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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 data product (D3.19)**

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SWE snow course observation data set

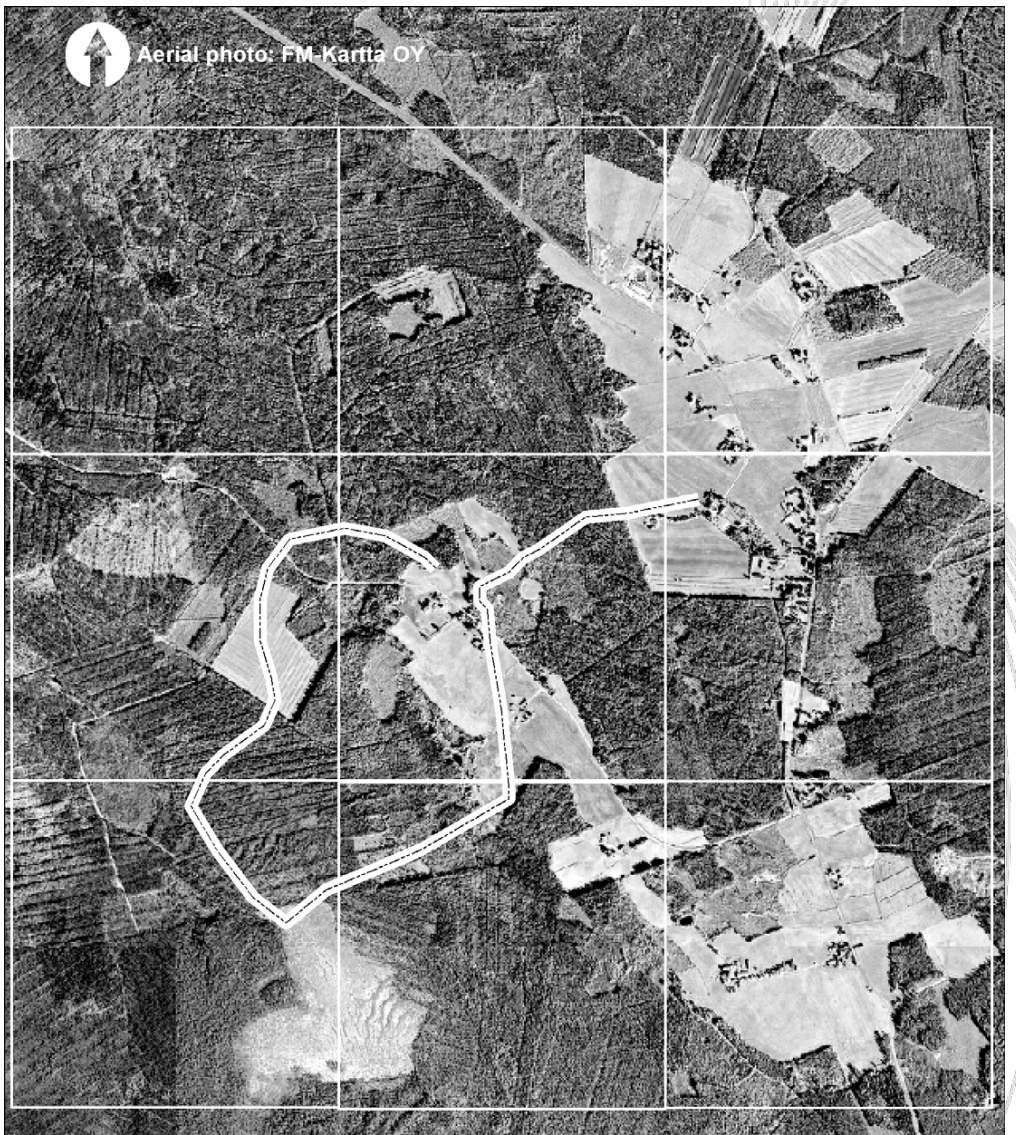
- Compilation of long-term in situ snow observations from different sources (up to ~100 years if possible and where possible)
  - Distributed snow course observations from Eurasia and North America on Snow Water Equivalent (SWE)
  - Russia/Former Soviet Union, Finland, Canada

- Prototype snow course data archive established in 2016 (finalized 2017) by FMI as recommended by the EU FP7 Core-Climax coordination meeting

