Chapter 5 - Detailed Observation Designs

Contents

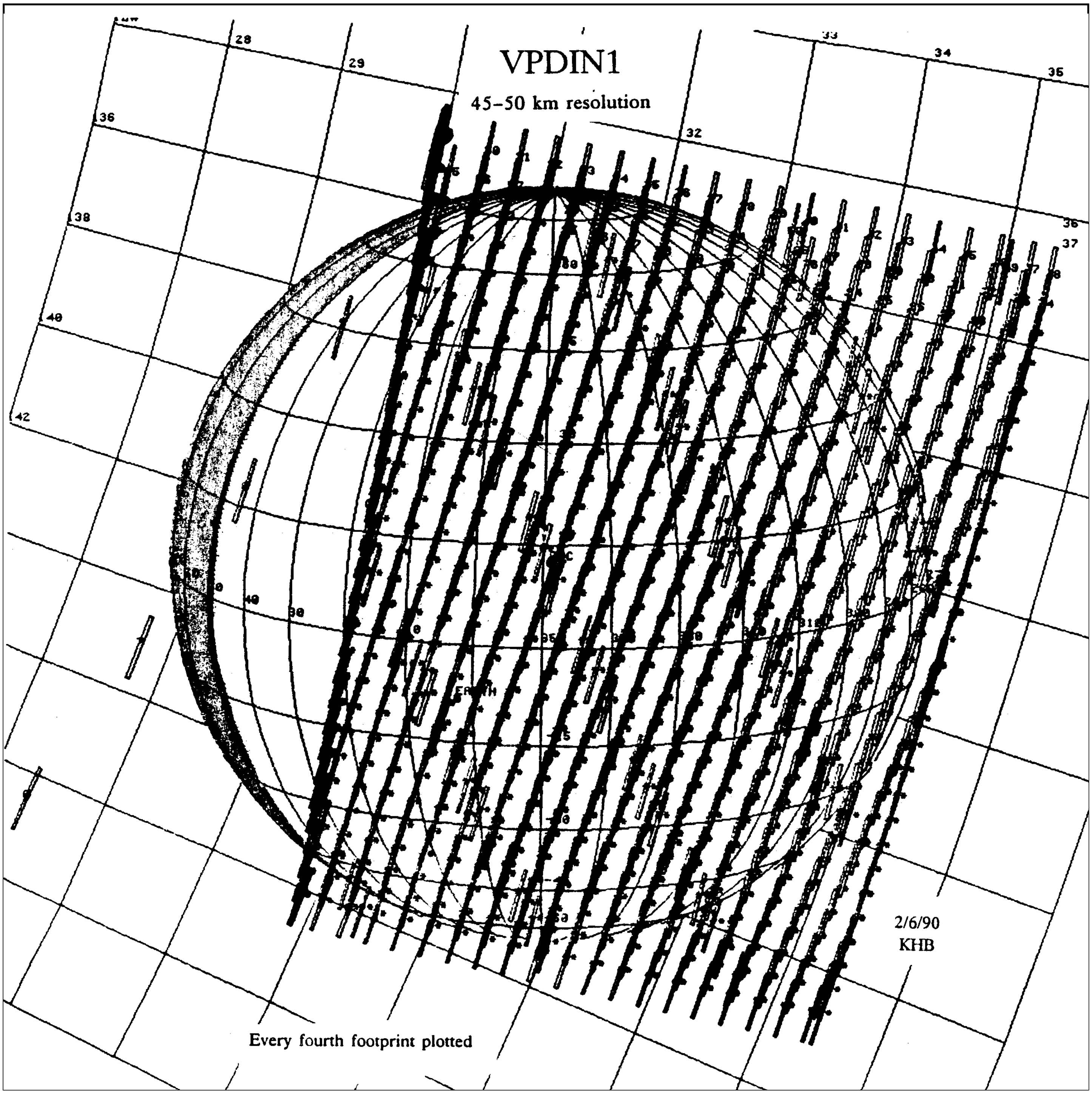
Introduction to Chapter 5

Detailed Observation Designs

Each NIMS Detailed Observation Design consists of an OAPEL form and a Pointer plot. The OAPEL form is a brief description of the design of the observation. The Pointer plot is a plot of the target body with the NIMS footprint incorporated in the mosaic design superimposed on the target body. The size and orientation of the target body is plotted as it appears at the time of the first NIMS footprint plotted. For long observations, the target body may rotate or move relative to the spacecraft during the observation.

