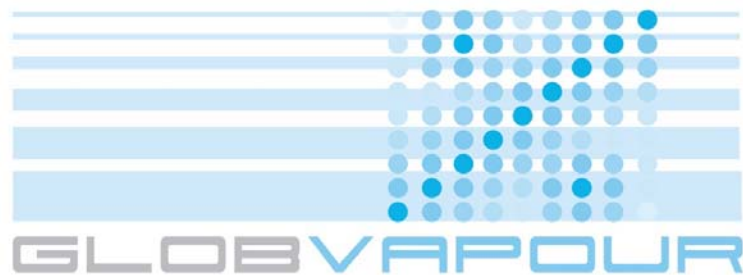




Project Management Plan

DUE GLOBVAPOUR



Issue 1 Revision 1

30 October 2009

Project Coordinator:

Jörg Schulz
Deutscher Wetterdienst
joerg.schulz@dwd.de



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1 Introduction

1.1 Reference

1.1.1 Client Reference

EUROPEAN SPACE AGENCY(ESA/ESRIN)

Dr Bojan R. Bojkov

Via Galileo Galilei, Casella Postale 64

00044 Frascati (RM)

Italy

Tel.: (+39) 06 94180 543

Fax: (+39) 06 94180 552

E-mail: Bojan.Bojkov@esa.int

EUROPEAN SPACE AGENCY(ESA/ESRIN)

Olivier Leonard

Contracts Officer

RES-PO Ground Segment and Operations Procurement Division

Via Galileo Galilei - Casella Postale 64

00044 Frascati

Italy

Tel.: direct line (+39) 06 941 80388, switchboard (+39) 06 941801

Fax: (+39) 06 94180382

E-mail: olivier.leonard@esa.int

1.1.2 Partner Reference

DEUTSCHER WETTERDIENST

Dr. Jörg Schulz

Frankfurter Straße 135

D-63067 Offenbach, Germany

Tel.:+49 69 8062 4927

Fax: +49 69 8062 3759

Email: joerg.schulz@dwd.de

DEUTSCHER WETTERDIENST

Wolfgang Mehley

Frankfurter Straße 135

D-63067 Offenbach, Germany

Phone: +49 69 8062 4926

Fax: +49 69 80623759

Email: wolfgang.mehley@dwd.de

DEUTSCHER WETTERDIENST

Dr. Marc Schröder


Frankfurter Straße 135

D-63067 Offenbach, Germany

Tel.:+49 69 8062 4939

Fax: +49 69 8062 3759

Email: marc.schroeder@dwd.de

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FREE UNIVERSITY OF BERLIN
Prof. Dr. Jürgen Fischer
Free University of Berlin
Carl-Heinrich-Becker-Weg 6-10
12165 Berlin, Germany
Tel.: +49 30 83856663
Fax: +49 30 83856664
Email: fischer@zedat.fu-berlin.de


FREE UNIVERSITY OF BERLIN
Dr. René Preusker
Free University of Berlin
Carl-Heinrich-Becker-Weg 6-10
12165 Berlin, Germany
Tel.: +49 30 83852375
Fax: +49 30 83856664
Email: rene.preusker@wew.fu-berlin.de

DEUTSCHES ZENTRUM FÜR LUFT- UND RAUMFAHRT E.V.
Diego G. Loyola R.
German Aerospace Center (DLR)
Remote Sensing Technology Institute (IMF)
Oberpfaffenhofen
D-82234 Wessling, Germany
Tel: +49 8153 281367
Fax: +49 8153- 81446
Email: Diego.Loyola@dlr.de

UK MET OFFICE, D2
Dr. Roger Saunders
Fitzroy Rd
Exeter EX1 3PB
U.K.
Tel.: +44 1392 886295
Fax: +44 1392 885681
Email: roger.saunders@metoffice.gov.uk

BROCKMANN CONSULT GmbH
Dr Carsten Brockmann
Brockmann Consult,
Max-Planck-Str. 2,
21502 Geesthacht, Germany
Phone: +49 4152 889301
Fax: +49 4152 889333
Email: carsten.brockmann@brockmann-consult.de

BROCKMANN CONSULT GmbH
Uwe Krämer
Brockmann Consult,
Max-Planck-Str. 2,
D-21502 Geesthacht, Germany
Phone: +49 4152 889 303
Fax: +49 4152 889 333
Email: uwe.kraemer@brockmann-consult.de


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1.2 Applicable Documents


- [AD-1] ESRIN Statement of Work. EOEP-DUEP-EOPS-SW-09-0003, issue 1 revision 1, dated 13 May 2009
- [AD-2] ECSS-E-ST-40C Part 1B; Space Engineering - Software; 6 March 2009
<http://www.ecss.nl/>
- [AD-3] DUE GLOBVAPOUR Proposal, issue 1 revision 3, dated 9 July 2009
- [AD-4] DUE GLOBVAPOUR Clarification Note, issue 1, revision 1, dated 29 October 2009

1.3 Definitions, Acronyms, Abbreviations


AATSR	Advanced Along Track Scanning Radiometer
ACR	ATBD Change Report
ATSR	Along Track Scanning Radiometer
AIRS	Atmospheric Infrared Sounder
AMSR	Advanced Microwave Scanning Radiometer
AMSU	Advanced Microwave Sounding Unit
AR	Acceptance Review
ARM	Atmospheric Radiation Measurement (Program)
ATBD	Algorithm Theoretical Basis Document
ATOVS	Advanced TIROS Operational Vertical Sounder
ATSR	Along-Track Scanning Radiometer
AVHRR	Advanced Very High Resolution Radiometer
BC	Brockmann Consult
BR	Baseline Requirement
CEOS	Committee on Earth Observation Satellites
CDR	Critical Design Review
CF	Climate Forecast
CGMS	Coordination Group of Meteorological Satellites
CHAMP	Challenging Mini-Satellite Payload
CI	Configuration Item
CM	Configuration Management
CMIP	Climate Model Intercomparison Project
CM-SAF	EUMETSAT Satellite Application Facility on Climate Monitoring
COSMIC	Constellation Observing System for Meteorology, Ionosphere and Climate
COSP	CFMIP Observational Simulator Package
COTS	Component Off the Shelf
DDF	Design Definition File
DDS	Diagnostic Data Set

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DJF	Design Justification File
DLR	Deutsches Zentrum für Luft- und Raumfahrt
DMI	Danish Meteorological Institute
DMS	Data Management System
DMSP	Defense Meteorological Satellite Program
DOAS	Differential Optical Absorption Spectroscopy
DRACULA	aDvanced Retrieval Atmosphere Constrained & Unconstrained Least squares Algorithms
DWD	Deutscher Wetterdienst
ECMWF	European Centre for Medium Range Weather Forecast
ECSS	European Cooperation for Space Standardization
ECV	Essential Climate Variable
EGVAP	European Global Water Vapour
EO	Earth Observation
EODAPS-GV	EO Data Processing System for GlobVapour
EPS	European Polar System
ESA	European Space Agency
EUMETSAT	European Organization for the Exploitation of Meteorological Satellites
FCDR	Fundamental Climate Data Record
FOV	Field Of View
FUB	Freie Universität Berlin
GCM	Global Circulation Model
GCMP	GCOS Climate Monitoring Principles
GCOS	Global Climate Observing System
GEWEX	Global Energy and Water Cycle Experiment
GMES	Global Monitoring for Environment and Security
GMS	Geostationary Meteorological Satellite
GNSS	Global Navigation Satellite System
GOES	Geostationary Operational Environmental Satellite
GOME/GOME-2	Global Ozone Monitoring Experiment
GPS	Global Positioning System
GRAS	GNSS (combined GPS and GLONASS positioning systems) Receiver for Atmospheric Sounding
GDD	Ground Data Document
GMES	Global Monitoring for Environment and Security
GOES	Geostationary Operational Environmental Satellites
GPS	Global Positioning System

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GRAS	GNSS (combined GPS and GLONASS positioning systems) Receiver for Atmospheric Sounding
GRUAN	GCOS Reference Upper-Air Network
GSICS	Global Space-based Inter-Calibration System
GTS	Global Telecommunication System
GUAN	GCOS Upper-Air Network
GVAP	Global Water Vapour Project
HadGEM	Hadley Centre Global Environmental Model
HIRS	High-resolution Infrared Radiation Sounder
HOAPS	Hamburg Ocean Atmosphere Fluxes and Parameters from Satellite Data
IAPP	International ATOVS Processing Package
IASI	Infrared Atmospheric Sounding Interferometer
IGPO	International GEWEX Program Office
IPCC	International Panel on Climate Change
IPWG	International Precipitation Working Group
IR	Infrared
ITWG	International TOVS Working Group
JRA	Japanese Reanalysis
K	Kelvin
LAADS	L1 and Atmosphere Archive and Distribution System
MERIS	Medium Resolution Imaging Spectrometer
MetOp	Meteorological Operational Satellite
MHS	Microwave Humidity Sounder
MLS	Microwave Limb Sounder
MODIS	Moderate Resolution Imaging Spectroradiometer
MOZAIC	Measurement of Ozone on Airbus In-service Aircraft
MSG	Meteosat Second Generation
MSU	Microwave Sounding Unit
MTG	Meteosat Third Generation
MVIRI	Meteosat Visible and InfraRed Imager
MWR	MicroWave Radiometer
NASA	National Aeronautics and Space Administration
NetCDF	Network Common Data Form
NIR	Near Infrared
NOAA	National Oceanic & Atmospheric Administration
NVAP	NASA Water Vapor Project
NWP	Numerical Weather Prediction

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O3M-SAF	Satellite Application Facility on Ozone Monitoring
OLR	Outgoing Longwave Radiation
PUG	Product User Guide
PVP	Product Validation Plan
PVR	Product Validation Report
QR	Qualification Review
RH	Relative Humidity
RMSE	Root Mean Square Error
RTM	Radiative Transfer Model
RTTOV	Radiative Transfer for TOVS
SAF	Satellite Application Facility
SCIAMACHY	Scanning Imaging Absorption Spectrometer for Atmospheric Chartography/Chemistry
SCO	Simultaneous Conical Overpass
SCOPE-CM	Sustained and Coordinated Processing of Environmental Satellite Data for Climate Monitoring
SEP	Scientific Exploitation Plan
SEVIRI	Spinning Enhanced Visible and Infrared Imager
SOA	Service Oriented Architecture
SOW	Statement Of Work
SSM/I	Special Sensor Microwave/Imager
SSMIS	Special Sensor Microwave Imager Sounder
SVP	Software Verification Plan
TCDR	Thematic Climate Data Record
TCWV	Total Column Water Vapour
TIROS	Television and Infrared Observation Satellite
TMI	TRMM Microwave Imager
TOVS	TIROS Operational Vertical Sounder
TR	Technical Requirement
TRMM	Tropical Rainfall Measuring Mission
TZD	Total Zenith Delay
UCWVP	UV/VIS Climate Water Vapour Processor
UKMO	United Kingdom Meteorological Office
UNEP	United Nations Environment Program
UNESCO	United Nations Educational, Scientific and Cultural Organization
UPAS	Universal Processor for UV/VIS Atmospheric Spectrometers
UTH	Upper Tropospheric Humidity

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UTLS	Upper Troposphere Lower Stratospher
UV	Ultra Violet
VCS	Version Control System
VIS	Visible
WACMOS	Water Cycle Multimission Observation Strategy
WCRP	World Climate Research Program
WMO	World Meteorology Organisation
WVP	Water Vapour Profile

1.4 Scope of Document

This document outlines the project management plan as required in the ESA Statement of Work (SoW) for DUE GlobVapour EOEP-DUEP-EOPS-SW-09-0003, issue 1 revision 1, dated 13 May 2009 [AD-1]. This project management plan is divided into the following sections:

- project organisation;
- resource allocation;
- communication between team members and ESA;
- website;
- details of the deliverables;
- analyses of the risk factors and mitigation strategies.


The breakdown of work packages required to meet the project tasks and the deliverables are described. The individuals responsible of each of these work packages and deliverables are clearly identified.

1.5 Project Objectives

ESA DUE GlobVapour contributes to and improves on the above described efforts with the development, validation and application of novel water vapour climate data sets derived from various sensors maximising the use of ESA data but also use other important space based data. The ultimate goal of the DUE GlobVapour project is the preparation of distinguished data sets and successful concepts that can be used to ensure a sustainable provision of such data from operational entities as the EUMETSAT SAF network.

In this context, the short term objectives of the project are:

- Development of multi-annual global water vapour data sets inclusive error estimates based on carefully calibrated and inter-sensor calibrated radiances.
- Validation of the water vapour products against ground based, airborne and other satellite based measurements taking into account the individual error structures of the individual observations as far as possible.
- Provision of a first assessment of the quality of five 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.

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- Demonstration of the usage of the products in the field of climate modelling, also applying alternative ways of climate model validation using forward radiation operators.
- Promoting the strategy of data set construction and the data sets to the global scientific and operational community.

2 Project Organisation

2.1 Project Team

The team led by DWD is composed of highly skilled experts in satellite instrument characteristics of all used instruments, radiative transfer modelling, atmospheric remote sensing including algorithm development, validation of remote sensing algorithms, climate monitoring, as well as climate modelling and analysis.

This consortium is particularly suitable to perform the bridging between pure research projects and the sustained provision of satellite climate data records because it consists of operational and scientific partners that have expert knowledge in all necessary fields.


The interplay between pure research institutions at FUB and DLR with research oriented but operational entities UKMO and DWD holds a very high potential for an optimal implementation of the DUE GlobVapour project.

Brockmann Consults completes the skills with its exceptional expertise in object oriented software development in general and the BEAM Application Programming Interface (API) in particular.

	Expertise in						
	Spectral calibration and Instrument intercalibration	Radiative transfer modelling	Algorithm Development	Algorithm Validation	Climate Monitoring	Climate Modelling	Object-oriented software
Schulz	X	X	X	X	X		
Schröder	X	X	X	X	X		
Courcoux		X	X	X	X		
Fischer	X	X	X	X			
Preusker	X	X	X	X			X
Saunders	X	X	X	X	X	X	
Ringer			X	X	X	X	
Loyola	X	X	X	X			
Schreier		X	X	X			
Gleisner		X	X	X	X		
Krämer							X
Embacher							X

Although the consortium has outstanding expertise it will benefit from two external services provided by the National Oceanic and Atmospheric Administration (NOAA), USA and the Max Planck Institute for Chemistry (MPI-C), Germany. Those three external services the following activities:

- NOAA participates in the IASI retrieval assessment, provides intercalibration methods for SSM/I including alternative level-2 data sets from all NOAA platforms. Contact person is Mitch Gold-

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berg who is the leader of the Satellite Meteorology and Climatology Division at NOAA-STAR, Washington D.C.

- MPI-C supports DLR in the development of the GOME/SCIAMACHY/GOME-2 retrieval processor. Contact person is Prof. Dr. Thomas Wagner who is an acknowledged expert in UV/VIS retrieval system development and application.

2.1.1 Deutscher Wetterdienst



The Deutscher Wetterdienst (DWD), which was founded in 1952, is as National Meteorological Service of the Federal Republic of Germany responsible for providing services for the protection of life and property in the form of weather and climate information. This is the core task of the DWD and includes the meteorological safeguarding of aviation and marine shipping and the warning of meteorological events that could endanger public safety and order. The DWD, however, also has other important tasks such as the provision of services to the Federation, the Länder, and the institutions administering justice, as well as the fulfilment of international commitments entered into by the Federal Republic of Germany. The DWD thus co-ordinates the meteorological interests of Germany on a national level in close agreement with the Federal Government and represents the Government in intergovernmental and international organisations as, for example the World Meteorological Organization (WMO). Currently DWD has a total staff of about 2300 employees at more than 130 locations all over Germany. DWD's spectrum of activity is very wide and comprises of:

- Weather observation and forecasting around the clock,
- Climate Monitoring at local, regional and global scale,
- Advice and information,
- National and international co-operation,
- Research and development.