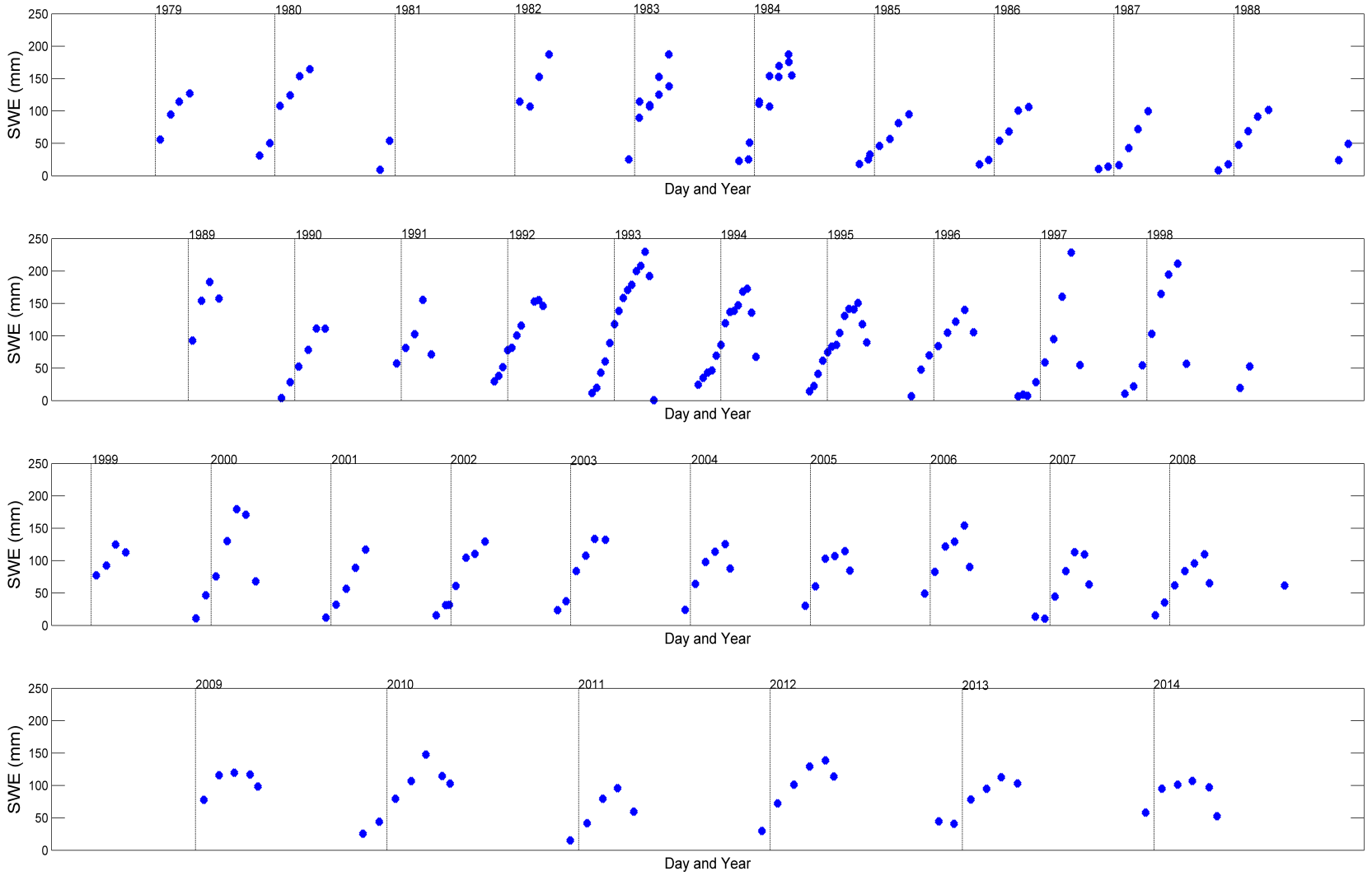
- Data set is now available at: **http://litdb.fmi.fi/eraclim2.php**

What is a snow course

- A typical Eurasian snow course (from Finland)

