SCIAMACHY	Operation Change Request	OCR No: 037
		Issue: A

Title: Slit width calibration

Description of Request:
Determine slit width in elevation direction using a small bright object, e.g. Venus. The accuracy of the slit width and scan speed determines the accuracy of the wavelength independent scaling factor with which the absolute irradiance of the moon can be determined, see OCR 25.
In addition, the measurements can be used to refine instrument offset pointing to the platform which would improve limb pointing knowledge when so needed.
The intensity of Venus is estimated to be 1/1000 (rough order of magnitude) of a clouded nadir scene. For a single pixel in channel 3 a signal to noise ratio of several tens is expected for 1 second exposure time. Combination of data from all channels with significant signal, and multiple exposures should increase the signal to noise ratio significantly.
Scan size should be enough to cover the size of Venus and the width of the slit (0.016 + 0.045 degrees), scan step size between read-outs should preferably be 0.001 - 0.002 degrees. Multiple scans up and down over the light source are essential.

Originator: Ralph Snel	Date of Issue: April 18, 2008	Signature: RS

Assessment of SSAG (necessary for requests by scientists):
A precise knowledge of the slit function in elevation will be crucial for lunar calibration. The proposed measurement will also help to characterise small pointing offsets.

In addition and not mentioned in the OCR, a better knowledge of the slit function in elevation will improve the quality of the limb retrieval for full mission reprocessing, as the FOV in elevation is illuminate inhomogeneously due to pressure gradient.

Taking all that together it is recommended to investigate implementation options and to perform this characterisation measurement when feasible and affordable.

SSAG: H. Bovensmann, IFE	Date: 16/09/2008	Signature: via e-mail 16/09/2008

Classification of OCR: D

OCR Analysis (incl. Implementation Option):
This OCR requires for the first time to observe another target than the Earth's atmosphere, Sun or moon. From a planning point of view Venus can be considered to be a point source. Two aspects have to be considered:

- visibility of Venus
- Line-of-Sight control during measurement

Because of the high pointing accuracy required we recommend to execute this OCR in two steps: first a test run to learn about pointing performance (predicted position of Venus, IFoV position, scan speed, etc.) and in a second or even third run, taking the lessons learned from the test into account, to perform the actual measurements.

1) Visibility of Venus (see Annex 1) and Timeline Definition

The second half of 2008 was not suited for Venus observations because the planet was either too close to the Sun or does not rise in the limb TCFoV. Measurements are possible in 2009 starting mid March.

The proposed test run should consist of 4 consecutive orbits in March and the second sequence (similar number of orbits) in June.

In March the ideal situation, i.e. Venus is trailing the Sun, occurs for about 2 weeks at the beginning of the 2009 visibility period. Venus can be found in the left part of the limb TCFoV. During the second or third sequence rise of Venus occurs after Sunrise but now with almost approx. maximum azimuth or maximum elevation difference between Venus above 100 km and the Sun (has already left limb TCFoV).

The proposed sequence of the timelines in the Venus observation orbits in March is as follows:
- t/l 02 (test t/l of set 09): Venus test observation starting at a Venus altitude of 100 km, i.e. Sun at about 36° (Note: although this is an unusual GEO_NUM value, the SCIACAL specification confirms its applicability. therefore the 'Venus' t/l can be constructed as a *Sun_fixed* timeline). The t/l ends when Venus reaches the upper edge of the limb TCFoV. Each Venus observation requires a separate timeline with an orbit specific GEO_NUM value since the relative elevation distance between Venus and Sun changes by about 1.3°/day, i.e. 0.09°/orbit.
- t/l 01 (test t/l of set 09): SO&C observation without preceding limb states
- t/l 47/50 (routine t/l of set 35): alternating limb/nadir measurements between end SO&C and eclipse start
- t/l 53/44 (routine t/l of set 35): eclipse phase

The proposed sequence of the timelines in the Venus observation orbits in June is as follows:
- t/l 01 (routine t/l of set 35): Sun in SO&C window preceeded by 4 limb states
- test timelines of set 09: Venus observation starting at a Venus altitude of 100 km, i.e. Sun at 2.46° (Note: although this is an unusual GEO_NUM value, the SCIACAL specification confirms its applicability. therefore the 'Venus' t/l can be constructed as a *Sun_fixed* timeline). The t/l ends when Venus reaches the upper edge of the limb TCFoV. In June the relative elevation distance between Venus and Sun changes by about 0.6°/day, i.e. 0.04°/orbit. Whether this is sufficiently small to implement a single timeline can be judged once the data from the first sequence is available. Presently we assume that again 4 separate timelines are needed.
- t/l 47 & 50: (test timelines of set 09): alternating limb/nadir measurements between end Venus observation and start eclipse phase.
- t/l 53/44 (routine t/l of set 35): eclipse phase

We propose to schedule the Venus observations on March 20th, 2009 (day 443 in fig. 1, orbit 36873-37876 and June 25th, 2009 (day 540 in fig. 1, orbit 38261-38266). For the slit width measurements in June the start of the Venus t/l shall be exactly as derived from the reference orbit for 3 orbits. The remaining 3 orbits shall shift these t/l by 1 sec to compensate for the slight pointing inconsistency observed in the March test observations. This approach shall ensure that Venus is indeed scanned by the IFoV. Details about the applicable angular parameters and Venus ephemeris data can be found in Annex 2.

