

## ERA-CLIM2 4<sup>th</sup> General Assembly Welcome and Introduction

**Roberto Buizza** 

**European Centre for Medium-Range Weather Forecasts** 

### Welcome



Welcome and thank you to:

- Everyone for your help and engagement, especially to the WP Leaders for their leadership role
- Everyone for all for your work and progress (we will hear more about it ..)
- *Monika Kacik* for her support and help
- Stefan Brönnimann for organizing this final 4<sup>th</sup> General Assembly

After the WS:

 Please let me know if you object that your slides will be made available on ECMWF ERA-CLIM2 project web site:

http://www.ecmwf.int/en/research/projects/era-clim2

### Outline



### 1) Adoption of the Agenda

- 2) Project overview and deliverables' status
- 3) 5<sup>th</sup> International Conference on Reanalysis (Rome, 13-17/11/17)
- 4) ERA-CLIM2 Symposium

### **1. Adoption of the agenda**



Tuesday 12 December (0900-1800), Kuppelsaal, Main Building, University of Bern			
0900-	Registration		
1030-1045	Welcome and Introduction	Roberto Buizza	
1045-1455 WP1 (Global 20 <sup>th</sup> century reanalysis) and WP5 (Service developments)			
1045-1105	Overview WP1 / WP5	P. Laloyaux	
1105–1130	Biogeochemical reanalysis	C. Perruche	
1130-1155	CERA-SAT	D. Schepers	
1155–1220	Land Carbon reanalysis	P. Peylin / N. Vuichard	
1220-1330 Lunch			
1330-1355	CERA-SAT ocean component and further developments	E. de Boisseson	
1355-1420	Tropical cyclone representation	Y. Kosaka	
1420-1445	Improving the use of historical surface and upper-air observations	P. Dahlgren	
1445-1745 WP2 (Future coupling methods)			
1445-1455	Overview of WP2	M. Martin	
1455-1515	SST assimilation developments	D. Lea and J. While	
1515-1535	Sea-ice assimilation developments	CE. Testut	
1535-1555	Ensemble B in NEMOVAR	A. Weaver	
1555-1625	Coffee break		
1625-1645	Ensemble covariances in coupled DA	A. Storto	
1645-1705	Impact of 4DVar and research into fully coupled DA	A. Vidard	
1705-1725	Land carbon optimisations	P. Peylin	
1725-1745	Strengths/weaknesses in existing coupled DA, coupled error covariances and model drift/bias correction	K. Haines/X. Feng	
1745-1820 Discussion (WPs 1, 2 and 5)			
1820-2000	Reception		
2000	End of first day		

# **1. Adoption of the agenda** Wednesday 13 December (0900-1800) Kuppelsaal, Main Building, University of Bern



0845-1225 WP3 (Earth System Observations)			
0845-0910	WP3 Overview and accomplishments	S. Brönnimann	
0910-0935	RIHMI Input for WP3 within ERA CLIM2 Project	A. Sterin	
0935-1000	Data Rescue, QC and a metadatabase: FCiências.ID's contribution to WP3	M. A. Valente	
1000-1025	Upper air data rescue Météo-France's contribution to WP3	S. Jourdain	
1025-1050	Snow in situ and satellite data	J. Pulliainen	
1050-1110 Coffe	e break		
1110-1135	Satellite data records for reanalysis	J. Schulz	
1135-1200	tbd	N. Rayner	
1200-1710 WP4 (Quantifying and reducing uncertainties)			
1200-1205	Overview of WP4	Leo Haimberger	
1205-1225	Uncertainties and bias corrections for radiosonde temperatures	Leo. Haimberger	
1225-1350 Lunch break			
1350-1410	Bias corrections for radiosonde humidity	Michael Blaschek	
1410-1430	Quality control for observations	M. Antonia Valente	
1430-1450	ERA20C and Cera-20C precipitation in comparison to GPCC daily and monthly analyses	Markus. Ziese	
1450-1510	Uncertainties associated to the land carbon balance; comparison between ORCHIDEE and CTESSEL	Philippe Peylin	
1510-1530	Comparison with other reanalyses, Trends and low frequency variability	Leo Haimberger	
1530-1610 Coffee break			
1610-1630	Comparisons of ERA reanalyses with the station Upper Air data	Alexander Sterin	
1630-1650	Uncertainties in energy budgets	Leo Haimberger, Michael Mayer,	
1650-1800 Discussion The ERA-CLIM2 project: lessons learned and open questions for the future			
1900 Dinner			
End of second day			