The principal NIMS Venus observations, VPDIN1, VJBAR2, VPDIN2, VLSN and VLSD each have an OAPEL form and Pointer plot to describe them. The shading of Venus in the Pointer plots has been inverted (black for dayside, white for nightside) for clarity. The rest of the NIMS observations were ride-alongs behind SSI obervations. There are individual Pointer plots (with normal shading) for each ride-along observation but only a summary page to describe the observations. The ride-along Pointer plots show the SSI field of view instead of the NIMS footprint, but the location of the NIMS footprint can be inferred from the center of the SSI frame.

This Page Intentionally Blank.



VPDIN1 : Venus Partial Disk Imaging, Nightside 1

CENTRAL BODY:VENUS

PERIAPSIS:90-041/06:08:49.590

OBSERVATION: VPDIN1

Mode: XM, Gr_Strt 16, Gain 2, Chop Ref, Gr_Off 4
17 Wavelengths
Every 10th NIMS Footprint
Mosaic Start: Cone: 30., Clock: 35.
Slew Rate: 1.5 mrad/sec, Z Scan
Plot Ref Time: Start of Mosaic
Lat, Lon, Range, Res, Phase: (14.0, 349.1, 97083, 50., 148)

Venus Partial Disk Imaging Nightside 1	ACTIVITY ID: VEVNPDIN1 START TIME: 90-041/01:48:22

Activity ID: Orbit VE Target V Inst N OAPEL PDIN1 SeqNo Multi

Title Venus Partial Disk Imaging Nightside 1 Instrument NIMS

Requestor K. Baines Team NIMS Working Group AWG

Time System CDS Load ID EV6 Calendar Date 02/10/90 Week 06

Start	90-041/01:48:22	VCA-000/04:20:27
End	90-041/02:31:43	VCA-000/03:37:06
Duration	000/00:43:21	000/00:43:21

Top Label VEVNPDIN1
Bottom Label

Plot Key	NIMS	Riding Plot Key		Conflict	Yes
CDS Bytes		Report Options		Real Time Activity	No

Observation Objective

Obtain high spatial resolution multi-spectral imagery at twice the spatial resolution available from Earth in order to examine small-scale deep-atmosphere cloud properties from pole to pole. In particular, study convective, zonal and meridional transport processes in conjunction with VPDIN2 observations. Quantify the lower-atmosphere wave structure and wind fields, examining in particular orographic effects of mountainous terrain such as Ishtar Terra and Maxwell Montes.

Design Detail

Alias VPDIN1

General Design: Fixed grating (16), continuous sampling (1500 microrads per second slewrate), 10 pixel overlap between swaths.