For the March observations 5 test timelines (set 09) are required. In June the same measurement can only be achieved with 8 test timelines (set 09).

2) Line-of-Sight Control (see Annex 2 and 3)

For the duration of the OCR_037 measurements state ID 24 (nadir_pointing) will be temporarily overwritten. Five CT parameter tables are affected:

- State Duration table
- Scanner State parameter table
- Basic Profile table (here compliance with other state executions needs to be considered)
- Pixel Exposure Time table
- State Index table

The corresponding parameter values are listed in annex 3. Note that angular parameters in the basic profile table are preliminary and might undergo refinement as a result of further simulations.

SOST: M. Gottwald, E. Krieg, DLR-IMF (ESA, Industry if necessary)	Date: 01/12/08 Updated: 03/04/09	Signature: via e-mail 01/12/08

Approval of Proposed Implementation:

Originator Approval: R. Snel, SRON	Date: 02/12/2008	Signature: via e-mail 02/12/2008
SSAG Approval: H. Bovensmann	Date: 16/09/2008 (for test in March) 15/04/2009 (for slit width measurement in June)	Signature: via e-mail 16/09/2008 (for test in March) via e-mail 15/04/2009 (for slit width measurement in June)

<u>Decision / Approval:</u>
1. The feasibility of the Venus measurements shall be tested as proposed by SOST.
2. Approval of the second measurement sequence in May/June has to await analysis of March test measurement.
3. June measurements to be scheduled avoiding interference with Cabauw campaign (OCR 040)

DLR Approval: A. Friker	Date: 23/12/2008 (for test in March) 16/04/2009 (for slit width measurement in June)	Signature: via e-mail 23/12/2008 (for test in March) via e-mail 16/04/2009 (for slit width measurement in June)

<u>Implementation by SOST</u>:
A sequence of 4 test orbits is scheduled on March 20th, 2009 (orbit 36873-36876). The date has been slightly shifted compared to our original proposal to fit other planning constraints. State parameter and timeline definitions – adjusted for March 20th, are implemented as described in the annexes.

The final slit width measurements are scheduled for June 25th (orbit 38261-38266). In order to achieve a time separation between a solar event and Venus at 100 km similar to the test measurements, the Sun at an elevation of 22.5 deg has been selected as a reference. In the first 3 orbits start of the Venus timelines is exactly as derived from the ENVISAT reference orbit. In the next 2 orbits the Venus t/l begins 1 sec earlier and in the last orbit 1 sec later. This accounts for potential timing/pointing uncertainties as observed in the test measurements.

In total 5 CTI parameter tables are uploaded. Timelines use IDs 03, 04, 05, 06, 07, 08 (all for Venus) and 31, 32 (shortened limb/nadir sequences between end of Venus t/l and start of eclipse) from test set 09.

No interference occurs with OCR_040 (Cabauw campaign).

SOST: M. Gottwald, E. Krieg, DLR-IMF	Date: 28/01/09 (test) 27/04/2009	Signature: via e-mail 28/01/09 Via e-mail 27/09/2009

Annex 1: Venus Visibility Analysis

As one of the two inner planets the celestial motion of Venus is limited to a region close to the Sun. Four distinct locations can be identified

- inferior conjunction: Venus stands in the direction of the Sun – closest approach to Earth
- maximum western elongation: Venus is furthest away from the Sun to the right – ‘Morning Star’
- superior conjunction: Venus stands in the direction of the Sun – furthest away from Earth
- maximum eastern elongation: Venus is furthest away from the Sun to the left – ‘Evening Star’

Fig. 1 displays the azimuth and elevation difference Sun-Venus ’ for the periods in 2008 and 2009 when Venus is within the limb TCFoV (azimuth = 316° - 44°, elevation = -27.3°-19.5°). The difference is determined when Venus has reached an elevation which corresponds to an altitude of approx. 150 km. In 2008 Venus moves to the left edge of the limb TCFoV and leaves the TCFoV at day 220 (August 8th). On day 162 (June 10th) superior conjunction occurred (Venus behind Sun). Between day 220 (2008) and day 72 (March 17th, 2009) Venus is not visible in SCIAMACHY’s limb TCFoV. On day 72 (2009) it enters the TCFoV again at the left edge and approaches the Sun for inferior conjunction on day 85 (March 26th). For the rest of the year Venus is visible in the limb TCFoV.