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### 2. The FP7 ERA-CLIM2 project (2014-2017)



Goal: Production of a consistent 20<sup>th</sup>-century reanalysis of the coupled Earth-system: atmosphere, land surface, ocean, sea-ice, and the carbon cycle



#### Main components:

- Production of coupled reanalyses, for 20C and the modern era (WP1)
- Research and development in coupled data assimilation (WP2)
- Earth system observations for extended climate reanalyses (WP3)
- Evaluation of uncertainties in observations and reanalyses (WP4)
- Improving access to reanalysis data and input observations (WP5)



- 3 new reanalysis datasets to supplement CERA-20C
- CERA-20C/Carbon (land and ocean)



Total land carbon net flux between the atmosphere and the land from CERA-20C/ Land carbon

 $\rightarrow$  increase of the land ecosystem carbon sink over the century

#### CERA-SAT

Range (days) when 365-day mean 2-metre temp. AC (%) falls below threshold



CERA-SAT is much better than ERA-Interim CERA-SAT is similar to ERA5 EDA system

 $\rightarrow$  2-metre temperature improvement at short time scale not yet investigated

CERA-SAT/Carbon (land)



All WP2 deliverables completed.

#### Ocean DA:

- SST (2.1) and sea-ice (2.2) assimilation developments
- Use of ensembles in the background error covariances (2.3)
- Testing 4DVar in the ocean (2.5)

#### **Coupled DA**:

- Coupled error covariances using air-sea balance relationships tested (2.4)
- Coupled model bias corrections (2.10) •
- Fully coupled DA in idealised models (2.11

#### **Papers:**

At least six peer reviewed papers accepted, published or in preparation in the last 9 months.

#### Land and ocean carbon:

- Optimisation of land carbon parameters (2.6)
- Methods for coupling ocean biogeochemistry ٠ (2.7)

#### **Code developments:**

A new version of NEMOVAR (v5), containing all the ocean DA developments made in ERA-CLIM2 is about to be released.

Parameterized and hybrid T100m standard devs estimated from ECMWF 11-member ocean reanalysis.



0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0





#### **Deliverables**:

- Completed: D3.3, D3.6, D3.7, D3.19
- Pending: D3.10, D3.13, D3.14

Registry: updated and online



#### Data:

- **Upper-air/surface:** QC data delivered and reported
- In-situ snow: data delivered
- Satellite: now running at full speed

#### Papers and Outreach:

- Common publication submitted to BAMS
- Several scientific papers and conference presentations
- Book publication on historical extreme events



#### Except D4.10, D4.14, WP4 deliverables completed. **Upper air and surface:**

- All radiosonde records and PILOT records digitized in ERACLIM(2), ready for assimilation
- Homogenization of temperatures available for ٠ assimilation, back to beginning of records
- Good progress in humidity homogenization ٠
- Special QC and homogenization for certain long records



#### **Diagnostics**:

- Improved method for estimating surface energy balance
- Estimates of OHC uncertainty from CERA20C, • ORA20C
- Lateral ocean flux diagnostics (e.g. Moorings vs. reanalyses) for the Arctic and Tropics

#### Low frequency variability, intercomparisons:

- Community effort, many results from WP1,2,3 fall into this category as well
- CERA20C clearly better than ERA20C, NOAA-20CR in terms of upper air, precipitation
- Assessment of land carbon sink remains big challenge. Sensitive to meteorological forcing.
- Limitations in temporal homogeneity evident ٠ even in most recent reanalysis products - a clear indication that further dedicated







#### **D5.2: Data Services**

- 1 PByte CERA-20C atmospheric + wave + feedback observations added to the Public Datasets (early 2017)
- CERA-SAT consolidation has just finished and ½ Pbyte dataset has been released to the public

#### **D5.3: Usage statistics**

- Extended the reporting capability of the Public Data Server.
- Usage statistics for CERA-20C will be shown in the report and WP5 presentations, including study on most popular parameters

Delivered Volume in TB



### 2. Project deliverables (to be updated on 8 Dec)



- > 88% of the deliverables (58/66) have been submitted and approved;
- > 8% of the deliverables (5/66) are in a draft format;
- ➤ 3 deliverables are pending:
  - D3p10: AVHRR polar winds (EUMST) expected to be completed by 15 Jan
  - D3p12: AMV from MFG (EUMST) Expected to be completed by 25 Jan
  - D3p13: Radio occultation data (EUMST) Expected to be completed by 12 Jan



### 2. Project publications





### **ERA-CLIM2** publications

# ERA-CLIM2 publications

# of publications written by people funded by ERA-CLIM2

# of publications that use ERA-CLIM2 data or acknowledges ERA-CLIM2 support

# of publications that discuss work funded by ERA-CLIM2



### **2.** Financials



- Pre-financing (60% with retention of 5% guarantee fund) – Q1-2014
- First interim after month 18 (up to 90% of the budget) – Paid by May 2017
- 3. Final report needs to be sent by 31/01/2018
- 4. Final payment by June 2018

All partners should have received 85% of their agreed reimbursements (5% kept by EC as a guarantee fund).