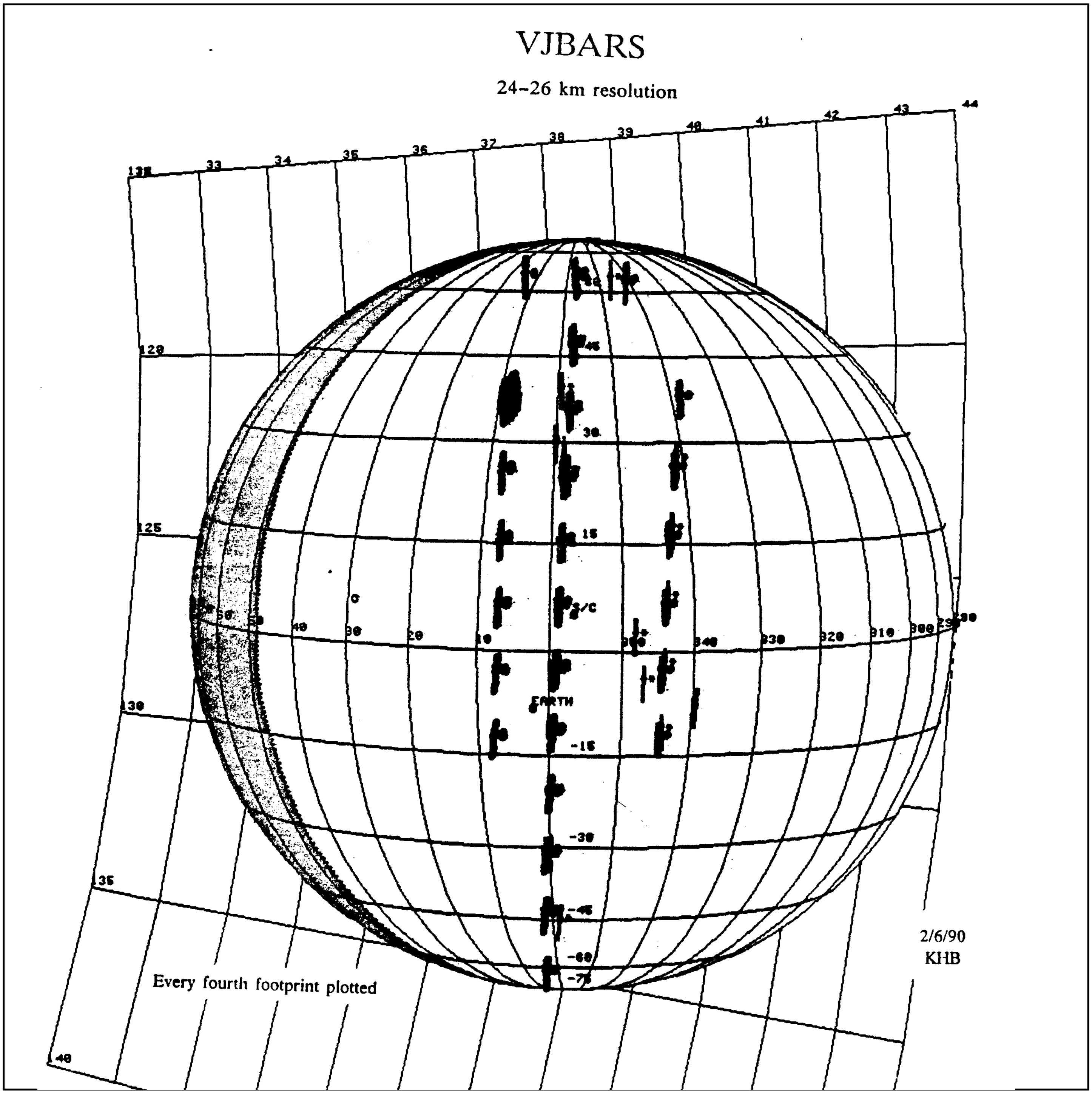
Details: Spacecraft distance at -04:00 is 97083 km to cloudtops, ~15.8 Venus radii, with 6140 km being a Venus cloudtop radius.
253 nimsels span the disk.
Spatial resolution is ~50 km.

Approximate Start Geometry:
Sub-spacecraft Latitude: 14.0 N
Sub-spacecraft Longitude: 349.1 W
Phase Angle: 148.4

Fixed Map (XM), Gain 2, Grating Start 16, Chopper Ref, MPW

Last Changed 11/22/95 Changed By FEL 02/10/90 00:00:00

Galileo Activity Plan Form rev 11/95



VJBARS : Venus Jail Bars

CENTRAL BODY:VENUS

PERIAPSIS:90-041/06:08:49.590

OBSERVATION: VJBARS

Mode: LM, Gr_Strt 0, Gain 2, Chop Ref, Gr_Off 4

408 Wavelengths

Every NIMS Footprint

Mosaic Start: Cone: 37., Clock: 122.

Slew Rate: xxx mrad/sec, SMOS

Plot Ref Time: Start of Mosaic

Lat, Lon, Range, Res, Phase: (7.4, 356.3, 44644, 26., 143)

Venus Jail Bars		ACTIVITY ID:	VEVNJBARS
		START TIME:	90-041/03:40:21

Activity ID: Orbit VE Target V Inst N OAPEL JBARS SeqNo Multi

Title Venus Jail Bars Instrument NIMS

Requestor K. Baines Team NIMS Working Group AWG

Time System CDS Load ID EV6 Calendar Date 02/10/90 Week 06

Start	90-041/03:40:21	VCA-000/02:28:28
End	90-041/04:02:01	VCA-000/02:06:48
Duration	000/00:21:40	000/00:21:40

Top Label VEVNJBARS
Bottom Label

Plot Key	NIMS	Riding Plot Key		Conflict	Yes
CDS Bytes		Report Options		Real Time Activity	No

Observation Objective

Acquire 26 high-spectral-resolution start/stop 20-nimsel mosaics to obtain detailed spectroscopic information on the latitudinal and longitudinal variation of water and CO on 25 km scales.