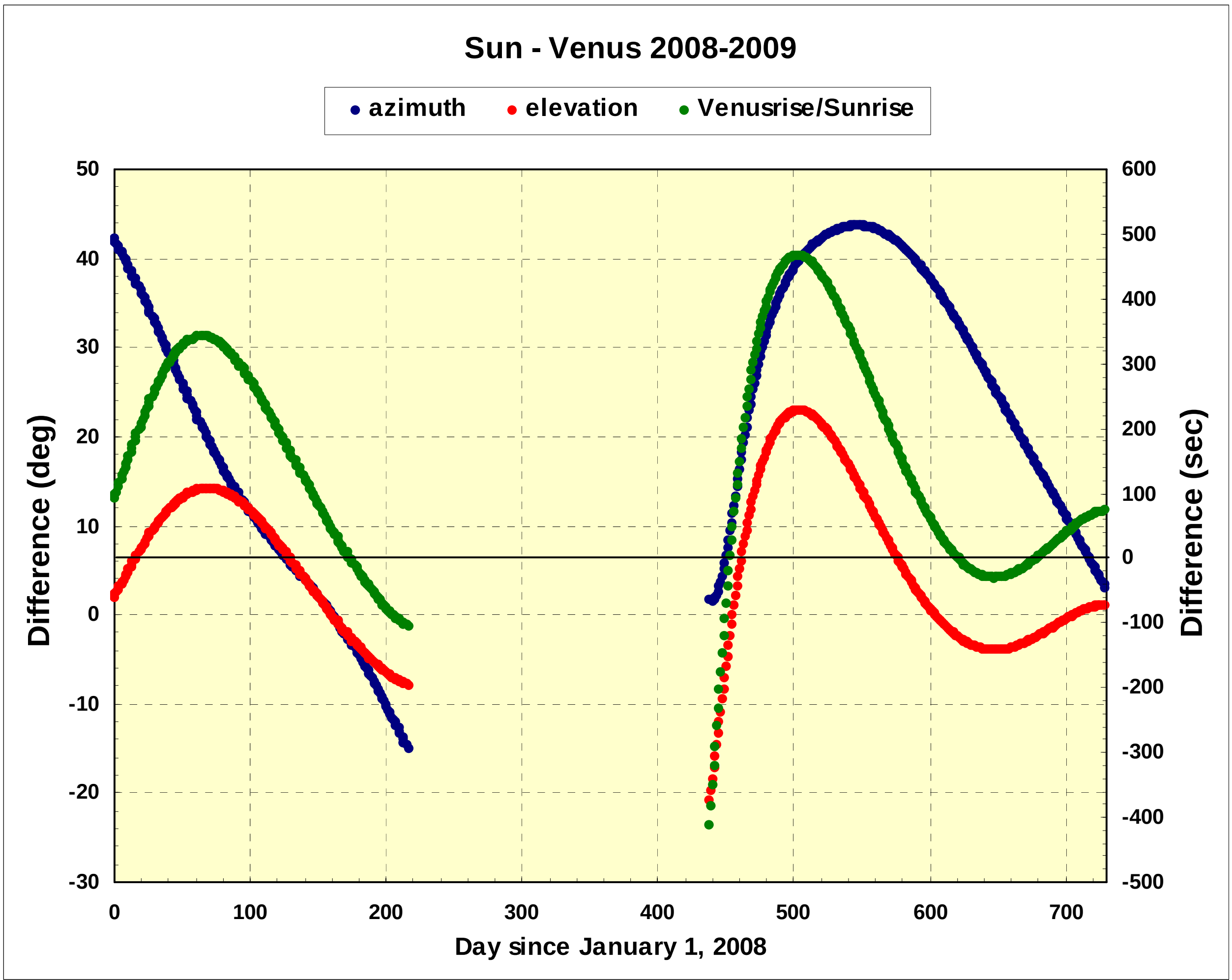

Fig. 1: Venus visibility in the limb TCFoV for the years 2008 and 2009.

The green curve in fig. 1 (secondary axis) shows the time difference between the Sun at an altitude of 17 km and Venus at 150 km. Positive values represent periods when the Sun rises before Venus, negative values those where Venus precedes the Sun. Since Venus moves with an elevation rate through the limb TCFoV, which is similar to the solar rate, the green curve permits an estimate when measurements between 150 km and the upper edge of the limb TCFoV are possible with the Sun still being either below the horizon or having already left the limb TCFoV. Periods where the Sun is trailing Venus would be preferred because they allow to execute the measurements prior to the SO&C

observations. Thus none of the long timelines scheduled for the illuminated part of the orbit would require modification.

The second half of 2008 was not suited for Venus observations because the planet was either too close to the Sun or did not rise in the limb TCFoV. Measurements are possible in 2009 starting mid March.

The angular diameter and apparent brightness of Venus are depicted in fig. 2.

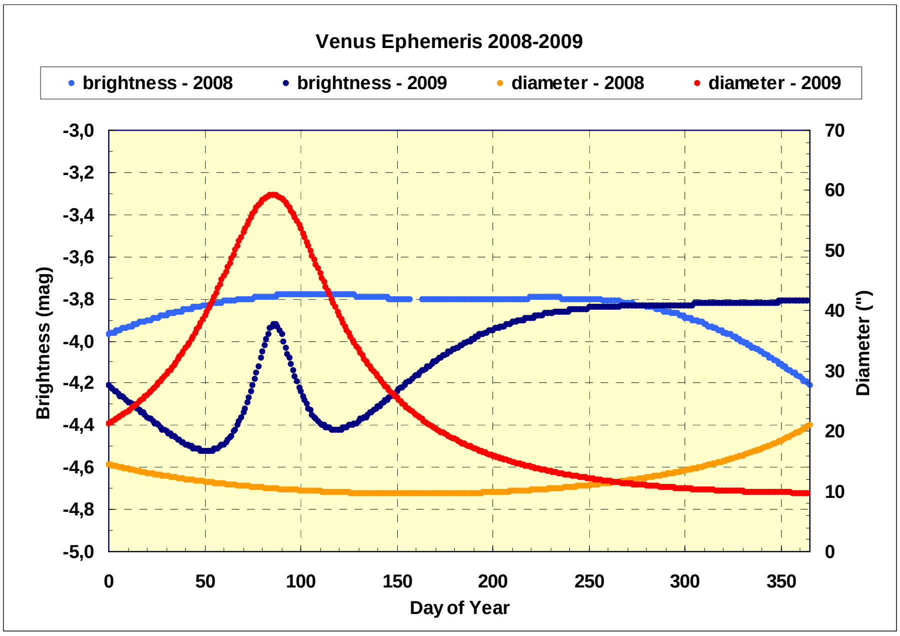

Fig. 2: Apparent brightness and diameter of Venus for the years 2008 and 2009.

