

ERA-CLIM2 WP4 Status Report

DWD, ECMWF, FFCUL, RIHMI,
UNIBE, UNIVIE, UVSQ

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Thanks to EC for giving us the opportunity to complete our tasks

April 25, 2016

Main tasks

- Making optimal use of observations in reanalysis, and providing end users with meaningful information about uncertainties in reanalysis products.
- Range of activities,
 - quality control and error estimation for input observations,
 - work on bias correction and homogenisation of data records,
 - quality assessments of reanalysis products based on independent observations and comparisons with other reanalyses and high-level observational products.

Status of Deliverables

Deliverable number	Deliverable title	Delivery date
D4.1	RS bias adjustments (UNIVIE)	20
D4.2	Updated RS bias adjustments (UNIVIE)	48
D4.3	QC for observations from FFCUL (FFCUL)	48
D4.4	Visualization tool for QC (FFCUL)	12
D4.5	QC for upper-air, surface, and snow obs. (RIHMI)	36
D4.6	Methodology for quantifying obs error (UBERN)	36
D4.7	Verification of precipitation against GPCC (DWD)	48
D4.8	Global energy, water, carbon cycles (ECMWF, UNIVIE, UVSQ)	48
D4.9	Upper air data qc (UBERN, RIHMI)	28
D4.10	Comparison with other reanalyses (UNIVIE; ECMWF)	48
D4.11	Low frequency variability and trends (ALL)	48
D4.12	Uncertainty of input parameters for carbon budget (UVSQ)	20
D4.13	Confidence intervals on carbon fluxes (UVSQ)	48
D4.14	Comparison of CTESSEL, ORCHIDEE flux estimates (ECMWF, UVSQ, UNIVIE)	48

Collaboration July 2015-

- Intense collaboration ECMWF, UNIVIE, UBERN
 - Upper air bias adjustments provided for ERA5
 - ERA-preSAT (1939-1967) evaluation, paper in preparation
- CHUAN v2.0 delivered 08/2015 (WP3).
 - Analysis departures of newly digitized data have been calculated offline, are currently analysed (WP4)
- Self-assessment of newly digitized and quality controlled data FFCUL, RIHMI (WP3-WP4), D4.9
- Preliminary evaluation of CERA20C (WP1-WP4)
- UNIVIE now member of COST-action 1402 „Evaluation of Ocean Syntheses“ STSM scheduled (WP2-WP4)

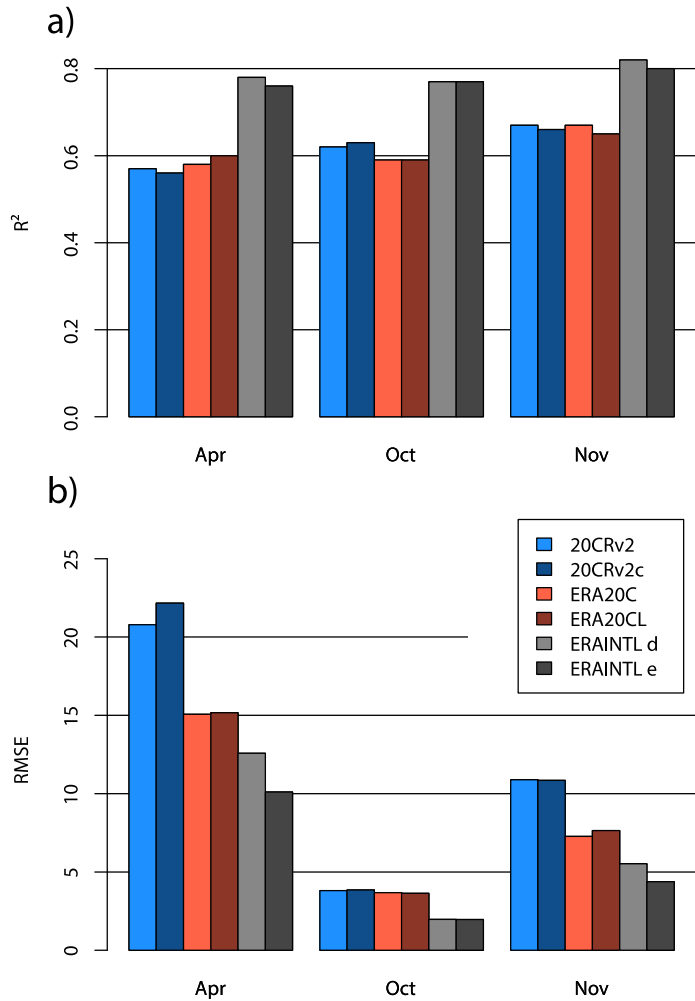
Progress since July 2015

- Work on ERA-preSAT paper
 - Excellent upper air background departure statistics
 - Inhomogeneities in the Tropics
- Radiosonde -T bias correction with annual cycle for ERA5
 - Adjustments read into IFS, assimilation runs ongoing, 1979-
 - Extension back to 1940s challenging, internal testing is ongoing
- Radiosonde humidity bias correction
 - Beta version available, uses quantile matching,
 - Comparison with reprocessed satellite data
- Austrian (FWF) project has been funded
 - Arctic energy budget diagnostics in collaboration with AWI, ECMWF - will strengthen uncertainty estimates for ERA-CLIM2