Design Detail

Alias VJBARS

General Design: Long Map. Start/stop, non-continuous sampling.

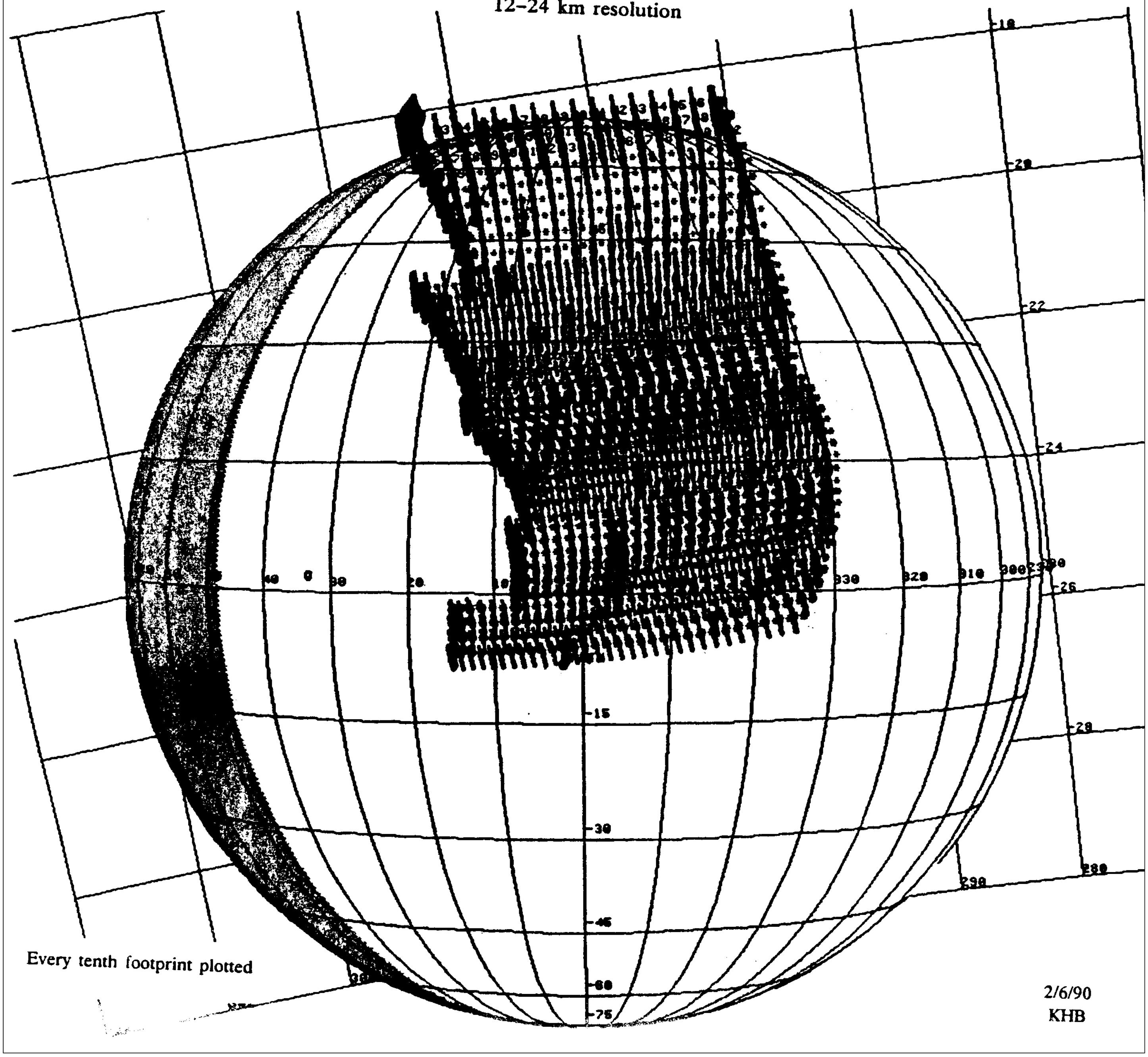
Details: Spacecraft distance at the end of the Oapel is 44644 km, yielding a nimsel FOV resolution of 0.005*44644 = 22.3 km. At the beginning, the cloudtops are 52431 km away, yielding a nimsel resolution of 26.2 km. Three longmap mode integrations of each nimsel are acquired in order to ensure boom clearance for each grating position. A longmap integration time, 8.666 sec, is assumed for overhead in moving from one location to another, except between longitudinal strips. 6 observations are first observed along the westernmost meridian (6 degrees W. longitude) covering temperate and equatorial latitudes. Then 12 observations are acquired pole-to-pole (with gaps) along the central-meridian (357 degrees W.), followed by 6 along the easternmost meridian (339 degrees W.). Then, two separate observations, upstream and downstream of Maxwell Montes, are accumulated. Thus, 26 observations are acquired during the 20 minute period corresponding to 520 NIMS FOVs (nimsels). The semi-diameter of Venus is about arcsin(1./(7.27rV + 1.)) = 0.1212 radians. Thus some 2.*0.1212/0.005 = 485 nimsels span the disk, or about 24 NIMS observations at 20 nimsels per observations. The 12 central-meridian observations consequently cover only about 50% of this meridian, leaving 50% gaps. Similar gaps are used on the nearby parallel observations, which are meant as second and third samplings of the low latitudes (plus Maxwell Montes) covered in the central-meridian observations.
Long Map (LM), Gain 2, Grating Start 0, Chopper Ref, MPW