In particular activities are in:

Data Acquisition and Data Management

Acquisition of measurements and observations in Germany by means of an area-wide network. Exchange of data and processing of weather reports from all over the world.

Weather Forecasting and Warning Services


Operational preparation of weather analyses and forecasts on the basis of DWD's own research work. Monitoring of the atmosphere and issuing of weather warnings around the clock. Provision of meteorological information to the Federal Armed Forces, research institutions, and companies.

Advisory Services

Broad spectrum of services ranging from the customized consultancy profile to the public announcement service, from the meteorological expert's report to the seasonal forecasting, provided by our Departments Basic Forecasts, Aviation Meteorology, Marine Meteorological Services, Climate and Environment Consultancy, Hydrometeorology, Human Biometeorology, and meteorology for agricultural applications.

Monitoring of the Atmosphere

Monitoring of the climate, the composition of the atmosphere (ozone, radioactive trace elements), as well as the meteorological processes and their impact on the environment on the basis of the DWD-developed numerical simulation models. DWD is running the Satellite Application Facility on Climate Monitoring (CM-SAF) for EUMETSAT that provide regional and global satellite derived climate data records. CM-SAF has very good experience in the development of satellite retrieval

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algorithms and its operational application. Furthermore CM-SAF also has experience in the homogenization of fundamental satellite records and in climate analysis.

DWD operates a global collection centre for oceanic observations of surface and upper air observations. DWD functions as the national climate archive of Germany. It runs also two world leading atmospheric observatories in Lindenberg and Hohenpeissenberg that provide reference measurements for process studies.

International Activities

Participation in the conception of international programmes: European weather satellites (EUMETSAT), medium-range and seasonal forecasts (ECMWF), world-wide standardization and co-ordination (WMO).

Performance of tasks on the international level: the Weather Forecast Centre for Europe, Host of the Satellite Application Facility on Climate Monitoring a consortium of 6 national weather services. Regional Telecommunication Hub for the world-wide exchange of data, reference station within the Global Environment Monitoring Programme, Global Precipitation Climatology Centre, etc.

2.1.2 Free University of Berlin - Institute for Space sciences




The Institut für Weltraumwissenschaften (ISS) at the Freie Universität Berlin, located in Berlin-Dahlem, has excellent experiences in radiative transfer modelling, instrument development and satellite remote sensing.

A deep understanding in all three fields leads to innovative solutions in the interpretation and processing of satellite data. Applications are in atmosphere, ocean and land but also in calibration of satellite sensors. Major contributions have been performed for the definition and layout of MSG's SEVIRI and ENVISAT's MERIS. There is also a deep understanding of the radiometric and spectral performance of the instruments due to contributions in the calibration of the satellite devices.

The radiative transfer code MOMO simulates radiation processes in clear and cloudy atmosphere's, over ocean and land surfaces. Any spectral and vertical resolution can be realised in the solar as well as thermal spectral domain. In the framework of ESA's project 'WaterRadiance' MOMO will be extended to consider polarisation as well and in the ESA-project "SnowRadiance" snow- and ice-surface are introduced. The absorption due to atmospheric gases are calculated by a line-by-line model, using the actual HITRAN database 2008 which is used to estimate the k-coefficients applied in MOMO. The filter functions of all the different sensors can be considered in detail. An algorithm to correct for the extinction due to the atmosphere above land surface has been developed and successfully applied to MERIS data within ESA's project AlbedoMap. A case-2 water algorithms, including atmospheric correction and water constituent retrieval, has been developed and integrated in BEAM. There are number user which applied the FUB case-2 water algorithm to the ChinaSea, the Baltic and other coastal waters.

FUB contributes to the calibration of the MERIS instrument via the participation of Prof. Fischer at the MERIS Quality Working Group and FUB is continuously processing MERIS and SEVIRI data in near real-time during the last years. The FUB satellite data archive consists of nearly all MSG-SEVIRI and MERIS data. The FUB-ISS group has coordinated and participated in numerous ESA funded projects, among them the AlbedoMap ("MERIS Global Land Surface Albedo Maps") and the AATSR / MERIS Synergy ("AATSR / MERIS Synergy Algorithms for Cloud Screening Aerosol Retrieval and Atmospheric Correction") projects.

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2.1.3 DLR



DLR is Germany's national research centre for aeronautics and space. Its extensive research and development work in Aeronautics, Space, Transportation and Energy is integrated into national and international cooperative ventures. As Germany's space agency, DLR has been given responsibility for the forward planning and the implementation of the German space program by the German federal government as well as for the international representation of German interests. Approximately 5,300 people are employed in DLR's 28 institutes and facilities at eight locations in Germany. DLR operates offices in Brussels, Paris, and Washington, D.C. The DLR mission comprises the exploration of the Earth and Solar System, research for protecting the environment, for environmentally-compatible technologies, and for promoting mobility, communication, and security. DLR's research portfolio ranges from basic research to innovative applications and products of tomorrow. In that way DLR contributes the scientific and technical know-how that it has gained to enhancing Germany's industrial and technological reputation.

DLR operates large-scale research facilities for DLR's own projects and as a service provider for its clients and partners. It also promotes the next generation of scientists, provides competent advisory services to government, and is a driving force in the local regions of its field centres.

DLR's Applied Remote Sensing Cluster (C-AF) is composed of the Remote Sensing Technology Institute (IMF) and the German Remote Sensing Data Center (DFD). Cluster AF is the core of DLR's earth observation activities. Its responsibilities comprise basic research and algorithm development as well as data acquisition, processing, archiving and delivery of complex products for scientific use and in land surface, marine, atmospheric and security applications.

2.1.4 UK Met Office




The Met Office based at Exeter in the UK is one of the leading meteorological services in the world. It supports a large number of customers in Public Services, Civil Aviation, Defence, Industry and Commerce. A wide range of weather information is provided on a range of scales, from site specific storm surge forecasts to global upper wind data for commercial aviation. The Office is also a world leading organisation in Numerical Weather Prediction and Climate and Climate Change, and is involved in many collaborative research activities and projects. There is a continuing commitment from the Office to developing, promoting and delivering customer driven services in the natural environment, and in working more closely with customers to improve their decision making and risk management through better understanding of weather and the natural environment. Throughout all of these activities the Office provides underpinning research expertise to support the development of numerical weather prediction and climate prediction models to respond to new requests from government and environmental agencies. See <http://www.metoffice.gov.uk/corporate/index.html> for more details.

2.1.5 Danish Meteorological Institute



The Danish Meteorological Institute (DMI) is a governmental institution under the Ministry of Energy and Transport in Denmark. The Meteorological Institute was founded in 1872 and was in 1990 merged together with the civil aviation administration and the meteorological service for the defense, and has today a staff of about 300 persons. The DMI is responsible for serving the meteorological needs of society for the Kingdom of Denmark (Denmark, Faeroe Islands, and Greenland) including water and airspace. This entails monitoring of weather, climate, and environmental conditions in the atmosphere, on land and at sea. The Research Department is responsible for applied research and development, including the development of the DMI weather forecasting systems. In addition, research is conducted on the stratosphere and upper atmosphere, including the ionosphere and magnetosphere and the Earth's magnetic field. DMI is also responsible

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for the high-level processing, validation and dissemination of GPS occultation data from the MetOp satellite. The Danish Climate Centre, also located at DMI, is performing cutting-edge climate research and climate monitoring.

The remote sensing group in the Research Department of DMI (including the DMI key personnel for this proposal) has developed skills and facilities through engagement in various satellite programs and other studies. The research on remote sensing has since 1995 placed DMI in a leading position within the field of GPS and microwave radio occultations.

Together with partners at the University of Graz and CNES in France, DMI conducted the first ESA study on the GPS radio occultation technique in 1995. This led to other ESA contracts, including a key role in the development of the first versions of the end-to-end Generic Occultation Performance Simulator (EGOPS).

DMI was in 1999-2000 responsible for the processing and analysis of the GPS radio occultation measurements from the Danish Ørsted satellite. Ørsted was the first European satellite to collect GPS radio occultation data. DMI developed software and facilities for the processing of the data from Ørsted, and have since build on the experience gained from Ørsted.

Work on the GPS occultation sensor (GPSOS), together with Saab Ericsson Space and TERMA A/S, led to several proposals to ESA for both opportunity missions and core missions under the Earth Explorer programme. This includes work on ACE, WATS, ACE+ and ACEPASS. DMI was involved in both the industrial and the scientific part of the ACE+ project. DMI acted as an adviser in the industrial part of ACE+. The goal was here to prototype instruments for LEO-LEO link measurements at X/K band frequencies. The scientific task of LEO-LEO radio links was investigated in the ACEPASS project, where DMI was a key partner. The objectives included a thorough evaluation and characterization of the measurement and geophysical retrieval performance achievable by sounding the atmosphere through active microwave (X/K band) links at frequencies of 9.7 GHz, 17 GHz and 23 GHz between Low Earth Orbiting (LEO) satellites. These simulations included models for scintillations in the neutral atmosphere.

DMI has also described and implemented different routines that have been used in the ESA ground processor prototype made as a simulation tool for the MetOp mission. These tools include a wave propagator that can simulate radio occultation measurement and a back propagation algorithm. More recently the group has become the primary contractor on the study and modelling of ionospheric propagation impairments at C-band, which is an ESA contract to study the potential applications of a third Galileo frequency near 5 GHz.


DMI is today the leading entity of the GRAS Satellite Application Facility (SAF), which is a decentralised part of the EUMETSAT operational ground segment for the MetOp satellite. The GRAS SAF, which includes key personnel of this proposal, is responsible for deriving, disseminating, and archiving geophysical parameters (temperature, pressure, and humidity profiles) from the GRAS radio occultation measurements on MetOp.

2.1.6 Brockmann Consult



Brockmann Consult is a private company offering scientific consultancy and environmental informatics services. These services include, among others, software development for database systems, data processors, visual analysis tools, geographic information systems and web-based user interfaces.

BC was founded in 1999 and is located on the campus of the GKSS Research Centre, a national research centre in Geesthacht, close to Hamburg. Brockmann Consult is lead by Dr. Carsten Brockmann, a physical oceanographer, who is working for more than 15 years in ocean colour remote sensing and software development. The employees are a mix of software engineers, physicists and environmental scientists, all with a sound and long term software development experience and project management.

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Brockmann Consult has been and is deeply involved in the preparation, quality control and evolution of software for the processing of MERIS data and has stated these activities now for Sentinel 3. In the frame of the industrial / scientific consortium, which is responsible for the development of the algorithm for processing L1b and L2 data, Brockmann Consult is concerned with detailed definition of products generated by synergistic use of OLCI and SLSTR, and is responsible for the software development for this processing branch of Sentinel 3.

One of the most successful activities of Brockmann Consult the company is developing the BEAM Earth Observation data processing and analysis software on behalf of ESA. BEAM is a collection of tools for visualisation, interpretation, conversion and processing of optical and radar EO data. The success of the open source BEAM project is based on the deep involvement of the company in the development, verification and validation of the operational MERIS processor.

The BEAM technology is also widely used in the MERCI software, a system for quality control, archiving and retrieval of large volume of Earth Observation data. MERCI is used by ESA, JRC and other institutional users in Europe for managing and distributing their data products. CEOS is operating the CalValPortal, which developed and maintained by Brockmann Consult. The EO data and in-situ data functionality in the portal is a Web based implementation of MERCI technology.

Brockmann Consult is offering environmental information services to public, institutional and private customers for the coastal zone. The Geoinformation Services include value-added products and thematic information derived from remote sensing data and scientific consultancy for environmental concerns. As one example, the Water Quality Service System WAQSS is providing satellite derived information for coastal waters and intertidal flats to customers around the North Sea and Baltic Sea.

2.2 Project Management and Reporting

The management structure of DUE GlobVapour is presented schematically in Figure 1. This will facilitate the production of deliverables with a minimum of bureaucracy and of business meetings. The organisational structure is designed to ensure that the work of the WPs is carried out efficiently and according to the plan, and that this work is then integrated effectively to achieve the goals of the project. The structure combines proven concepts of a number of ongoing and successful projects at European level. With this structure in place, we will be able to react flexibly to unexpected developments which might occur during the lifetime of the project.

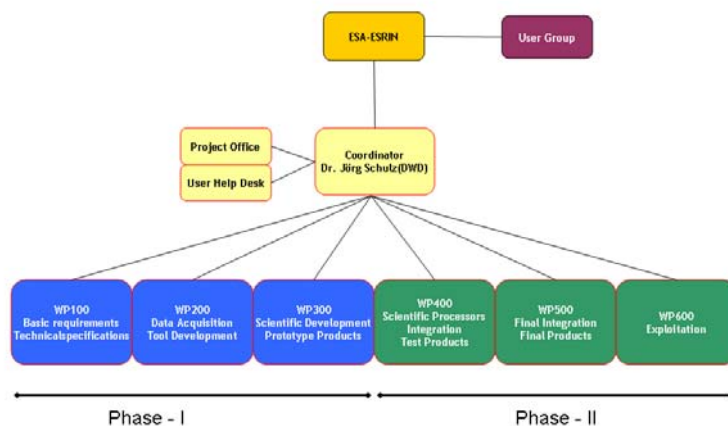



Figure 1: Management structure of GlobVapour.

The management of the project will be carried out by DWD who will report to ESA on project performance. All deliverables and documents on project progress will be made available to ESA by 30/10/2009

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Email, ftp and through the project website. The management activities of FUB, DLR, UKMO, DMI and BC are related to the co-ordination with DWD and will provide input for reporting to ESA. DWD will monitor and report status of the project to ESA, including activities performed by the sub-contractors. Monthly progress reports containing management and technical status will be delivered to ESA. The Project Manager is responsible for the project execution technically, financially and with respect to scheduling. The project supervisor carries out inspection of the project in order to verify compliance with the project specification. The project manager is responsible for a subcontracted activity is to ensure that the subcontractor is supplying a competent delivery. This may include the auditing of the subcontractor by the project manager. In this project the quality management and risk analysis will be carried out by Dr Jörg Schulz, with technical support from Mr Wolfgang Mehley, DWD Department Climate Monitoring and administrative support from Mrs Nicole Riß, DWD Department Business Administration.

The technical aspects of this project will be managed by Dr Jörg Schulz. He will prepare and maintain the project plan and schedule, co-ordinate the team and control the internal information flow. He will report to ESA and discuss on all technical aspects. It is also the task of the project manager to organise and co-ordinate progress meetings, reviews, and ad-hoc meetings and to prepare minutes of meetings. The project manager will ensure the progress of the project in accordance with the time table, i.e. to compile, edit and distribute the reports that are part of the projects deliverables, and to coordinate the release of deliverables. He also keeps track of action items. The project manager will also control the resource allocation and monitor resource usage, particularly the personnel resources. The administrative, contractual and financial management is also the responsibility of Dr Jörg Schulz.

The management will be performed in accordance with the rules and procedures, defined in the DWD Quality Assurance System. DWD has been awarded the ISO 9001:2000 certification in 2004, proving that DWD's quality management was assessed by independent auditors. In 2006, some branches of the DWD have also been accredited to the ISO 17025:2005 metrology standard. The ISO 9001 *Quality Management Systems - Requirements* meet the general requirements of the ESA ECSS standards. The Quality System includes:

- Objectives and policy
- The Quality Manager, who is responsible for the maintenance of the Quality System
- The Quality Manual and associated quality documents, describing the quality management activities, including rules for system audit and guidelines for the annual evaluation by management.

The Project Management Manual includes rules and guidelines for:


- Preparation and submittal of proposals and applications
- Handling of agreements and contracts, including Contract Review
- Project execution, including documented Project Quality Plan
- The role of project manager and project supervisor for projects/services. The Project Manager is responsible for the project execution technically, financially and with respect to scheduling. The project supervisor carries out inspection of the project in order to verify compliance with the project specification.

