WP3 Overview and Accomplishments

EUMST, FFCUL, FMI, METFR, METO, RIHMI, UNIBE

18 January, 2017

Main tasks

- T3.1 - Data rescue for in-situ observations, quality control and metadata

- T3.2 - Satellite data rescue, reprocessing and inter-calibration

- T3.3 - Boundary constraints and external forcing

- Strong collaboration with WP4 (QC, comp

Status of Deliverables

Number	Description (Lead beneficiary)	Month
D3.1	Data catalogue (UBERN)	6
D3.2	Priorities for data rescue (UBERN)	6
D3.3	Meta-database update (UBERN)	48
D3.4	In-situ data for reanalysis (UBERN)	36
D3.5	In-situ data (other) (UBERN)	42
D3.6	Quality-controlled version of D3.4 (UBERN)	48
D3.7	Quality-controlled version of D3.5 (UBERN)	48
D3.8	RTTOV updates (METO)	36
D3.9	Early satellite data (METO)	37
D3.10	AVHRR polar winds (EUMST)	48
D3.11	SSM/T2 and AMSU-B/MHS radiance data (EUMST)	42
D3.12	Geostationary radiance data (EUMST)	42
D3.13	AMV from MFG (EUMST)	48
D3.14	Radio occultation data (EUMST)	48
D3.15	HadISST2 update (METO)	18
D3.16	Ice thickness data (METO)	12
D3.17	Ocean database update (METO)	24
D3.18	Snow data product (FMI)	42
D3.19	Quality controlled version of snow data base (in situ) (FMI)	48
D3.20	HadISD update (METO)	12

Status T3.1: Data Rescue Activities

- Imaging completed

- Digitisation very far advanced

- QC in process

- Large amounts of rescued data already delivered, deliverables extended to keep going and to do also the "nice to have"

FFCUL: Data Rescue Activities

- 100% of ca. 40K upper air station days imaged and digitised in ERA-CLIM1/2
- 100% of ca. 2.2M surface data station days imaged in ERA-CLIM1/2, 97% digitised

METFR: Data Rescue Activities

- Until April 2016, METFR inventoried 643K station days of upper−air data, of which 246K high priorities. About 95% of high priorities is imaged, 72% of high priorities is digitised. The inventory is continuously enhanced and updated. QC of the data is ongoing.

RIHMI: Upper-Air Data Rescue Activities

- **RIHMI inventoried 33,000 station days of upper-air data, 100% has been imaged and digitised. RIHMI also completed the rescue of hourly meteorological data and of snow data.**

UBERN: Upper-Air Data Rescue Activities

- **100% finished summer 2015**

Met Office WP3 activities

- ACRE coordination
  - historical data rescue

- Imaging historical Southern Ocean observations

- D3.17: Development of HadIOD
  - surface and sub-surface ocean data - delivered

- D3.8 and D3.9: Use of satellite data - delivered
  - advice on use of old satellite data and provision of RTTOV coefficients

EUMST: Status Satellite Data Reprocessing

- Radio Occultation Bending Angle Profiles: Metop-A GRAS completed but validation detected error that triggered full reprocessing which has been finished for Metop-A and B up to December 2015. COSMIC and CHAMP wave optics processing in Q2 and Q3/2017;

- Microwave Sounder Radiances: Evaluation revealed needed change in inter-satellite calibration algorithm, updated algorithm expected in Q1/2017, delivery in Q2/2017;

- AVHRR winds: algorithm implemented and tested, processing in Q1/2017;

- Meteosat radiances: Re-calibration completed, images generation will be finished in Q1/2017, documentation and delivery in Q2/2017;

- Meteosat Winds: Cloud analysis implemented, awaits new Meteosat images, processing in Q2-Q3/2017;

- All processing tasks were hampered by the delayed availability of the new EUMETSAT compute environment which only became available in mid October 2016.

