

SCIAMACHY Quality Working Group (SQWG-3): Project Overview

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Introduction

- Tasks of the SCIAMACHY Quality Working Group (SQWG):
 - Focus on all activities around the evolution of the **operational processing** of SCIAMACHY data.
 - **Pool all necessary expertise in one group** who takes the responsibility for the evolution and improvements of the operational data processing chain from Level 0 to Level 2.
- First SQWG was formed in **2007**, following the exercise successfully applied to the evolution of data processing of other ENVISAT instruments
- Demonstrated since then the efficient maintenance and evolution of the operational SCIAMACHY processors under **ESA contract** and with ***national co-funding***.

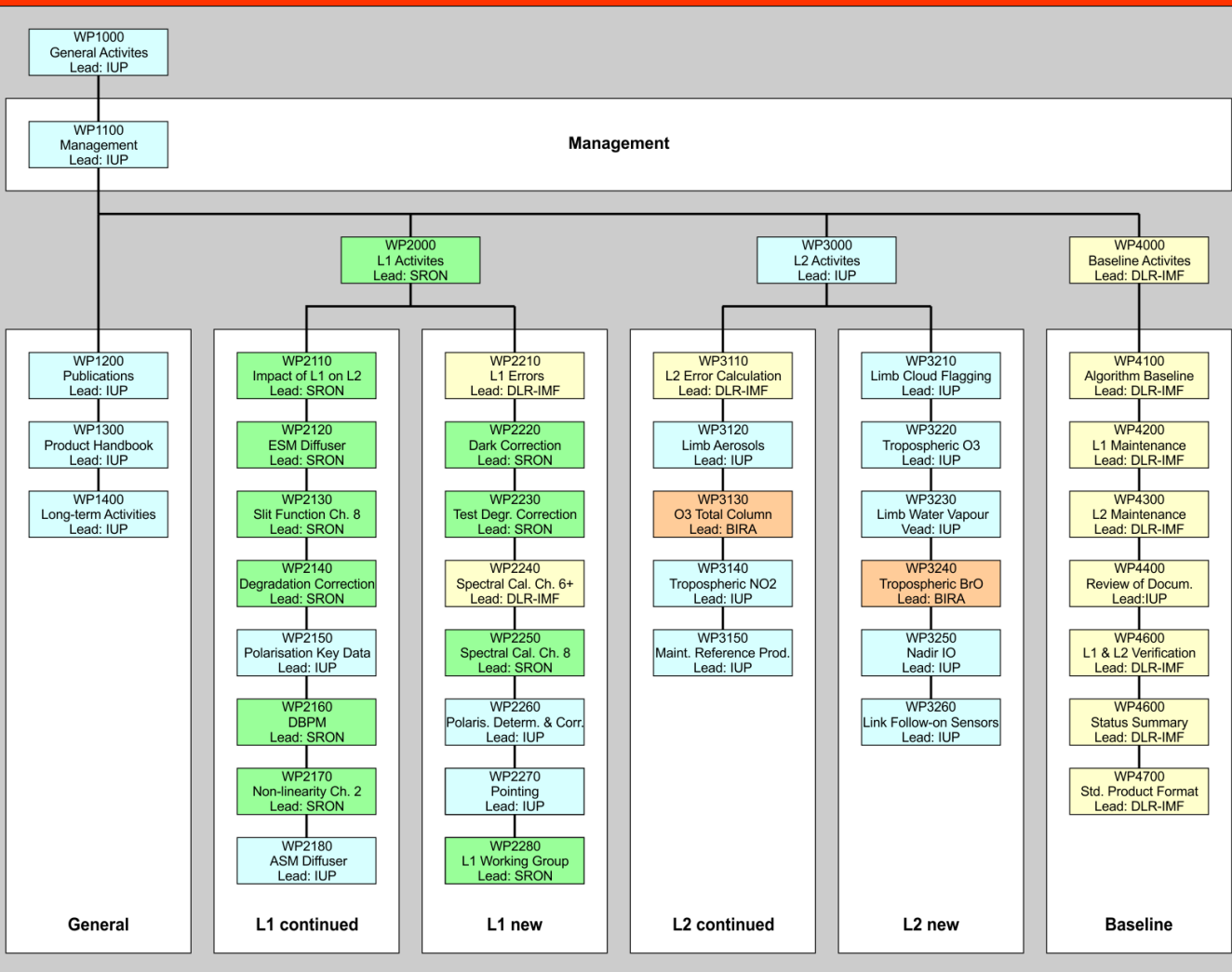
SQWG-3 Project History

- After the unexpected **end of the ENVISAT operational phase in April 2012** it was agreed between all agencies that a continuation of the SQWG activities is needed.
- A **work plan for Phase F** has been set up, reviewed and recommended for implementation by the SCIAMACHY Science Advisory Group and was agreed to be implemented by all parties.
- **RfQ** begin of December 2013
- **Proposal** submitted begin of February 2014
- Project start **July 2014**, duration **30 months** (i.e. until **January 2017**)
- Extension via a **CCN** (include validation activities) under discussion
- Current members of the SQWG are the University of Bremen (**IUP**) (Lead), **BIRA**, **DLR-IMF**, and **SRON**.
- The expertise of **KNMI** is brought in via an association with SRON.

SQWG-3 Project Goals

- **Update the Level 0-2 processing chain** so it reflects the current scientific knowledge.
Special emphasis is put on **improvements in the Level 0-1 area** (instrument calibration and corrections), since this task requires expert instrument knowledge that is not available outside the SQWG.
- **Deliver the processor baseline** (processors including documentation and user tools) that enables the generation of a **quality controlled Level 1b and Level 2 data** sets for the whole mission that can be used by scientific and institutional users.
- **Ensure long-term usability of the data** by
 - (1) reviewing the complete documentation
 - (2) providing the data in a standard format.

Project Structure



- Work packages include:
 - Finalisation of current baseline (L1V8, L2V6)
 - Generation of new baseline (L1V9, L2V7)
- Tight schedule:
 - Focus on L1