The following graphs illustrates the budget consumption at 31/12/2016, after RP2.



#### Total and consumed budget





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### **3.** 5<sup>th</sup> International Conference on Reanalysis





ERA-CLIM2 4<sup>th</sup> General Assembly (Bern, 12-13 Dec 2017) - Roberto Buizza: Welcome and Introduction

### **3.** 5<sup>th</sup> International Conference on Reanalysis





### **3. 5th International Conference on Reanalysis**



ICR5 (Rome, 13-17 Nov 2017) saw an important contribution from the ERA-CLIM2 people. ICR5 gave us the opportunity to illustrate the project's results to users.

It is worth to list few key recommendations relevant for the European Union (see D9p1, Policy Brief #4):

**Reanalysis production** - As production centers move toward coupled Earth-system reanalyses, they should embrace the notion of families of products designed to support different applications. Reduced latency of data products (ideally real-time) should be aimed for, since it can increase reanalyses' value.

**Observations for reanalysis** - More funding should be made available to support the rescue, reprocessing, recalibration, correction, quality control and use of observations for reanalysis.

### **3.** 5<sup>th</sup> International Conference on Reanalysis



**Methods for reanalysis** - There is a gap of research funding to improve the design of data assimilation methods for reanalysis. Should the funds for such essential research come from Copernicus or from programs such as H2020?

**Evaluation of reanalyses** - Diagnostic and evaluation activities that look at the coupled atmosphere-ocean-land Earth System reanalyses should be promoted.

**Applications of reanalyses** – The communication between reanalyses' producers and users must be increased. There is a need for better and more 'actionable' uncertainty characterization.

**Communication** - Promote reanalyses as a key resource in policy relevant documents from area planning on the local scale, to IPCC Assessment reports on the global scale.

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### **Symposium**



Stefan, thank you for proposing it, and organizing it!!

And thank you to the Univ. of Bern for hosting us!!

### ERA-CLIM2 -Climate Reanalyses and Services for Society

UNIVERSITÄT BERN

OESCHGER CENTRE CUMATE CHANGE RESEARCH

14 December 2017, 9:15-18:30 Kuppelsaal, Main Building, University of Bern

#### OGRAM

PROGRAM	
0915-0920	Welcome Christian Leumann (Rector) Univ. Bern, Switzerland
0925-0940	Introduction Roberto Buizza, ECMWF, UK
0940-1000	New Reanalyses for Society Patrick Laloyaux, ECMWF, UK
1000-1020	Ocean data assimilation for reanalysis Matthew Martin, Met Office, UK
1020-1050	Coffee break
1050-1110	Coupled Data Assimilation Methods Andrea Storto, CMCC, Italy
1110-1130	Observations for Reanalyses Nick Rayner, Met Office, UK
1130-1150	Importance of Satellite Data Jörg Schulz, EUMETSAT, Germany
1150-1210	Reducing uncertainties in reanalysis input and products Leopold Haimberger, Univ. Vienna, Austria
1210-1230	Discussion
1230-1430	Lunch break
1430-1450	Developing a truly global framework for climate services: the GFCS Michel Jarraud (former Secretary General of WMO)
1450-1510	Overview of ERA-CLIM2 Roberto Buizza, ECMWF, UK
1510-1530	Reanalysis within Europe's Copernicus Initiative Jean-Noël Thépaut, Copernicus C3S, UK
1530-1620	Coffee break
1620-1640	The Swiss National Center for Climate Services Bertrand Calpini, MeteoSwiss, Switzerland
1640-1700	New European capabilities from space Jörg Schulz, EUMETSAT, Germany
1720-1720	The Global Climate Observing System (GCOS) Carolin Richter, GCOS/WMO, Switzerland
1720-1740	Reanalysis Stories Stefan Brönnimann, Univ. Bern, Switzerland
1740-1830	Reception

Participation is free of charge, please register: dimate.services@giub.unibe.ch