Even at inferior conjunction the diameter of Venus (59”) is still smaller than the vertical extent of the IFoV (0.045° = 162”). For S/N issues Venus observations around times when the planet appears brightest would be favourable.

Annex 2: Venus Scans

Scan Strategy – General:

Scans in the Venus slit width observations differ from the proposed first test run.

Venus slit width measurements: The scan over Venus consists of two symmetric phases. In the first part the IFoV is positioned slightly above Venus and moved upwards with a rate smaller than Venus' elevation rate. Thus Venus overtakes the IFoV which is equivalent to a downward scan. The first phase ends when Venus is slightly above the IFoV. Then phase 2 begins by moving the IFoV with a faster rate upwards. Now the IFoV overtakes Venus which is equivalent to an upward scan.

Effective total exposure times and angular resolution are defined by the difference in elevation rates and the selected PET. Taking the total available time for Venus observations per orbit into account (100 sec), each scan takes 50 sec. If the vertical resolution has to amount to 0.001°-0.002°, the differential elevation rate between IFoV and Venus has to lie in the same range for a PET of 1 sec. Simulation of the scans yield that an elevation difference between Venus and IFoV at the start/end of 0.02° and a differential elevation rate of 0.0017°/sec fulfils the requirements.

No particular constraints exist for the azimuth of Venus and the IFoV. The azimuth of Venus changes by 1°/day, i.e. 0.07°/orbit. Therefore Venus does not approach the horizontal edges of the IFoV (1.8° wide) in 4 consecutive orbits when azimuthally centred in the first measurement.

Assuming no diffraction effects Venus can be observed, at least partially, from about 8 sec to 45 sec after the start of the measurement, i.e. for a total period of slightly more than 35 sec.

Venus test measurements: Since the pointing accuracy of the scan described above lies in the order of a few 10 mdeg, it has to be investigated first how well the complete planning chain (SOST simulation with definition of scanner pointing parameters and timelines – actual scheduling on ENVISAT side) together with the final on-board execution fulfils this requirement. For this purpose a single scan with variable margin (0.04°, 0.08°, 0.12° and 0.16 °) and adjusted differential elevation rates between Venus and IFoV (0.00125°/sec, 0.00205°/sec, 0.00285°/sec, 0.00365°/sec) shall be executed. It is identical to the first part of the scan for the actual Venus measurement except that the values for margin and differential elevation rate allow total scan duration of 100 sec in one direction. In 4 consecutive orbits a wider range in elevation can be covered permitting to investigate the accuracy of IFoV pointing w.r.t. Venus. From the observed Venus signal and corresponding ESM scanner readings we hope to conclude whether corrections are necessary for the basic profile parameters of the actual Venus scans.

Options for Scan Part 2:

The quasi upward scan can be implemented in two ways.
Version A: Another basic profile, unused in the particular orbit, defines a counter elevation rate required to produce the upward scan resulting in a differential vertical rate as in the quasi downward scan (part 1). We propose to use basic profile 13. This profile is nominally available for modification in the time slot envisaged.
Version B: A relative profile unused in the particular orbit, defines a counter elevation rate required to produce the upward scan resulting in a differential vertical rate as in the quasi downward scan (part 1). We propose to use relative profile 5. Duration of this profile is 2 sec such that 24 repetitions are required to result in an opposite scan of 50 sec duration. To maintain the information of the position of Venus at the end of part 1 a further basic profile (ID13) has to be used containing exactly this elevation position. No elevation rate is required. Since the basic profile contains also the azimuth information this position is further progressed.

Venus Parameters:

The scans options (test scan and symmetric scan) shall ensure useful results

- at the proposed dates (March 20th, 2009 = DoY 79 and June 25th, 2009 =DoY 175)
- an angular resolution of the slit dimension between 0.001°-0.002°

At these dates the Line-of-Sight parameters and ephemeris data of Venus at the start of the observations are as listed in table 1. For comparison the solar parameters are given for the same moment. Note that we have used here a Venus altitude of 100 km instead of 150 km (visibility analysis) since simulation of the scan options revealed that a measurement duration of more than 75 sec is required. LoS parameters have been derived using the ENVISAT CFIs with a time resolution of 0.1 sec corresponding to a Venus altitude resolution of 0.3 km.