 - Only few new operational L2 products
 - Additional scientific L2 products

History of Level 2 Products

Product Improvements Level 2					
Version	V 3.01	V4.0	V5.0	V6.0	V7.0
Verified		March 2008	March 2009	Autumn 2013	2016
Baseline Delivered		June 2008	June 2009	Winter 2013/14	2016
Switch (forward processing)	2007	not activated	October 2010	N/A	N/A
Release of Reprocessed Data			June 2012	2016	2017 (planned)
Nadir Products					
Absorbing Aerosol Index	quality not sufficient	improved algorithm and usage of degradation corrections	no changes	Usage of calculated TC O3	Maintenance
Ozone total column	slight trend over time (< 0.5% Per year), GDP 4	degradation correction taken into account	smaller trend	improvements w.r.t. trends expected from L1 improvements	Maintenance
trop. O3				implementation study	scientific product (operational implementation tbd)
NO ₂	offset removed	reference spectra	no changes	Maintenance	Maintenance
trop. NO2				new product	Verification & Maintenance
BrO		SCD	VCD	Maintenance	Maintenance
trop. BrO					new product
IO					scientific product (operational implementation tbd)
SO ₂		SCD, reference sector	VCD, volcanic and pollution	Maintenance	Maintenance
OCIO			SCD	Maintenance	Maintenance
HCHO				new product VCD	Maintenance
CHOCHO				new product VCD	Maintenance
H2O			VCD	Maintenance	Maintenance
CO / xCO			VCD xCO quality tbc	xCO improvements	Maintenance
xCH4				new product	Maintenance
Cloud parameter evolution	OCRA/SACURA	improvements due to degradation correction	new minimum reflectance data base improved OCRA CF	ice/snow/ clouds discrimination	Maintenance

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Limb Products					
Ozone profile evolution	TH offset removed, maximum of 4 limb O3 profiles per tangent height	improved forward model, optimised retrieval settings, => substantially smaller low bias	clouds and aerosol improvements lower stratosphere	extension to upper stratosphere and lower mesosphere	Maintenance
NO ₂ profile evolution	TH offset removed	improved forward model, optimised retrieval settings => improved lower strat.	clouds taken into account	Maintenance	Maintenance
BrO profile implementation			product newly implemented	Maintenance	Maintenance
Limb clouds			product newly implemented	Maintenance	Maintenance
H2O profile				implementation investigations	scientific product (operational implementation not planned)
Aerosols				implementation investigations	scientific product (operational implementation not planned)

