CMUG Achievements

plus:

www.cci-cmug.org
## CMUG Programme of work

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### Task 1, 2, 3, 4, 5
1. Meeting the needs of the climate modelling community
2. Feedback to ESA and CCI teams
3. Coordination and outreach
4. Interface with climate service

### Task 1, 2, 3, 4, 5
- Meeting the needs of the climate modelling community: 0.6, 0.4, 0.4, 0.4, 0.4, 0.3
- Feedback to ESA and CCI teams: 1, 0.5, 0.5, 0.5, 0.5, 0.5
- Coordination and outreach: 4, 1, 1, 1, 1, 1
- Interface with climate service: 1, 0.3, 0.2, 0.2, 0.2
Cloud Fraction JJA 2007
• Observation uncertainties compare well in structure with estimates obtained using the Desroziers et al (2005) method

• All the products exhibit negligible to very small biases

• All of the assessed O3-CCI datasets lead to improved ozone analyses

• For RR assimilation exercises, with the exception of OMI TCO3, the O3-CCI retrievals seem to better constrain the ozone analyses than retrievals obtained from the same radiances using alternative algorithms

• The assimilation of the GOME-2 NPO3 show a clear improvement in the internal consistency of the data assimilation system in terms of better fit to the AIRS ozone-sensitive IR channels which gives a statistically significant reduction in the RMS of the geopotential forecast errors in the tropics
## Ozone: main CMUG results

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<th>( \text{TCO}_3 )</th>
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\(^+\) Not assessed based on previous runs that led to –ve impact.

\(^\$\) Data not yet available.

\($)\) Not assessed based on data assessment results (Dragani, 2012).
Ambient Aerosol Optical Thickness at 550 nm
Aerosol

RMSE - Global

Sea Ice

Sea ice concentration difference, 1991-2008, MAR mean
SICCI observations minus assimilation

Sea ice concentration difference, 1991-2008, MAR mean
NSIDC/NT observations minus assimilation
Sea Surface Height

![Graph showing Sea Surface Height anomalies](image)

- **CNRM-RCSM4**
- **CCI-ECV**
- **Meyssignac et al. 2011**
- **Calafat and Jorda 2009**
- **NEMOMED12**

**Mean sea level anomalies [m]**

- Y-axis ranges from -0.08 to 0.08
- X-axis ranges from 1980 to 2015
Sea Surface Height

CCI-ECV

CNRM-RCSM4

NEMOMED12

-5 -4.5 -4 -3.5 -3 -2.5 -2 -1.5 -1 -0.5 0 0.5 1 1.5 2 2.5 3 3.5 4 4.5 5
Ocean Colour
• The data assimilation improves the fit of model chlorophyll to both the assimilated data and independent in situ observations. Improvements are seen throughout the water column, including to deep chlorophyll maxima.

• The impact on the carbon cycle is small overall, but beneficial in areas of high biological activity.

• The reanalyses are able to capture real-world variability on different timescales.

• OC-CCI and GlobColour data give very similar results, and both products are fit for purpose. However, the OC-CCI data show improved coverage and stability, which leads to better results in some areas.
Glaciers

Globcover v.2.2
ESA CCI LU 2010 v 1.4
RGI v4.0
Fire
Land Cover
CMUG cross cutting results

- Consistency
- Uncertainty
- Climate processes
- Other (data, masks, algorithms)
WCRP Grand Challenges: (1) Clouds, circulation and climate sensitivity, (2) Changes in cryosphere, (3) Climate extremes, (4) Regional climate information, (5) Regional sea-level rise, and (6) Water availability, plus an additional theme on “biospheric forcings and feedbacks.”

Goal
ESMValTool as one of the CMIP documentation functions to routinely assess the performance of CMIP DECK and CMIP6 simulations running alongside the ESGF.
Performance Metrics for Climate Models

Relative error measures of CMIP5 model performance, based on the global seasonal-cycle climatology (1980–2005) computed from the historical CMIP5 experiments. Figure 9.8 of IPCC AR5 (Flato et al., 2013).
• CMUG Phase 1 results are written up
• CMUG Phase 2 results arriving now
• Good dialogue between CMUG CRG and Science Leads
• Good interactions between CMUG and external actors
• Think integration!