2.3 Project Work Packages

The project is divided into six major tasks according to the SOW plus one extra task on the scientific exploitation. To meet these tasks the project is split into six corresponding work packages and several more sub work packages:

WP 100: Consolidation of Requirements and specifications (Task 1)

WP 200: Creation of Diagnostic Data Set and validation tools (Task 2)

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WP 300: Development prototype product (Task 3)

WP 400: Processor development and test product (Task 4)

WP 500: Final product (Task 5)

WP 600: Scientific Exploitation (Task 6)

Here we summarise the main activities of each work package. The work programme of each package is described in detail in Section 2.5. Figure 2 shows the complete breakdown structure of all work packages involved. The Gantt chart in Figure 3 shows the start and finish date of each of the WP tasks. The critical pathways and dependencies between the work packages are highlighted in Figures 4 and 5 individually for the two phases.

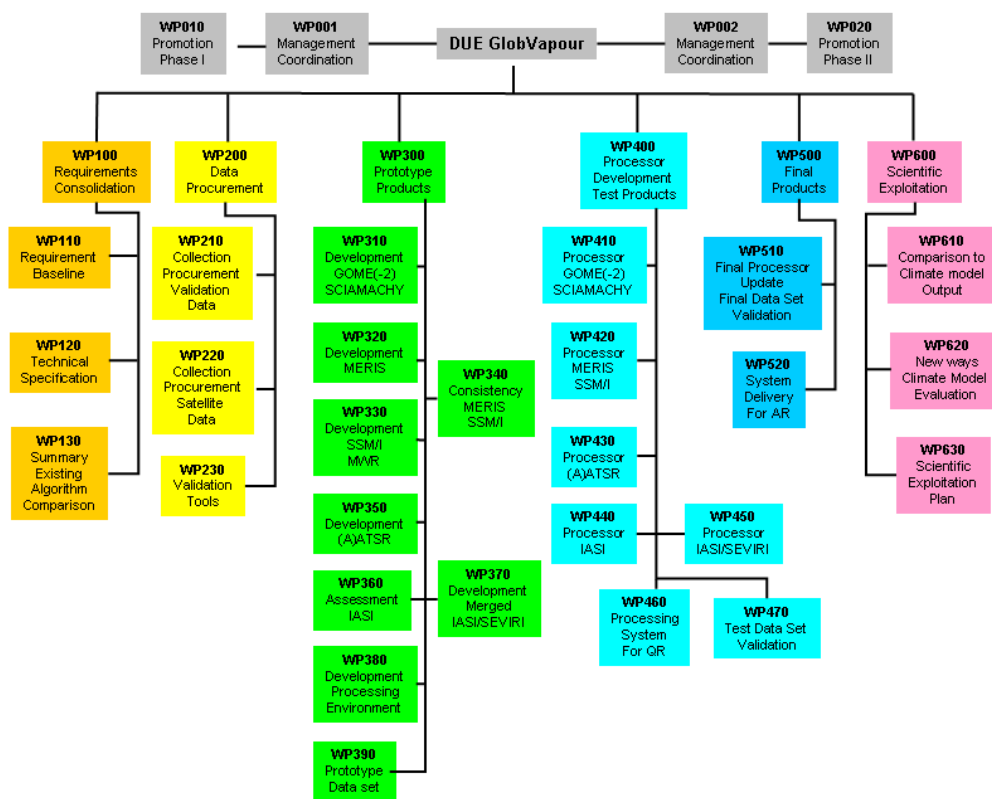


Figure 2: Hierarchal breakdown of WP structure.

WP001, WP002: Project Management and Coordination

Within this work package the overall coordination of the project as well as the documentation takes place. This includes quality assurance, organisation of meetings and reviews, maintenance of the Project Management Plan, preparation of monthly reports and final check and release of project deliverables. The work package has two numbers separately for the phases I and II as required by the SOW.

WP010, 020: Promotion

Within this work packages the GlobVapour web site will be developed to establish a communication platform among the project partners and ESA as well as the outside world. Several promotional actions will be performed towards international research and operational bodies to establish GlobVapour as a leading activity. The work package has two numbers separately for the phases I and II as required by the SOW.

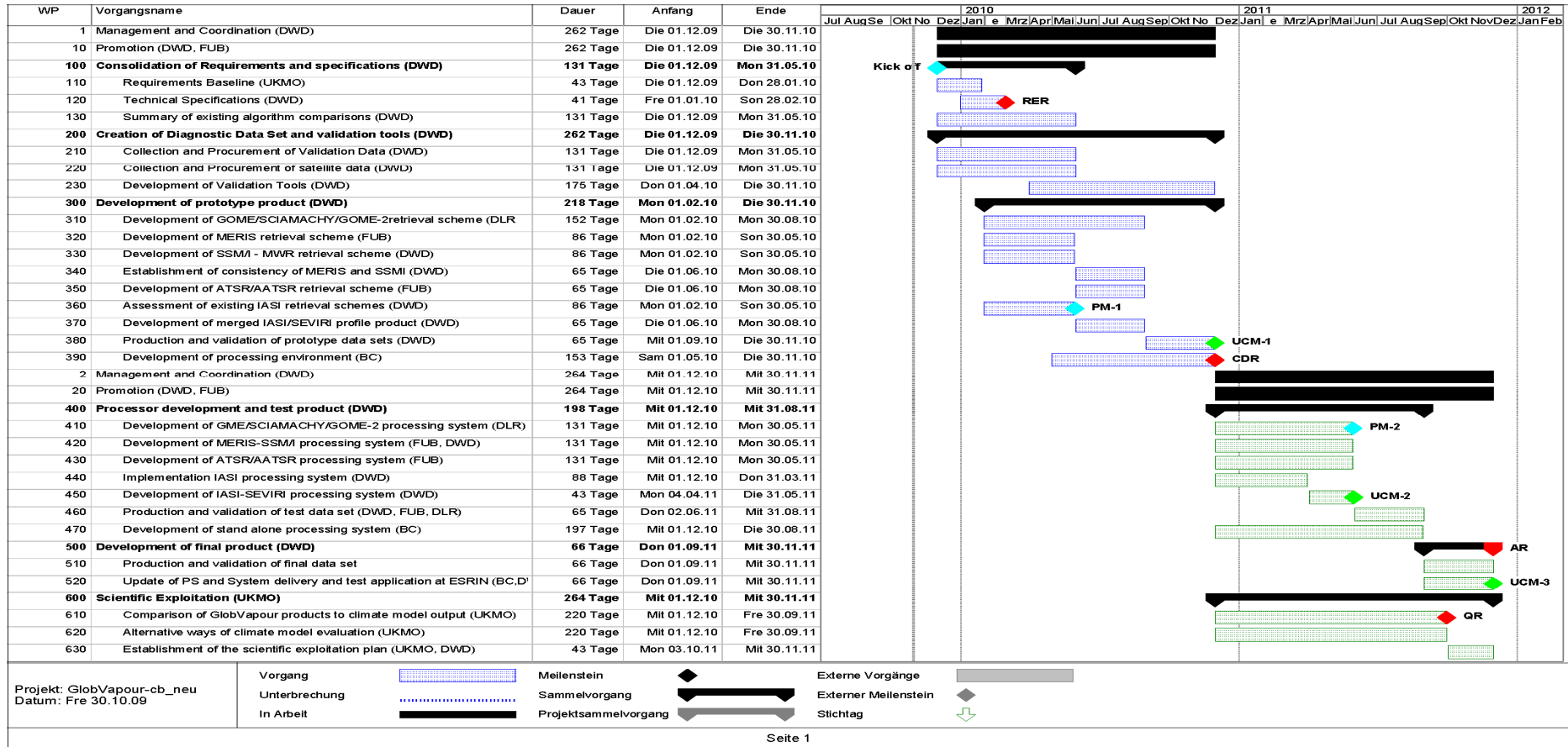



Figure 3: Project Gantt Chart and schedule.

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WP100: Consolidation of Requirements and specifications

WP110 Requirements Baseline

In this WP the requirements for water vapour profiles for global NWP and climate modelling will be collated starting with the GCOS (for climate) and WMO (for NWP) user requirements as a baseline.

WP120 Technical Specification

In response to the requirements baseline this WP will provide the technical specifications document for each water vapour product. In particular the document will contain a compliance matrix showing how far the requirements can be fulfilled by each water vapour product. Also in this WP the Software Development Plan based on the methodological approaches will be written.

WP130 Summary of existing algorithm comparisons

A literature study will be carried out that consolidates the explanations given in this proposal. For each of the planned water vapour products a comprehensive review on the existing comparison results will be given.

WP 200: Creation of Diagnostic Data Set and validation tools

WP210 Collection and Procurement of Validation Data Within this WP all necessary validation data will be assembled, centrally archived at DWD and combined to the Diagnostic Data Set.. The archive will consist of ground based and satellite products not used for the production of the GlobVapour products.

WP220 Collection and Procurement of satellite data

Within this WP all satellite data needed for the production of GlobVapour products will be acquired and archived at different places. Existing data holdings will be checked for completeness and eventually filled.

WP230 Development of Validation Tools

The GlobVapour products will be validated against the Diagnostic Data Set. Within this WP existing validation tools will be shared and improvements and new tools will be developed to gain maximum consistency between the varies validation efforts whenever feasible.

WP300: Development prototype product

WP310 Development of GOME/SCIAMACHY/GOME-2 retrieval/combination retrieval scheme

An algorithm for optimal combining the total column water vapour from the three instruments to create a climate data set will be developed. GOME will be used as reference whereas SCIAMACHY and GOME-2 will be adjusted to minimize spatial and temporal differences. The accuracy estimates on the data product will be reviewed.


WP320 Development of MERIS retrieval scheme

We will develop and test an optimal estimation based retrieval for TCWV, which allows a pixel-by-pixel accuracy estimation. This needs a fast forward operator, a standard RTM would be too slow. We will try a single scattering model and an artificial neural network as the forward operator, both are fast and allow an analytic calculation of the partial derivatives. The forward operators will be validated with a precise RTM (MOMO, Fell and Fischer, 2001). If their accuracy is insufficient, we will use the standard MERIS L2 as fall back. The pixel based accuracy will then be based on look up tables from stratified error analyses.

WP330 Development of SSM/I - MWR retrieval scheme

A 1DVAR retrieval for passive microwave observations will be developed. The retrieval output will be total column water vapour over oceans including a pixel based error information.

WP340 Establishment of consistency of MERIS and SSMI

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The high quality of TCWV products from SSM/I and MERIS above ocean, respectively land surfaces are utilised to produce a global TCWV product for 4 months during the period 2006-2008 in Task 3h. During prototype software development, a couple of scientific questions need to be addressed, among them the assessment of the consistency of the spatially complementary SSM/I and MERIS products. This will be done in this task.

WP350 Development of ATSR/AATSR retrieval scheme

We will develop a regression based retrieval to estimate the total water vapour content from the thermal channels at 11 μm and 12 μm . It will utilize the different impact of water vapour on the transmission in both bands. For this we must assume, that the surface emissivities are equal in each band which is reasonable for most cases, in particular for water. Nevertheless, we will analyse NASA's emissivity archive to prove this assumption and to optionally use the NDVI as a proxy for slight deviations.

WP360 Assessment of existing IASI retrieval schemes

In this WP a comparison of various IASI retrieval schemes vs. a subset of the Diagnostic Data Set will be performed to facilitate the choice of a IASI retrieval scheme for the GlobVapour products. Among the criteria for a decision will be accuracy as well as computational efficiency.

WP370 Development of merged IASI/SEVIRI profile product

In this WP the NWC-SAF water vapour retrieval for SEVIRI and the IASI retrieval from Task 3f will be implemented. Then a prototype software for merging IASI and SEVIRI water vapour profiles that is currently under development within the ESA WACMOS project will be utilised and adapted to the specific requirements within GlobVapour.

WP380 Production and validation of prototype data sets

In this WP the prototype data sets will be produced following the Technical Specifications. The prototype data sets will be compared to the Diagnostic Data Set and among each other to assess the consistency between them.

WP390 Development of processing environment

In this WP the processing environment for GlobVapour, the so called EO Data Processing System for GlobVapour (EODAPS-GV), will be developed. The EODAPS-GV will be a highly modular and de-synchronised system. The Processing Management System takes care of the organisation of single processing tasks, distribution of jobs on the available hardware, load balancing, data input-output, preparation of processing requests and registration of successful / unsuccessful jobs. The scientific processing modules (for example cloud screening, retrieval of water vapour, sensor merging, etc.) will be independent executables that will be called by the Processing Management System.


WP400: Processor development and test product

WP410 Development of GOME/SCIAMACHY/GOME-2 processing system

The prototype algorithm developed in Task 3a will be implemented as stand alone program after the implementation of improvements learned from validation. Additionally, the scientific processor will be transferred to the EODAPS-GV.

WP420 Development of MERIS-SSM/I processing system

The quality of radiance time series of MERIS and SSM/I radiance observations for climate analysis will be assessed and pre-processing of radiance record will be carried out if appropriate. The prototype software will be adapted to lessons learned from validation.

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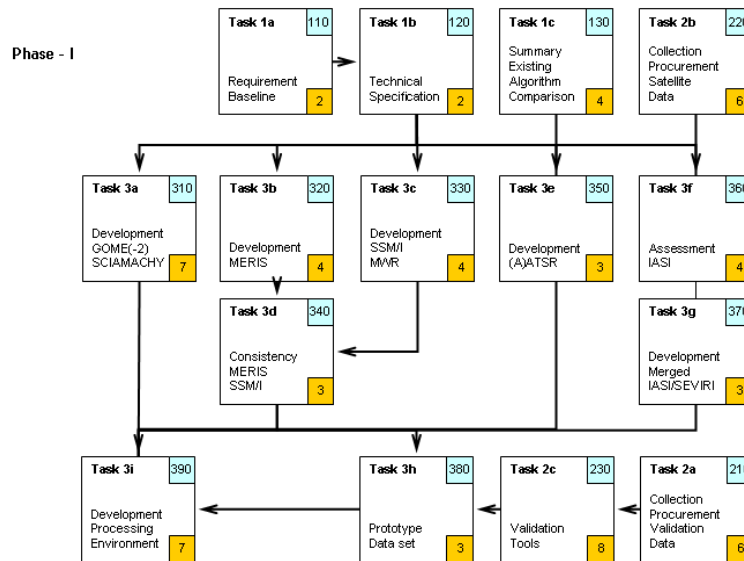


Figure 4: Dependencies of the Tasks. The upper right corner of each box contains the corresponding WP number, the lower right corner the expected duration in month.

WP430 Development of ATRSR/AATSR processing system

The prototype algorithm developed in Task 3a will be implemented as plugin for beam. Test products in NetCDF or beams DIMAP format will be generated with this program taking as input the (A)ATSR(2) L1B. The TCWV product will be analysed with respect to the additional benefit against the SSM/I and MERIS product.

WP440 Implementation of IASI processing system

All changes required by ACR will be implemented. The IASI retrieval will be transferred to a stand alone software and forwarded to the EODAPS-GV.

WP450 Development of IASI-SEVIRI processing system

The quality of radiance time series from IASI and SEVIRI will be assessed. The prototype software will be transferred into a stand alone program with possible adaptations resulting from validation.

WP460 Production and validation of test data set

In this WP the test data sets for all sensor individual products and blended/merged products will be performed. The validation done in Task 3h will be repeated and extended to the years 2006-2008.


WP470 Development of stand alone processing system

In this WP the individual scientific processors will be included into the EODAPS-GV. The system will be used in parallel to the individual processing results of sensor series at the partner laboratories. A technical comparison ensuring the full compatibility of processing systems will be performed.

