

What is the Climate Modelling User Group (CMUG) ?

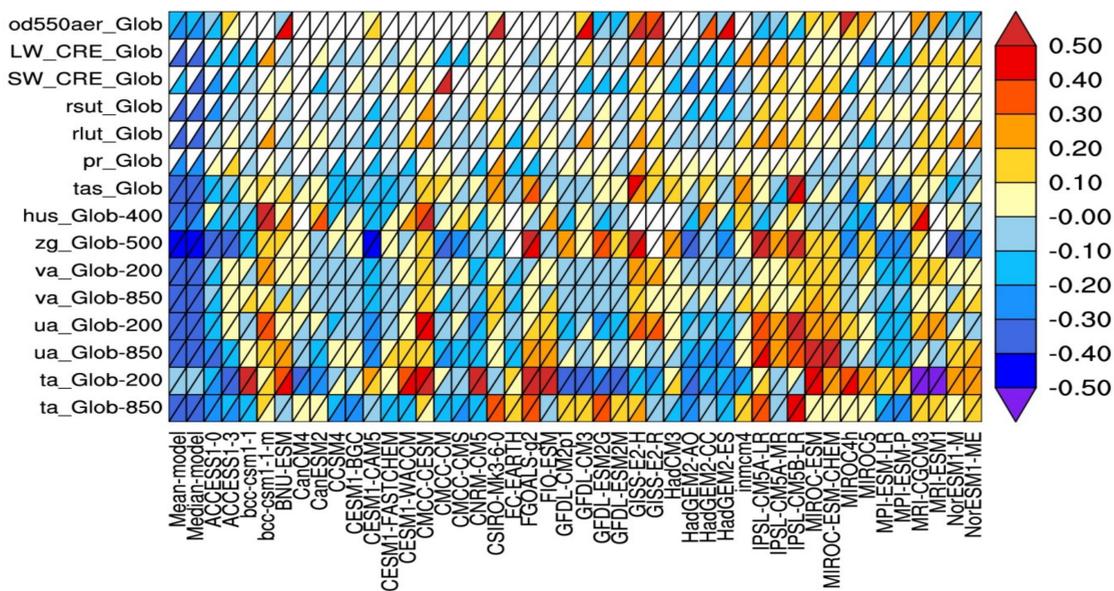
ESA's Climate Change Initiative (CCI) project is creating climate data records for 13 ECVs for climate monitoring, developing climate models and assimilation in reanalyses. The CMUG was set up as an independent group to assess the datasets for climate modellers and promote their use by them.

Model	Ocean		Atmosphere							Land			Experiment Type
	SST	SSH	SeaIce	OC	Cloud	Ozone	Aerosol	GHG	LC	SM	Fire	Glacier	
FOAM	X	X	X	X									Assimilation
NEMOVAR_ORA	X	X	X	X									Assimilation and Detection
ERA-Clim					X								Assimilation
MACC-II					X	X	X						Assimilation
JSBACH_TM3					X	X	X	X	X	X	X		Assimilation
EC-Earth/CMIP5	X				X	X	X	X	X	X			Assessment, evaluation
LMdz_ORCHIDE					X			X	X	X	X		Boundary Condition
MPI-OM, MPI-ESM	X		X	X	X								Assimilation (Polar Regions)
EMAC-MADE					X	X							Comparison
RCA HARMONIE	X				X					X			Comparison/Eval (CORDEX Africa)
Arctic HYPE		X							X			X	Assessment
CNRM-RCM	X	X			X	X				X			Comparison (Med CORDEX)
CNRM-CM, Arpege	X		X			X			X	X	X		Boundary Cond
IPSL-ESM	X		X										Boundary Cond
EC-EARTH	X		X										Boundary Condition
ESMVal	X	X	X			X			X	X	X		Tech ESMVal CMPI6 + metrics
ESMValTool	X	X	X			X	X	X		X			ESMValTool + metrics
CMF	X	X	X	X	X	X	X	X					Web interface CMF
Benchmarking	X	X	X	X	X	X	X	X	X	X	X		ESMValTool + metrics

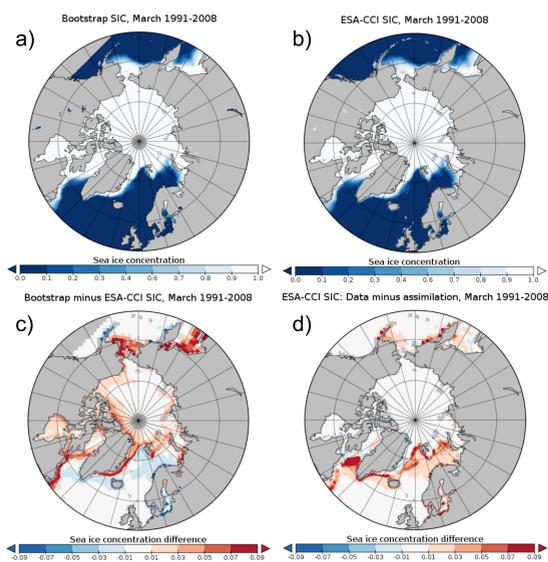
A summary of the assessments being carried out by the CMUG for each ECV and also the model evaluation tools being developed.

