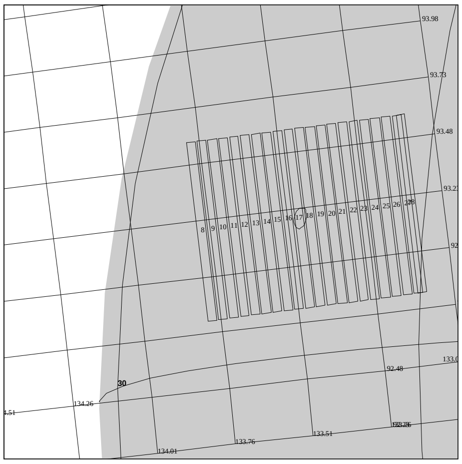

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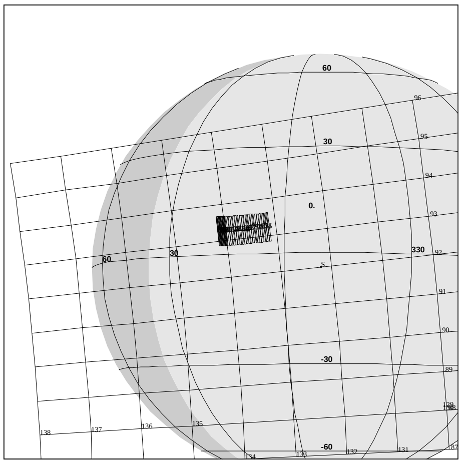

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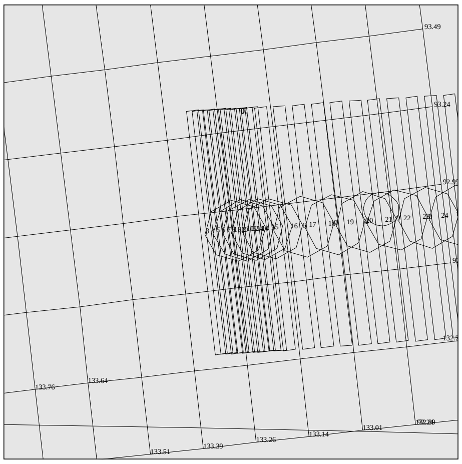

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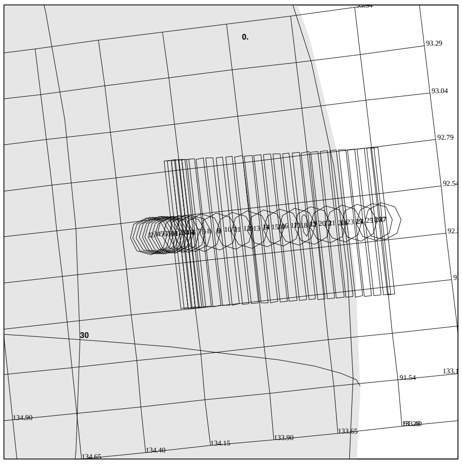

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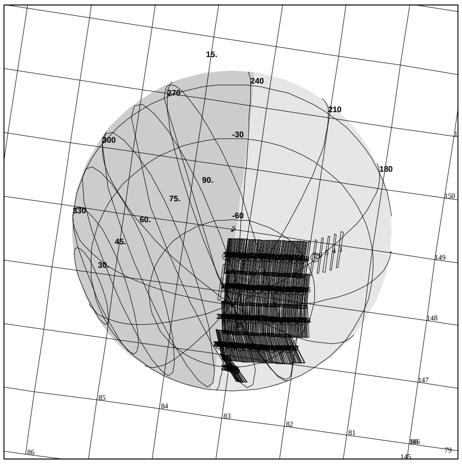

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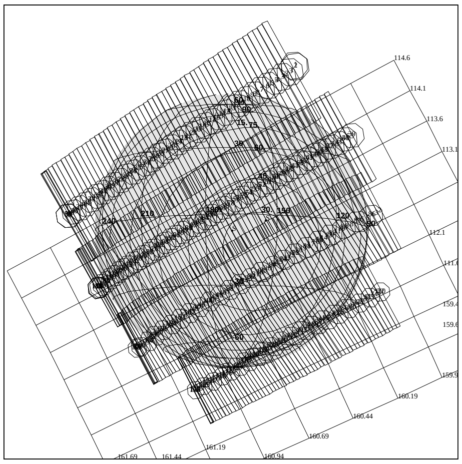

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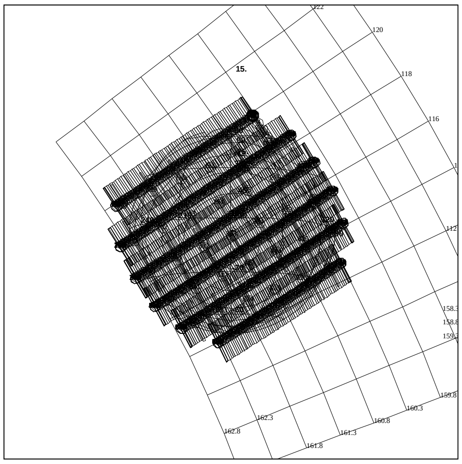

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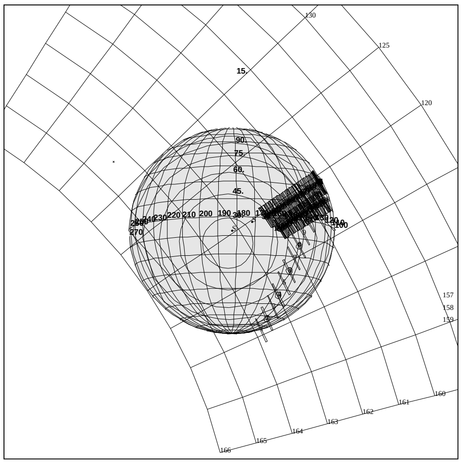
J0 NIMS B