Task 3.3: Boundary constraints and external forcing

J.Pulliainen, **M. Salminen, Finnish Meteorological Institute (FMI)**

- Global estimates of snow extent and snow water equivalent (SWE) based on GlobSnow

- Development of a consolidated quality-controlled data base of in-situ snow observations in collaboration with NSIDC and RIHMI

- **Deliverables**

  - 3.18 Prototype snow data product (GlobSnow development product) for reanalysis

  - **3.19 Quality controlled version of snow data base (in-situ) and snow product product (D3.18), first version released in 2016**

Conferences and Activities since last GA

- EGU Sessions Anthropocene / Historical Climatology
  (again 2017)

- Organisation of conference: Observations for Re-analyses
  (22 June 2016, Maynooth, Ireland, together with ACRE meeting)

- Efforts to make data rescue sustainable across projects and services (C3S)

- New data rescue projects

- Common papers with WP4 (tomorrow)

Publications

- Bližňák, V., Valente, M. A. and Bethke, J. (2015) Homogenization of time series from Portugal and its former colonies for the period from the late 19th to the early 21st century. *Int. J. Climatol.,* **35:** 2400–2418. doi:10.1002/joc.4151

- Brönnimann S (2015) *Climatic Changes Since 1700.* Springer, Adv Global Change Res **55**, 375 pp.

- Brugnara Y et al (2015) A collection of sub-daily pressure and temperature observations for the early instrumental period with a focus on the "year without a summer" 1816. *Clim Past* **11:**1027-1047.

- Brugnara, Y., S. Brönnimann, M. Zamuriano, J. Schild, C. Rohr, D. Segesser (2016) December 1916: Deadly Wartime Weather. *Geographica Bernensia* **G91**. 8 pp. ISBN 978-3-905835-47-2, doi:10.4480/GB2016.G91.01 (also appeared in German and Italian)

- Hunziker, S., S. Gubler, J. M. Calle Fernandez, I. Moreno, M. F. Andrade, F. velarde, G. Carrasco, Y. Castellón, M. Croci-Maspoli, T. Konzelmann, M. Rohrer, and S. Brönnimann (2016) Identifying, attributing, and overcoming common data quality issues of manned station observations. *Int. J. Climatol.* (revised).

Publications

- Schmocker, J., H. P. Liniger, J N. Ngeru, Y. Brugnara, R. Auchmann, and S. Brönnimann (2016) Trends in mean and extreme precipitation in the Mount Kenya region from observations and reanalyses. *Int. J. Climatol.* **36,** 1500-1514.

- Stickler A et al (2015) Upper-air observations from the German Atlantic Expedition (1925–27) and comparison with the Twentieth Century and ERA-20C reanalyses. *Meteorol Z* **22:**349-358

- Thorne, P. et al. (2017) Towards an integrated set of surface meteorological observations for climate science and applications. *B. Amer. Meteorol. Soc.* (subimtted)

- Wegmann, M., Y. Orsolini, E. Dutra, O. Bulygina, A. Sterin, and S. Brönnimann (2016) Eurasian snow depth in long-term climate reanalyses, *The Cryosphere Discuss.,* doi:10.5194/tc-2016-253.

Outlook

- Deliverables D3.5/3.5/3.7

- EUMETSAT and FMI Deliverables

- Common data paper?

- EGU 2017

- Continuing data rescue (METFR, UBERN, ...)

- New round of IPCC: Role of observations/ reanalyses/ comparisons?

ERA-CLIM2 supports ACRE coordination
Rob Allan

This includes:

• Assessing international holdings of historical observations to enable prioritisation and avoid duplication of effort

• Placing and managing contracts with specialists in cataloguing, imaging and digitisation

• Obtaining other funding for digitisation work

  • e.g. engage the National Meteorological and Hydrological Services of various countries in the Indian region in aiding the digitization and QC of terrestrial and marine surface daily data in the Indian Daily Weather Reports (IDWR).

• Discussing activities with other international data rescue bodies

Southern Ocean data rescue

Sub-contracted to Clive Wilkinson

Aim: Make inventories and undertake imaging, in various archives of historical observations of sea-ice and atmospheric variables from ships in the Antarctic-Southern Ocean region.