	Venus (DoY 79 – orbit 36873-36876)	**Sun (DoY 79 – orbit 36873-36876)**
azimuth (°)	322.693/322.795/322.897/323.000	323.252/323.315/323.378/323.441
azimuth rate (°/sec)	0.0160/0.0160/0.0159/0.0159	0.0253/0.0252/0.0251/0.0249
elevation (°)	25.305/25.305/25.306/25.305	36.155/36.067/35.979/35.891
elevation rate (°/sec)	-0.0455/-0.0455/-0.0456/-0.0457	-0.0459/-0.0460/-0.0460/-0.0461
altitude (km)	100.1/100.0/100.0/99.9	< 500 km (below limb)
diameter	58.7" (< 40% vertical IFoV)	
brightness	-4.02 mag	
	Venus (DoY 175 – orbit 38261-38266)	**Sun (DoY 175 – orbit 38261-38266)**
azimuth (°)	22.069/22.066/22.065/22.062/22.06/22.058	338.431/338.426/338.422/338.418/338.414/338.410
azimuth rate (°/sec)	-0.0126/-0.0126/-0.0126/-0.0126/-0.0126/-0.0126	0.0005/0.0005/0.0005/0.0005/0.0005/0.0005
elevation (°)	25.370/25.371/25.370/25.371/25.370/25.369	8.479/8.495/8.517/8.534/8.556/8.573
elevation rate (°/sec)	-0.0563/-0.0563/-0.0563/-0.0563/-0.0563/-0.0563	-0.0545/-0.0545/-0.0545/-0.0545/-0.0545/0.0545
altitude (km)	100.0/100.1/99.9/100.1/99.9/100.0	> 400
diameter	19.5" (< 12% vertical IFoV)	
brightness	-4.07 mag	

Table 1: Venus and Sun parameters at proposed observation dates

The measurement duration is given by the time it takes Venus to rise from 100 km to the upper edge of the limb TCFoV, i.e. to cover an elevation width of 5.9° with a rate as given above. The resulting duration amounts to 102 sec on all three dates.

Scanner State Simulation:

The scan (part 1 / part 2 – version B) was simulated yielding results for the scanner behaviour compliant with what was expected. Below the planned execution is shown for the Venus slit width measurements on day 175 with the final settings for the scan based on the actual data of Venus (table 1). Only results from the elevation scanner are displayed. The ASM control is considered uncritical. Note that in addition to the derived ESM scan track also the relative position of the IFoV and in comparison the size of Venus are indicated.

Fig. 1-3 present simulation results for day 175.

In these new simulations the limitations of Excel have been overcome and the output of the scanner simulator tool is produced and displayed for the full state duration including set-up and close-up. Part 1 and 2 of the scan is set to 50 sec duration each. The graphs prove the envisaged observation strategy, i.e. the overtaking of the IFoV by the rising Venus and show the turnaround of the relative position in part 2. All angular dimensions are the actual values of day 175. The vertical dimension of the IFoV is shown by the two black lines. It is drawn as specified with a width of 0.045°. The angular values in the graph are given in scanner angles, i.e. they are half of the LoS-angles. The graph covers the start of scan, entry of Venus into IFoV and crossing of Venus of the centre of the IFoV. (‘downwards scan’), exit of Venus from the IFoV and the turnaround. Since set-up is part of the simulation, the measurement part (phase 2 in scanner state table) starts at 1300 msec.

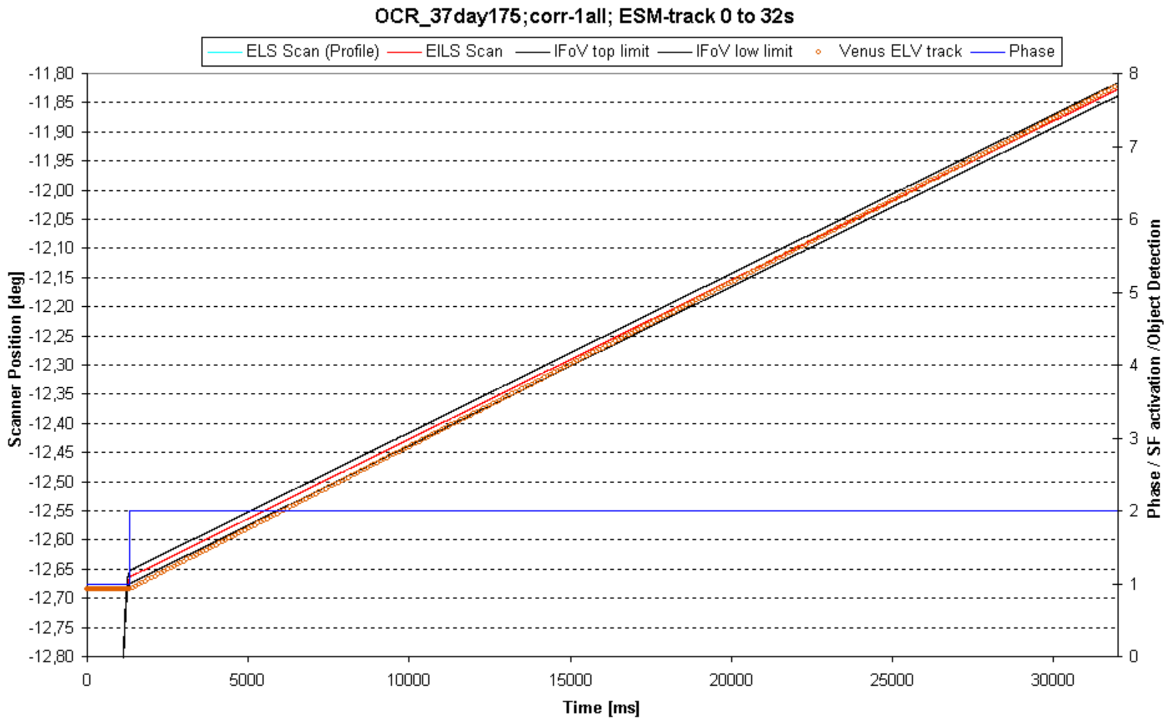

Fig. 1: The first 30 sec of part 1 of a full state simulation.

