Technical Note on:

ORM Cal. Val. Analysis
Part 1: Summary Sheets

Draft

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Delivery of WPs 9130 & 9500 of the CCN#5 of the study:

"Development of an Optimised Algorithm for Routine p, T and VMR Retrieval from MIPAS Limb Emission Spectra"

Contract No: **11717/95/NL/CN**

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Contents

1 Reference documents

[RD1] TN-IROE-RSA9603**,** Issue: 3A
Title: Software Architecture and Algorithm Definition

[RD2] TN-IROE-GS0102**,** Issue: 1 - Revision: 1
Title: Pre-flight modifications to the ORM_ABC code

[RD3] Draft:
Title: 'New functionalities implemented in ORM_ABC_1.2.3' ,
M. Ridolfi (16 November 2001)

[RD4] PO-MA-DOG-GS-0001, Issue: 2 - Revision: A
Title: ML2PP Software User Manual

[RD5] TN-IROE-GS0101, Issue: 1 - Revision: A
Title: Level 2 Algorithm Characterization & Validation Plan

[RD6] TN-IROE-GS0103, Draft Revision A
Title: ORM for Commissioning Phase (18 April 2002)

[RD7] TN-IROE-GS0104, Draft
Title: Description of Statistical Tool

[RD8] PO-PL-ESA-GS-1124, Issue 1B, Title: Implementation pf MIPAS post-launch calibration and validation tasks, (March 2002)

[RD9] Title: 'MIPAS-B Retrieval residuals analysis', V. Jay and A. Dudhia (23 Jan. 01)

[RD10] Title: 'REC Analysis of MIPAS data', Draft, A. Dudhia (22 April 2003)

2 Introduction

In the frame of ESA contract 11717/95/NL/CN an Optimized forward /retrieval Model (ORM) has been developed, suitable for implementation in MIPAS near real-time Level 2 Processor. In particular, version 1.2.3 of the ORM_ABC code (described in [RD1], [RD2] and [RD3]) is the scientific reference for the Retrieval Component Library of MIPAS Level 2 NRT processor [RD4]. Before the ENVISAT launch, the most critical input parameters and the most critical baselines used in the ORM were identified and a list of tests to be performed during the Commissioning Phase for both optimising the input parameters and verifying the impact of the code approximations were described in [RD5]. In order to perform these tests a modified ORM with added functionalities [RD6] and a dedicated software tool for the analysis of ORM products (Statistical Tool) [RD7] were developed.
The tests described in [RD5] have been included in the overall calibration and validation activities of the early in-flight operation of MIPAS, described in [RD8].
These tests have been performed using first one of the first orbit detected by MIPAS, i.e. orbit #504 (acquired on the 5th April 2002) with unconsolidated Level1 data and then using orbit #2081 (acquired on the 24th July 2002) with improved Level1 data.

This TN reports the results of the tests performed on orbit #2081 following the order of presentation used in [RD5]. It is divided in two parts. The first part is a collection of the summary sheets of all performed tests according to the template provided by ESA and provides the summary of the results and the recommendations for ESA.
The second part contains, for each test, the rationale, the used procedure (if different to the one described in [RD5]), the results and the conclusions. It is meant to collect details that justify the recommendations to ESA given in the first part.
The results of the tests described in [RD5] performed with the REC analysis are reported in [RD10].
This introduction is repeated in both parts of the report in order to make possible to consult them as independent documents.

3 Tuning of input parameters

The first group of the tests deals with the tuning of critical processing set-up parameters. The outputs of these tests consist in modified Level2 auxiliary data (PS_FRAME.DAT, PS_PT.DAT, PS_H2O.DAT, PS_O3.DAT, PS_HNO3.DAT, PS_CH4.DAT, PS_N2O.DAT, PS_NO2.DAT) that are used to generate the file MIP_PS2_AX file. The modified auxiliary files were delivered to ESA on 31st October 2002 and were implemented in the Payload data Segment (PDS) on the 13th of November.

The following input parameters have been tuned:

Tuned parameter	Sheet
Atmospheric continuum related parameters	MIP_PS_2_5 & MIP_PS_2_6 /1
Marquardt dumping factors	MIP_PS_2_5 & MIP_PS_2_6 /2
Regularization parameter	MIP_PS_2_5 & MIP_PS_2_6 /3
Convergence criteria thresholds	MIP_PS_2_5 & MIP_PS_2_6 /4
Retrieval grid	MIP_PS_2_5 & MIP_PS_2_6 /5
Layering in the forward model	MIP_PS_2_5 & MIP_PS_2_6 /6
Tropopause altitude	MIP_PS_2_5 & MIP_PS_2_6 /7
Field of view related parameters	MIP_PS_2_5 & MIP_PS_2_6 /8
Line of Sight Variance Covariance Matrix	MIP_PS_2_5 & MIP_PS_2_6 – AX2.1
Initial Guess Variance Covariance Matrix	MIP_PS_2_5 & MIP_PS_2_6 /9
Second order polynomial coefficients for the spectral correction	MIP_PS_2_3-MV_2_15