The ESA DUE GlobVapour Project
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**Project Overview**

The DUE GlobVapour project started on 01 December 2009 followed by its first meeting on 15 March 2010, and reviewing of the requirements baseline and the technical specifications on 16 March. Its main objective is to provide long-term coherent water vapour data sets exploiting the synergic capabilities of different EO (ESA and non-ESA) missions allowing for improved accuracies and enhanced temporal and spatial sampling better than those provided by the single sources. It is envisaged that successful concepts from the project can ensure a sustainable provision of the data. The project’s scientific set-up and progress is closely attended by the User Group.

**Objectives**

The main objective of the DUE GlobVapour project is to support users’ requirements for a long time series of satellite borne global water vapour measurements. GlobVapour will develop, validate and apply novel water vapour climate data sets derived from various sensors maximizing the use of ESA data but also use other important space based data. More specifically, the primary objectives of the GlobVapour project are:

- Development of multi-annual global water vapour data sets inclusive error estimates based on carefully calibrated and intercalibrated radiances.
- Validation of the water vapour products against ground based, airborne and other satellite based measurements.
- Provision of assessment of the quality of different IASI water vapour profile algorithms developed by the project contractors and outside groups.
- Provision of a complete processing system that can further strengthen operational production of the developed products.
- Promoting the strategy of data set construction and the data sets to the global scientific and operational community.

**Timeline**

- Dec 2009: Start of project
- Mar 2010: Requirements and technical specifications review
- Mar 2011: User Workshop I together with GEWEX Radiation Panel Meeting
- Jun 2011: User Workshop II
- Nov 2011: End of project

**First Results**

SSMI total column water vapour (TCWV) will be derived as part of the joint global SSMI-MERIS TCWV product over ice-free ocean on a spatial resolution of 0.5°.

The retrieval scheme applied is a 1D-Var scheme using ERA-Interim (or optionally climatological profiles) as background information. The scheme will be applied to SSM/I data, which is recalibrated and homogenized within CM SAF. First 1D-Var retrieval results are shown below.

**Validation Data**

- Radiosondes
- GRUUN
- Specific campaigns
- GPS data
- E-GVAR
- SoumiNet, GSD
- Microwave Radiometers, ARM, MOL

**Envisaged Products**

Total column water vapour, three data sets:
- Combined SSMI (above ocean) and MERIS (above land) for 2003 - 2008, with composite and monthly products, SSMI only will be provided back to 1996.
- GOME/SCIAMACHY/GOME-2 above ocean for 1996 - 2008 with weekly and monthly resolution, daily product.

Data sets are geolocated on lon/lat global grid in Climate and Forecast standard under CEOS QA4EO guidelines.

**The Project Consortium**

Project lead, product development for SSM/I, MWR, SSMI + MERIS, IASI = SEVIRI, processing, validation, and dissemination including Help Desk.

Product development for MERIS and ATBD, process, validation.

Product development for GOME/SCIAMACHY/GOME-2, validation and processing.

Usage of products in climate model evaluation, comparison of model-to-instrument vs. instrument-to-model approach in climate model evaluation.

Development of processing environment and integration of scientific processors.

 Provision of validation data from radio occultation satellites.

Product development for GOME/SCIAMACHY/GOME-2, validation.

NOAA will participate in the IASI retrieval assessment.

**Requirements Baseline and Technical Specifications**

The GlobVapour project successfully passed a review, the Requirements Baseline and Technical Specification Ready (RER) in March. The Requirements Baseline Document (RBD), the Technical Specifications Document (TSD), the Data Acquisition Plan and the Software Development Plan were under review and are publicly available through the projects web page.

**The User Group**

The GlobVapour User Group’s main objective is to provide feedback on the Requirements Baseline, the Technical Specifications, the GlobVapour products and their validation. They will guide the definition of a ‘Scientific Exploitation Plan’.

The GlobVapour User’s Workshop will be held at ESA in Frascati, Italy, in March 2011. Experts of the following institutes are already members of the GlobVapour User Group:

- University of Frankfurt
- University of Wisconsin
- Deutscher Wetterdienst (DWD)
- Max-Planck-Institut für Meteorologie (MPI-HH)
- Technische Universität Cottbus (TUC)
- Svenskt Meteorologisk och Hydrologiska Institut (SMHI)
- The User Group is lead by R. Saunders (UKMO).

**Figure 1.** Total column water vapour derived from (a) ERA-Interim and (b) SSMI 1D-Var retrievals; (c) SEVIRI Pseudo-RGB Image; (d) estimated measure of 1D-Var retrieval uncertainty

**Figure 2.** Time series of total columnar water vapour as derived from ground-based microwave radiometer (MWR) and radiosonde as well as from SSMI1 measurements at Nauru ARM site.

**Figure 3.** IASI Assessment: Inter-comparison of (a) mean and (b) RMS errors for retrieved and background water vapour profiles with respect to radiosonde measurements at Lamont, OK/US ARM site.

**Figure 4.** IASI Assessment: Time series of retrieved and background total columnar water vapour and equivalent radiosonde and ground-based microwave estimates at Lamont, OK/US ARM site.

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