1 INTRODUCTION

This readme file describes the EPS-SG MWS L1B and MWS L2 Test Data V2.

The MWS Level 1B data contains the variables of the geolocation and calibration processing. These are listed according to the specifications given in the MWS L1B Product Format Specification document that is distributed along with this Test Data Package (TDP). This product is generated using the MWS L1B In-house Prototype Processor (IPP) developed at EUMETSAT.

The MWS L2 test data set is generated with the MWS L2 In-house Prototype Processor using L1B data and auxiliary data as input. The L2 test data contains the geolocated total precipitable water (TPW) over water-surfaces, and limb-corrected brightness temperatures for all 24 MWS channels. The L2 product also contains quality information for the processed orbit. The MWS L2 PFS is also available along with this TDP release.

2 METOP-SG ORBIT AND ATTITUDE DEFINITION

The MWS L1B TDP (Test Data Package) V2 is based on the Metop-A orbits with numbers 4654, 4655, 4656, all dated 12/09/2007 and 6985 dated 23/02/2008. Table 2-1 lists the start and end time of each of them.

Table 1: UTC times of MWS Test data orbits

		4654	**4655**	**4656**	**6985**
L1B	***Scan lines***	2712	2637	2707	2624
	Start	07:01:27	08:43:21	10:22:25	08:46:26
	End	08:43:21	10:22:25	12:04:07	10:25:01

3 CONTENTS OF THE TEST DATA PACKAGE

3.1 Test data scenarios for MWS L1B

While the first version (V1) of Test Data Package encompassed a nominal scenario only (Test_Scenario 010), Version 2 provides an additional suite of non-nominal test data.

The table provides an overview of the different test scenarios for which the MWS L1B test data has been generated.

Table 2: MWS L1B Test Scenarios

ID	TDP Scenario Title
Test_Scenario_01x	Nominal Processing: NRT Global
Test_Scenarios_06x	Non-nominal Processing – Degraded science data
Test_Scenarios_07x	Non-nominal Processing – Special cases

Test Scenario 01x – NRT Global Processing

The Test Scenarios 01x consist of four full orbits of Metop-A, each full orbit covering all typical observing conditions, therefore spanning the expected range of MWS radiances:

1.) Regions with expected maximum radiance values for surface-sensitive channels, i.e. illuminated (descending orbit) African desert;
2.) Regions with expected minimum surface radiance values for surface-sensitive channels, i.e. cold water surfaces around Antarctica;
3.) Regions with expected maximum radiance values for atmospheric channels, i.e. Tropical areas;
4.) Regions with expected minimum atmospheric radiance values for atmospheric channels, i.e. Southern Hemispheric winter over Antarctica

Table 3lists the scenarios included under the nominal processing scenario.

Table 3: MWS L1B Scenarios with nominal processing (Test Scenario 01x)

ID	Scenario Title	Product	Coverage/Validity
Test_Scenario_010	Nominal – Realistic condition Orbit 4655	MWS-1B-RAD	07:01:27 12/09/2007 - 08:43:21 12/09/2007
Test_Scenario_011	Nominal – Ideal condition Orbit 4654	MWS-1B-RAD	07:01:27 12/09/2007 - 08:43:21 12/09/2007
Test_Scenario_012	Nominal – Ideal condition Orbit 4655	MWS-1B-RAD	08:43:21 12/09/2007 - 10:22:25 12/09/2007
Test_Scenario_013	Nominal – Ideal condition Orbit 4656	MWS-1B-RAD	10:22:25 12/09/2007-12:04:08 12/09/2007
Test_Scenario_014	Nominal – Ideal condition Orbit 6985	MWS-1B-RAD	08:46:26 23/02/2008 - 10:25:01 23/02/2008

In the fifth case in Table 3, science data counts stored in the Level 0 product relative to orbit 4655 have been 'perturbed' with Gaussian noise to simulate the one always present in a real instrument. This still corresponds to a nominal case, but adds a natural variability to the data than the 'ideal' ones generated by the IDS.

Test Scenarios 06x – degraded science data

A number of non-nominal test scenarios related to degraded science data have been developed and provided to users through the release of this version of the test data.

In Test Scenario 062, in addition to the forcing described for Test Scenario 010, to simulate a degradation of the antenna counts, every scan from the 11th onwards Earth view antenna counts have been forced to drift (steadily increase) away from the nominal value. The maximum allowed difference specified in the auxiliary data file is exceeded around the Nadir FOV (triggering the corresponding flag).

In Test Scenario 063, in addition to the forcing described for Test Scenario 010, channel 17 cold view counts at FOVs 1, 2, 3 and 4 (respectively starting after scan 100, 1000, 1500, 2000) jump out of the minimum/maximum expected values given in the auxiliary data making them been rejected from the subsequent processing.

In Test Scenario 064, in addition to the forcing described for Test Scenario 010, counts of PRT 1 to 5 (respectively starting after scan 100, 400, 500, 1000, 1500) jump out of the minimum/maximum expected values given in the auxiliary data file making them been rejected from the subsequent processing.

In Test Scenario 065, in addition to the forcing described for Test Scenario 010, after scan 1300, thermistor 18 has been assigned with the counts of thermistor 12, introducing a disagreement with thermistor 21 (used together to define the instrument/reflector temperatures) and after scan 1100 thermistor 21 counts are set to a value that triggers the out of range temperature specified in the auxiliary data file.

