

→ CLIMATE CHANGE INITIATIVE

[CMUG] CCI Newsletter

Issue 2 | October 2011

In this issue:

- Consistency of products
- Reanalysis
- CMUG progress
- New ECV projects



Background to CMUG

The European Space Agency (ESA) has established the "Climate Modelling User Group" (CMUG), to ensure a climate system perspective at the centre of its Climate Change Initiative (CCI) programme, and to provide a dedicated forum through which the Earth Observation Data Community and Climate Modelling Community can work closely together. Visit the CMUG website at: <http://www.cci-cmug.org/> for the latest news.

Consistency of products

The first ten Essential Climate Variable (ECV) projects of the European Space Agency (ESA) Climate Change Initiative (CCI) have now written their Product Specification Documents (PSDs). The CMUG examined these PSDs alongside documented user requirements to develop a view on the consistency of data and initial time series across all the ECV projects.

Temporal Consistency

One area where CMUG is looking at ECV datasets is the temporal consistency which the teams process and provide their datasets. If the ECV projects provide their phase I datasets to cover a common year across the projects this will allow CMUG to explore cross-ECV dependencies, analyse consistency in features, and to examine prognostic variables and initial assumptions. A common year is

referred to as a 'golden year' and the current processing plans for all ECVs are given in Table 1 (next page). Such golden years may avoid anomalous periods (e.g. El Nino, Pinatubo) and be recent enough to include some of the new technology in orbit (e.g. ENVISAT, AURA and METOP).

In Table 1 it can be seen that the marine and terrestrial ECV projects have 2000 as a golden year, but within the atmospheric ECV projects this has

not been achieved. The major constraint is the aerosol project which is only processing data for 2008 due to the availability of best quality satellite and reference data. The CCI projects are also liaising with each other regarding common datasets they might both be able to use for their product generation. Without the possibility of a common year it will be very difficult to investigate the synergies between the ECV projects.

In this issue:

- Consistency of products
- Reanalysis
- CMUG progress
- New ECV projects



	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
SST (start 1991)	■	■	■	■	■	■	■	■	■	■	■	■
Sea level (start 1991)	■	■	■	■	■	■	■	■	■	■	■	■
Ocean colour (start 1995)	■	■	■	■	■	■	■	■	■	■	■	■
Clouds									■	■	■	■
GHG												■
Aerosol										■	■	■
Ozone (start 1985)	■	■	■	■	■	■	■	■	■	■	■	■
Fire	■	■		■	■		■					
Landcover	■	■	■	■	■	■	■	■	■	■	■	■
Glaciers	■	■	■	■								

Table 1: Planned time series of ECVs from 1999 in Phase 1 of the CCI.

Consistent use of level 1 data and processing between ECV projects

To ensure a basic level of consistency between products the common level 1 satellite datasets on which they are based must be the same for all ECV projects as far as is possible. This is not only important for consistency of products after the first processing but when the 'official' level 1 datasets are reprocessed with improved calibration and navigation all the ECV projects using that dataset will easily be able to ingest the newly reprocessed level 1 data and provide corresponding improvements in their own products. In an attempt to show which ECV projects will have common needs in terms of level 1 datasets Table 2 identifies common sensors between different ECV projects.

In addition to ensuring the same basic level 1 processing there may be other components of the processing which should be made common for example cloud detection (but care must be taken that, for example, a cloud mask for cloud properties and a cloud mask for aerosol properties will have different requirements) and removal of atmospheric correction effects (e.g. gaseous absorption, aerosol scattering) for surface products. This ensures the same cloud-free data are used for the various ECVs which are using the same sensor. One example is the use of MERIS for the Land Cover and Fire ECV projects and another might be the use of ATSR for cloud and SST.

	(A)ATSR	MERIS	SPOT VGT	Landsat TM	ASAR	SEVIRI	MODIS	SciamaChy	GOSAT	GOME-1/2	AVHRR	GOMOS	IASI	AIRS	AMSU	ACE	SeaWiFS	MIPAS	OMI	RADALT	TMI/AMSR-E	PARASOL
SST	■					■					■										■	
Sea level																				■		
Ocean colour		■					■										■					
Clouds	■	■					■				■											
GHG								■	■	■			■	■	■	■			■			
Aerosol	■	■						■		■	■	■							■			■
Ozone								■		■	■	■							■	■		
Fire	■	■																				
Landcover		■	■	■	■																	
Glaciers				■																		

Table 2: Satellite sensors used by each ECV project as input to the derived climate data records. Note many more datasets are used for validation of the products,

Reanalysis

The role of ECMWF within the CMUG consortium is especially important to the success of the CCI, for as well as contributing its modelling and research knowledge to the programme ECMWF is also bringing its reanalysis expertise, vital for a programme where gridded climate observations will be produced for use, *inter alia*, in climate models.