Sources:
- Christian Salvesen Archive, U of Edinburgh;
- Sea Mammal Research Unit, U. of St Andrews;
- National Meteorological Archive (Met Office);
- Whaling Museum and the Vestfold Archive, Sandefjord, Norway;
- Maritime Museum, Mareihamn, Finland
- Chilean National Maritime Museum

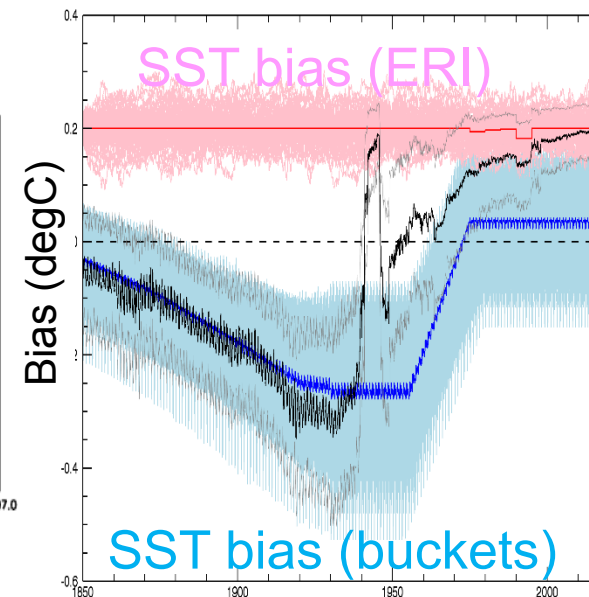# Updates to Marine Database (D3.17) – delivered
Chris Atkinson

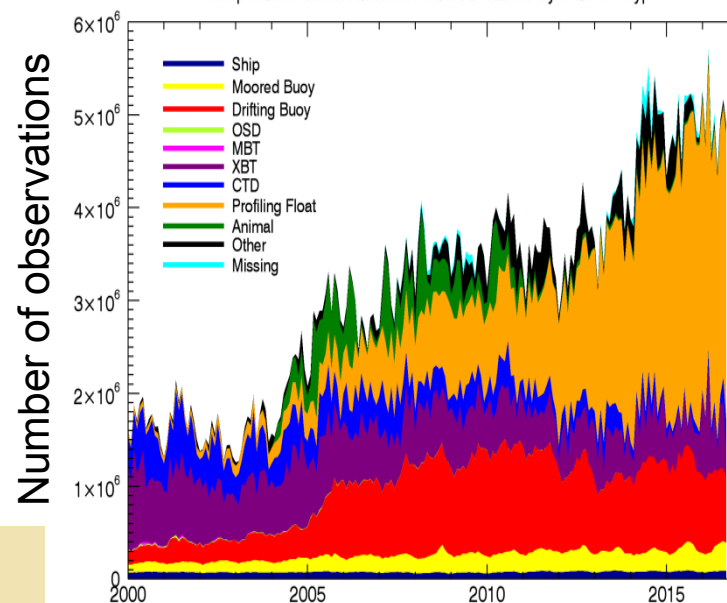HadIOD* version 1.2.0.0 created:

Improvements c.f. version 1.1.0.0:

• Clean re-run of SST QC and unmasked ship call signs

• Latest EN.4.2.0 profile data (with multiple XBT correction schemes)

• Multiple ship SST correction realisations based on HadSST3.1.1.0 ensemble

• Improved drifter/ship SST tracking QC with periodic updates

• Improved quality assurance

• High temporal resolution GTMBA data (added for SST CCI II)

32819ddd OSTIA QC=1000200

Globally Averaged Ship Macro-Bias in HadIOD.1.2.0.0

SST bias (ERI)

SST bias (buckets)
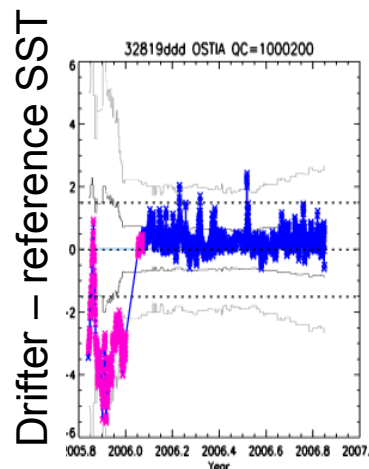
Temperature Observations in HadIOD.1.2.0.0 by Platform Type