WP500: Final product

WP510 Production and validation of final data set

Adapting all processing schemes after Qualification Review the time series 1996-2008 for TCWV and 2007-2008 for the water vapour profiles will be produced and validated where the Diagnostic Data Set holds data for times prior to 2006.

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WP520 Update of the Processing System and system delivery and test application at ESRIN

After Qualification Review the final version of the EODAPS-GV will be compiled and tested following the approach of Task 4g.

WP600: Scientific Exploitation

WP610 Comparison of GlobVapour products to climate model output

The GlobVapour products will be used to evaluate the HadGEM2 climate model, which will be the model the Met Office will submit to the next IPCC process (AR5/CMIP5 - with the next report due in 2013).

WP620 Alternative ways of climate model evaluation

In this WP satellite simulators will be used to simulate the actual satellite measurements from the HadGEM2 model fields, thus providing a direct comparison with the original measured quantities. The results will be compared with the direct water vapour profile comparison and any differences will be analysed.

WP630 Establishment of the scientific exploitation plan

In this WP the Scientific Exploitation Plan will be updated according to the validation results, the outcome of exploitation work and comments of the User Group.

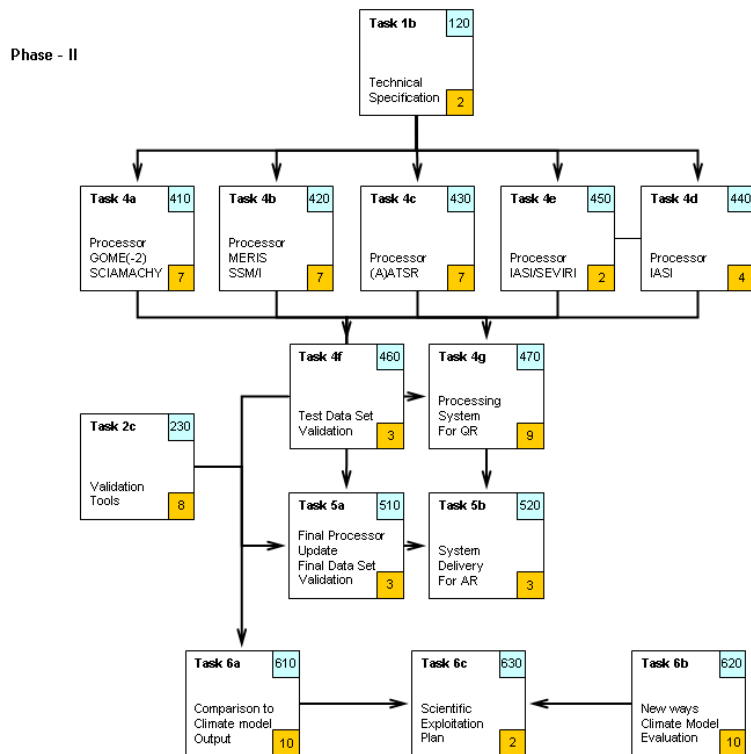



Figure 5: Dependencies of the Tasks in Phase 2 The upper right corner of each box contains the corresponding WP number, the lower right corner the expected duration in month.

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2.4 Schedule

The overall schedule is outlined in the Gantt Chart (Figure 3) and detailed in the work breakdown structure (Section 2.5). The project will initially derive the Requirements Baseline and Technical Specifications for all products. At the same time a literature study on results of existing algorithm and product validation activities is performed and the needed satellite and validation data are procured as necessary.

The development of the prototype products starts with partially parallel running work packages for the development of individual retrieval software packages. Also in parallel the processing environment where the final processors will be integrated is developed. The functionality of the processing environment is tested against the prototype products prepared by the individual groups. The first phase ends after one year.

The second phase starts further parallel development of processing systems for the individual sensors and combinations of sensors, i.e., by doing this in parallel following the requirements given by the processing environment there is only little interdependency of the development tasks. After the production of the test data sets the scientific exploration can be started. The key events (Milestones) are:

Phase I

M1	Dec 2009	Kick-off payment
M2	Feb 2010	Requirements baseline and technical specification ready, RER
M3	May 2010	Procurement of data and analysis of existing algorithms, ready
M4	Aug 2010	Algorithms inclusive documentation for prototype products ready
M5	Nov 2010	Prototype products ready, CDR/UCM-I


Phase II

M6	Feb 2011	Algorithms inclusive documentation for test products ready
M7	May 2011	Test products ready and UCM-II
M8	Aug 2011	First Stand alone processing system ready, QR
M9	Nov 2011	Final project presentation, AR/UCM-III


The following table present the overall Milestone Payment Plan (every second milestone is a payment milestone, the values are rounded to full Euro).

Table 2-1: Milestone Payment Plan

Milestone	Planned Date	Amount (€)						%
		DWD	FUB	DLR	UKMO	BC	DMI	
M1: Advance payment: upon signature of the Contract by both Parties.	01.12.09	70,000	47,000	23,000	28,000	23,000	11,000	20%
M3: Procurement of data and analysis of existing algorithms	31.05.10	73,000	45,000	22,000	0	0	0	14%


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Milestone	Planned Date	Amount (€)						%
		DWD	FUB	DLR	UKMO	BC	DMI	
M5: Prototype products ready, CDR/User Consultation Meeting-I.	30.11.10	60,000	44,000	20,000	0	23,000	11,000	16%
M7: Test products ready, User Consultation Meeting-II	31.05.11	87,000	60,000	32,000	42,000	23,000	0	24%
M9: Final Settlement: Final project presentation, Acceptance Review, User Consultation Meeting-III and completion of the entire project and acceptance by ESA of all remaining deliverables due under the Contract	30.11.11	86,000	60,000	32,000	42,000	23,000	13,000	26%
<i>Totals</i>		<i>376,000</i>	<i>256,000</i>	<i>129,000</i>	<i>112,000</i>	<i>92,000</i>	<i>35,000</i>	<i>100%</i>


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2.5 Work Breakdown Structure


WORK PACKAGE	ISSUE: 2	SHEET: 1
DESCRIPTION	DATE: 22.10.09	
PROJECT:	DUE GLOB-Vapour	WP: 001
WP TITLE:	Project Management and Coordination	
CONTRACTOR:	DWD	
MAJOR CONSTITUENT:	Management and documentation	
START EVENT:	Kick-off	PLANNED DATE: 01.12.09
END EVENT:	Critical Design Review	PLANNED DATE: 30.11.10
W.P. MANAGER:	Dr. Jörg Schulz	
INPUTS:	<ul style="list-style-type: none"> • Statement of Work • DWD proposal • Contract 	
DESCRIPTION OF TASKS:	<ul style="list-style-type: none"> • Management of the DUE GlobVapour project, i.e. activities associated with the general management, administration and schedule control. Moreover it includes the review presentation preparation activities as well as the co-ordination of the administration and secretary support of the project. • Quality Assurance management focusing on the provision of QA in relation to the involvement of end-users and the implementation of the Requirements Baseline. • Supporting of the Project and the Quality Assurance in: <ul style="list-style-type: none"> • document preparation • configuration control • contractual matters • financial matters • Organising all project meetings, specifically the kick-off, requirements engineering review and critical design review meetings which will be held at user premises. Organising the first User Consultation Meeting in coincidence with the critical design review meeting • Maintenance of the project management plan • Preparation of monthly reports and set up of an action data base with monthly updates • Final check and release of all project deliverables 	
TASKS SPECIFICALLY EXCLUDED:	<ul style="list-style-type: none"> • none 	
OUTPUTS FROM WP:	<ul style="list-style-type: none"> • D-22 - Project Management Plan • D-24 - Monthly Progress Report and Action Data Base • D-25 - Minutes of Kick-off and other meetings 	

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WORK PACKAGE DESCRIPTION	ISSUE: 2	SHEET: 1
	DATE: 22.10.09	
PROJECT:	DUE GLOB-Vapour	WP: 010
WP TITLE:	Promotion	
CONTRACTOR:	DWD, FUB	
MAJOR CONSTITUENT:	Establishment and use of the GlobVapour web site	
START EVENT:	KO	PLANNED DATE: 01.12.09
END EVENT:	CDR	PLANNED DATE: 30.11.10
W.P. MANAGER:	Dr. Jörg Schulz	
INPUTS:		
<ul style="list-style-type: none"> • Statement of Work • DWD proposal • Contract 		
DESCRIPTION OF TASKS:		
<p>The major mean for promotion is the GlobVapour Web site. The web site will be hosted at FUB and established before the RER. This web site will be maintained and updated also during 2 years after the end of the project. The contents of the web site will be submitted to ESA for approval. This web site will provide a direct access to the different products developed during the project and also host a User Help Desk function to support inexperienced users.</p> <p>This WP will establish links between the GlobVapour activities and the relevant projects and programmes within GEWEX and the wider World Climate Research Program (WCRP), the Earth System Science Partnership (ESS-P) and the operational programmes by:</p> <ul style="list-style-type: none"> • Promoting the GlobVapour concept, results and products within the GEWEX community, in particular to the GEWEX Radiation Panel, and ESS-P, making sure that the ESA activities are visible to these organisations and their individual programmes; • Promoting the GlobVapour Product Portfolio and distribution of the planned data sets to the user community, in particular, the GlobVapour user Group; • Promoting the GlobVapour project and its products to the operational user community, e.g., the CGMS International TOVS Working Group and the WMO SCOPE-CM activity; • Representing the Globvapour project at scientific conferences and other international forums through scientific presentations and exhibitions. • 		
TASKS SPECIFICALLY EXCLUDED:		
<ul style="list-style-type: none"> • none 		
OUTPUTS FROM WP:		
<ul style="list-style-type: none"> • D-23 - GlobVapour web portal and project data repository • Participation in international meetings 		

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WORK PACKAGE	ISSUE 2	SHEET 1
DESCRIPTION	DATE: 22.10.09	
PROJECT:	DUE GLOB-Vapour	WP: 110
WP TITLE:	Requirements baseline	
CONTRACTOR:	UKMO, DWD	
MAJOR CONSTITUENT:	Document on baseline user requirements	
START EVENT:	KO	PLANNED DATE: 01.12.09
END EVENT:	RER	PLANNED DATE: 31.01.10
W.P. MANAGER:	Dr. Roger Saunders	
INPUTS:		
<ul style="list-style-type: none"> • Interactions with user group • Existing requirement documents, e.g., from GCOS, WMO, other satellite missions • SOW • Proposal • Contract 		
DESCRIPTION OF TASKS:		
<ul style="list-style-type: none"> • Compile user requirements from users inputs; • Analysis of limitations and potentially conflicting requirements; • Product definitions including information content, format, spatiotemporal resolution, map projections, spectral ranges, accuracies, definition of quality flags and uncertainty statistics; • Product validation description • Product delivery schedules • Draft document defining baseline user requirements 		
TASKS SPECIFICALLY EXCLUDED:		
<ul style="list-style-type: none"> • none 		
OUTPUTS FROM WP:		
<ul style="list-style-type: none"> • D-1 - Requirements Baseline Document 		

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	Date: 30 October 2009	
	Issue: 1	Revision: 1 0


WORK PACKAGE	ISSUE: 2	SHEET: 1
DESCRIPTION	DATE: 22.10.09	
PROJECT:	DUE GLOB-Vapour	WP: 120
WP TITLE:	Technical Specifications	
CONTRACTOR:	DWD, FUB, DLR	
MAJOR CONSTITUENT:	Document on technical specifications	
START EVENT:	KO	PLANNED DATE: 01.01.10
END EVENT:	RER	PLANNED DATE: 28.02.10
W.P. MANAGER:	Dr. Jörg Schulz	
INPUTS:		
<ul style="list-style-type: none"> • Requirements Baseline Document • Specifications from existing products, e.g., from EUMETSAT SAF • SOW • DWD Proposal • Contract 		
DESCRIPTION OF TASKS:		
<p>We will provide a technical answer to the Requirements Baseline and propose a technical description for the GlobVapour product portfolio as well as the proposed methodological approaches to be implemented and validated in the project. This shall include a description of:</p> <ul style="list-style-type: none"> • The technical specifications for the products in terms of spatial and temporal sampling, temporal and geographic coverage, accuracy, quality flags, uncertainty statistics; • The input data sources (EO and non EO) and the output data description; • The proposed methodological approaches to implement the products including limitations of the algorithms; • Planned test data sets for algorithm prototyping; • A detailed plan for validation including the required data and limitations of the approach; <p>Additionally, the proposed methodological approaches and the validation plan will be used to formulate the Software Development Plan</p>		
TASKS SPECIFICALLY EXCLUDED:		
<ul style="list-style-type: none"> • none 		
OUTPUTS FROM WP:		
<ul style="list-style-type: none"> • D-2 - Technical Specification Document • D-4 - Software Development Plan • D-5 - Product Validation Plan 		

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	Issue:	1	Revision:	1 0


WORK PACKAGE	ISSUE: 2	SHEET: 1
DESCRIPTION	DATE: 22.10.09	
PROJECT:	DUE GLOB-Vapour	WP: 130
WP TITLE:	Summary of existing algorithm comparisons	
CONTRACTOR:	DWD, FUB, DLR, UKMO	
MAJOR CONSTITUENT:	Literature study on algorithm and existing product comparisons for all GlobVapour products	
START EVENT:	KO	PLANNED DATE: 01.12.09
END EVENT:	PM-1	PLANNED DATE: 31.05.10
W.P. MANAGER:	Dr. Jörg Schulz	
INPUTS:	<ul style="list-style-type: none"> • Proposal • SOW • Literature • Public reports from other products, e.g., EUMETSAT SAF and EU projects 	
DESCRIPTION OF TASKS:	<ul style="list-style-type: none"> • Review on existing algorithm and product validation • Review on existing algorithm comparison • Review on existing product comparison • Review on existing comparisons to climate models and model based reanalysis • Review of comparison techniques used and how far they include estimates of the product uncertainty • Review on usage of water vapour products for climate applications 	
TASKS SPECIFICALLY EXCLUDED:	<ul style="list-style-type: none"> • none 	
OUTPUTS FROM WP:	<ul style="list-style-type: none"> • Guidance for algorithm and product validation activities • Guidance for the IASI retrieval assessment • Guidance for retrieval improvements • D-6 - Summary report on existing algorithm comparison and validation reports 	

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	Issue:	1	Revision: 1	0


WORK PACKAGE	ISSUE: 2	SHEET: 1
DESCRIPTION	DATE: 22.10.09	
PROJECT:	DUE GLOB-Vapour	WP: 210
WP TITLE:	Collection and procurement of validation data	
CONTRACTOR:	DWD, FUB, DLR, UKMO	
MAJOR CONSTITUENT:	Collection, archiving and dissemination to partners of validation data	
START EVENT:	KO	PLANNED DATE: 01.12.09
END EVENT:	PM-1	PLANNED DATE: 31.05.10
W.P. MANAGER:	Dr. Marc Schröder	
INPUTS:	<ul style="list-style-type: none"> • Product Validation Plan • SOW • DWD Proposal • Existing data holdings at partner institutions 	
DESCRIPTION OF TASKS:	<ul style="list-style-type: none"> • Draft validation data part of Data Acquisition Plan • Implement external services on Radio Occultation data and NOAA satellite data • Acquire, collect and archive needed validation data • Establish Diagnostic Data Set using satellite and ground based data sets including collocation information • Reformat Diagnostic Data Set as necessary • Enable access to Diagnostic Data Set for partners • Draft Ground Data Document 	
TASKS SPECIFICALLY EXCLUDED:	<ul style="list-style-type: none"> • none 	
OUTPUTS FROM WP:	<ul style="list-style-type: none"> • Contribution to D-3 - Data Acquisition Plan for validation data • D-5 - Ground Data Document • D-5 - Diagnostic Data Set 	

