



CMUG Science Perspective on CCI+

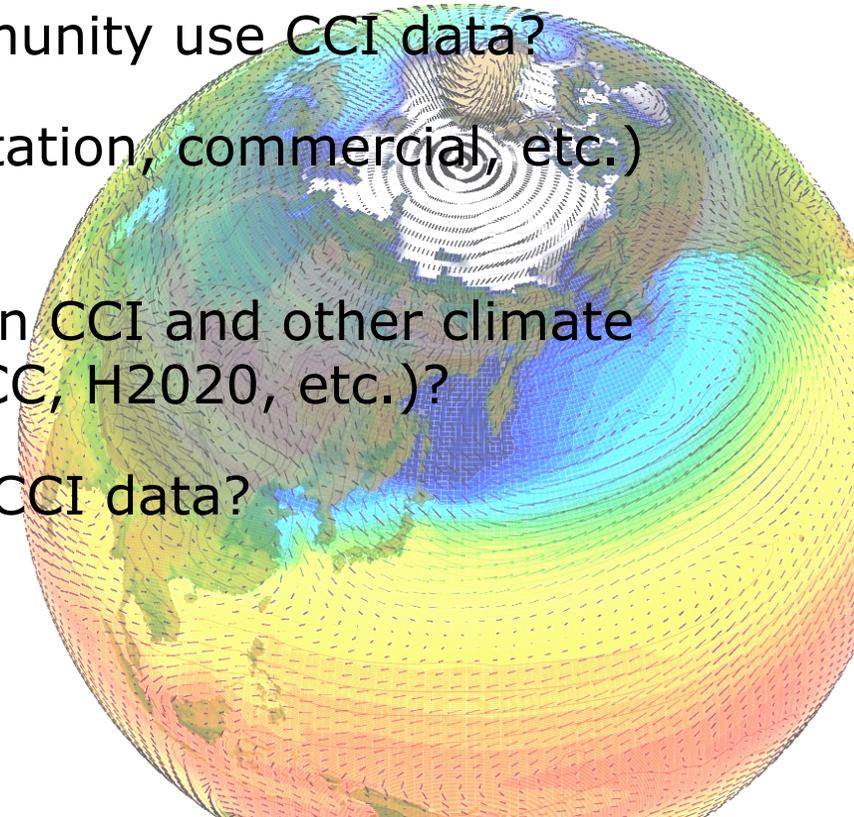


www.cci-cmug.org

The science role of CMUG in CCI+



- What can CMUG's models tell us about CCI data?
- What can CCI data tell us about CMUG's models?
- How will the climate modelling community use CCI data?
- How will other users (impacts, adaptation, commercial, etc.) use CCI data?
- What will be the interactions between CCI and other climate actors (C3S, MIPs, GCOS, CEOS, IPCC, H2020, etc.)?
- How to demonstrate the benefits of CCI data?



CMUG models



| Institute | Model name | Model components | | | | | |
|---------------|------------------|------------------|-------|------|---------------|------|--------|
| | | ATM | OCEAN | LAND | CARBON BUDGET | CHEM | CMIP5? |
| Hadley Centre | HadGEM2-ES | ◆ | ◆ | | ◆ | ◆ | Yes |
| | UKESM-1 | ◆ | ◆ | | ◇ | ◇ | |
| | GLOSEA | | ◆ | | | | |
| | JULES | | | ◆ | ◆ | | |
| | HadSST | | ◆ | | | | |
| MPI-M | MPI-ESM, JSBACH | | | ◆ | ◆ | | Yes |
| | MPI-ESM, MPIOM | | ◆ | | | | |
| | MPI-ESM, HAMOCC | | ◆ | | ◆ | | |
| | MPI-ESM, ECHAM | ◆ | | | | | |
| MétéoFrance | MOCAGE | ◆ | | | | ◆ | Yes |
| | ALADIN-CLIMAT-V5 | ◆ | | | | | |
| | NEMO | | | | | | |
| | CNRM-CM3.3 | ◆ | ◆ | ◆ | | | |
| IPSL | ORCHIDEE | | | ◆ | ◆ | | Yes |
| | IPSL-CM5 | ◆ | ◆ | ◆ | ◆ | ◆ | |
| DLR | EMAC | ◆ | ◆ | | | ◆ | |
| SMHI | EC-Earth | ◆ | ◆ | ◆ | | ◇ | Yes |
| | RCA | ◆ | (◆) | ◆ | | | |
| | HARMONIE | ◆ | | ◆ | | | |
| ECMWF | ERA | ◆ | ◆ | ◆ | | ◆ | |
| | MACC-II | | | | | ◆ | |
| | ORA | | ◆ | | | | |

