climate change initiative

→ CLIMATE MODELLING USER GROUP

MOHC RCM study using CCI Lakes data (WP3.7)

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Assessment of Lake CCI data using Regional Climate Model (RCM) experiments

Proposed design – drive RCM (HadREM3-GA7.05) with reanalyses and perform sensitivity experiments:

- Control: Lakes described as inland water in the land surface scheme in ERAInterim driven simulation for 1982-2012

- Anomaly: As control but with lakes represented by observed lake temperature and ice fraction over full observation period

Global Lake Surface Water Temperature and Lake Ice Cover LIC ECVs from this project could not be used as observation intermittency meant required daily data were not available

Used ARC3 dataset for lake surface temperature with two options explored:

- High res climatology (0.05x0.05), bimonthly (suitable for tropical region)

- Daily temperature of lake centre (1995-2011), MacCallum and Merchant (2011), required for high latitude region given the variability

ERAInterim-driven HadREM3-GA7.05 run

- Run with filled lake (i.e. lakes described as inland water in the land surface scheme), CORDEX ERAInterim run, 1982-2012)

- Run with lakes prescribed from ARC3, lake ice fraction = 1 if T<0C, otherwise 0, 1996-2011 (also common period for analysis)

- Model evaluation:

1. EObs v20.0e , 0.11 degree (Cornes et al 2018)
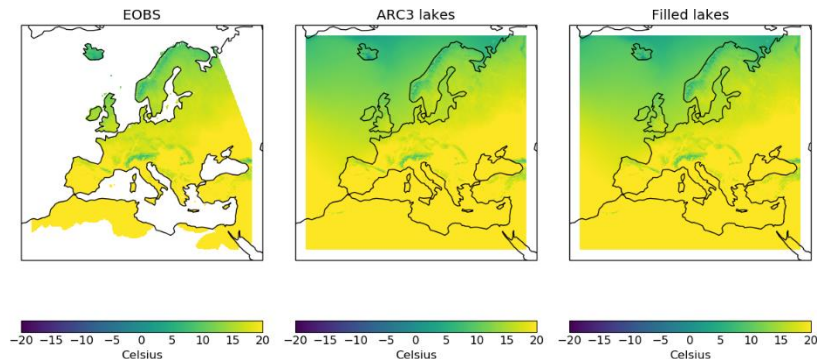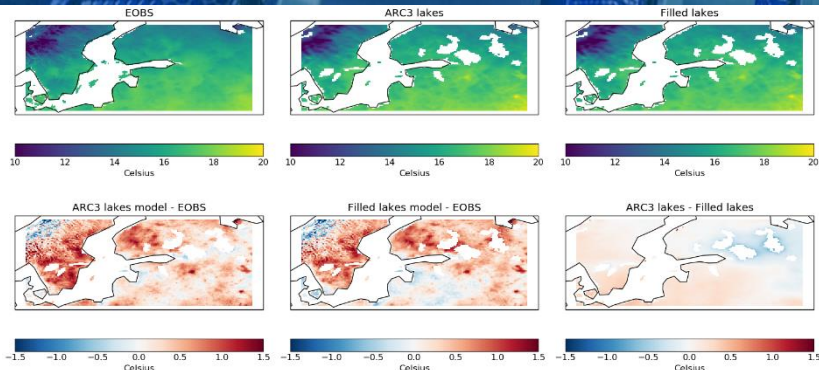
2. LST-CCI (CMUG product)
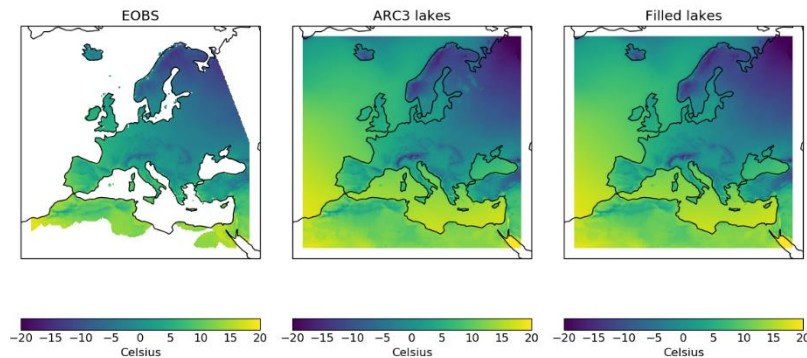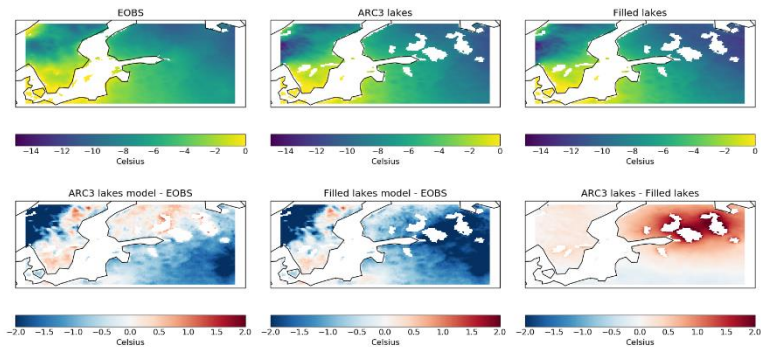
Clear effect on local climate from prescribed lake temperature around big lakes
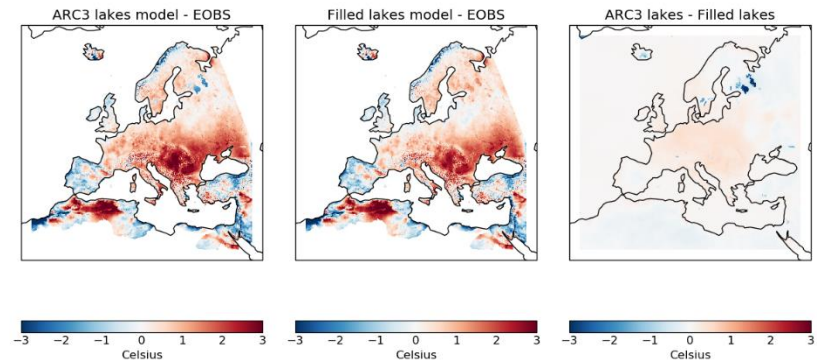
Improved comparison with observations