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WORK PACKAGE	ISSUE: 2	SHEET: 1
DESCRIPTION	DATE: 22.10.09	
PROJECT:	DUE GLOB-Vapour	WP: 220
WP TITLE:	Collection and procurement of satellite data	
CONTRACTOR:	DWD, FUB, DLR, UKMO	
MAJOR CONSTITUENT:	Ensure availability and accessibility of satellite data records	
START EVENT:	KO	PLANNED DATE: 01.12.09
END EVENT:	PM-1	PLANNED DATE: 31.05.10
W.P. MANAGER:	Dr. Jörg Schulz	
INPUTS:	<ul style="list-style-type: none"> • DWD Proposal • SOW • Baseline Requirement • Technical Specification 	
DESCRIPTION OF TASKS:	<ul style="list-style-type: none"> • Assess availability and proof accessibility of time series of satellite data needed for the production of Globvapour; • Draft Data Acquisition Plan for satellite data; • Decide where Level 1 data will be stored and move them if necessary; • Establish data set for prototype, test, and final products; • Reformat satellite data sets as necessary. 	
TASKS SPECIFICALLY EXCLUDED:	<ul style="list-style-type: none"> • none 	
OUTPUTS FROM WP:	<ul style="list-style-type: none"> • Contribution to D-3-Data Acquisition Plan for satellite data needed for production • Satellite Level-1 data in place for application of scientific operators 	

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WORK PACKAGE	ISSUE: 2	SHEET: 1
DESCRIPTION	DATE: 22.10.09	
PROJECT:	DUE GLOB-Vapour	WP: 230
WP TITLE:	Development of Validation Tools	
CONTRACTOR:	DWD, DLR, FUB, UKMO	
MAJOR CONSTITUENT:	Metric and software development	
START EVENT:	RER	PLANNED DATE: 01.04.10
END EVENT:	CDR	PLANNED DATE: 30.11.10
W.P. MANAGER:	Dr. Marc Schröder	
INPUTS:	<ul style="list-style-type: none"> • Software Development Plan • Ground Data Document • Diagnostic Data Set (DDS) • Product Validation Plan • Currently existing validation tools from all partners 	
DESCRIPTION OF TASKS:	<p>Within this WP we will develop software to validate the GlobVapour products with the Diagnostic Data Set (DDS).</p> <ul style="list-style-type: none"> • Agree on metric to assess the quality of the GlobVapour products. • Gather and adapt existing software to load the individual DDS data sets, to collocate and to validate water vapour. • Develop new software whenever needed. E.g., tools to assess the quality of various IASI water vapour profiles will be developed following Pougatchev 2008 and Pougatchev et al., 2009. 	
TASKS SPECIFICALLY EXCLUDED:	<ul style="list-style-type: none"> • none 	
OUTPUTS FROM WP:	<ul style="list-style-type: none"> • Validation tools 	

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	Issue:	1	Revision: 1	0


WORK PACKAGE	ISSUE: 2	SHEET: 1
DESCRIPTION	DATE: 22.10.09	
PROJECT:	DUE GLOB-Vapour	WP: 310
WP TITLE:	Development of GOME/SCIAMACHY/GOME-2 retrieval scheme	
CONTRACTOR:	DLR	
MAJOR CONSTITUENT:		
START EVENT:	RER	PLANNED DATE: 01.02.10
END EVENT:	CDR	PLANNED DATE: 31.08.10
W.P. MANAGER:	Diego Loyola	
INPUTS:	<ul style="list-style-type: none"> • Statement of Work • GlobVapour proposal • Contract 	
DESCRIPTION OF TASKS:	<p>This task will develop algorithm for optimal combining the total column water vapour from the GOME/SCIAMACHY/GOME-2 instruments to create a climate data set.</p> <ul style="list-style-type: none"> • The first step will be the definition of optimal algorithm settings (e.g. DOAS fitting window and cross-sections) for the three instruments taking into account the different viewing geometry, ground pixel size, overpass time, etc. • The accuracy estimates on the total column water vapour data will be reviewed. • Test products will be generated for each sensor using the pre-existing UPAS processing system. The output of the single products is HDF5 in accordance with the current GOME/GOME-2 operational products. • Finally an algorithm for combining the data sets will be developed. The current baseline is to use GOME as reference and adjust SCIAMACHY and GOME-2 to minimize spatial and temporal differences. 	
TASKS SPECIFICALLY EXCLUDED:	<ul style="list-style-type: none"> • none 	
OUTPUTS FROM WP:	<ul style="list-style-type: none"> • Preliminary water vapour products from GOME/SCIAMACHY/GOME-2 in HDF5 format. • Contribution to D-7 ATBD and DJF. 	

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WORK PACKAGE	ISSUE: 2	SHEET: 1
DESCRIPTION	DATE: 22.10.09	
PROJECT:	DUE GLOB-Vapour	WP: 320
WP TITLE:	Development of MERIS retrieval scheme	
CONTRACTOR:	FUB	
MAJOR CONSTITUENT:	Development of single scattering model and ANN forward operator	
START EVENT:	RER	PLANNED DATE: 01.02.10
END EVENT:	PM-1	PLANNED DATE: 31.05.10
W.P. MANAGER:	Dr. René Preusker	
INPUTS:	<ul style="list-style-type: none"> • DWD proposal • Requirements Baseline • Technical Specification • Data Acquisition Plan • Software Development Plan • MERIS level 1B data • MERIS level 2 data (for aerosol loading) • First guess data, e.g., ERA Interim 	
DESCRIPTION OF TASKS:	<ul style="list-style-type: none"> • Development of a single scattering model and ANN forward operator • Accuracy investigation of single scattering model and ANN forward operator • Development of a 1DVAR retrieval scheme 	
TASKS SPECIFICALLY EXCLUDED:	<ul style="list-style-type: none"> • none 	
OUTPUTS FROM WP:	<ul style="list-style-type: none"> • Contribution to D-7 - ATBD and DJF for the prototype products • Scientific processor for MERIS 	

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WORK PACKAGE	ISSUE: 2	SHEET: 1
DESCRIPTION	DATE: 22.10.09	
PROJECT:	DUE GLOB-Vapour	WP: 330
WP TITLE:	Development of SSM/I (MWR) retrieval scheme	
CONTRACTOR:	DWD	
MAJOR CONSTITUENT:	Development of 1D-VAR retrieval for SSM/I and MWR	
START EVENT:	RER	PLANNED DATE: 01.02.10
END EVENT:	PM-1	PLANNED DATE: 31.05.10
W.P. MANAGER:	Dr. Marc Schröder	
INPUTS:	<ul style="list-style-type: none"> • Technical Specification • Data Acquisition Plan • Software Development Plan • SSM/I and MWR level 1 data • First guess data, e.g., ERA Interim 	
DESCRIPTION OF TASKS:	<ul style="list-style-type: none"> • Develop 1D-VAR retrieval for passive microwave observations. • Implement retrieval of total column water vapour with pixel based error information. 	
TASKS SPECIFICALLY EXCLUDED:	<ul style="list-style-type: none"> • none 	
OUTPUTS FROM WP:	<ul style="list-style-type: none"> • Scientific processor for SSM/I (MWR) 1D-VAR retrieval as input to WPs 340 and 420. • Contribution to D-7 - ATBD and DJF 	

	Doc:	20091021_GlobVapour_pmp_v1.1.doc		
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	Issue:	1	Revision: 1	0


WORK PACKAGE	ISSUE: 2	SHEET: 1
DESCRIPTION	DATE: 22.10.09	
PROJECT:	DUE GLOB-Vapour	WP: 340
WP TITLE:	Establishment of consistency of MERIS and SSM/I	
CONTRACTOR:	DWD, FUB	
MAJOR CONSTITUENT:	Development of blending technique for SSM/I and MERIS	
START EVENT:	PM-1	PLANNED DATE: 01.06.10
END EVENT:	CDR	PLANNED DATE: 31.08.10
W.P. MANAGER:	Dr. Marc Schröder	
INPUTS:	<ul style="list-style-type: none"> • Technical Specification • Data Acquisition Plan • Software Development Plan • Output from WP 320 and 330 	
DESCRIPTION OF TASKS:	<p>In WP 340 TCWV from MERIS (WP 320) and SSM/I (WP 330) will be blended in order to optimally combine synergies between the observations, that is, the high spatial resolution TCWV products of MERIS above land surfaces during day and under clear sky conditions and the TCWV products from SSM/I during day and night and in the absence of rain. The following activities will be carried out:</p> <ul style="list-style-type: none"> • Define an embedded grid with 0.5° and 0.05° spatial resolution for SSM/I and MERIS observations, respectively. • Analyse, if MERIS TCWV can be used to fill coastal areas. • Assess, if the application of Kriging is reasonable in areas with systematically increased errors. • Adapt CM-SAF's Kriging software to the embedded grid and to MERIS observations. • Define and include quality content information. Among others, it is planned to combine error information and natural variance to provide full error propagation. • Assess how systematic biases between the land and the ocean products could be removed if present. • Develop and implement blending method TCWV from MERIS and SSM/I observations. 	
TASKS SPECIFICALLY EXCLUDED:	<ul style="list-style-type: none"> • none 	
OUTPUTS FROM WP:	<ul style="list-style-type: none"> • Contribution to D-7 Algorithm Theoretical Basis Document • Contribution to D-7 Design Justification File 	

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WORK PACKAGE	ISSUE: 2	SHEET: 1
DESCRIPTION	DATE: 22.10.09	
PROJECT:	DUE GLOB-Vapour	WP: 350
WP TITLE:	Development of ATSR-AATSR retrieval schemes	
CONTRACTOR:	FUB	
MAJOR CONSTITUENT:	Radiative transfer simulations	
START EVENT:	PM-1	PLANNED DATE: 01.06.10
END EVENT:	CDR	PLANNED DATE: 31.08.10
W.P. MANAGER:	Dr. René Preusker	
INPUTS:		
<ul style="list-style-type: none"> • Requirements Baseline • Technical Specification • Data Acquisition Plan • Software Development Plan • AATSR L1B data • MERIS and MWR TWVC (for validation) • NASA emissivity data base 		
DESCRIPTION OF TASKS:		
<ul style="list-style-type: none"> • RTM simulations to relate AATSR BT_12 and BT_11 to TWVC • Investigation about the emissivity equality assumption • Application to selected scenes • Comparison with MERIS TWVC over Land • Comparison with MWR/Envisat L2 TWVC • Quantification and stratification of retrieval error and bias 		
TASKS SPECIFICALLY EXCLUDED:		
<ul style="list-style-type: none"> • none 		
OUTPUTS FROM WP:		
<ul style="list-style-type: none"> • Contribution to D-7 Algorithm Theoretical Basis Document • Contribution to D-7 Design Justification File • Scientific processor plugin for BEAM. 		

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WORK PACKAGE	ISSUE: 2	SHEET: 1
DESCRIPTION	DATE: 22.10.09	
PROJECT:	DUE GLOB-Vapour	WP: 360
WP TITLE:	Assessment of existing IASI retrieval schemes	
CONTRACTOR:	DWD, DLR, UKMO	
MAJOR CONSTITUENT:	Comparison of IASI retrieval schemes to decide which one to use	
START EVENT:	RER	PLANNED DATE: 01.02.10
END EVENT:	PM-1	PLANNED DATE: 31.05.10
W.P. MANAGER:	Dr. Jörg Schulz	
INPUTS:	<ul style="list-style-type: none"> IASI retrievals schemes from DWD, DLR, UKMO, EUMETSAT and NOAA Diagnostic Data Set Validation method from WP230 	
DESCRIPTION OF TASKS:	<ul style="list-style-type: none"> Produce IASI temperature and water vapour profiles for a subset of collocated data from the Diagnostic Data Set; Observe the computational efficiency for each retrieval, e.g., run time, memory use, etc.; Compare the retrieval results using a subset from the DDS; Analyse the differences of the retrieval schemes and the differences in technical performance; Decide on the basis of this analysis which IASI scheme will be implemented for GlobVapour. 	
TASKS SPECIFICALLY EXCLUDED:	<ul style="list-style-type: none"> none 	
OUTPUTS FROM WP:	<ul style="list-style-type: none"> Contribution to D-7 - ATBD and DJF Contribution to D-8 - Prototype Products Contribution to D-9 - Product Validation Report and ATBD Change Report 	

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WORK PACKAGE	ISSUE: 2	SHEET: 1
DESCRIPTION	DATE: 22.10.09	
PROJECT:	DUE GLOB-Vapour	WP: 370
WP TITLE:	Development of merged IASI/SEVIRI profile product	
CONTRACTOR:	DWD	
MAJOR CONSTITUENT:	Merging of IASI and SEVIRI profile information	
START EVENT:	PM-1	PLANNED DATE: 01.06.10
END EVENT:	CDR	PLANNED DATE: 31.08.10
W.P. MANAGER:	Dr. Marc Schröder	
INPUTS:	<ul style="list-style-type: none"> • Technical Specification • IASI retrieval system from WP 360 • Prototype merging software from the ESA WACMOS project • IASI Level 1c and SEVIRI Level 1.5 data • Data from NWP model as first guess 	
DESCRIPTION OF TASKS:	<ul style="list-style-type: none"> • Assess whether or not systematic biases between IASI and SEVIRI water vapour products exist by convolving IASI radiance observations with the spectral response functions of SEVIRI, applying the SEVIRI retrieval and comparison to collocated SEVIRI retrieval; • Subject to the results of the assessment the bias will be removed taking IASI as truth; • Implementation of the ESA WACMOS software as scientific GlobVapour processor. 	
TASKS SPECIFICALLY EXCLUDED:	<ul style="list-style-type: none"> • none 	
OUTPUTS FROM WP:	<ul style="list-style-type: none"> • Scientific processor for merging IASI/SEVIRI profile data as input to WP 460 • Contribution to D-7 - ATBD and DJF for the prototype products 	

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WORK PACKAGE	ISSUE: 2	SHEET: 1
DESCRIPTION	DATE: 22.10.09	
PROJECT:	DUE GLOB-Vapour	WP: 380
WP TITLE:	Production and validation of prototype data sets	
CONTRACTOR:	DWD, FUB, DLR	
MAJOR CONSTITUENT:	Process prototype products and validate with DDS	
START EVENT:	PM-1	PLANNED DATE: 01.09.10
END EVENT:	CDR	PLANNED DATE: 30.11.10
W.P. MANAGER:	Dr. Jörg Schulz	
INPUTS:	<ul style="list-style-type: none"> • Retrieval schemes from WP310, 320, 330, 340, 350, 370 • Results from IASI assessment result • Validation methods • Diagnostic Data Set • Technical Specification 	
DESCRIPTION OF TASKS:	<ul style="list-style-type: none"> • Processing of TCWV for 4 months in 2006-2008 for GOME/SCIAMACHY/GOME-2; • Processing of TCWV for 4 months in 2006-2008 for MERIS and SSM/I combined; • Processing of TCWV for 4 months in 2006-2008 for (A)ATSR; • Processing of vertically resolved multi-sensor IASI-SEVIRI for 4 months in 2007-2008; • Comparison of products and to the DDS using the triple collocation method; • Analysis of differences and draft of first Product Validation Report • Draft of ATBD Change Report 	
TASKS SPECIFICALLY EXCLUDED:	<ul style="list-style-type: none"> • none 	
OUTPUTS FROM WP:	<ul style="list-style-type: none"> • D-8 - Prototype products • D-9 - Product Validation Report, ATBD Change Report 	