A zoomed-in version for the initial part of fig. 1 is given in fig. 2. It illustrates how Venus is catching up on the IFoV and then entering it.

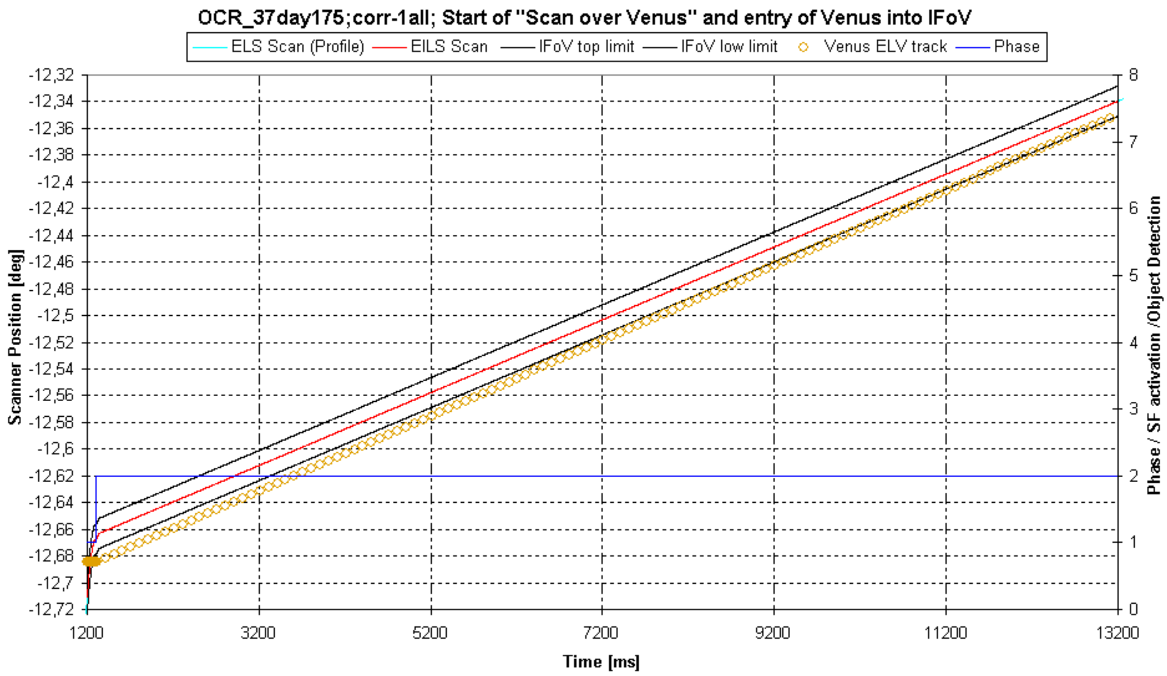

Fig. 2: First 12 sec of the scan from the simulation described above. In this period the entry of the upper edge of Venus into the IFoV at about 8 sec (8200) of the scanner operation is obvious.