Progress since July 2015

- ECMWF
 - CERA20C proceeds at fast pace, first evaluations promising
- RIHMI
 - Upper air QC and quality assessment available, uploaded to ECAS
 - Snow data digitized, already used for validation
- FFCUL
 - Homogenization and QC of key surface stations (Madeira, Azores)
 - Evaluation of background departure statistics ongoing
- DWD
 - Regional and global PREC validation studies - show importance of independent validation. Homogenization efforts (HOMPRA)
- UVSQ
 - Improved studies on sensitivity of historic carbon fluxes on LCC

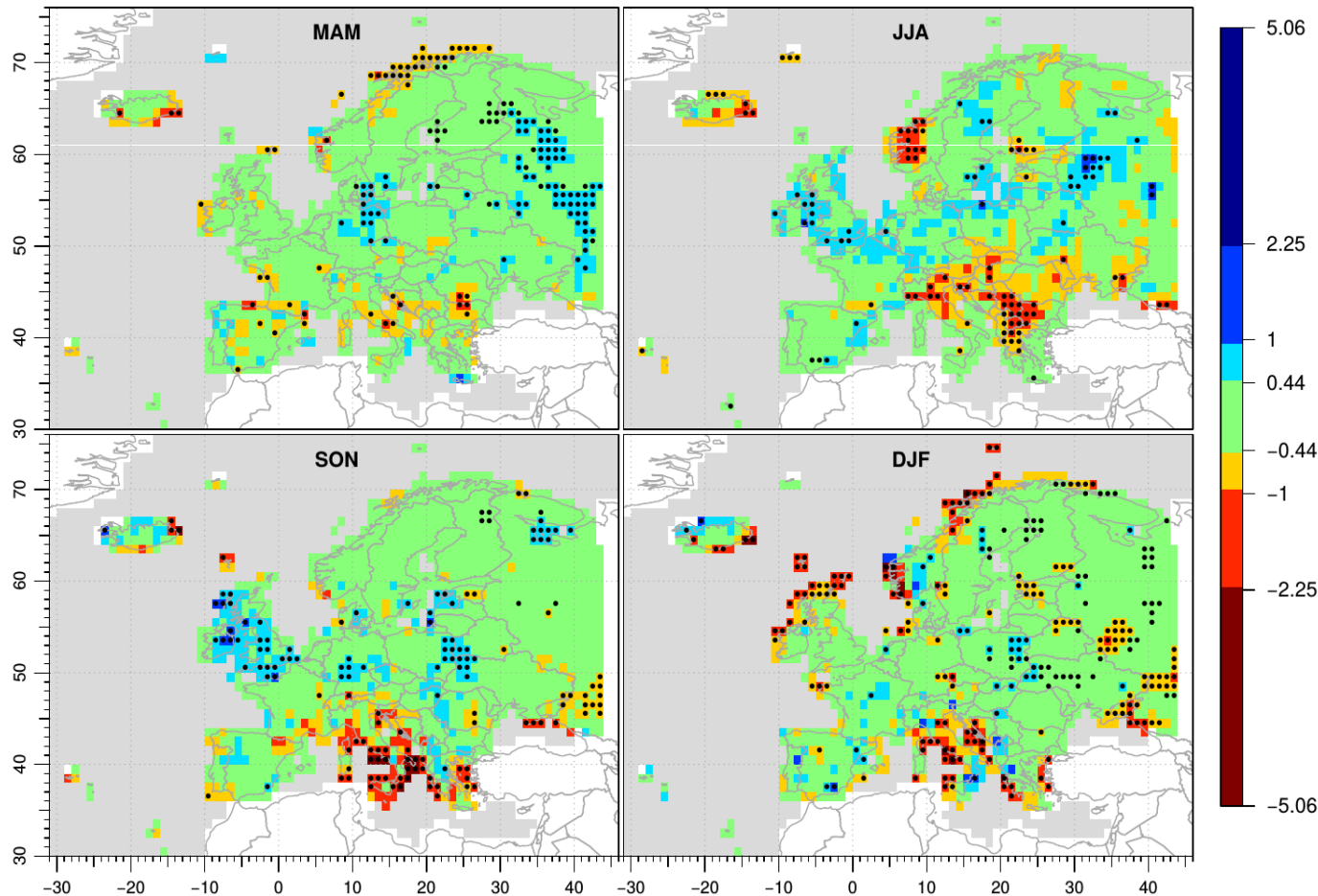
Much improved snow cover analysis



a) correlation coefficient and b) RMSE averaged over 13 Arctic stations for daily April, October and November snow depth in ERA20C, ERA20C Land, 20CRv, 20CRv2c (all 1901-2011), ERA-INTERIM land d (GPCC corrected) and ERA-INTERIM land e (uncorrected). For the climatology and anomalies, the corrected version was used. Note that the sample size for ERA-INTERIM is smaller (1979-2011)

