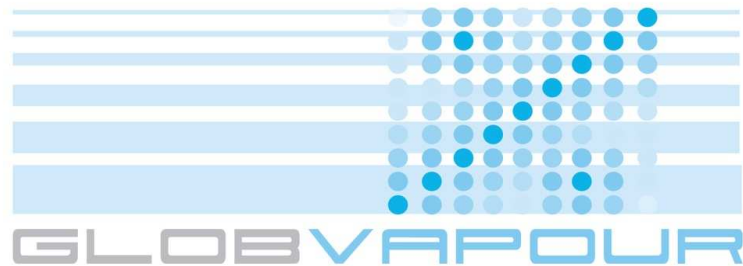




## DUE GLOBVAPOUR

### Monthly Progress Report

July & August 2011



GLOBVAPOUR

Issue 1, Revision 0

05 September 2011

ESRIN/Contract No.: 22696/09/I-OL

Project Coordinator: Marc Schröder  
Deutscher Wetterdienst  
[marc.schroeder@dwd.de](mailto:marc.schroeder@dwd.de)

Technical Officer: Bojan Bojkov  
ESA  
[bojan.bojkov@esa.int](mailto:bojan.bojkov@esa.int)

**Monthly Progress Summary - ESA DUE GlobVapour**

ESRIN/Contract No.: 22696/09/I-OL

Reporting Period: 01.07.2011 - 31.08.2011

**Main Accomplished Actions:**

- Test products for SSM/I+MERIS and SCIAMACHY/GOME2 products and AATSR prototype months have been processed and are available via the webpage.
- The initial stand-alone processing system has been designed, with the design summarized in a draft version of the processing system software design document. The combined SSM/I+MERIS processors have been successfully implemented.
- The validation of the test products has been carried out.
- The Product User Guide and latest versions of the Product Validation Reports have been drafted, reviewed and updated.
- On 6+7 July 2011 the project carried out its fourth progress meeting in Berlin.

**Activities, Achievements and Status - Phase II****Management and Coordination****WP 002 - Management and Coordination (M. Schröder)**

- Organization and execution of the fourth progress meeting (PM-4) in Berlin (FUB).
- The organization of the GlobVapour User Consultation Meeting has been finalised in cooperation with UKMO. UCM will take place in Oslo during the EUMETSAT Satellite Conference 2011 (afternoon of 8 September 2011). Contact to potential users/experts was made and several experts agreed to attend UCM.

•

**WP 020 - Promotion (M. Schröder)**

- The GlobVapour Newsletter Vol. 3/ Issue 1 /2011 has been published.
- Minor webpage updates, e.g. presentations of PM4, Newsletter, UCM2 announcement.
- In dialogue with a new GV user C. Radermacher (MPI-HH). Her plan is to use the high resolution SSMI+MERIS product for model validation (REMO).
- GlobVapour will contribute two posters to the EUMERSAT Meteorological Satellite Conference: ESA DUE GlobVapour water vapour products: retrieval methods, ESA DUE GlobVapour water vapour products: validation.

**Creation of Diagnostic Data Set and validation tools****WP 210: Collection and procurement of validation data (M. Schröder)**

- Acquisition of additional GUAN and ARM data for validation of final products finalised. Acquisition of satellite data for validation of final products ongoing.

•

**WP 220: Collection and procurement of satellite data (M. Schröder)**

- SSM/I FCDR for years >1998 finalised by CM SAF. During the 90s processing is hampered by missing time stamp. A potential solution has been found and is currently tested. Finalisation expected soon. Other satellite Level 1 data acquisition finalised.

•

**WP 230: Development of validation tools (M. Schröder)**

- Implementation of more statistical validation tools (e.g., scatter plots for test products using GUAN).
- Cloud identification algorithm developed for GUAN radiosonde observations.
- Cloud screening implemented in AIRS processing.

## Development of Prototype Product

### WP 310: Development of GOME/SCIAMACHY/GOME-2 retrieval scheme (D. Loyola)

- The retrieval scheme has been adapted to allow assimilation of SCIAMACHY and GOME data. Homogenisation development has been finalised.
- The SCIAMACHY 2006 dataset was delivered to DWD.

### WP 320: Development of MERIS retrieval scheme (R. Preusker)

- The MERIS retrieval development has been finalised and summarised in an updated ATBD.

### WP 330: Development of SSM/I - MWR retrieval scheme (M. Schröder)

- Minor issues in the SSM/I retrieval have been fixed, with insignificant effects on quality.