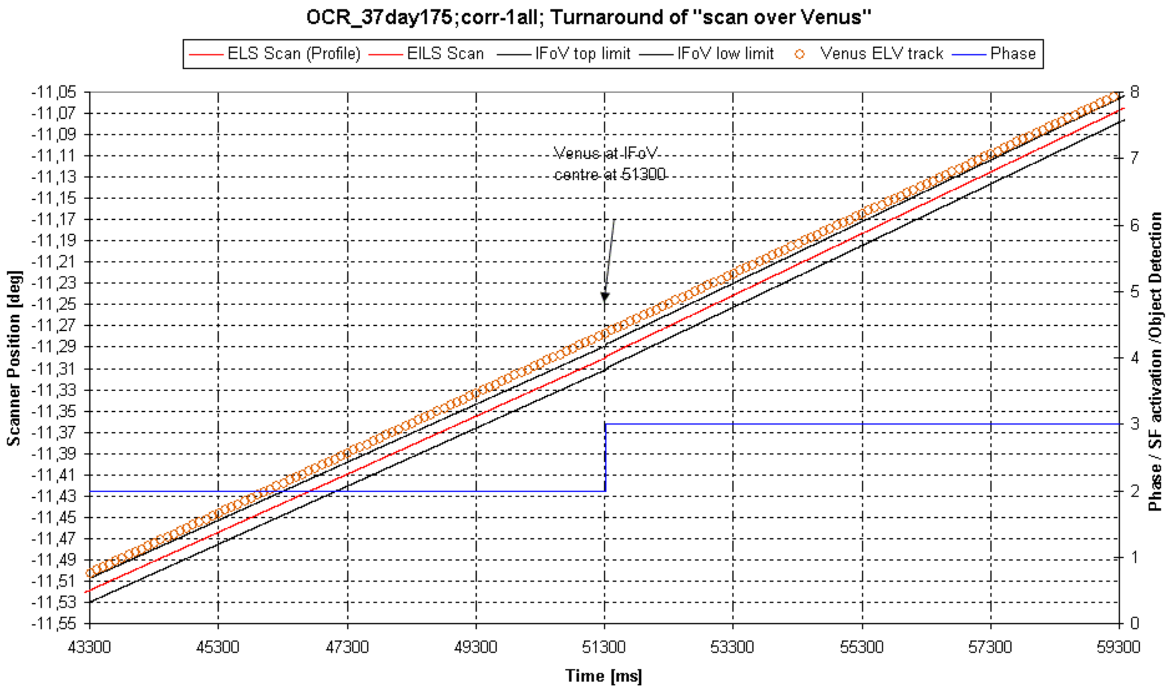

Fig. 3: The middle 12 sec of the same simulation with turnaround of the scanner motion and the re-entry of the lower edge of Venus into the IFoV.

Annex 3: Detailed State Design

For the Venus test measurement the following CTI parameter settings apply.

Scanner State parameter table:

Scanner State Parameter #24	24	Venus-observation - OCR-37							
	Common	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6	Phase 7	Phase 8
STATE ID	24								
spare									
Relative Scan Profile 1 Factor	0								
Relative Scan Profile 2 Factor	0								
Relative Scan Profile 3 Factor	0								
Relative Scan Profile 4 Factor	0								
Relative Scan Profile 5 Factor	0								
Relative Scan Profile 6 Factor	0								
Number of Scan Phases	3								
Duration of Phase [msec]		1300	100000	840	0	0	0	0	0
Phase Type		0	1	0	0	0	0	0	0
Azimuth Centering of Relative Scan Profile		0	0	0	0	0	0	0	0
Azimuth Filtering		0	0	0	0	0	0	0	0
Az. Inverse Rel. Scan Profile for Even Scan		0	0	0	0	0	0	0	0
Azimuth Correction of nominal Scan Profile		1	1	0	0	0	0	0	0
Azimuth Relative Scan Profile Identifier		6	6	0	0	0	0	0	0
H/W constellation		3	3	3	0	0	0	0	0
Azimuth Basic Scan Profile Identifier		4	4	0	0	0	0	0	0
Azimuth Number of Repetition of Rel. Scan		0	49	0	0	0	0	0	0
spare									
Elevation Centering of Relative Scan Profile		0	0	0	0	0	0	0	0
Elevation Filtering		0	0	0	0	0	0	0	0
El. Inverse Rel. Scan Profile for Even Scan		0	0	0	0	0	0	0	0
Elevation Correction of nominal Scan Profile		1	1	0	0	0	0	0	0
Elevation Relative Scan Profile Identifier		6	6	0	0	0	0	0	0
spare									
Elevation Basic Scan Profile Identifier		11	11	0	0	0	0	0	0
Elevation Number of Repetition of Rel. Scan		0	49	0	0	0	0	0	0

State Index table:

	State ID	Cluster Definition Index	Coadding Index High Data Rate	Coadding Index Low Data Rate	Measurement Category ID
Venus_observation OCR37	24	1	6	6	28

State Duration table:

	State ID	Restart Time	(SDPU) Mode	SDPU Duration (Number of BCPS)	Wait Measurement Execution	State Duration	Scanner Reset Wait
Venus_observation OCR37	24	255	STANDARD	1600	25576	26512	174

PET table:

State ID	Data Rate	Channel 1a	Channel 1b	Channel 2b	Channel 2a	Channel 3	Channel 4	Channel 5	Channel 6	Channel 7	Channel 8	State ID	Data Rate	Channel 1a	Channel 1b	Channel 2b	Channel 2a	Channel 3	Channel 4	Channel 5	Channel 6	Channel 7	Channel 8	
24	Low	1,	1,	1,	1,	1,	1,	1,	1,	1,	1,	24	High	1,	1,	1,	1,	1,	1,	1,	1,	1,	1,	changed due to =OCR_37 Venus

Basic Profile table:

In routine measurement operations the basic profiles 04, 10, 11 and 13 are used in Sun_ASM_Diffuser_Calibration states (ID 17-22). Since the orbits reserved for OCR_037 do not execute daily calibrations, all 4 profiles can be temporally overwritten. During the Venus test measurements on day 79 (orbits 36873-36876) only one profile each for ASM and ESM are used since no inverted relative motion of Venus has to be generated. The following values for the basic profiles apply:

Orbit 36873: LoS margin = 0.040°, elevation rate = -0.00125 °/sec

Scanner Basic Profile EU				
Basic Scan Profile ID	Basic Scan Rate		Basic Scan Position	
	Azimuth [10-6 rad/sec]	Elevation [10-6 rad/sec]	Azimuth [10-6 rad]	Elevation [10-6 rad]
4	-000140	000000	-0000459833	986111
11	-008145	000386	0003228859	-220282

Orbit 36874: LoS margin = 0.080°, elevation rate = -0.00205 °/sec

Scanner Basic Profile EU				
Basic Scan Profile ID	Basic Scan Rate		Basic Scan Position	
	Azimuth [10-6 rad/sec]	Elevation [10-6 rad/sec]	Azimuth [10-6 rad]	Elevation [10-6 rad]
4	-000140	000000	-0000460723	986111
11	-008145	000379	0003228859	-219933