Dataset Evaluation

One tool for the assessment of the quality and inter-consistency of ECV precursor data sets and products, including a comparison of shifts and anomalies in ECV products with observed climate signals will be done by CMUG using ECMWF reanalyses and other related climate data products. A tool for doing this will be the ECMWF Climate Monitoring System (ECMS) which is currently under development. The ECMS is a system for visualising time series of ECVs, e.g. as shown in Figure 1, together with other climate data. The next generation reanalysis (ERA-CLIM) is now being prepared at ECMWF and the new CCI datasets will provide an important input to the new reanalysis.

One example of ECMWF data provision is what will be provided to the Aerosol ECV project and how that data will be applied. Assimilation of aerosol amount (aerosol optical depth) and aerosol size from MODIS Terra (am) and Aqua (pm) satellite sensors into the ECWMF modelling environment is currently being pursued as part of the MACC project. ECMWF will facilitate the assessment of new CCI aerosol data products by providing data from the MACC project, including the (currently pre-operational) near-real time monitoring services, and the forthcoming second-generation MACC reanalysis (2003-2010).

Data provision

ECMWF ERA-interim data have already been provided to ECV project teams to support their work on the development of retrieval algorithms and climate data sets. ERA-interim data will also be used by the ECV projects to facilitate product evaluation, and where appropriate, advice on usage and interpretation of EMCWF products will be given. Depending on the level of interaction desired by the ECV teams, this could extend to joint evaluation of ECV products.

Observation Operators

For some of the CCI ECVs observation operators will be constructed in order to compare the climate model or reanalysis with the equivalent ECV climate data record from a precursor or CCI dataset. This is an area where ECMWF and the other CMUG partners have experience that is being contributed to the CCI programme.