				02/10/90
Last Changed	11/22/95	Changed By	FEL	00:00:00

Galileo Activity Plan Form rev 11/95

VPDIN2

12–24 km resolution



VPDIN2 : Venus Partial Disk Imaging, Nightside 2

Mode: XM, Gr_Strt 16, Gain 2, Chop Ref, Gr_Off 4

17 Wavelengths

CENTRAL BODY:VENUS

Every 10th NIMS Footprint

Mosaic Start: Cone: xx, Clock: xx

Slew Rate: 1.5 mrad/sec, Z Scan

PERIAPSIS:90-041/06:08:49.590

Plot Ref Time: Start of Mosaic

Lat, Lon, Range, Res, Phase: (4.9, 358.9, 22222, 18., 140)

OBSERVATION: VPDIN2

Venus Partial Disk Imaging Nightside 2	ACTIVITY ID: VEVNPDIN2 START TIME: 90-041/04:02:08

Activity ID: Orbit VE Target V Inst N OAPEL PDIN2 SeqNo Multi

Title Venus Partial Disk Imaging Nightside 2 Instrument NIMS

Requestor K. Baines Team NIMS Working Group AWG

Time System CDS Load ID EV6 Calendar Date 02/10/90 Week 06

Start	90-041/04:02:08	VCA-000/02:06:41
End	90-041/05:03:48	VCA-000/01:05:01
Duration	000/01:01:40	000/01:01:40

Top Label VEVNPDIN2
Bottom Label

Plot Key NIMS Riding Plot Key Conflict Yes
CDS Bytes Report Options Real Time Activity No

Observation Objective

Obtain high-spatial resolution (11-24 km) multi-spectral imagery to compare with previous VPDIN1 to measure lower-atmosphere wind speeds and directions. Determine the spatial scales of localized middle-atmosphere features. Examine, in particular, the effect of high terrain in the Ishtar Terra and Maxwell Montes regions on atmosperic dynamics in the lower atmosphere.

Design Detail

Alias VPDIN2

General Design: Fixed Grating (16), continuous sampling (1500 microrads per second slewrate), 10 pixel overlap between swaths.

Details: Spacecraft distance at end (VCA-00:45) is 22222 km, yielding 11.1 km/nimsel, and a planetary diameter of 873 nimsels (distance to center of Venus is 4.619 Venus radii. Angular semi-diameter is arcsin(1./4.619)=12.5 degrees or 0.218 radians or 436.5 nimsels. Diameter is just twice this.) An East-West swath over ~21.6 degrees of longitude is approximately sin(21.6) * angular diameter = 321 nimsels. At beginning (VCA-01:45), distance is 43875 km or 7.146 rV. Planetary diameter is 14.1 degrees = 0.246 radians, spanning some 492 nimsels, and an East-West swath extends over 181 nimsels.