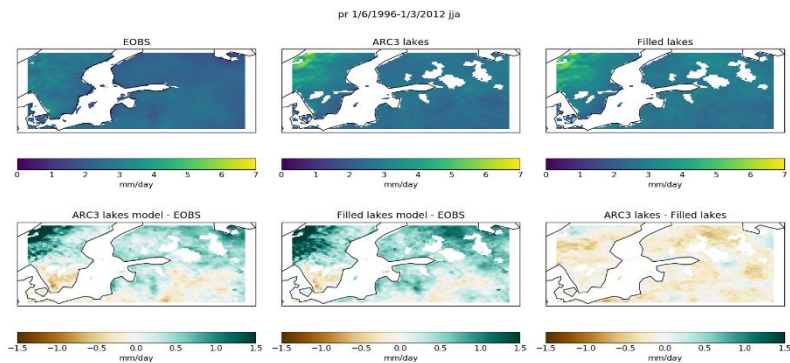Smaller differences in T in this season, local effects around Russian lakes, reduction on precipitation bias

Comparison with LST-CCI
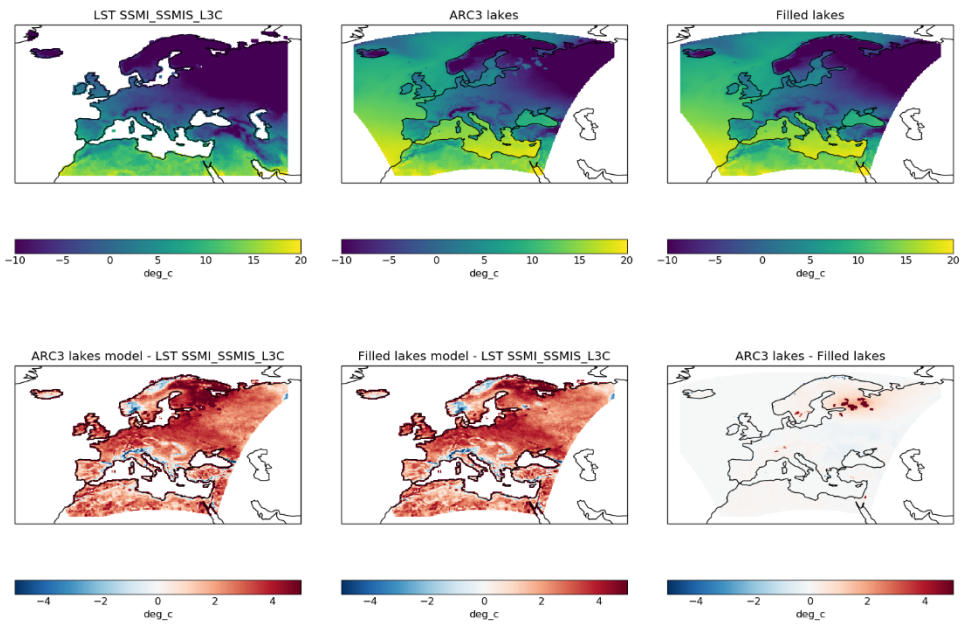
- CCI ECV lake surface water temperature and lake ice cover data not currently useable in climate model simulations due to gaps. We suggest a reconstruction like that applied to the ARC3 lake data set (MacCallum and Merchant 2011).

- By including lake surface water temperature/lake ice in our re-analysis driven RCM run over Europe, winter and summer surface air temperature biases over land surrounding larger lakes (> 5000km^2) are reduced compared to E-OBS observations.

- There are little to no changes in temperature or precipitation in areas surrounding smaller lakes (< 500 km^2) but this may be a feature of model resolution (and limited to mean climatology)