Model Data comparisons

• Model fields vs observations
  Obs monitoring gives global view (esp for commissioning phase, or for developing climate quality datasets)

• Reanalyses vs observations
  To study long term variability of observations

• Assimilation in models
  To improve model fields of variables and forecasts
  Allows study of consistency between variables
Model Data comparisons

• Assessment of models with independent obs
  Improve processes in climate models.
  Compare long term trends.

• CMIP5 assessments of models vs obs
  Allow models to be compared to a reference based on observations.

• Metrics to assess climate models
  Will allow more consistent assessments of climate models.
## Task 3: Assessing consistency and quality of CCI products

<table>
<thead>
<tr>
<th>Model</th>
<th>SST</th>
<th>SSH</th>
<th>SeaIce</th>
<th>OC</th>
<th>Cloud</th>
<th>Ozone</th>
<th>Aerosol</th>
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**Experiment type**
- Assimilation
- Assimilation (Polar Regions)
- Boundary Condition
- Comparison
- Comparison/Eval (CORDEX Africa)
- Assessment
- Comparison (Med CORDEX)

## Task 4: Exploiting CCI products in MIP experiments

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</table>

**Experiment type**
- Boundary Cond

## Task 5: Adaption of climate evaluation tools for CCI needs

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</tbody>
</table>

**Experiment type**
- Tech Infra ESMVal CMPI6
- Int of CCI metrics
- Web interface CMF
SSM/T-2 Ob-Fg for ERA-Interim

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Ocean colour experiments

• Assimilate chlorophyll products into FOAM-HadOCC model
• Create global reanalysis for September 1997 – July 2012
• Compare:
  • Control run
  • Assimilation of OC-CCI chlorophyll
  • Assimilation of GlobColour chlorophyll
• Assess:
  • Impact of data assimilation on biology and carbon cycle
  • Differences between OC-CCI and GlobColour runs
  • Seasonal and inter-annual variability
Impact of assimilation on fCO$_2$
(compared to observations from SOCAT v2)

OC-CCI  |  GlobColour

Assimilation better  |  Control better

μatm

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Impact of assimilation on fCO$_2$
(compared to observations from SOCAT v2)

**OC-CCI**

Better: 5,856,471 (66%)
Worse: 3,053,868 (34%)

**GlobColour**

Better: 5,607,541 (63%)
Worse: 3,302,818 (37%)
Surface chlorophyll at BATS

In situ data from http://bats.bios.edu/
Cloud liquid water
HadGEM2 vs. obs: JJA 2007
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

Meehl et al., EOS, 2014
• 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., 20137).
• A similar figure will be produced for selected ESA CCI ECVs using ESA CCI as the reference data set and if available an alternate observational data set for comparison.