This project

- Note: Reprocessing and validation of new data products not included in current SQWG-3 project

CCN1

- CCN1 in preparation
- Aim: Validation of L2V7 products, incl. reprocessed data
- > Extension of SQWG-3 project duration required (until end of 2017, TBC)
- Additional work packages:
 - WP 5100 Management support for validation (IUP)
 - WP 5200 Multi-TASTE validation activities (BIRA)

General Schedule

- Two project phases with MTR in between
- Phase 1:
 - Preparation of the new baseline (main focus on L1):
 - Provide updated / new algorithms and implement them into the operational processor
 - Perform an initial verification
- Phase 2:
 - Finalisation of baseline (esp. L2) incl. verification
 - Documentation
 - Long-term recommendations, etc.
 - Finalisation of scientific products (reprocessing, documentation)
- At MTR:
 - Present status of project
 - Decide upon work plan for Phase 2, especially:
 - Is baseline finished or not (taking into account funding situation)?
 - Can some scientific products be made operational?

Level 1 Improvements (1)

- Investigated & decided **not to implement**:
 - Time dependent spectral slit function ch. 8:
CO algorithm developers recommend no implementation
 - Investigate/improve absolute radiometric calibration of ASM diffuser:
Suggested algorithm (scaling of ASM to ESM diffuser) results in unknown product quality; no time/resources for full approach (include ASM diffuser in mirror model)
 - Non-linearity correction for ch. 2:
Implementation already not foreseen in proposal; only documentation required
- Already implemented: **-> see individual presentation**
 - Individual pixel characterization for DBPM characterization
 - Investigate/improve dark correction
 - Investigate/improve spectral calibration ch. 8
 - Investigate/improve pointing
 - Investigate/improve ESM diffuser solar reference spectra
 - Investigate/improve degradation correction
 - Investigate/improve polarisation key data

Level 1 Improvements (2)

- Not yet implemented: -> include in Phase 2
 - Investigate/improve spectral calibration ch. 6+:
Not possible before MTR (other changes had higher priority)
 - Investigate/improve polarisation determination and correction:
*Large implementation effort, full implementation not possible before MTR
(some changes for nadir done)*

Level 2 Improvements

- New/improved L2 products, full implementation after MTR: -> see individual presentations
 - Limb cloud flagging
 - Tropospheric BrO
- Scientific products: -> see individual presentations
 - Nadir IO
 - Tropospheric O₃ from Limb-Nadir matching
 - Limb aerosols
 - Feasibility study of Limb water vapour product

Additional Work done during Phase 1

- Finalisation of previous baseline (L1V8, L2V6):
 - Analysis of potential new trend in total ozone columns with L1V8
 - Improvements of CO product
 - Implementation of tropospheric NO₂ product
 - Update of product handbook
 - Additional verification activities (i.e. check of reprocessed data):
 - > Problem with reprocessed L1V8 data which needed to be fixed -> see presentation
 - > *Larger effort than originally foreseen*
 - > *Delay in schedule of about three months*
- Definition of standard product format -> see presentation
- General / ongoing activities:
 - Management
 - Recommendations for long-term activities
 - Check impact of L1 on specific L2 products
 - Maintenance of scientific reference products

Planned Work during Phase 2

- Specific tasks during Phase 2:
 - Implementation of standard product format
 - Finalisation of baseline implementation incl. verification
 - Investigate/improve and consolidate L1 errors
 - Documentation and improvement of L2 error calculation
 - Work on scientific products
 - Link SCIAMACHY time series to follow-on sensors
 - Review of documentation
 - SCIAMACHY Product Handbook maintenance (update for new products)
 - Summary of L1 and L2 baseline status
- General / ongoing activities:
 - Management
 - Recommendations for long-term activities
 - Support of L1 Working Group
 - Maintenance of scientific reference products

-> to be discussed

Red:
Depending on availability
of national funding