- Ship
- Moored Buoy
- Drifting Buoy
- OSD
- MBT
- XBT
- CTD
- Profiling Float
- Animal
- Other
- Missing

Update on RTTOV coefficients (D3.8) – delivered
Roger Saunders
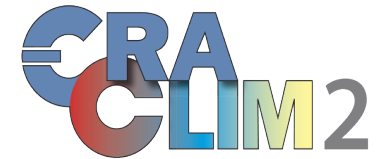
Several motivations to update the radiative transfer model (RTTOV) coefficients for satellite radiance assimilation:

- Benefit from updated radiative transfer models from which RTTOV is referenced to

- Use improved instrument spectral response functions (e.g. HIRS, AMSU-A, allow for SSU cell pressure changes, etc)

- Better atmospheric state (i.e. allow for changes in GHG concentrations over period analysed) and more vertical levels 43→54

- Addition of Zeeman effect for SSMIS and AMSU-A, which affects upper peaking channels in the stratosphere

- Use latest version of RTTOV (i.e. Version 11); needs newer formats

- Updates have also been made for many newer satellite instruments that have previously been used in reanalyses

Provision of old satellite datasets (D3.9) will be delivered 23-27 Jan 2017 (R. Saunders)
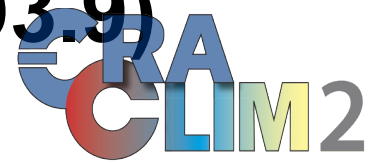
- Use of satellite datasets not exploited in ERA-40 primarily:

  – SSM/T-2 Characterisation of Special Sensor Microwave Water Vapour Profiler (SSM/T-2) radiances using radiative transfer simulations from global atmospheric reanalyses Kobayashi *et. al.* 2016

  – PMR Rayer Met Office Report.

  – HIRS-1

  – IRIS Recent advances in satellite data rescue. Poli *et. al.* 2017

  – SMMR FCDR CMSAF report

- Use of reprocessed radiances into FCDRs:

  – AMSU-B/MHS FCDR (EUMETSAT) Several papers by John *et. al.*

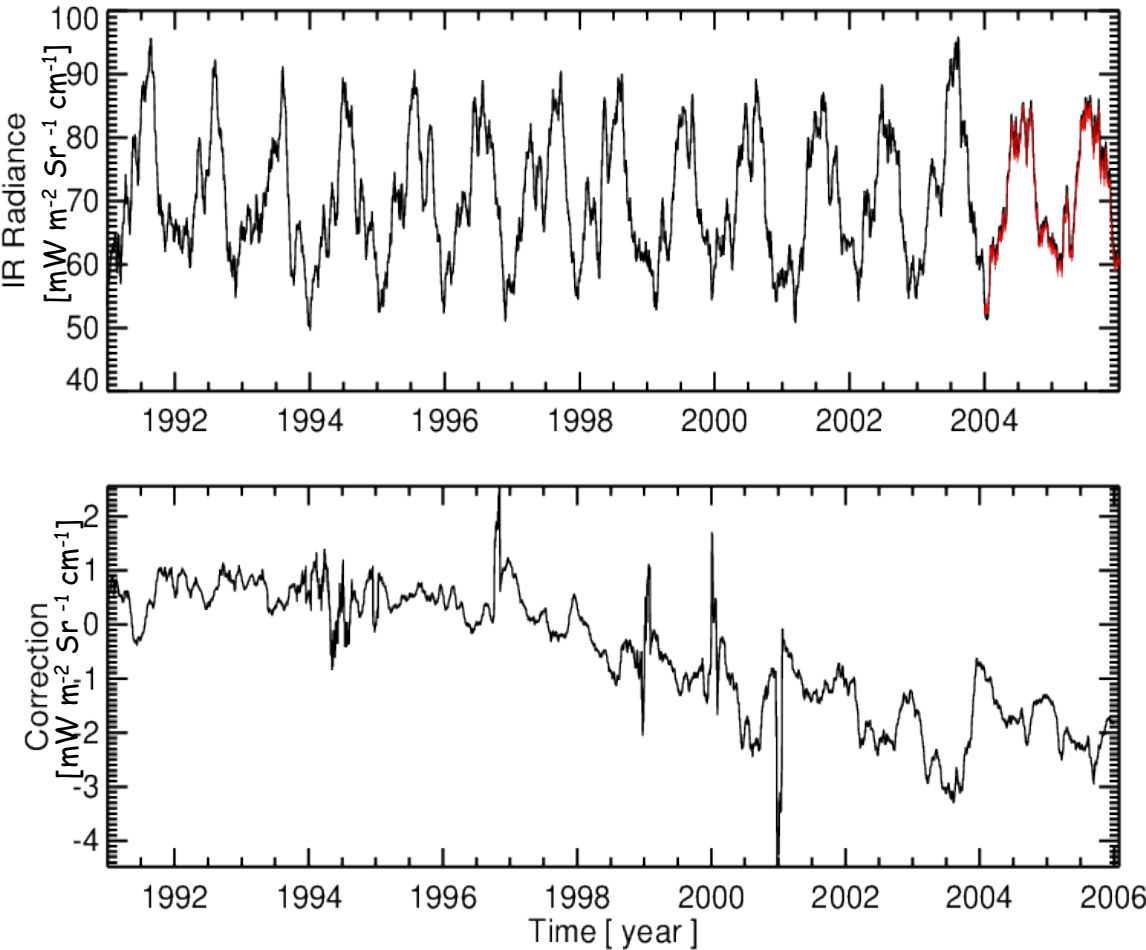 – SSU FCDR (Met Office/NOAA) Nash and Saunders, 2015, Zou *et. al.* 2014