Lines of CMUG work in CCI+



- Modelling assessment of the new CCI ECVs
- Modelling assessment of updated CCI ECVs
- Assessment of CCI data against external user requirements e.g. C3S
- Assessment of the climate models (with CCI data) against external user requirements e.g. C3S
- International engagement



Global assessment of ECVs



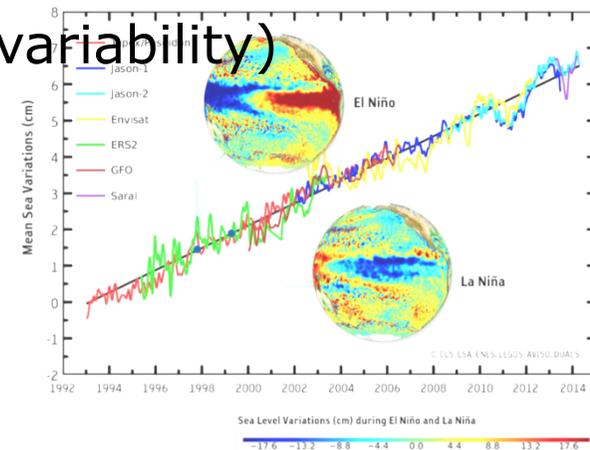
- Assessment of ECVs in CMUG global model(s)
- Could be singly or in combination (e.g. Fire, SM & **Biomass**)
- CMUG assessment of:
 - dataset quality (against user reqts)
 - consistency between ECVs
 - improvement of Phase 2 data over Phase 1
 - model performance
- Link with other CMUG MIP / ESMVal work
- Link with other research project(s)?



Regional assessment across ECVs



- Assessment of ≥ 3 ECVs in CMUG regional model or with regional focus
- Could be old and new CCI ECVs (e.g. SM, **Land Surface Temp, Biomass**) and others (e.g. fAPAR)
- CMUG assessment of:
 - dataset quality (against user reqts)
 - consistency between ECVs
 - improvement of Phase 2 data over Phase 1
 - model performance
 - Understanding the climate system (e.g. variability)
- **Link with other research project(s)?**



Suggestions for CMUG regional assessments in CCI+

Arctic

ECV's OLD: Cloud, OC...

EXTRA Permafrost

NEW: Sea state, Salinity, LC HR, Snow cover, Lakes, Above ground biomass, TLand

Number of model, observational projects: e.g. ESA APVE workshop II 27-28/10 2015

Baltic Sea region - <http://www.baltic-earth.eu/>

ECV's OLD: Cloud (sunlint HR), SST, SI, OC (Brackish water)... SSH HR?

NEW: Sea state, Salinity, LC HR, Snow cover, Lakes, Above ground biomass, TLand

Colaborate with Baltic Earth community their core research questions:

- Salinity dynamics in the Baltic Sea,

- Land-Sea biogeochemical feedbacks in the Baltic Sea region

- Natural hazards and extreme events in the Baltic Sea region

- Understanding sea level dynamics in the Baltic Sea

- Understanding regional variability of water and energy exchanges

Mediterranean Sea region - <http://www.hymex.org/?page=motivations>

- The water budget of the Mediterranean Sea

- The continental hydrological cycle and related water resources

- Heavy rainfalls, flash-floods and floods

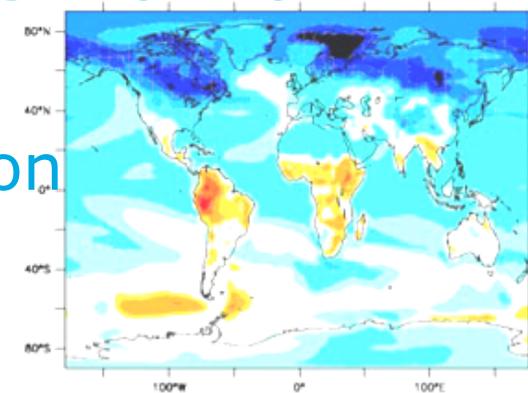
- Intense sea-atmosphere interactions

- Societal and economic impacts

CMUG examination of an Earth climate system component



- Select an Earth System component of interest to climate researchers, modellers (and policymakers) e.g. Carbon budget
- CMUG model experiment to examine the 'performance' of CCI ECVs in understanding this component of the Earth System (LC, SM, **Biomass**, Fire, Aerosols, GHG, OC, **Aerosol Precursors**) plus other ECVs (fAPAR, ocean biomass)
- Could be linked to other CMUG MIP and ESMVal work
- Link with other research project(s)?
- Regional aspects e.g. Amazon deforestation



Other possible studies



1. Sea Ice / ocean margins
2. Hydrology in Northern latitudes
3. Drought in the tropics
4. Impact of a strong El Niño
5. Spatial and temporal teleconnections
6. Research needs identified in IPCC AR5

MIPs / extending the ESMVal tool



Two areas of potential benefit to the CCI and the climate research community:

1. CMUG MIP experiment examining at CCI ECVs in a MIP set up
 - Consider the merit of aligning this with CMIP6 (for inclusion in AR6)
2. Extend the ESMVal tool (to cover new ECVs)



Collaboration with other projects / initiatives



- CMUG collaborative research with current and future H2020 projects and other research projects , e.g. CLiC, FIDUCEO
- CMUG engagement with MIPs, GCOS, CEOS, IPCC, EEA (adaptation community)....
- CMUG to work with the CCI Data Portal if Climate Projection datasets are requested by the research community
- CMUG summer school (jointly organised?)

All of which will:

- Propagate the use of CCI ECV datasets (in climate research)
- Broaden the user base of CCI ECV datasets
- Increase user feedback to the CCI ECV teams

Suggestion for CMUG and CRG links

To ensure better collaboration and information flow between CMUG and the respective climate research group one person could be part of CMUG and CRG, i.e. taking part in meetings, making sure no overlap for the WP's and promote synergy effects like writing papers together etc.

This would also make sure the SL and others in the ECV group get information about CMUG and vice versa.

CMUG and the C3S



C3S will be producing operational forecasts at seasonal and longer timescales:

- *CMUG could demonstrate to the implementers of C3S the benefit of using CCI ECV datasets in climate models*
- *and the benefit of C3S climate models independently QA'ed by CMUG using CCI data*

C3S needs ECV data that has undergone full QA

- *CMUG should demonstrate to the implementers of C3S the benefit of CCI ECV datasets that have been QA'ed by methods developed in CMUG*

C3S will not undertake R&D

- *CMUG should demonstrate to the implementers of C3S the benefit of its ongoing research in climate modelling using ECVs, and ECV validation*

What are the game changers?



- High resolution global climate modelling (25km now, 5km in 2020?)
- MIPs – CMIP6 about to start publicly
 - currently over a dozen MIPs (self organising but coordinated user groups for model validation) entry points to user communities
- IPCC AR6 – IPCC will publish special reports (e.g. oceans) as well as Assessment Reports. Likely publication date for AR6 is 2020.
- The next “climate event”

Other CMUG points for CCI+



- CCI is best served if CMUG is comprised of the key modelling and reanalysis centres in Europe, and CMUG provides a modelling and integrating perspective to the CCI
- New CMUG areas of expertise (esp cryosphere) to be considered
- The CMUG work will necessarily become more complex because of: more CCI ECV datasets, longer and more mature datasets, and increasing resolution and complexity of climate models and reanalysis
- The CMUG work could have an element that is reactive to scientific issues which arise periodically (e.g. in the past this was the warming hiatus)
- The CMUG could develop expertise as a QA channel for C3S (up to operational)
- CMUG should become more engaged with downstream users of CCI ECV datasets