Quantifying and reducing uncertainties

Work package 4

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

ERA-CLIM2 4thGA, Dec 13, 2017

Main tasks

- 4.1 making optimal use of observations in reanalysis, and
- 4.2 providing end users with meaningful information about uncertainties in reanalysis products.
- involves a range of activities,
  - quality control and error estimation for input observations,
  - work on bias correction and homogenisation of data records,
  - comparisons with other reanalyses and high-level observational products.
  - diagnostic studies
  - Ensembles now available, do they describe true uncertainty?

Deliverables 19 Jan 2017

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)	24
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

8 threads started ...

Status of Deliverables 15.11.

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Are there threads in infinite loop ???

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No, it was just efficient parallelism...

Upper air data base

- ERA-preSAT was catalyst for progress in this respect
- CHUAN2.1 assembled in July 2017, including recent digitized data
- Data format (ODB2) fit for Copernicus Climate Data Store and for assimilation into reanalyses
- Prospect of ERA5 going back to 1950 is highly motivating
- More formal maintenance and documentation procedure should be implemented for Copernicus

Data portals, visualization tools

- Continuous development until end of project

- http://www.ecmwf.int/en/research/climate-reanalysis
- http://transcom.globalcarbonatlas.org/
- http://srvx1.img.univie.ac.at/raobvis/
- http://eraclim-global-registry.fc.ul.pt/

Conclusion

- Capacity has been built for
  - for full coupled reanalysis of 20th century
  - Correcting data and metadata errors
  - Evaluation of fluxes through climate system
  - Including carbon cycle for long reanalysis
  - Answering pressing research questions (e.g. low frequency variability
- Prospect of ERA5 going back to 1950 is highly motivating
- Ensembles spread more frequently provided, but do they describe true uncertainty

Rationale for EU follow on project

- Assimilation in presence of strong observation density gradients
- Coupled diagnostics, flux validation
- „Ultimate" solution for RS-T using GPS-RO as reference – GAIA-CLIM
- Evaluation of ensembles
  - apply EMOS, BMA to reanalysis ensembles, observation ensembles?
- Prove positive impact of rescued data

continued

- Update and include new ISPD version
- Continue data rescue (e.g. METEOSAT1 images, whaling log books) and feedback analysis
- Rescued data often not in shape to be assimilated or not CDR
- Carbon data assimilation? Feasible?
- Coupled long term SST assimilation

Achievements to be promoted into Copernicus

- Homogenized UA data consistent with GPS-RO – consistent anchor back to beyond 2001
- Energy budget diagnostics
- After further tests: RH and wind homogeneity adjustments.
- Feed QC flags into sources

- WP2-WP4 interaction
- Meteorological input for carbon models crucial
- CRUNCEP increases Primary production fluxes by 50% compared to CERA20C, net fluxes sometimes opposite
- Soil freezing important for co2 fluxes in extratropical boreal regions