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WORK PACKAGE	ISSUE: 2	SHEET: 1
DESCRIPTION	DATE: 22.10.09	
PROJECT:	DUE GLOB-Vapour	WP: 390
WP TITLE:	Development of processing environment	
CONTRACTOR:	BC	
MAJOR CONSTITUENT:	Technical setup for EODAPS elements fro GlobVapour	
START EVENT:	RER	PLANNED DATE: 01.05.10
END EVENT:	CDR	PLANNED DATE: 30.11.10
W.P. MANAGER:	Uwe Krämer	
INPUTS:	<ul style="list-style-type: none"> • DWD proposal • Requirements Baseline • Technical Specification • Data Acquisition Plan • Software Development Plan 	
DESCRIPTION OF TASKS:	<ul style="list-style-type: none"> • Development of the EODAPS elements for GlobVapour: <ul style="list-style-type: none"> • Database: data model development and implementation • Device Manager • Standard recipe wrapper class • Dispatcher • Buffering Concept • Token Manager • The software will be built in an iterative development process. Starting from the TS a first skeleton system will be built consisting of the device manager, the database and one recipe. In following iterations the buffering, the dispatcher and the token manager will be added. Finally the recipe will be generalised. Each iteration will be reviewed with the scientific partners to ensure consistency with the GlobVapour processors. • Drafting of a test plan • Ingestion of test data • Software verification 	
TASKS SPECIFICALLY EXCLUDED:	<ul style="list-style-type: none"> • none 	
OUTPUTS FROM WP:	<ul style="list-style-type: none"> • Contribution to D-8 - Contribution to Prototype products • Contribution to D-13- Stand alone processing system 	

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WORK PACKAGE	ISSUE: 2	SHEET: 1
DESCRIPTION	DATE: 22.10.09	
PROJECT:	DUE GLOB-Vapour	WP: 002
WP TITLE:	Project Management and Coordination in Phase 2	
CONTRACTOR:	DWD	
MAJOR CONSTITUENT:	Management and documentation	
START EVENT:	CDR, UCM-1	PLANNED DATE: 01.12.10
END EVENT:	AR, FP, UCM-3	PLANNED DATE: 30.11.11
W.P. MANAGER:	Dr. Jörg Schulz	
INPUTS:		
<ul style="list-style-type: none"> • Statement of Work • DWD proposal • Contract • Deliverables from Phase 1 		
DESCRIPTION OF TASKS:		
<ul style="list-style-type: none"> • Management of the DUE GlobVapour project, i.e. activities associated with the general management, administration and schedule control. Moreover it includes the review presentation preparation activities as well as the co-ordination of the administration and secretary support of the project. • Quality Assurance management focusing on the provision of QA in relation to the involvement of end-users and the implementation of the Requirements Baseline. • Supporting of the Project and the Quality Assurance in: <ul style="list-style-type: none"> • document preparation • configuration control • contractual matters • financial matters • Organising all project meetings, specifically the second progress meeting, the qualification review, and the acceptance review and preparing for the final presentation. • Organising the second and the third User Consultation Meeting in coincidence with the second progress meeting and the acceptance review meeting, respectively. • Maintenance of the project management plan • Preparation of monthly reports • Final check and release of all project deliverables 		
TASKS SPECIFICALLY EXCLUDED:		
<ul style="list-style-type: none"> • none 		
OUTPUTS FROM WP:		
<ul style="list-style-type: none"> • D-15 - Qualification Review Report • D-20 - Acceptance Review Report • D-21 - Final Project Report • D-24 - Monthly Progress Report and updates of action data base • D-25 - Minutes of Kick-off and other meetings 		

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WORK PACKAGE	ISSUE: 2	SHEET: 1
DESCRIPTION	DATE: 22.10.09	
PROJECT:	DUE GLOB-Vapour	WP: 020
WP TITLE:	Promotion	
CONTRACTOR:	DWD, FUB, DLR, UKMO	
MAJOR CONSTITUENT:	Maintanance of web site and preparation for UCM-3	
START EVENT:	CDR, UCM-1	PLANNED DATE: 01.12.10
END EVENT:	AR, FP, UCM-3	PLANNED DATE: 30.11.11
W.P. MANAGER:	Dr. Jörg Schulz	
INPUTS:	<ul style="list-style-type: none"> • Statement of Work • DWD proposal • Contract 	
DESCRIPTION OF TASKS:	<p>The major mean for promotion is the GlobVapour Web site. The web site will provide a direct access to the different products developed during the project and also host a User Help Desk function to support inexperienced users.</p> <p>This WP will further strengthen links between the GlobVapour activities and the relevant projects and programmes within GEWEX and the wider World Climate Research Program (WCRP), the Earth System Science Partnership (ESS-P) and the operational programmes by:</p> <ul style="list-style-type: none"> • Promoting the GlobVapour concept, results and products within the GEWEX community, in particular to the GEWEX Radiation Panel, and ESS-P, making sure that the ESA activities are visible to these organisations and their individual programmes; • Promoting the GlobVapour Product Portfolio and distribution of the planned data sets to the user community, in particular, the GlobVapour user Group; • Promoting the GlobVapour project and its products to the operational user community, e.g., the CGMS International TOVS Working Group and the WMO SCOPE-CM activity; • Especially make use of the third GlobVapour User Consultation Meeting and extend it in the form of an international workshop; • Representing the Globvapour project at scientific conferences and other international forums through scientific presentations and exhibitions. 	
TASKS SPECIFICALLY EXCLUDED:	<ul style="list-style-type: none"> • none 	
OUTPUTS FROM WP:	<ul style="list-style-type: none"> • D-23 - GlobVapour web portal and project data repository • D-26 - Scientific Article submitted to peer reviewed journal • Participation in international meetings 	

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WORK PACKAGE	ISSUE: 2	SHEET: 1
DESCRIPTION	DATE: 22.10.09	
PROJECT:	DUE GLOB-Vapour	WP: 410
WP TITLE:	Development of GOME/SCIAMACHY/GOME-2 processing system	
CONTRACTOR:	DLR	
MAJOR CONSTITUENT:	Implementation of processing system	
START EVENT:	CDR	PLANNED DATE: 01.12.10
END EVENT:	PM-2, UCM-2	PLANNED DATE: 31.05.11
W.P. MANAGER:	Diego Loyola	
INPUTS:	<ul style="list-style-type: none"> • Outputs from WP 310 • Algorithm Theoretical Basis Documents (Change Report), Design Justification File • Product Validation Plan • Software Development Plan • Software Validation Plan 	
DESCRIPTION OF TASKS:	<p>This task will implement a stand alone program for the combination of GOME/SCIAMACHY/GOME-2 water vapour products: the UV/VIS Climate Water Vapour Processor (UCWVP). The algorithm will be defined in WP 310 and the overall processing flow is described in section 4.4.5.1.</p> <p>The resulting processing system will generate GOME/SCIAMACHY/GOME-2 products in NetCDF format.</p> <p>In particular the following tasks will be performed:</p> <ul style="list-style-type: none"> • Adapt software following ACR; • Validate the software according to the SVP; • Draft the Software User Manual; • Transfer UCWVP software to the EODAPS-GV processing system. 	
TASKS SPECIFICALLY EXCLUDED:	<ul style="list-style-type: none"> • none 	
OUTPUTS FROM WP:	<ul style="list-style-type: none"> • D-10 - ATBD and DJF updates; • D-11 - DDF; • Software User Manual; • Input to D-13. 	

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WORK PACKAGE	ISSUE: 2	SHEET: 1
DESCRIPTION	DATE: 22.10.09	
PROJECT:	DUE GLOB-Vapour	WP: 420
WP TITLE:	Development of MERIS-SSM/I processing system	
CONTRACTOR:	DWD, FUB	
MAJOR CONSTITUENT:	Implement and validate MERIS-SSM/I processing system	
START EVENT:	CDR	PLANNED DATE: 01.12.10
END EVENT:	PM-2	PLANNED DATE: 31.05.11
W.P. MANAGER:	Dr. Rene Preusker	
INPUTS:		
<ul style="list-style-type: none"> • Outputs from WP 320, 330, and 340 • Algorithm Theoretical Basis Documents (Change Report), Design Justification File • Product Validation Plan • Software Development Plan • Software Validation Plan • MERIS and SSM/I Level 1 data • First guess data, e.g., ERA Interim • Aerosol data, e.g., MERIS Level 2 aerosol product 		
DESCRIPTION OF TASKS:		
<ul style="list-style-type: none"> • Adapt software following ACR; • Compare results from various homogenisation and inter-calibration approaches for SSM/I radiance measurements and decide on most appropriate approach; • Implement homogenisation or intercalibration approach; • Validate the software according to the SVP; • Draft the Software User Manual; • Transfer prototype software to the EODAPS-GV processing system. • Support the implementation of the MERIS-SSM/I processor into EODAPS-GV processing system. 		
TASKS SPECIFICALLY EXCLUDED:		
<ul style="list-style-type: none"> • none 		
OUTPUTS FROM WP:		
<ul style="list-style-type: none"> • D-10 - ATBD and DJF updates; • D-11 - DDF; • Software User Manual; • Input to D-13. 		

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WORK PACKAGE	ISSUE: 2	SHEET: 1
DESCRIPTION	DATE: 22.10.09	
PROJECT:	DUE GLOB-Vapour	WP: 430
WP TITLE:	Development of ATSR-AATSR processing system	
CONTRACTOR:	FUB	
MAJOR CONSTITUENT:	Implement and validate ATSR-AATSR processing system	
START EVENT:	CDR	PLANNED DATE: 01.12.10
END EVENT:	PM-2	PLANNED DATE: 31.05.11
W.P. MANAGER:	Dr. Rene Preusker	
INPUTS:	<ul style="list-style-type: none"> • Algorithm Theoretical Basis Documents (Change Report), Design Justification File • Product Validation Plan • Software Development Plan • Software Validation Plan 	
DESCRIPTION OF TASKS:	<ul style="list-style-type: none"> • Adapt software following ACR; • Validate the software according to the SVP; • Draft the Software User Manual; • Transfer prototype software to the EODAPS-GV processing system. • Support the implementation of the MERIS-SSM/I processor into EODAPS-GV processing system. 	
TASKS SPECIFICALLY EXCLUDED:	<ul style="list-style-type: none"> • none 	
OUTPUTS FROM WP:	<ul style="list-style-type: none"> • D-10 - ATBD and DJF updates; • D-11 - DDF; • Software User Manual; • Input to D-13. 	

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WORK PACKAGE	ISSUE: 2	SHEET: 1
DESCRIPTION	DATE: 22.10.09	
PROJECT:	DUE GLOB-Vapour	WP: 440
WP TITLE:	Implementation of IASI processing system	
CONTRACTOR:	DWD	
MAJOR CONSTITUENT:	Retrieval of water vapour profiles from IASI radiances	
START EVENT:	CDR	PLANNED DATE: 01.12.10
END EVENT:	PM-2	PLANNED DATE: 31.03.11
W.P. MANAGER:	Dr. Jörg Schulz	
INPUTS:	<ul style="list-style-type: none"> • Results from IASI retrieval assessment (WP 360) • Algorithm Theoretical Basis Documents (Change Report), Design Justification File • Product Validation Plan • Software Development Plan • Software Validation Plan • Retrieval codes (e.g. NWP SAF 1D-Var, DWD) 	
DESCRIPTION OF TASKS:	<ul style="list-style-type: none"> • Implement all changes required by the ACR; • Implement the IASI scientific processor and validate the processing against SVP • Draft the Software User Manual; • Transfer prototype software to the EODAPS-GV processing system. 	
TASKS SPECIFICALLY EXCLUDED:	<ul style="list-style-type: none"> • First Guess taken from ERA-Interim model if NWP-SAF 1D-Var is used. 	
OUTPUTS FROM WP:	<ul style="list-style-type: none"> • IASI water vapour profile retrieval software as input to WPs 450 and 460 • Software User Manual 	

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WORK PACKAGE	ISSUE: 2	SHEET: 1
DESCRIPTION	DATE: 22.10.09	
PROJECT:	DUE GLOB-Vapour	WP: 450
WP TITLE:	Development of IASI-SEVIRI processing system	
CONTRACTOR:	DWD	
MAJOR CONSTITUENT:	Implementation of merged IASI/SEVIRI water vapour profiles	
START EVENT:	End of WP 440	PLANNED DATE: 01.04.11
END EVENT:	Progress Meeting No. 2	PLANNED DATE: 31.05.11
W.P. MANAGER:	Dr. Marc Schröder	
INPUTS:	<ul style="list-style-type: none"> • Implemented IASI processor from WP 440 • Implement merging processor from WP 370 • IASI Level 1c and SEVIRI Level 1b data • Product Validation Report • ATBD Change Report, Design Justification File • Software Development Plan • Software Validation Plan • First guess data, e.g., from ERA Interim 	
DESCRIPTION OF TASKS:	<p>Within this WP Kriging will be implemented to handle pre-processed IASI and SEVIRI profiles in order to achieve optimally merged water vapour profiles from IASI and SEVIRI observations:</p> <ul style="list-style-type: none"> • Implement all changes required by the ACR to NWC-SAF software and merging software; • Consolidate results from GSICS and bias monitoring at CM-SAF; • Implement ESA WACMOS merging software for IASI and SEVIRI water vapour profiles and adapt to new input formats and bias correction; • Implement the IASI-SEVIRI scientific merging processor and validate the processing against SVP; • Draft the Software User Manual; • Transfer prototype software to the EODAPS-GV processing system; • Support the implementation of the MERIS-SSM/I processor into EODAPS-GV processing system. 	
TASKS SPECIFICALLY EXCLUDED:	<ul style="list-style-type: none"> • none 	
OUTPUTS FROM WP:	<ul style="list-style-type: none"> • IASI-SEVIRI retrieval and merging module as input to WP 460; • D-10 - ATBD and DJF updates; • D-11 - DDF; • Input to D-13; • Software User Manual 	

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WORK PACKAGE	ISSUE: 2	SHEET: 1
DESCRIPTION	DATE: 22.10.09	
PROJECT:	DUE GLOB-Vapour	WP: 460
WP TITLE:	Production and validation of test data sets	
CONTRACTOR:	DWD, FUB, DLR	
MAJOR CONSTITUENT:	Production of test data sets for the period 2006 - 2008	
START EVENT:	PM-2	PLANNED DATE: 01.06.11
END EVENT:	QR	PLANNED DATE: 31.08.11
W.P. MANAGER:	Dr. Jörg Schulz	
INPUTS:	<ul style="list-style-type: none"> • GOME/SCIAMACHY/GOME-2, SSM/I, MERIS, (A)ATSR, IASI level 1 and SEVIRI level 1.5 data • Scientific processing schemes from WP410, WP420, WP430, WP440, WP450 • Validation methods • Diagnostic Data Set • Technical Specification • First product Validation report, ATBDs, DJFs, ACRs from Phase-1 	
DESCRIPTION OF TASKS:	<ul style="list-style-type: none"> • Processing of TCWV for 2006-2008 for GOME/SCIAMACHY/GOME-2; • Processing of TCWV for 2006-2008 for MERIS and SSM/I combined; • Processing of TCWV for 2006-2008 for (A)ATSR; • Processing of vertically resolved multi-sensor IASI-SEVIRI for 2007-2008; • Comparison of products and to the DDS using the triple collocation method; • Analysis of differences and writing of Product Validation Report • Writing the Design Definition File • Writing the Product User Guide • Draft of ATBD Change Report 	
TASKS SPECIFICALLY EXCLUDED:	<ul style="list-style-type: none"> • FG taken from ERA-Interim model if NWP-SAF 1D-Var is used) 	
OUTPUTS FROM WP:	<ul style="list-style-type: none"> • D-12 - TCWV test product from GOME/SCIAMACHY/GOME-2, SSM/I-MERIS, (A)ATSR) in NetCDF format. • D-12 - Water vapour profile test products from IASI-SEVIRI in NetCDF format. • D-12 - Product User Guide • D-14 - Product Validation Report and ACR update for test products 	