### WP 340: Establishment of consistency of MERIS and SSMI (M. Schröder)

- In preparation of the processing of the final products, the MERIS TCWV retrieval was validated over open ocean using SSM/I data in order to optimize the accuracy of the product over coastal areas. A wet bias of MERIS over dark ocean areas was found and eliminated by modifying the MERIS retrieval scheme. The bias was caused by a misinterpretation of the ocean surface reflectance, which is a function of observing geometry and wind speed. Using the ECMWF forecast wind speed provided with MERIS L1b files was found to cause insatisfactory results, instead a constant wind speed of 10m/s is used now. The comparison can be used to assess the consistency of MERIS and SSMI if only MERIS measurements over sun glint are used. Here, a dry bias of MERIS is found (-1.5mm) which can be readily identified as a cloud-free bias compared to the all-sky SSM/I retrieval. The relatively large scatter (~5mm) is in parts due to the time gap between the observations (-4h). An additional validation exercise using ENVISAT MWR data is currently carried out.
- The data has been screened in order to carry out a visual inspection of the transition between land and ocean TCWV values where coastal mountainous are not present. Typically smooth transitions are found.
- Finally, bias and correlation have been determined for nearest neighbours between SSM/I and MERIS TCWV values, with the constrain that altitude is below 50 m. A bias of <1 mm and a correlation of 0.84 was observed.
- Results have been summarised in the PVR for SSM/I+MERIS.

### WP 350: Development of AATSR retrieval scheme (R. Preusker)

- The 1D-Var retrieval scheme was replaced with a statistical retrieval scheme that fully exploits the available observations, that is, all IR channels in forward and nadir view. First comparisons against SSM/I exhibit slightly improved quality relative to the 1D-Var version. However, quality is still rather low with a bias <1 mm and an RMS ~7 mm.

### WP 360: Assessment of existing IASI retrieval schemes (M. Schröder)

- UK Met Office IASI retrievals for the GUAN stations in Dec 2008 have been produced and an initial version of daily netCDF files have been sent to DWD. Work continues on refining the dataset.
- In order to increase the number of valid collocations the assessment is currently extended to additionally include GUAN radiosondes and collocated IASI retrievals.

- First results have been produced, and a presentation for the UCM has been prepared.

**WP 370: Development of merged IASI/SEVIRI profile product (M. Schröder)**

- The analysis of the kriging error is still ongoing. A reprocessing of a sub period of the SEVIRI+IASI product is foreseen in order to consider the individual terms of the kriging error. It is assumed that SEVIRI information dominates even in presence of IASI overpasses. It is also likely that the information content might dominate the retrieval error impact (see also minutes of meeting from PM4).

**WP 380: Production and validation of prototype data sets (M. Schröder)**

- The prototype products have been re-evaluated. The combined SSM/I+MERIS product exhibits increased quality at coastal areas. This is discussed in the updated PVR for SSM/I+MERIS.

**WP 390: Development of processing environment (U. Krämer)**

- Development of concurrent processing for stand-alone processing system finished.

**Processor Development and Test Product****WP 410: Development of GOME/SCIAMACHY/GOME-2 processing system (D. Loyola)**

- Development, and delivery to Brockmann Consult, of the UCAS stand-alone processor for generating GOME/SCIAMACHY/GOME-2 L3 products.
- The development of the processing system is ongoing.

**WP 420: Development of MERIS-SSM/I processing system (M. Schröder, R. Preusker)**

- Nothing to report.

**WP 430: Development of AATSR processing system (R. Preusker)**

- Calculation of the 4 month of prototype data set has been finalised.
- The submission of the processor to BC was foreseen for August 2011 and is slightly delayed.

**WP 440: Development of IASI processing system (M. Schröder, R. Saunders)**

- The IASI retrieval scheme and processing has been finalised. At PM4 it was decided not to include the module into the processing system. Remaining efforts are shifted to the IASI assessment. Following discussions at PM4 the assessment is currently extended to GUAN radiosondes and therefore requires more effort.

**WP 450: Development of IASI-SEVIRI processing system (M. Schröder)**

- The development of the SEVIRI+IASI retrieval and processing has been finalised. Further processing and inclusion into the processing system is not foreseen. This was decided at PM4 on basis of missing added value relative to single sensor products.