In Test Scenario 066, in addition to the forcing described for Test Scenario 010, cold, warm, Earth counts have Channel 1 counts with inflated random noise from scan 101 to 1000 to reach NEΔT above requirements. Similarly done for Channels 17 from scan 1101 to 2000.

Table 4: MWS L1B Non-nominal Scenarios – degraded science data (Test Scenario 06x)

ID	Scenario Title	Product	Coverage/Validity
Test_Scenario_062	Degraded because of degraded antenna counts	MWS-1B-RAD	08:43:21 12/09/2007 - 10:22:25 12/09/2007
Test_Scenario_063	Degraded because of degraded calibration (cold or warm) counts	MWS-1B-RAD	
Test_Scenario_064	Degraded because of degraded PRT counts	MWS-1B-RAD	
Test_Scenario_065	Degraded because of degraded instrument thermistor counts	MWS-1B-RAD	
Test_Scenario_066	Degraded because of excessive striping or NEΔT noise or instrument non linearity	MWS-1B-RAD	

Special Test Scenarios

This special test scenario considers the Moon contamination of cold views. This has been generated moving forward in time the timestamps of MWS and NAVATT packets to an instant when the Moon is seen by MWS cold views while scanning along orbit 4655. It has been found that this condition occurs (among others) about two weeks after the 12/09/2007. Level 0 data have been modified increasing to the cold (space) view counts for the contribution of the Moon emission. The NAVATT product has been also modified to have quaternions that match the (old) state vector and the new times. Also worth mentioning that a new POF (Prediction Orbit File) has been generated shifting forward the times accordingly.

Table 5: MWS L1B Special Scenarios (Test Scenario 071)

ID	Scenario Title	Product	Coverage/Validity
Test_Scenario_071	Moon contamination of the cold views	MWS-1B-RAD	07:36:22 29/09/2007 - 09:15:26 29/09/2007

3.2 Test Data Scenarios for MWS L2

Table 6 provides an overview of the different test scenarios for which MWS L2 Test Data is provided.

Table 6: MWS L2 Test Scenarios

ID	Scenario Title
Test_Scenario_01x	Nominal NRT Global Processing
Test_Scenario_06x	Non-nominal Processing – Degraded science data

Test Scenario 01x – NRT Global Processing

The Test Scenarios 01x consist of three consecutive full orbits of Metop-A with numbers 4654, 4655, 4656, all dated 12/09/2007, and the full Metop-A orbit number 6985, dated 23/02/2008. Each full orbit provides a suitable data base, because

1. regions with high total precipitable water content (in particular over water) are covered (i.e. tropical oceans).
2. regions between -50°S and 50°N are fully covered (note that the L2 product TPW is only computed for this geographical latitude belt to ensure ice-free conditions).

The generated output is a L2-product in netcdf format, containing geolocated TPW, and limb-corrected brightness temperatures for all 24 MWS channels. The L2 product also contains quality information for the processed orbit.

Table below lists the scenarios included in this version of test data delivery. Beside the four orbits mentioned above (corresponding to TS011, TS012, TS013 and TS014), there is a fifth case TS010 with added noise simulating a realistic dataset. The noise was added as follows: science data counts stored in the Level 0 product relative to orbit 4655 have been 'perturbed' with Gaussian noise to simulate the one always present in a real instrument. This still corresponds to a nominal case, but adds a natural variability to the data that the 'ideal' ones generated by the IDS lacks.

ID	Scenario Title	Product	Coverage/Validity
Test_Scenario_010	Nominal – Realistic condition Orbit 4655	MWS-1B-RAD	08:43:21 12/09/2007 - 10:22:25 12/09/2007
Test_Scenario_011	Nominal – Ideal condition Orbit 4654	MWS-1B-RAD	07:01:27 12/09/2007 - 08:43:21 12/09/2007
Test_Scenario_012	Nominal – Ideal condition Orbit 4655	MWS-1B-RAD	08:43:21 12/09/2007 - 10:22:25 12/09/2007
Test_Scenario_013	Nominal – Ideal condition Orbit 4656	MWS-1B-RAD	10:22:25 12/09/2007 – 12:04:08 12/09/2007
Test_Scenario_014	Nominal – Ideal condition Orbit 6985	MWS-1B-RAD	08:46:26 23/02/2008 – 10:25:01 23/02/2008

Test Scenario 06x – Degraded Science Data

This scenario covers the case of a degraded L1B product, where the degradation was caused by any problem affecting the calibration. The respective problem is reflected through L1B quality flags, which are read during L2 processing, and hence indicate degraded data in the L2

product. Since there are different situations leading to a differently degraded L1B product, several degraded L1B products are used as test data input for the L2 TDP. Hence, subscenarios TS061a,b,c,d,e, and f are provided. The input for the Level 2 TS061 is the L1B data set for Level 1 TS 062 –TS 066 and TS 071. Please refer to Table 4 for further information on the individual L1B data sets.

ID	Scenario Title
Test_Scenario_061	Degraded L1B product: any problem affecting the calibration, reflected through L1B quality flags, which are read during L2 processing

Test Scenario ID	L1B - TS ID	Product	Coverage/Validity
TS 061a	TS 062	MWS-02-TPW	08:43:21 12/09/2007 - 10:22:25 12/09/2007
TS 061b	TS 063	MWS-02-TPW	
TS 061c	TS 064	MWS-02-TPW	
TS 061d	TS 065	MWS-02-TPW	
TS 061e	TS 066	MWS-02-TPW	
TS 061f	TS 071	MWS-02-TPW	