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WORK PACKAGE	ISSUE: 2	SHEET: 1
DESCRIPTION	DATE: 22.10.09	
PROJECT:	DUE GLOB-Vapour	WP: 470
WP TITLE:	Development of stand alone processing system	
CONTRACTOR:	BC	
MAJOR CONSTITUENT:	Implementation of scientific processors into EODAPS-GV	
START EVENT:	CDR	PLANNED DATE: 01.12.10
END EVENT:	QR	PLANNED DATE: 31.08.11
W.P. MANAGER:	Uwe Krämer	
INPUTS:	<ul style="list-style-type: none"> • Scientific processors • Prototype and test data products • Software development plan 	
DESCRIPTION OF TASKS:	<ul style="list-style-type: none"> • Review of processor software, auxiliary data, processing request and configuration of scientific processors; analysis of provided documentation • Iteration with software developers on processing requests and status information provided by the processors • Integration of the scientific processors; ingestion of auxiliary data; adaptation of configuration; development of processing request templates • Development of recipes • Configuration of EODAPS-GV for all processors • Configuration of scheduler • Ingestion of test data • Software verification 	
TASKS SPECIFICALLY EXCLUDED:	<ul style="list-style-type: none"> • none 	
OUTPUTS FROM WP:	<ul style="list-style-type: none"> • D-13 - Initial stand alone processing system 	

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WORK PACKAGE	ISSUE: 2	SHEET: 1
DESCRIPTION	DATE: 22.10.09	
PROJECT:	DUE GLOB-Vapour	WP: 510
WP TITLE:	Production and validation of final data set	
CONTRACTOR:	DWD, FUB, DLR	
MAJOR CONSTITUENT:	Production and dissemination of final GlobVapour data products	
START EVENT:	QR	PLANNED DATE: 01.09.11
END EVENT:	AR, FP, UCM-3	PLANNED DATE: 30.11.11
W.P. MANAGER:	Dr. Jörg Schulz	
INPUTS:	<ul style="list-style-type: none"> • GlobVAPOUR scientific processors • Consolidated radiance data series • Diagnostic data set • Technical requirements • All preliminary versions of ATBD, DJF, DDF, PUG 	
DESCRIPTION OF TASKS:	<ul style="list-style-type: none"> • Update of ATBD, DJF and DDF documents following ACR and QRR • Processing of 1996 - 2008 GOME-SCIAMACHY-GOME-2 TCWV record • Processing of 1996 - 2008 MERIS-SSM/I TCWV record • Processing of 1996 - 2008 ATSR-AATSR TCWV record • Processing of 2007 - 2008 IASI - SEVIRI individual and merged products • Final validation of all products • Update of Product User Guides for all products 	
TASKS SPECIFICALLY EXCLUDED:	<ul style="list-style-type: none"> • none 	
OUTPUTS FROM WP:	<ul style="list-style-type: none"> • D-16 - Updated ATBD, DJF, and DDF documents • D-17 - Final Products (TCWV and water vapour profiles) and Product User Guide for final products • D-19 - Final Product Validation Report • Contribution to D-20 - Acceptance Review Report • Contribution to D-21 - Final Project Report 	

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WORK PACKAGE	ISSUE: 2	SHEET: 1
DESCRIPTION	DATE: 22.10.09	
PROJECT:	DUE GLOB-Vapour	WP: 520
WP TITLE:	Update of processing system, delivery and test application at ESRIN	
CONTRACTOR:	BC, DWD, FUB, DLR	
MAJOR CONSTITUENT:	Delivery of final stand alone processing system	
START EVENT:	QR	PLANNED DATE: 01.09.11
END EVENT:	AR	PLANNED DATE: 30.11.11
W.P. MANAGER:	Uwe Krämer	
INPUTS:	<ul style="list-style-type: none"> • Final version of GlobVAPOUR scientific processors • Subset from consolidated radiance data series • Subset of GlobVapour final products 	
DESCRIPTION OF TASKS:	<ul style="list-style-type: none"> • Update of scientific processors after QR • Test processing for subset of consolidated radiance series • Technical comparison of EO-DAPS-GV output to subset of final products • Delivery to ESRIN for Acceptance Review 	
TASKS SPECIFICALLY EXCLUDED:	<ul style="list-style-type: none"> • none 	
OUTPUTS FROM WP:	<ul style="list-style-type: none"> • D-18 - Final stand alone processing system • Contribution to D-20 - Acceptance Review Report 	

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WORK PACKAGE	ISSUE: 2	SHEET: 1
DESCRIPTION	DATE: 22.10.09	
PROJECT:	DUE GLOB-Vapour	WP: 610
WP TITLE:	Comparison of GlobVapour products with climate model output (UKMO)	
CONTRACTOR:	UKMO	
MAJOR CONSTITUENT:	Comparison of GlobVAPOUR datasets with HadGEM2 and HadGEM3	
START EVENT:	Commence model comparisons	PLANNED DATE: 01.12.10
END EVENT:	Release report on model comparisons	PLANNED DATE: 30.09.11
W.P. MANAGER:	Mark Ringer	
INPUTS:	<ul style="list-style-type: none"> • GlobVAPOUR datasets • Associated metadata • Model simulators for GlobVAPOUR datasets 	
DESCRIPTION OF TASKS:	<ul style="list-style-type: none"> • Extract model fields from HadGEM2 and HadGEM3 • Compare model fields with GlobVAPOUR measurements and/or analyses • Write report on comparisons of GlobVAPOUR datasets with model outputs 	
TASKS SPECIFICALLY EXCLUDED:	<ul style="list-style-type: none"> • none 	
OUTPUTS FROM WP:	<ul style="list-style-type: none"> • Contribution to D-19 - Report on model comparisons 	

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WORK PACKAGE	ISSUE: 2	SHEET: 1
DESCRIPTION	DATE: 22.10.09	
PROJECT:	DUE GLOB-Vapour	WP: 620
WP TITLE:	Alternative ways of climate model evaluation (UKMO)	
CONTRACTOR:	UKMO	
MAJOR CONSTITUENT:	Comparison of water vapour channel radiance with HadGEM2/3	
START EVENT:	Commence model comparisons	PLANNED DATE: 01.12.10
END EVENT:	Release report on model comparisons	PLANNED DATE: 30.09.11
W.P. MANAGER:	Dr. Mark Ringer	
INPUTS:	<ul style="list-style-type: none"> • GlobVAPOUR water vapour channel radiance datasets • Associated metadata • Model simulators for radiances 	
DESCRIPTION OF TASKS:	<ul style="list-style-type: none"> • Extract model fields from HadGEM2 and HadGEM3 • Run COSP simulator for period of comparison • Compare model simulated radiances with GlobVAPOUR measurements and/or analyses • Write report on comparisons of water vapour radiance datasets with model outputs 	
TASKS SPECIFICALLY EXCLUDED:	<ul style="list-style-type: none"> • none 	
OUTPUTS FROM WP:	<ul style="list-style-type: none"> • Contribution to D-19 - Report on model comparisons 	

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WORK PACKAGE	ISSUE: 2	SHEET: 1
DESCRIPTION	DATE: 22.10.09	
PROJECT:	DUE GLOB-Vapour	WP: 630
WP TITLE:	Establishment of the scientific exploitation plan (UKMO, DWD)	
CONTRACTOR:	UKMO, DWD	
MAJOR CONSTITUENT:	Provision of update to scientific exploitation plan	
START EVENT:	Review with user group	PLANNED DATE: 01.09.11
END EVENT:	Release updated plan	PLANNED DATE: 30.11.11
W.P. MANAGER:	Dr. Roger Saunders	
INPUTS:	<ul style="list-style-type: none"> Initial scientific exploitation plan in proposal Discussions with users 	
DESCRIPTION OF TASKS:	<ul style="list-style-type: none"> Review initial scientific exploitation plan with users At first User Consultation Meeting ascertain additional exploitation plans by users and confirm existing plans already listed Collect examples of GlobVAPOUR exploitation for inclusion in the plan. Refine exploitation plan text and release as a separate document. 	
TASKS SPECIFICALLY EXCLUDED:	<ul style="list-style-type: none"> none 	
OUTPUTS FROM WP:	<ul style="list-style-type: none"> D-21 - Updated Scientific Exploitation Plan 	

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3 Resources

Table 3.1 lists the staff involved, main responsibilities and expertise, and time allocated to the project over the two-year lifespan. About for persons will be newly employed at the various institutions. Those contributions are listed under NN. A detailed breakdown of time commitment from the company PSS is given in Table 3.2, and a further breakdown in mapping from staff to the various work packages is given in Table 3.3. All partners have the policy to allow flexible assignment of tasks between staff. Thus, breakdown of hours is not subdivided into persons in Table 3.3.

Table 3-1: Companies involved, type of commitment to the project and estimated allocated time.

Name	Role Description	Time allocated in Project
Jörg Schulz, DWD	Overall project coordinator, organiser of IASI comparison activity.	20%
Marc Schröder, DWD	Chief developer of microwave and merging algorithms.	10%
Nathalie Corcoux, DWD	IASI comparison and IASI-SEVIRI merging. Leads validation of SSM/I and IASI-SEVIRI components.	77%
NN, DWD	Development and implementation of SSM/I algorithms and MERIS-SSM/I merging algorithms. Responsible for all processing activities.	100%
Jürgen Fischer, FUB	Guides developments for MERIS and ATSR retrieval schemes and associated validation activities.	5%
René Preusker, FUB	Leads development of MERIS and ATSR components.	10%
NN, FUB	Develops the MERIS and ATSR processing scheme and performs the validation of components.	100%
NN, FUB	Supports development of retrieval and processing schemes for MERIS and ATSR and also contributes to the scientific exploitation in WP6	25%
Diego Loyola, DLR	Leads the development, implementation and validation of the GOME/SCIAMACHY/GOME-2 product.	20%
Franz Schreier, DLR	Contributes to the IASI retrieval intercomparison activity.	20%
NN, DLR	Performs the development, implementation and validation of the GOME/SCIAMACHY/GOME-2 product.	50%
Roger Saunders, UKMO	Leads the activities on the user requirements and the scientific exploitation plan.	5%
Mark Ringer, UKMO	Leads the activities of comparison of GlobVapour products to the HADCM and the usage of the forward models in WP620.	5%
NN, UKMO	Performs the comparison to climate model data and implements the forward model approach and performs the comparison at radiance level.	50%
Hans Gleisner, DMI	Contributes to the validation by providing radio occultation data with associated expertise. Supports usage of this data for all validation activities.	11%
Uwe Krämer, BC	Leads the development, implementation and verification of the EODAPS-GV processing environment.	30%
Sabine Embacher, BC	Contributes to the EODAPS-GV development and verification.	20%


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Table 3-2: Individual contributions to the project in hours as defined in the financial PSS forms.

Individual	Class	WP000	WP100	WP200	WP300	WP400	WP500	WP600	Total
DWD									
Jörg Schulz	Scientific Expert	500	0	0	0	0	0	0	500
Marc Schröder	Scientific Expert	0	98	138	136	197	120	57	747
Nathalie Courcoux	Researcher	0	376	516	530	663	474	255	2814
NN	Researcher	0	475	675	695	884	617	304	3650
FUB									
Jürgen Fischer	Scientific Expert	0	23	23	13	60	27	27	173
René Preusker	Scientific Expert	0	47	47	27	60	53	53	287
NN	Researcher	100	500	680	617	703	600	450	3650
NN	PhD	0	0	250	148	172	150	200	920
DLR									
Diego Loyola	Scientific Expert	0	40	22	0	138	22	0	222
Franz Schreier	Researcher	0	0	0	222	0	0	0	222
NN	Researcher	0	67	78	78	254	78	0	555
UKMO									
Roger Saunders	Scientific Expert	0	20	0	20	0	0	10	50
Mark Ringer	Scientific Expert	0	20	0	0	0	0	30	50
NN	Researcher	0	28	0	270	0	0	1340	1638
DMI									
Hans Gleisner	Researcher	0	0	178	34	62	60	0	334
BC									
Uwe Krämer	Senior Consultant	0	0	0	256	220	25	0	501
Sabine Embacher	Consultant	0	0	0	238	211	26	0	475



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Table 3-3: Work package breakdown / time allocation summary.


Work package	Start WP	End WP	WP Manager	Time commitment of staff (hours)
001	01.12.2009	30.11.2010	Jörg Schulz	DWD: 150
010	01.12.2009	30.11.2010	Jörg Schulz	DWD: 100 FUB: 100
110	01.12.2009	31.01.2010	Roger Saunders	DWD: 49 UKMO: 68
120	01.12.2009	28.02.2010	Jörg Schulz	DLR: 57 DWD: 400 FUB: 170
130	01.12.2009	31.05.2010	Jörg Schulz	DLR: 50 DWD: 500 FUB: 400
210	01.12.2009	31.05.2010	Marc Schröder	DMI: 170 DWD: 429 FUB: 250
220	01.12.2009	31.05.2010	Jörg Schulz	DLR: 40 DWD: 300 FUB: 250
230	01.04.2010	30.11.2010	Marc Schröder	DLR: 60 DWD: 600 FUB: 500
310	01.02.2010	31.08.2010	Diego Loyola	DLR: 50
320	01.02.2010	31.05.2010	Réne Preusker	FUB: 200
330	01.02.2010	31.05.2010	Marc Schröder	DWD: 350
340	01.06.2010	31.08.2010	Marc Schröder	DWD: 250 FUB: 205
350	01.06.2010	31.08.2010	Réne Preusker	FUB: 200
360	01.02.2010	31.05.2010	Jörg Schulz	DLR: 200 DWD: 400 UKMO: 290
370	01.06.2010	31.08.2010	Marc Schröder	DWD: 200
380	01.09.2010	30.11.2010	Jörg Schulz	DLR: 50 DMI: 34 DWD: 162 FUB: 100
390	01.05.2010	30.11.2010	Uwe Krämer	BC: 494
002	01.12.2010	30.11.2011	Jörg Schulz	DWD: 150

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Work package	Start WP	End WP	WP Manager	Time commitment of staff (hours)
020	01.12.2010	30.11.2011	Jörg Schulz	DWD: 100
410	01.12.2010	31.05.2011	Diego Loyola	DLR: 300
420	01.12.2010	31.05.2011	Réne Preusker	DWD: 600 FUB: 350
430	01.12.2010	31.05.2011	Réne Preusker	FUB: 350
440	01.12.2010	31.03.2011	Jörg Schulz	DWD: 400
450	01.04.2011	31.05.2011	Marc Schröder	DWD: 300
460	01.06.2011	31.08.2011	Jörg Schulz	DLR: 92 DMI: 62 DWD: 444 FUB: 265
470	01.12.2010	31.08.2011	Uwe Krämer	BC: 431
510	01.09.2011	30.11.2011	Jörg Schulz	DLR: 100 DMI: 60 DWD: 1000 FUB: 730
520	01.09.2011	30.11.2011	Uwe Krämer	BC: 51 DWD: 211 FUB: 100
610	01.12.2010	30.09.2011	Mark Ringer	UKMO: 500
620	01.12.2010	30.09.2011	Mark Ringer	DWD: 316 FUB: 430 UKMO: 500
630	01.09.2011	30.11.2011	Roger Saunders	DWD: 300 FUB: 300 UKMO: 380

4 Communications and Reporting

Communications between the members of the consortium led by DWD and between DWD and ESRIN will be carried out in a manner that improves the flow of information between all project participants. Emails, teleconferences and faxes will be used to implement a cost effective and efficient method for the frequent exchange of information. All project documentation and communications will be in the English language. Formal communication to ESRIN will be provided by DWD including relevant input from sub-contractors. Formal communication will be in accordance with the project rules as applicable. Any formal correspondence will be sent as hard copy; it may be sent electronically for information only. Informal communications are defined as routine technical correspondences or teleconferences that, upon agreement between Project Managers, can be exchanged between their subordinate key-persons or engineers with copy to the respective project hierarchy. All meetings will be prepared for the attendance as summarised in the Travel

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and Subsistence Plan in the Financial Proposal. Additional working and formal meetings by members of the team will be organised as necessary depending on project need. However, the continuous exchange of information (via e-mail, fax, phone or other form) will reduce those meetings to a minimum. The planning of the meetings will ensure that all parties provide the necessary material to a review or a meeting, in due time before the meeting. Minutes of all project meetings, including additional working and formal meetings, will be produced. The implementation of all actions will be monitored closely. The action control procedure includes feed-back reports between and at Progress meetings.