**WP 460: Production and validation of test data set (M. Schröder)**

- The MERIS-SSM/I test data set (2006-2008) has been completed at DWD (SSM/I) and at FUB (MERIS). Monthly means (MM) and Daily Composites (DC) for each 15<sup>th</sup> are available on ftp server through [www.globvapour.info](http://www.globvapour.info).
- The SCIAMACHY/GOME-2 test data set has been completed for 2006 - 2008; Weekly and monthly means are available on ftp server.
- Validation of SSM/I+MERIS products and of the SCIAMACHY and GOME2 products for the years 2006-2008 against the diagnostic data set (DDS) was performed and is included in PVRs 2.0.
- The Product Validation Reports (PVR) for SSMI+MERIS and GOME+SCIA+GOME2 have been reviewed and presented at PM4. A consolidated version has been prepared. Besides review comments scatter plots against GUAN radiosonde have been included.

- Validation of AATSR products for the prototype months has been performed. The results for the first month have been presented at PM4. The full validation results are summarised in a technical note as it was decided at PM4 not to prepare a PVR for AATSR.
- The Product User Guide was re-submitted to ESA for review.

#### **WP 470: Development of stand alone processing system (U. Krämer)**

- Standalone processing system design document and validation plan finished and delivered. Final versions are available.
- Control software for processing system implemented as described in design document. Test of the control software is ongoing.

### **Development of Final Product**

#### **WP 510: Production and validation of final data set (M. Schröder)**

- Processing of SSM/I and MERIS Level 2 data started. The SSM/I Level 2 product is available for 1998-2005.

#### **WP 520: Update of PS and System Delivery and Test Application at ESRIN (U. Krämer)**

- Not yet started.

### **Scientific Exploitation**

#### **WP 610: Comparison of GlobVapour Products to Climate Model Output (M. Ringer)**

- Collection and pre-processing (e.g. regridding) of observational data sets for model comparisons, including GlobVapour test products, SSM/I (RSS), and ERA Interim and MERRA reanalyses.
- As above for Hadley Centre model data plus CMIP5 model output from CMIP5 data portal (currently five additional models available).
- Initial comparisons for 2006-2008 using GlobVapour test products (SSM/I/MERIS, GOME/SCIAMACHY) to demonstrate use of GlobVapour TCWV products for climate model evaluation.
- Preparation of presentation on this work for GlobVapour user group meeting at Eumetsat conference, Oslo.

#### **WP 620: Alternative Ways of Climate Model Evaluation (M. Ringer, R. Saunders)**

- The WP has been started, and the evaluation is ongoing.

#### **WP 630: Establishment of the Scientific Exploitation Plan (R. Saunders)**

- Structure and content of the SEP are under discussion. SEP will benefit from UCM.

### **Next Steps and Schedule**

- Processing of final products.
- Finalisation of implementation into processing system (AATSR and GOME/SCIAMACHY/GOME2).
- User Consultation Meeting (08 September 2011, Oslo, Norway).
- Continuous development on all running WPs.

## Achievements

- Test products, i.e., products covering the years 2006-2008, are available from [www.globvapour.info](http://www.globvapour.info).
- Product User Guide and Product Validation Reports for test products have been updated following comments during PM4.
- The Processing System Software Design and Validation Plan documents have been drafted, submitted and are available in final version.
- Retrieval development is finalised.
- Consistency between SSM/I and MERIS has been evaluated and documented in a section in the PVR for SSM/I and MERIS.
- A technical report on Level 3 validation of AATSR products has been drafted, also showing regional differences to other satellite products.

## Problems encountered and solutions proposed

- Homogenisation of GOME/SCIAMACHY/GOME2 has been finalised but is not applied to test data.
- The number of valid collocations in previous approaches considered in the IASI assessment is rather small, and it seems to be beneficial to include more stations and/or months. Therefore, all participants have been contacted to provide collocations to GUAN radiosonde stations to increase the number of valid collocations and to base the assessment on sound statistics. This further delays the IASI assessment.
- AATSR was designed for the retrieval of sea surface temperature. Consequently, the instrument was set up such that atmospheric impacts on the emitted thermal radiation are minimal. In particular, it was made to be insensitive to atmospheric water vapour to the largest extent possible. Therefore, the value for (climate) applications might be limited.
- The added value of the merged SEVIRI+IASI product was analysed. It was demonstrated at PM4 that the added value is relatively small. Also, the processing is rather time consuming so that it was decided to stop this activity and shift efforts to the IASI assessment.
- Theo Steenbergen left the project on 15 August 2011. Recruitment of a new scientist for 3-4 months is not possible. As the project will end in November 2011 there is a risk that also the other project scientist will leave the project prior to its end.