Orbit 36875: LoS margin = 0.120°, elevation rate = -0.00285 °/sec

Scanner Basic Profile EU				
Basic Scan Profile ID	Basic Scan Rate		Basic Scan Position	
	Azimuth [10-6 rad/sec]	Elevation [10-6 rad/sec]	Azimuth [10-6 rad]	Elevation [10-6 rad]
4	-000139	000000	-0000461613	986111
11	-008145	000373	0003228859	-219593

Orbit 36876: LoS margin = 0.160°, elevation rate = -0.00365 °/sec

Scanner Basic Profile EU				
Basic Scan Profile ID	Basic Scan Rate		Basic Scan Position	
	Azimuth [10-6 rad/sec]	Elevation [10-6 rad/sec]	Azimuth [10-6 rad]	Elevation [10-6 rad]
4	-000139	000000	-0000462512	986111
11	-008145	000367	0003228859	-219235

For the Venus slit width measurements on day 175 (orbits 38261-38266) the CTI parameter settings for

- State Index
- Measurement duration
- Pixel exposure time

are identical to those from the Venus test measurements from day 79.

However the Scanner State and Basic Profile table differ since Venus shall cross the IFoV twice. Thus an inverted relative motion of Venus has to be produced. This requires to split phase 2 of the Scanner State parameter table into 2 phases of 50 sec each and to involve now two basic profiles each for the ASM and the ESM with the values listed below. They can be maintained for all 4 orbits because the elevation margin of Venus relative to the IFoV is kept at 0.02° and the elevation position of Venus varies only by ± 0.0025°.

Scanner State parameter table:

Scanner State Parameter #24	24	Venus-observation - OCR-37							
	Common Param.	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6	Phase 7	Phase 8
STATE ID	24								
spare									
Relative Scan Profile 1 Factor	000								
Relative Scan Profile 2 Factor	000								
Relative Scan Profile 3 Factor	000								
Relative Scan Profile 4 Factor	000								
Relative Scan Profile 5 Factor	000								
Relative Scan Profile 6 Factor	000								
Number of Scan Phases	4								
Duration of Phase [msec]		1300	50000	50000	840	0	0	0	0
Phase Type		0	1	1	0	0	0	0	0
Azimuth Centering of Relative Scan Profile		0	0	0	0	0	0	0	0
Azimuth Filtering		0	0	0	0	0	0	0	0
Az. Inverse Rel. Scan Profile for Even Scan		0	0	0	0	0	0	0	0
Azimuth Correction of nominal Scan Profile		1	1	1	0	0	0	0	0
Azimuth Relative Scan Profile Identifier		6	6	6	0	0	0	0	0
H/W constellation		3	3	3	3	0	0	0	0
Azimuth Basic Scan Profile Identifier		4	4	10	0	0	0	0	0
Azimuth Number of Repetition of Rel. Scan		0	24	24	0	0	0	0	0
spare									
Elevation Centering of Relative Scan Profile		0	0	0	0	0	0	0	0
Elevation Filtering		0	0	0	0	0	0	0	0
El. Inverse Rel. Scan Profile for Even Scan		0	0	0	0	0	0	0	0
Elevation Correction of nominal Scan Profile		1	1	1	0	0	0	0	0
Elevation Relative Scan Profile Identifier		6	6	6	0	0	0	0	0
spare									
Elevation Basic Scan Profile Identifier		11	11	13	0	0	0	0	0
Elevation Number of Repetition of Rel. Scan		0	24	24	0	0	0	0	0

Basic Profile table:

LoS margin = 0.020°, elevation rate = -0.0017 °/sec

Scanner Basic Profile EU				
Basic Scan Profile ID	Basic Scan Rate		Basic Scan Position	
	Azimuth [10-6 rad/sec]	Elevation [10-6 rad/sec]	Azimuth [10-6 rad]	Elevation [10-6 rad]
4	000110	000000	-977934	986111
10	000110	000000	-972436	170480
11	-008145	000476	3228859	-221024
13	-008145	000506	3159046	-197200

Venus observation (ID 24) timing inputs for timeline generation (test measurements)

RTCS	STT_01
RTCS set-up	636 cts
RTCS cleanup	277 (762-636-23+174)
total RTCS-duration	762 cts
WME	25576 cts (100×16×16-24)
WSR	174 cts
state duration	26512 cts (762+25576+174)
set-up	636 cts
cleanup	275 cts
measurement	25600 cts (100×16×16)
total duration	26512 cts
SDPU duration	1600 bcps
phase 1	1300 msec
phase 2	100000 msec
phase 3	840 msec

Venus observation (ID 24) timing inputs for timeline generation (slit width measurements)

RTCS	STT_01
RTCS set-up	636 cts
RTCS cleanup	277 (762-636-23+174)
total RTCS-duration	762 cts
WME	25576 cts (100×16×16-24)
WSR	174 cts
state duration	26512 cts (762+25576+174)
set-up	636 cts
cleanup	275 cts
measurement	25600 cts (100×16×16)
total duration	26512 cts
SDPU duration	1600 bcps
phase 1	1300 msec
phase 2	50000 msec
phase 3	50000 msec
phase 4	840 msec