Assessing CMIP5 model simulations

The Earth System Model Evaluation (ESMVal) Tool is being developed by DLR to evaluate known systematic biases common to climate models, such as coupled tropical climate variability, monsoons, southern ocean processes and continental dry biases. It has been used to compare modelled aerosol optical thickness with the CCI aerosol climate data record. The plot below shows relative space-time root-mean square error (RMSE) calculated from the 1980–2005 climatological seasonal cycle of the CMIP5 historical simulations for variables listed for each row. The relative performance is displayed, with blue shading indicating performance being better and red shading worse, than the median of all the model results. White boxes are used when data is not available for the given model and variable.

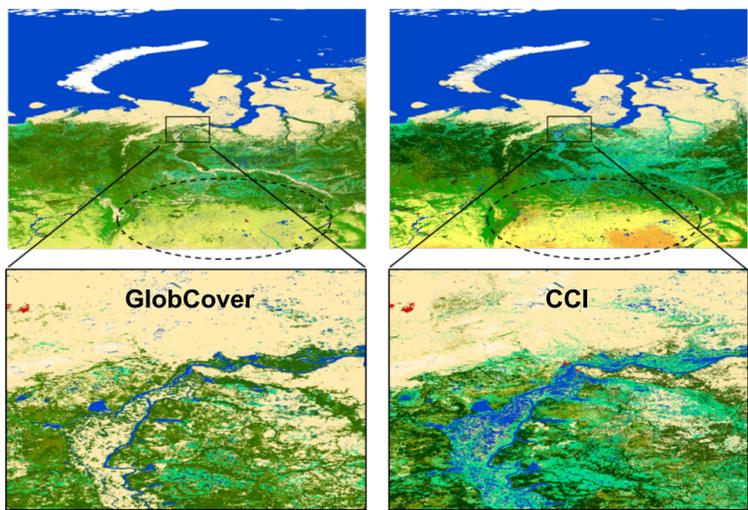


Assessing CCI Sea-Ice Fields for Models



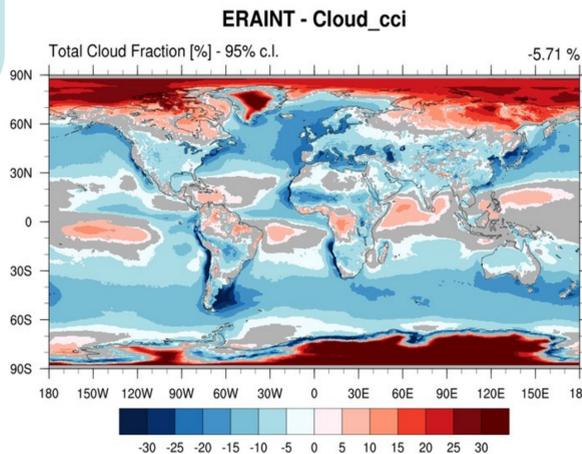
March-mean sea ice concentration for (a) NSIDC-Bootstrap and (b) ESA-SICCI sea ice products, averaged over 1991-2008. Differences between data products (c) and between ESA-SICCI data before and after assimilation into the MPI-ESM model (d) show small spurious ice concentrations, e.g., north of Norway. These are related to weather effects which are not filtered out in ESA-SICCI, since there is no robust method to do so (Ivanova et al., 2015). In the next release of the ESA-CCI sea ice product a data layer with applied weather filter will be included.

Assessment of CCI Land Cover



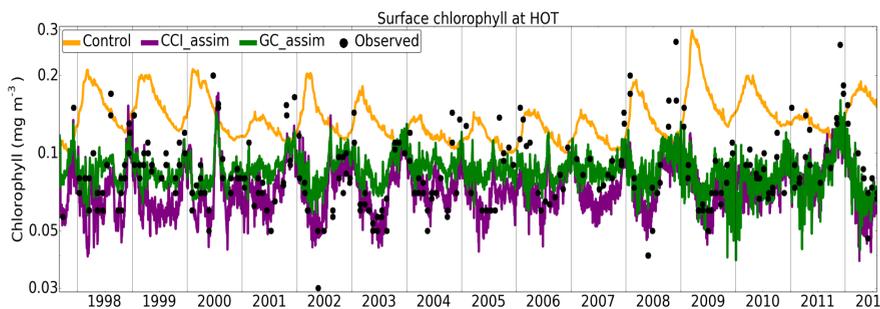
CCI Land cover was found to include more surface water (about 6-20% more) than GlobCover over parts of Siberia which might be important for understanding Arctic hydrology dominated by large rivers and a large number of small and large lakes. Impacts in the model are still to be analyzed.

Comparisons of CCI Cloud and Model data



Cloud cover from the CCI has been added to the ESMVal tool, and metrics are being developed to assess climate variability by comparing CCI cloud fraction with CLARA-A2, ERA-Interim, NCEP and CMIP3 models. The figure shows a recent comparison between ERA Interim and CCI cloud fraction data, showing the difference to be most significant at the poles.

Assimilation of CCI Ocean Colour Data



Time series of modelled and observed chlorophyll concentrations in the surface 10m at the Hawaiian site with no assimilation, GlobColour and CCI ocean colour assimilation runs.