The following measures are established in order to ensure the flow of communication within the project as well as with ESRIN.

- Each work package (WP) will be co-ordinated by a WP leader responsible for the technical work and the deliverables specified for each WP. The WP leader will report to the project manager.
- Internal teleconference meetings will be organised where the progress of each WP is reviewed. Six meetings, including four review meetings, will be held with ESRIN to report the progress and to discuss the status and further actions of the project.
- There will be monthly reporting of progress to the project manager, including definition of tasks for the next period, which the project manager will supervise and check with regard to time schedule and contents and which he will reject if not adequate.

The contract will be with Deutscher Wetterdienst, with contact Dr Jörg Schulz. Communication with ESA will be by monthly progress reports and a single final report. In addition there will be informal contact through telephone, email and video conferencing. A nominated ESA contact will work with Dr Schulz to ensure satisfactory delivery of the project aims, and resolution of any disputes arising. A project website will be set up, to aid communication and reporting as well as external access to the results of GlobVapour. A project email list with all team members will be set up.

Table 4-1: Project meeting schedule and planned participation.

Meeting	Date	Location	Participants
Kick-off, RER	February 2010	DWD, Offenbach	Schulz, Schröder Fischer, Preusker Loyola, Gleisner Saunders, Ringer Krämer
Progress 1	June 2010	FUB, Berlin	Schulz, Schröder, Fischer, Preusker Loyola, Schreier Saunders Krämer, Gleisner User Group
CDR UCM-1	November 2010	User Facility	Schulz, Schröder, Fischer, Preusker Saunders, Loyola, Gleisner User Group
Progress 2 UCM-2	May 2011	UKMO, Exeter	Schulz, Schröder, Fischer, Preusker Loyola, Schreier Saunders, Gleisner Krämer
QR	September 2011	ESRIN	Schulz, Krämer

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Meeting	Date	Location	Participants
AR FP/UCM-3	November2011	ESRIN	Schulz, Schröder, Fischer, Preusker Saunders, Ringer Loyola, Krämer, Gleisner User Group Open for wider group of participants

5 Project Website

The major mean for promotion is the GlobVapour Web site. The web site will be hosted at FUB and established before the RER. This web site will be maintained and updated also during 2 years after the end of the project. The contents of the web site will be submitted to ESA for approval. This web site will provide a direct access to the different products developed during the project and also host a User Help Desk function to support inexperienced users. The GlobVapour project will need to maintain a large set of external (for the user) and internal documents describing scientific, operations, engineering and management issues. All documents is under version control through a configuration management system. The documents will be accessible through the GlobVapour web site. Internal documents will be password protected. The team protected parts might be realised by implementing a Wiki.

The operational means of product and product information dissemination will be provided by means of the project web site, ftp and DVD on request. The dissemination will handled in a comparable way as implemented for the EUMETSAT CM-SAF (www.cmsaf.eu). A Web User Interface will allow the user to search and order the GlobVapour products. Additionally, quick looks of the products will be provided. Also regional cut outs from the global products, change of geographical projection and reformatting in different formats, e.g., from NetCDF to grib, will be available.

The different data sets produced in GlobVapour will reside on an ftp server attached to the web site if they are small enough, e.g., SSM/I and GOME data sets. All other data sets will reside at the place where they were produced. A data order will then handled via the User Help Desk start to end including the data delivery.

The product access, the product distribution and the User Help Desk activities are monitored and analysed, i.e., anonymous statistics of number and size of downloads will be monitored.

Although user needs will be carefully analysed for the requirements baseline, experience at CM-SAF has shown that users often need scientific support because of special requests or simply because they are inexperienced in the use of EO products. Here the support of the user is essential, with respect to technical as well as scientific aspects. To handle this the GlobVapour consortium will run a User Help Desk that also serves as focal point for questions related to GlobVapour science. In practise, scientific requests are redirected from the User Help Desk to the responsible scientists which then provide an answer to the customer.

6 Deliverables

All items requested in the SOW will be included as deliverables in this project. It is the project manager's responsibility to ensure that the named individual for each deliverable completes the task on time. Draft documents will be circulated via the project Web Site in their early development. This is particularly important for the ATBDs. This will allow team members and the ESA technical officer to comment on the documents and offer feedback and review.



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Table 6-1: Summary of Deliverables

Deliverable	Description	Acronym	Type	Due date
D-1	Requirements Baseline	RB	Doc	KO+2
D-2	Technical Specification	TS	Doc	KO+2
D-3	Data Acquisition Plan	DAP	Doc	KO+2
D-4	Software Development Plan	SDP	Doc	KO+3
D-5	Product Validation Plan, Ground Data Document, Diagnostic Data Set	PVP, GDD, DDS	Doc, Doc, Data	KO+4
D-6	Summary of existing algorithm comparison and validation reports	SVR	Doc	KO+6
D-7	Algorithm Theoretical Baseline Document, Design Justification File	ATBD, DJF	Doc, Doc	KO+9
D-8	Prototype Products	PP	Data	KO+11
D-9	Product Validation Report (Prototype), ATBD Change Report	PVR_P, ACR	Doc, Doc	KO+12
D-10	ATBD update, DJF update	ATBD, DJF	Doc, Doc	KO+13
D-11	Design Definition File for test products	DDF	Doc	KO+14
D-12	Test Products, Product User Guide	TP, PUG	Data, Doc	KO+18
D-13	Initial stand alone processing system	IPS	SW	KO+19
D-14	Product Validation Report (Test), ATBD Change Report (Update)	PVR_T, ACR	Doc, Doc	KO+20
D-15	Qualification Review Report	QRR	Doc	KO+20
D-16	ATBD, DJF, DDF updates	ATBD, DJF, DDF	Doc, Doc, Doc	KO+21
D-17	Final Products, Product User Guide	FP, PUG	Data, Doc	KO+23
D-18	Update stand alone processing system	UPS	SW	KO+24
D-19	Final Product Validation Report	PVR_F	Doc	KO+24
D-20	Acceptance Review Report	ARR	Doc	KO+24
D-21	Final Project Report, Scientific Exploitation Plan	FPR, SEP	Doc	KO+24
D-22	Project Management Plan	PMP	Doc	Kick-off
D-23	GlobVapour Web Portal	GWP	Web	KO+1,
D-24	Monthly Progress Report	PR	Doc	Monthly
D-25	Meeting Minutes	MM	Doc	Ad hoc
D-26	Peer reviewed publication	PUB	Doc	Ad hoc


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6.1 Deliverable Requirements Definition (needs to be extended to remaining deliverables)

This section presents the objective of each of the deliverables, describes the major elements, including a preliminary table of contents, and outline the update methodology along the project execution as requested in the SOW.


Deliverable	D-1 Requirements Baseline Document (RBD)
Type	Document
Associated WP	110
Responsible	Dr Roger Saunders
Start	01.12.2009
End	31.01.2010
Main Elements	This documents compiles baseline requirements for different applications from user inputs.
Contents	<ol style="list-style-type: none"> 1. Introduction <ol style="list-style-type: none"> 1.1 Purpose 1.2 Definitions, acronyms and abbreviations 1.3 Reference Documents 1.4 Structure of the document 2. Baseline requirements for total column water vapour <ol style="list-style-type: none"> 2.1 Relevance of products 2.2 Requirements analysis (potentially stratified by application) 2.3 Requirements Baseline 3. Baseline requirements for water vapour profile products <ol style="list-style-type: none"> 3.1 Relevance of products 3.2 Requirements analysis (potentially stratified by application) 3.3 Requirements Baseline 4. Conclusions
Updates	The RB will be delivered at the RER, so there will be very little opportunity to update this document.

Deliverable	D-2 Technical Specification Document (TSD)
Type	Document
Associated WP	120
Responsible	Dr Jörg Schulz
Start	01.01.2010
End	28.02.2010
Main Elements	This documents contains the technical specifications for each of the products to be delivered within GlobVapour.
Contents	<ol style="list-style-type: none"> 1. Introduction <ol style="list-style-type: none"> 1.1 Purpose 1.2 Definitions, acronyms and abbreviations 1.3 Reference Documents 1.4 Structure of the document 2. Total column water vapour specifications <ol style="list-style-type: none"> 2.1 GOME/SCIAMACHY/GOME2 <ol style="list-style-type: none"> 2.1.1 Overview 2.1.2 Description of methodology 2.1.3 Validation approach and required data

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Deliverable	D-2 Technical Specification Document (TSD)
	<ul style="list-style-type: none"> 2.1.4 Assumptions and limitations 2.1.5 Compliance with requirements baseline 2.2 SSM/I - MERIS <ul style="list-style-type: none"> 2.2.1 Overview 2.2.2 Description of methodology 2.2.3 Validation approach and required data 2.2.4 Assumptions and limitations 2.2.5 Compliance with requirements baseline 2.3 ATSR/AATSR <ul style="list-style-type: none"> 2.3.1 Overview 2.3.2 Description of methodology 2.3.3 Validation approach and required data 2.3.4 Assumptions and limitations 2.3.5 Compliance with requirements baseline 3. Water vapour profile products <ul style="list-style-type: none"> 3.1 IASI-SEVIRI <ul style="list-style-type: none"> 3.1.1 Overview 3.1.2 Description of methodology 3.1.3 Validation approach and required data 3.1.4 Assumptions and limitations 3.1.5 Compliance with requirements baseline 4. Conclusions
Updates	The TS will be delivered at the RER, so there will be very little opportunity to update this document. All groups producing products, i.e., DWD, FUB, DLR will contribute to this document.


Deliverable	D-3 Data Acquisition Plan (DAP)
Type	Document
Associated WP	210 and 220
Responsible	Dr Marc Schröder
Start	01.12.2009
End	28.02.2010
Main Elements	This documents details the need for satellite as well as ancillary data for the production of the GlobVapour data products. It also details the needs for space- and ground-based validation data, their sources, the estimated work needed to bring them to acceptable quality and potentially associated costs.
Contents	<ul style="list-style-type: none"> 1. Introduction <ul style="list-style-type: none"> 1.1 Purpose 1.2 Definitions, acronyms and abbreviations 1.3 Reference Documents 1.4 Structure of the document 2. Satellite Data for Production <ul style="list-style-type: none"> 2.1 Data Needs 2.2 Data Sources 2.3 Procurement Schedule 2.4 Data cost 3. Ancillary Data for Production <ul style="list-style-type: none"> 3.1 Data Needs 3.2 Data Sources 3.3 Procurement Schedule 3.4 Data cost 4. Satellite Data for Validation <ul style="list-style-type: none"> 4.1 Data Needs

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Deliverable	D-3 Data Acquisition Plan (DAP)
	<ul style="list-style-type: none"> 4.2 Data Sources 4.3 Procurement Schedule 4.4 Data cost 5. Ground-based Validation Data <ul style="list-style-type: none"> 5.1 Data Needs 5.2 Data Sources 5.3 Procurement Schedule 5.4 Workload estimate for quality control 5.4 Data cost 6. Conclusions
Updates	The DAP will be delivered at the RER, so there will be very little opportunity to update this document. All groups producing products or are involved in validation, i.e., DWD, FUB, DLR, UKMO, DMI, NOAA will contribute to this document.

Deliverable	D-4 Software Development Plan (SDP)
Type	Document
Associated WP	120
Responsible	Dr Jörg Schulz
Start	01.12.2009
End	28.02.2010
Main Elements	This documents details the needed software developments throughout the projects and provides schedules for the implementation into the EODAPS framework.
Contents	<ul style="list-style-type: none"> 1. Introduction <ul style="list-style-type: none"> 1.1 Purpose 1.2 Definitions, acronyms and abbreviations 1.3 Reference Documents 1.4 Structure of the document 2. Software Requirements Analysis 3. Standards 4. Retrieval and mapping components 5. EODAPS-GV 6. Validation Tools 7. Conclusions
Updates	The SDP will be delivered at the RER and will be updated as necessary during the project. All groups producing elements of the production scheme and the processing environment, i.e., DWD, FUB, DLR, and BC will contribute to this document.

Deliverable	D-5 Product Validation Plan (PVP)
Type	Document
Associated WP	120
Responsible	Dr Jörg Schulz
Start	01.12.2009
End	31.03.2010
Main Elements	This document describes the validation plan for the geophysical products.
Contents	<ul style="list-style-type: none"> 1. Introduction <ul style="list-style-type: none"> 1.1 Purpose 1.2 Definitions, acronyms and abbreviations 1.3 Reference Documents

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Deliverable	D-5 Product Validation Plan (PVP)
	<ul style="list-style-type: none"> 1.4 Structure of the document 1.5 Review of requirements for validation 1.6 Summary of available ancillary datasets 2. Detailed validation plans for project elements <ul style="list-style-type: none"> 2.1 Total Column Water Vapour <ul style="list-style-type: none"> 2.1.1 GOME/SCIAMACHY/GOME-2 Validation 2.2.1 SSM/I-MERIS Validation 2.3.1 (A)ATSR Validation 2.2 Water Vapour Profile Products <ul style="list-style-type: none"> 2.2.1 IASI Retrieval Assessment 2.2.2 IASI-SEVIRI Product Validation 3. Conclusions
Updates	The DAP will be delivered at the RER, so there will be very little opportunity to update this document. All groups producing products or are involved in validation, i.e., DWD, FUB, DLR, UKMO, DMI, NOAA will contribute to this document.

7 Risk Analysis


The most critical point is the extremely short time scale. Experience with comparable projects showed that the path from an scientific algorithm to an operational process is always iterative. But since the amount of data to be processed is very large and the requirements on accuracy are very high, there is only very limited time for iterations in developing algorithms and in particular inter-calibration and combination methods. Additionally, the different data sets must be produced in parallel, i.e., a failure in the development of one chain influences the validation in particular if methods as triple collocation are employed.

Software testing and the approach to get from prototype, over test to final products mitigate that risk but is absolutely no guarantee for a stable high quality climate record as this requires careful attention to instrument behaviour over time. We will try to minimise that risk by trying to embed our work into international programs on instrument characterisation, calibration and inter-calibration.

Another significant area of risk is the processing throughput due to I/O limitations. We are planning to use significant computer resources at DWD, FUB, DLR and UKMO. However, although sufficient disk-space will be available locally there is no guarantee that I/O will be able to keep up with the amount of data being processed. This has proved to be a significant bottleneck with operational processing of SEVIRI and IASI data processing at the EUMETSAT CM-SAF. However, we believe that we have scoped sufficient resources to cope with the demands. In particular, DWD and UKMO have access to large-scale supercomputer resources including resources at ECMWF, which we will exploit to mop up any excess computational demand. In this way we will be able to meet the schedule proposed.

Some of the used algorithms need to be redeveloped to produce the needed uncertainty estimates for blending and merging procedures. The time for the development and testing of such new components is very short so that solutions to any substantial methodological problem that may appear cannot be perfect. This may lead in some cases to delays in the production especially of the prototype data set. Additionally, the computational efficiency of new components is unknown and substantial work may be needed before a scientific processor can be integrated into the EODAPS-GV. For the algorithms itself a fallback position will be to use already existing algorithms including operational ones that are available for most of the instruments.

The GOME/SCIAMACHY/GOME-2, MERIS and SSM/I TCWV estimates can be considered as very mature as there is a clear signal in the channels used for the retrieval. (A)ATSR was not built to retrieve water vapour and not many studies have been performed on the validation of the few

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existing algorithms. We will look carefully at the validation result of this product compared to the other product and in a case that those results are much worse for (A)ATSR we suggest to drop this product from the list.