Approximate Start Geometry:

Sub-spacecraft Latitude:	4.9 N
Sub-spacecraft Longitude:	358.9 W
Phase Angle:	140.1

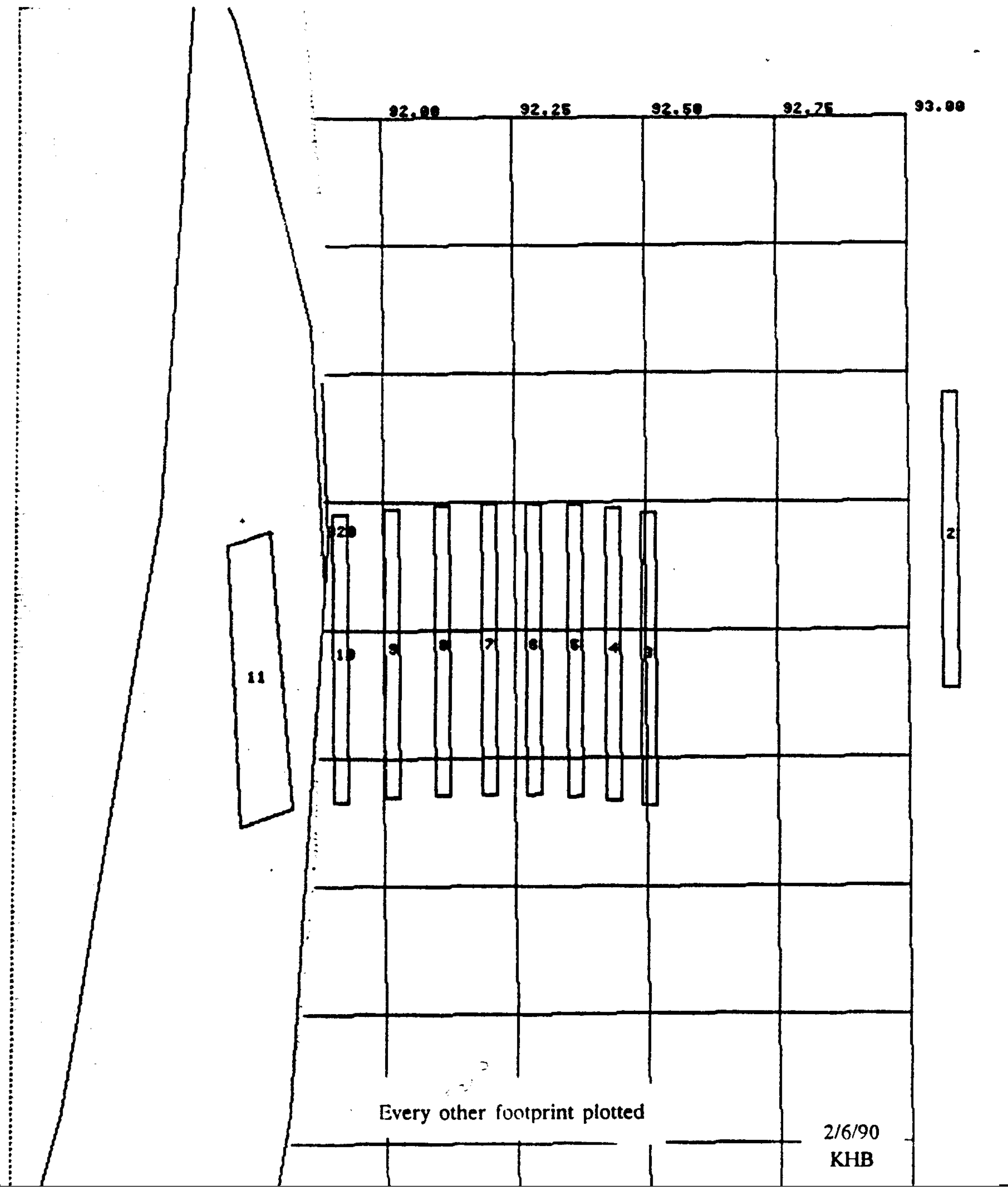
Fixed Map (XM), Gain 2, Grating Start 16, Chopper Ref, MPW

Last Changed 11/22/95 Changed By FEL 02/10/90 00:00:00

Galileo Activity Plan Form rev 11/95

VLSN

12 km resolution



VLSN : Venus Limb Scan, Nightside

Mode: LS, Gr_Strt 0, Gain 4, Chop Ref, Gr_Off 4

408 Wavelengths

CENTRAL BODY:VENUS

Every 2nd NIMS Footprint

Mosaic Start: Cone: 92.5, Clock: xx

Slew Rate: 0.032 mrad/sec, Limb Scan

PERIAPSIS:90-041/06:08:49.590

Plot Ref Time: Start of Mosaic

Lat, Lon, Range, Res, Phase: (-20.2, 26.4, 15818, 12., 110)