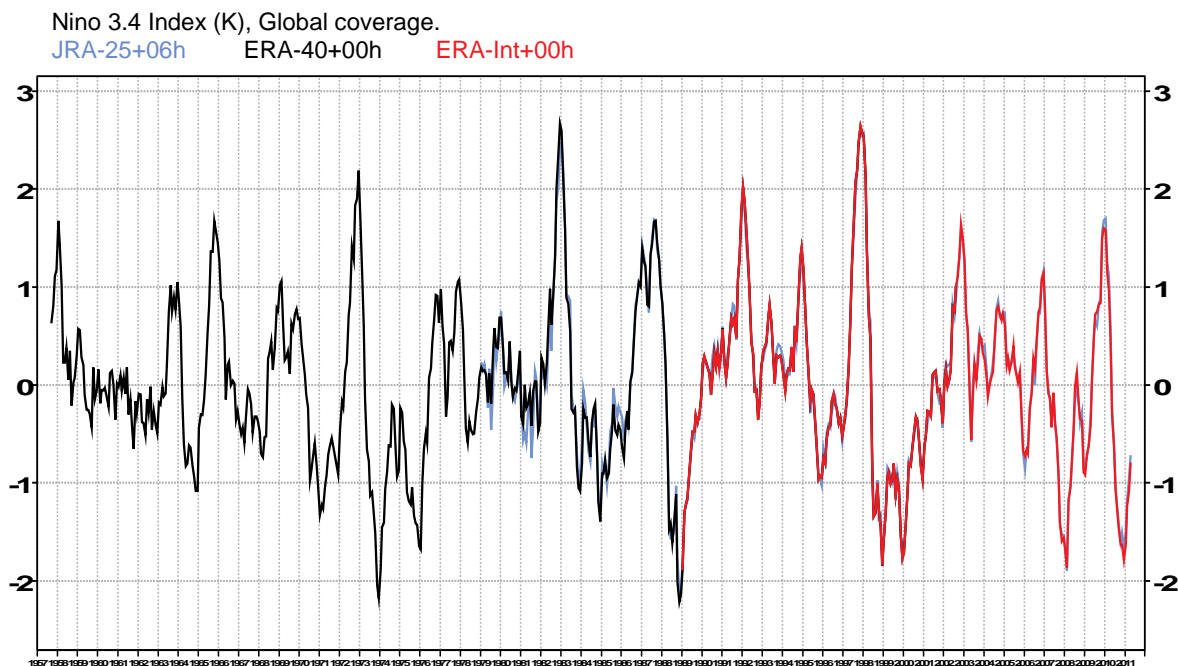


Figure 1: time series of the Nino3.4 Index (monthly means, 1957 to present) from the SST fields used in three global atmospheric reanalyses.

CMUG progress

Over the last twelve months the CMUG has made considerable progress in meeting its goals which help contribute towards the success of the CCI. Highlights include:

CMUG User Requirement Document

The primary aim of the CMUG liaison between the climate modelling community and the CCI is to ensure both are fully informed of each others work. In this way the needs of climate modellers will be understood by the ECV projects and ECV data products produced will be best suited for climate modellers to use them. The first step was canvassing climate modellers for their needs with regard to satellite climate observations, and then to convey that information to the ECV projects. The requirements of other groups (e.g. GCOS) were also included with traceability of sources documented. Descriptions of uncertainty and errors were also recorded, and the results written up into CMUG User Requirements Document (D1.2) which is available on the CMUG website (www.esa-cmug-cci.org).

Participation in CCI Colocation meeting, October 2011

CMUG partners attended the second CCI colocation meeting in Rome, October 2011, and contributed to the further direction and planning of the programme that arose from the discussions at this meeting.

Presenting information about the CCI to the climate modelling community

There has been continual effort by CMUG to reach the breadth and depth of the climate modelling community so as to inform them of the utility of CCI data products. Presentations have been made at many international conferences and meetings, including the following:

TOVS Study Conference, Monterey, USA

EGU, Vienna, Austria

IS-ENES, Barcelona, Spain

COP-16, Cancun

GEWEX, Seattle, USA

EUMETSAT Met. Satellite conference, Cordoba, Spain

WCRP WG Climate Models meeting, Exeter, UK

ESA/EGU/iLEAPS Earth observation, ESRIN, Italy

Coupling Technologies for ESMs, Toulouse, France

WCRP, Exeter, UK

WOAP, Rome, Italy

EUMETSAT Met. Satellite Conference Oslo, Norway

CMUG will also have a presence (presentation or poster) at the following forthcoming conferences: WCRP, October 2011, Denver; EUMETSAT, September 2012, Sopot; 3ICESM, September 2012, Hamburg, plus others. Please see the CMUG website for an up to date list (www.esa-cmug-cci.org). The information flow also operates the other way with climate modellers attending CMUG meetings to give a climate modelling perspective.

CCI Integration meeting at ECMWF with report

In March 2011 the CMUG organised and ran an Integration meeting at ECMWF for the CCI. The meeting explored the early product specifications of the ECV projects and how data products would be used by climate modellers, looked at ways of achieving consistency between projects, and discussed common issues (describing uncertainty, data validation, etc). A meeting report is available on the CMUG website (www.esa-cmug-cci.org).

Review of CCI Product Specifications

The ECV projects have all written Product Specification Documents which describe in detail the technical parameters of their data products. These specifications have been reviewed by the CMUG to assess how the data products will meet the needs of climate modellers. The assessment focussed mostly around the needs of climate researchers in the areas of modelling, reanalyses, and trend analyses for detection and attribution. The CMUG report (Deliverable 2.4: Analysis of how the CCI data sets will meet the needs of climate modellers) is available on the CMUG website (www.esa-cmug-cci.org).

New ECV projects

At the ESA colocation meeting for the CCI programme in Rome, October 2011 three new ECV projects were announced. These projects are Sea Ice, Ice Sheets and Soil Moisture with a consortium of organisations conducting the work for each.

The lead organisations for the three consortia are the Nansen Environmental and Remote Sensing Center in Norway (for Sea Ice), Denmark Technical University (DTU) National Space Institute (for Ice Sheets) and the Technology University of Vienna, Institute of Photogrammetry and Remote Sensing (for Soil Moisture).

The CMUG project office can be contacted at: cmug@metoffice.gov.uk