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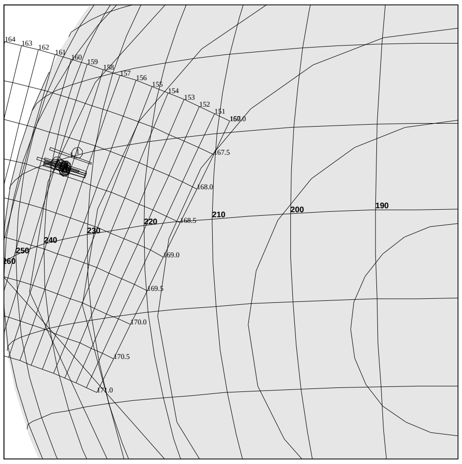

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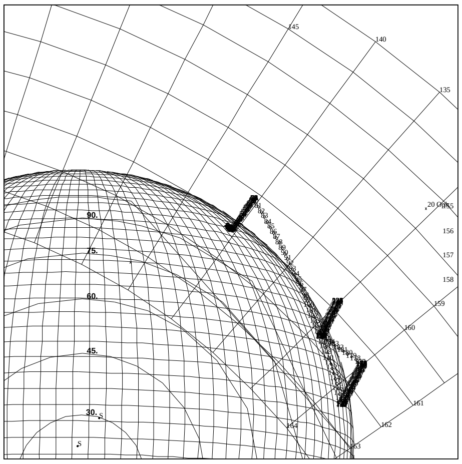

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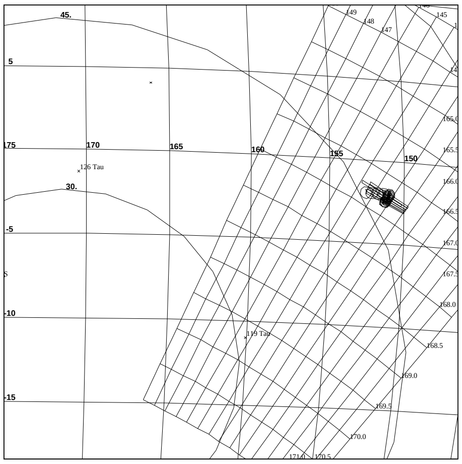

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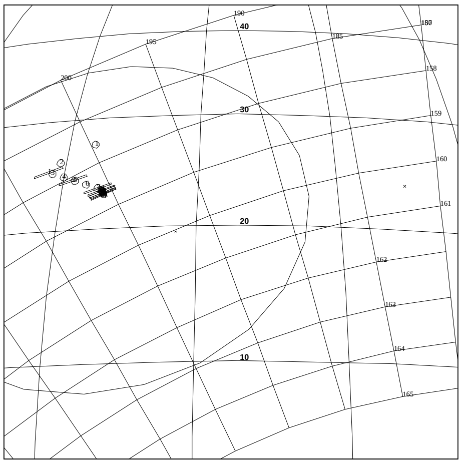

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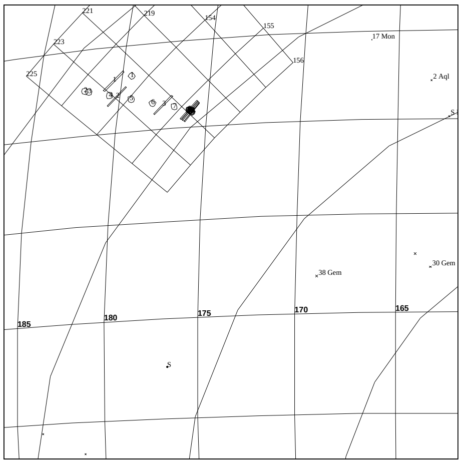

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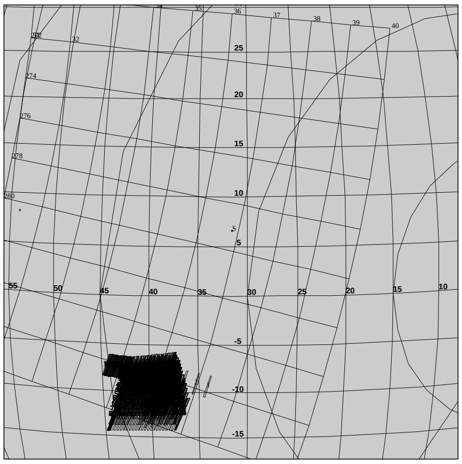

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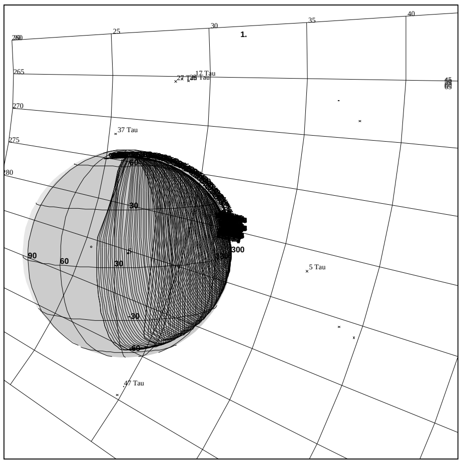

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