OBSERVATION: VLSN

Venus Limb Scan Nightside	ACTIVITY ID:	VEVNLSN
	START TIME:	90-041/05:31:44

Activity ID: Orbit VE Target V Inst N OAPEL LSN SeqNo Multi

Title	Venus Limb Scan Nightside	Instrument	NIMS
Requestor	K. Baines	Team NIMS Working Group	AWG

Time System CDS Load ID EV6 Calendar Date 02/10/90 Week 06

Start	90-041/05:31:44	VCA-000/00:37:05
End	90-041/05:38:55	VCA-000/03:30:54
Duration	000/00:07:11	000/00:06:11

Top Label VEVNLSN
Bottom Label

Plot Key	NIMS	Riding Plot Key		Conflict	Yes
CDS Bytes		Report Options		Real Time Activity	No

Observation Objective

Determine the vertical profile of oxygen and other trace minor species near the anti-subsolar point. Compare with subsequent VLSD observation to determine daytime/nighttime differences in oxygen chemistry.

Design Detail

Alias VLSN

General Design: Long Spectrometer (fixed mirror).
-20 to 230 km covered in one swath.

Details: Spacecraft distance at -00:20 is 15818 km to the cloudtops. Limb is about 1 Venus radius farther away. Limb distance is thus about 21950 km at the end of the observation. At the beginning, at -00:26, the cloudtops are 17045 km away, implying the limb is about 23000 km away. At the end, the 250 km swath is some 11.4 milliradians long. The slew rate to cover this in 360 seconds is 32 microradians/second.

Approximate Start Geometry:

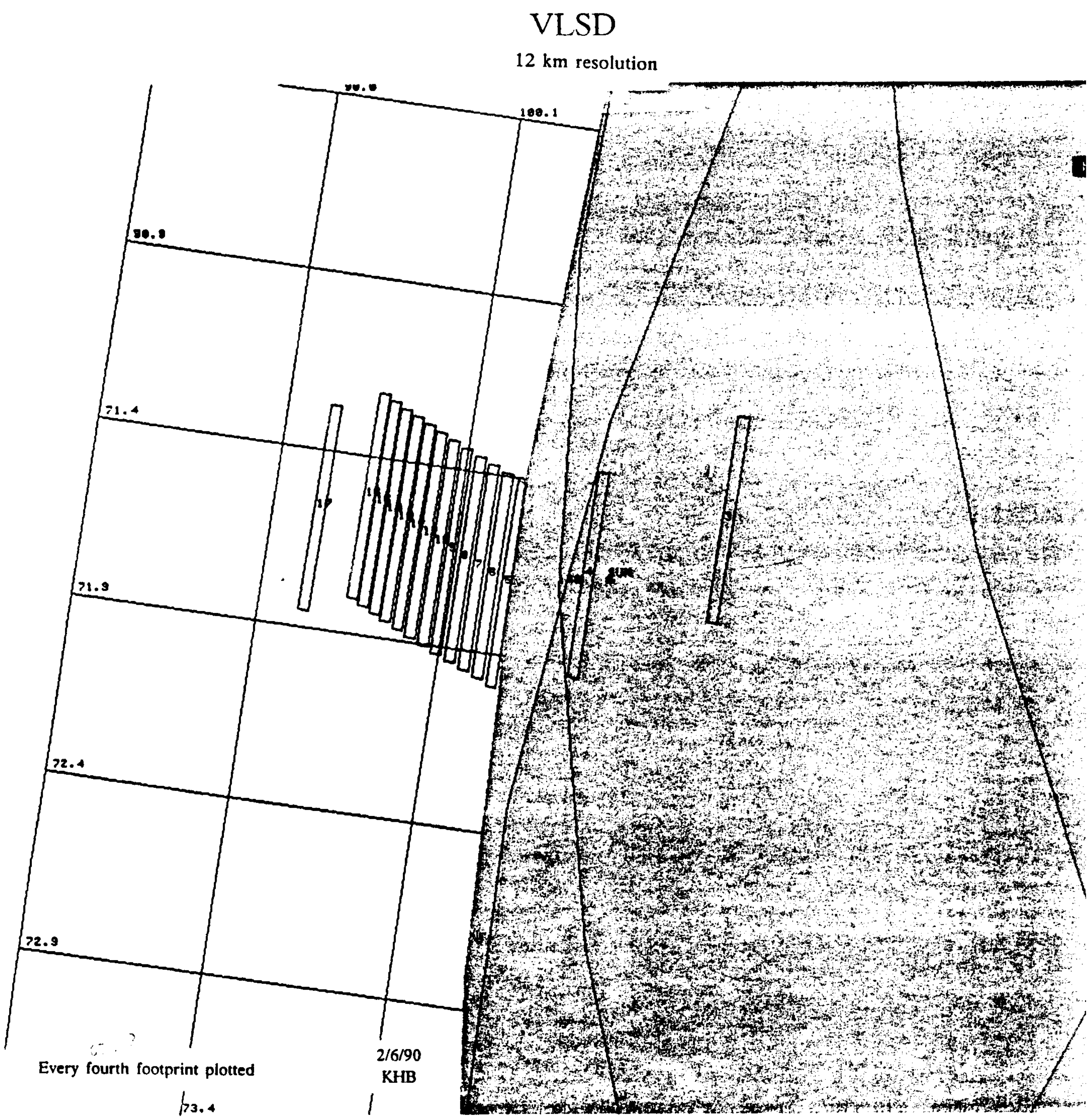
Sub-spacecraft Latitude:	20.2 S
Sub-spacecraft Longitude:	26.4 W
Phase Angle:	109.9