RIHMI, UBERN

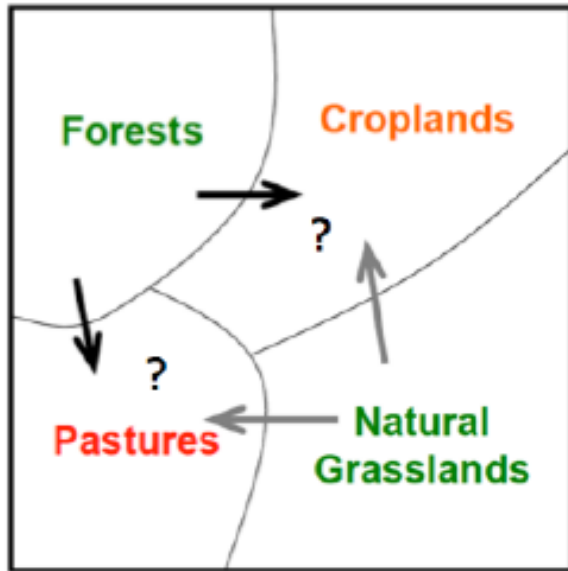
Reanalysis precipitation validation



Trend difference in ERA-20C minus HOMPR Europe in mm/year (1951-2005). Black dots indicate a significant trend difference ($p < 2.5\%$)

DWD

Uncertainties from Land cover changes...

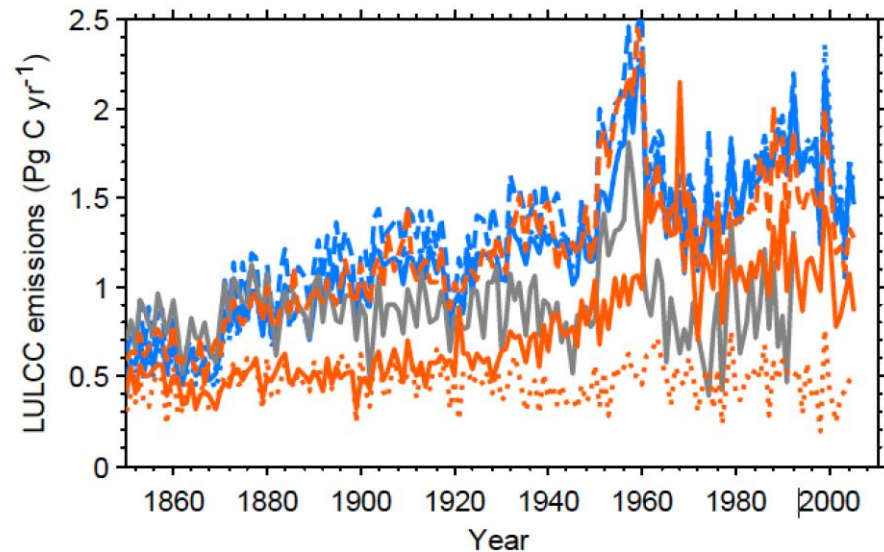


→ Derive several possible historical land cover maps (PFTs)...



→ LCC emissions

Legend for LCC emissions:
- BM1 (orange dotted line)
- BM2 (orange dashed line)
- BM3 (orange solid line)
- JP (grey solid line)
- FM1 (blue dotted line)
- FM2 (blue dashed line)
- FM3 (blue solid line)



Natural transition
(Hurtt et al.)

UVSQ

Plans for next 12 months

- D4.5, D4.6: QC Already excellent results, no problem anticipated
- Advanced Diagnostics for coupled reanalysis - Effort started (COST action, FWF project, STSM M. Mayer)
- Generate observation feedback for CHUAN 2.0:
 - Completed, quality assessment has just started
- Complete ERA-preSAT paper
- Solar elevation dependent radiosonde BC for pre-1979 period
- Radiosonde humidity bias adjustments and comparison with reprocessed satellite data
- Publishing concept for deliverables 4.2,4.3,4.7,4.8,4.10,4.11,4.13,4.14
- Uncertainties of Carbon fluxes due to uncertainties from meteorological forcing assessed by ensemble of the CERA-20C
- Extend precipitation evaluation to CERA-20C
- 3rd General Assembly in Vienna, Jan 2017