  – SSM/I FCDR (CMSAF) CMSAF report

EUMETSAT: Status of old satellites for ERACLIM2

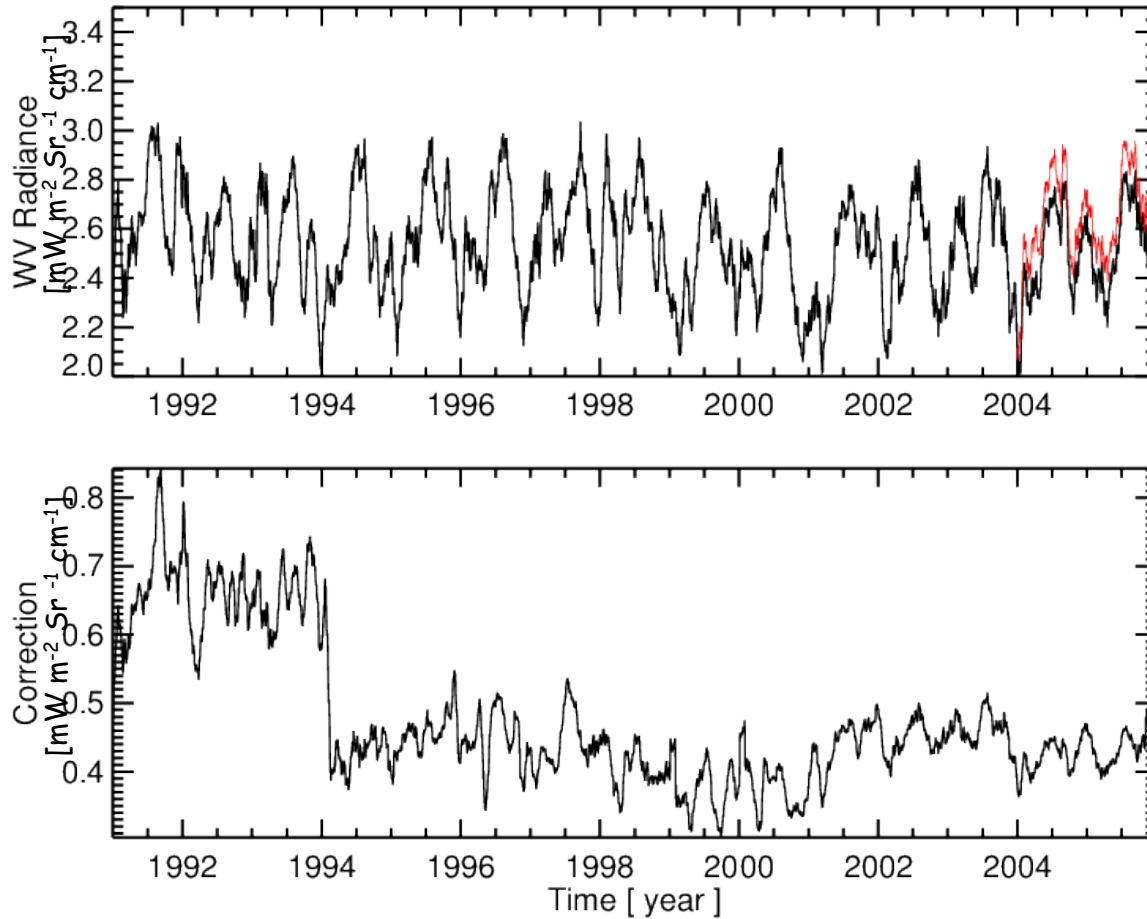

MFG

MSG

Every image IR 10.8 μm at Payerne site with original calibration (top) and absolute correction (bottom)

EUMETSAT: Status of old satellites for ERACLIM2

MFG

MSG

Every image IR 6.3 μm at Payerne site with original calibration (top) and absolute correction (bottom)

SWE snow course observation data set

- Compilation of long-term in situ snow observations from different sources (up to ~100 years if possible and where possible)

  - Distributed snow course observations from Eurasia and North America on Snow Water Equivalent (SWE)

  - Russia/Former Soviet Union, Finland, Canada

- Prototype snow course data archive established in 2016 by FMI as recommended by the EU FP7 Core-Climax coordination meeting

- Data set is now available at: **http://litdb.fmi.fi/ eraclim2.php**

http://litdb.fmi.fi/eraclim2.php

ILMATIETEEN LAITOS
METEOROLOGISKA INSTITUTET
FINNISH METEOROLOGICAL INSTITUTE

OBSERVATIONS AT THE ARCTIC RESEARCH CENTRE
SODANKYLÄ, FINLAND, (67.367°N, 26.629°E, 179M)

HOME

CAMPAIGNS

SATELLITE ACTIVITIES

Measurement fields:

PALLAS

SAARISELKÄ

AUTOMATIC WEATHER STATION

CO_2 FLUX MAST

INTENSIVE OBSERVATION AREA

LICHEN FENCE

MICROMETEOROLOGICAL MAST

MICROMETEOROLOGICAL MAST FIELD

PEATLAND FIELD

RADIATION TOWER

ROAD WEATHER STATION

ERA-CLIM2

Description: Northern Hemisphere Snow Water Equivalent (SWE) data compiled by FMI-ARC for the ERA-CLIM2 project.