Note: A NIMS OPCAL is performed at the beginning of this observation.

Long Spectrometer (LS), Gain 4, Grating Start 0, Chopper Ref, MPW

Last Changed 11/22/95 Changed By FEL 02/10/90 00:00:00

Galileo Activity Plan Form rev 11/95



VLSD : Venus Limb Scan, Dayside

Mode: LS, Gr_Strt 0, Gain 4, Chop Ref, Gr_Off 4

408 Wavelengths

CENTRAL BODY:VENUS

Every 4th NIMS Footprint

Mosaic Start: Cone: 71.4, Clock: 100.2

Slew Rate: 0.055 mrad/sec, Limb Scan

PERIAPSIS:90-041/06:08:49.590

Plot Ref Time: Start of Mosaic

Lat, Lon, Range, Res, Phase: (-40.4, 66.2, 14398, 10., 75)

OBSERVATION: VLSD

Venus Limb Scan Dayside	ACTIVITY ID: VEVNLSD START TIME: 90-041/06:07:45

Activity ID: Orbit VE Target V Inst N OAPEL LSD SeqNo Multi

Title Venus Limb Scan Dayside Instrument NIMS

Requestor K. Baines Team NIMS Working Group AWG

Time System CDS Load ID EV6 Calendar Date 02/10/90 Week 06

Start	90-041/06:07:45	VCA-000/00:01:04
End	90-041/06:13:00	VCA+000/00:04:11
Duration	000/00:05:15	000/00:05:15

Top Label VEVNLSD
Bottom Label

Plot Key	NIMS	Riding Plot Key		Conflict	Yes
CDS Bytes		Report Options		Real Time Activity	No

Observation Objective

Determine the vertical profile of oxygen and other trace constituents near the sub-solar point. Compare with previous VLSN observation to determine daytime/nighttime differences in oxygen chemistry.

Design Detail

Alias VLSD

General Design: Long Spectrometer (fixed mirror).
-10 to 260 km covered in one swath.

Details: Spacecraft distance at +00:10 is 14398 km to sub-s/c point. Limb is at 90 degrees phase, i.e., 1 Venus radius farther away, about 20500 km away. Km/Nimsel = 0.0005*20500 = 10.3 km. Swath is to be 270 km long, or 26.3 nimsels. Covering this distance, 26.3*0.0005 rads = 13.2 milliradians, in 240 seconds implies a slew rate of 55 microradians/sec.

Approximate Start Geometry:

Sub-spacecraft Latitude:	40.4 S
Sub-spacecraft Longitude:	66.2 W
Phase Angle:	75.0

Long Spectrometer (LS), Gain 4, Grating Start 0, Chopper Ref, MPW

Last Changed 11/22/95 Changed By FEL 02/10/90 00:00:00

Galileo Activity Plan Form rev 11/95