Data file columns:
1. Course (WMO station number or value based on national numbering or running number)
2. LAT (decimal degrees)
3. LON
4. DOY (day of year)
5. SWE (snow water equivalent, mm)
6. rho (snow bulk density, g/cm^3)
7. SD (snow depth, cm)
8. Julian day
9. Year
10. Snow course altitude (m)
11. Data Source (1=INTAS-SCCONE/RIHMI-WDC, 2 = Finnish Environment Institute, 3 = Environment Canada)
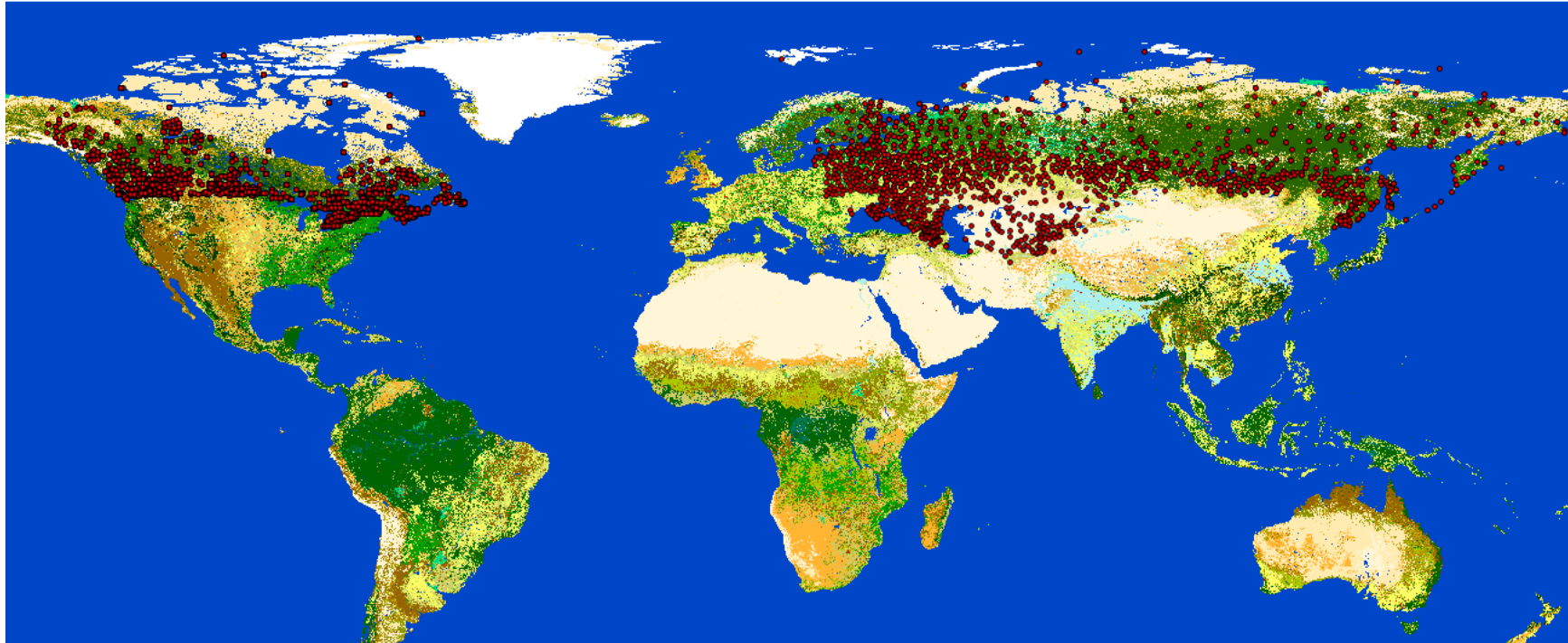
DATA FILES:
MAT-file
TXT-file

METADATA FILE:
TXT-file

For more information contact Miia Salminen (firstname.lastname@fmi.fi).

Page updated 19 April, 2016

SEVENTH FRAMEWORK PROGRAMME

http://litdb.fmi.fi/eraclim2.php

- Total number of snow course locations: 3589 (based on coordinates)
- Time period 1935-2014
- Total number of observations around 1.2 million
- Variables: Snow Water Equivalent (SWE), Snow Depth (SD), Snow Density

http://litdb.fmi.fi/eraclim2.php

METADATA:

```
File description
ERACLIM2_SWE_rus_fin_can.txt

North Hemisphere SWE compiled by FMI-ARC for the ERA-CLIM2 project

Columns:
1.  Course (WMO station number or value based on national numbering or running number)
2.  LAT (decimal degrees)
3.  LON
4.  DOY (day of year)
5.  SWE (snow water equivalent, mm)
6.  rho (snow bulk density, g/cm^3)
7.  SD (snow depth, cm)
8.  Julian day
9.  Year
10. Snow course altitude (m)
11. Data Source (1=INTAS-SCCONE/RIHMI-WDC, 2 = Finnish Environment Institute, 3 = Environment Canada
```

SWE time series since 1966

WMO Station 29676

1983-1984