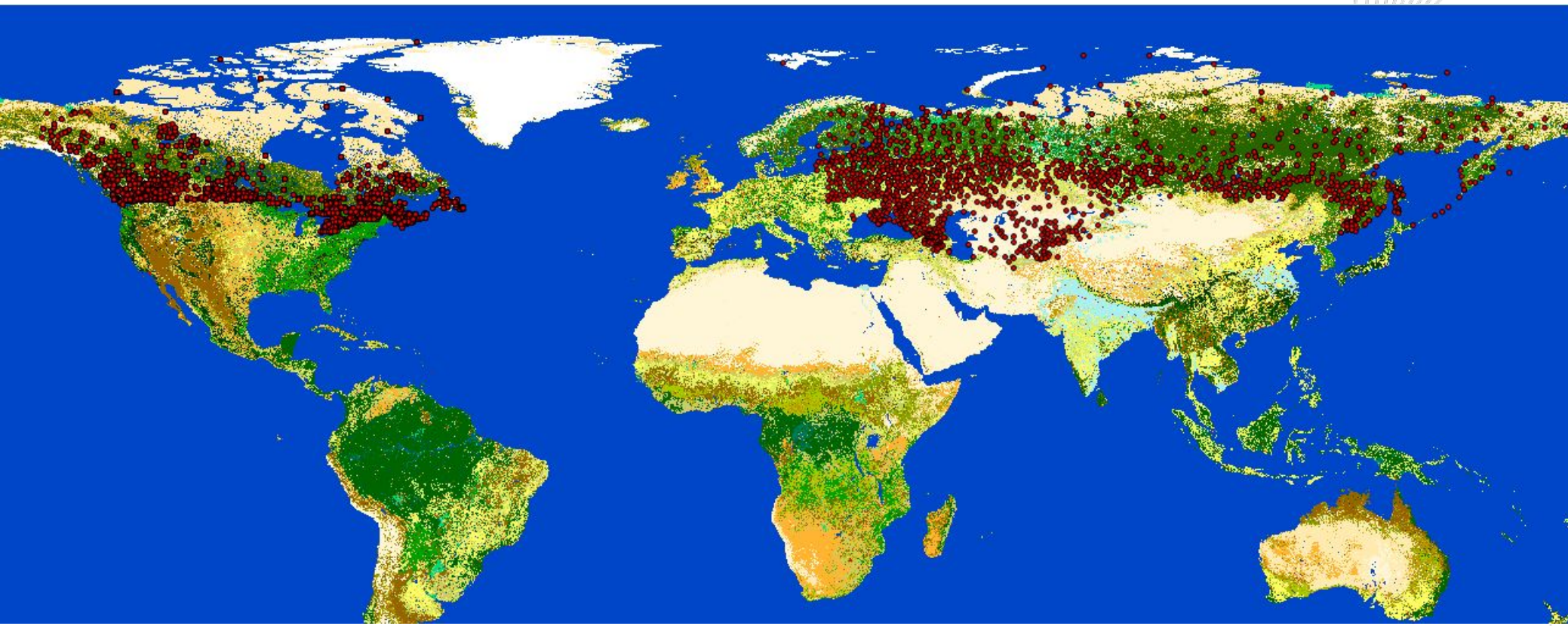


Example on Finnish snow course data



Deliverable D3.19: Quality controlled in situ snow data base (from snow courses)

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



- Time period 1935-2009 (30 000 snow courses)
- Total number of observations around 1 million
- Variables (average values from distributed samples):
  - Snow Water Equivalent (SWE)
  - Snow Dept (SD)
  - Snow Density

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

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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

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)
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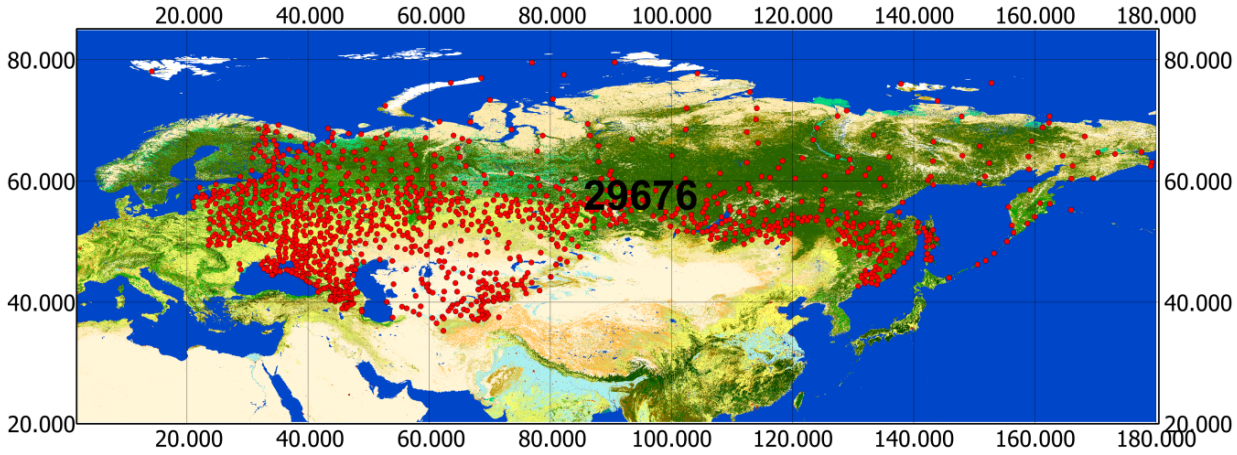
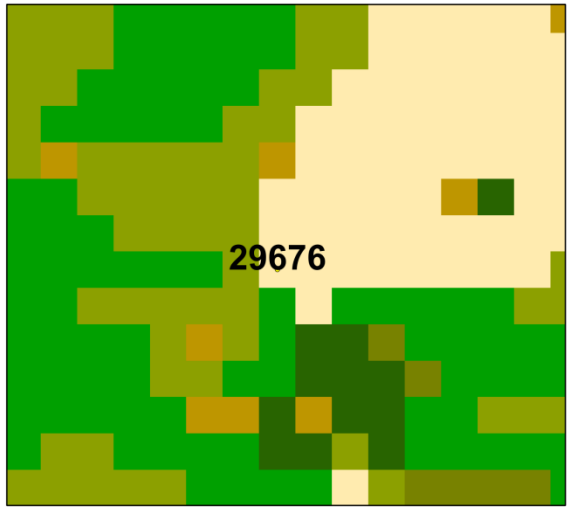
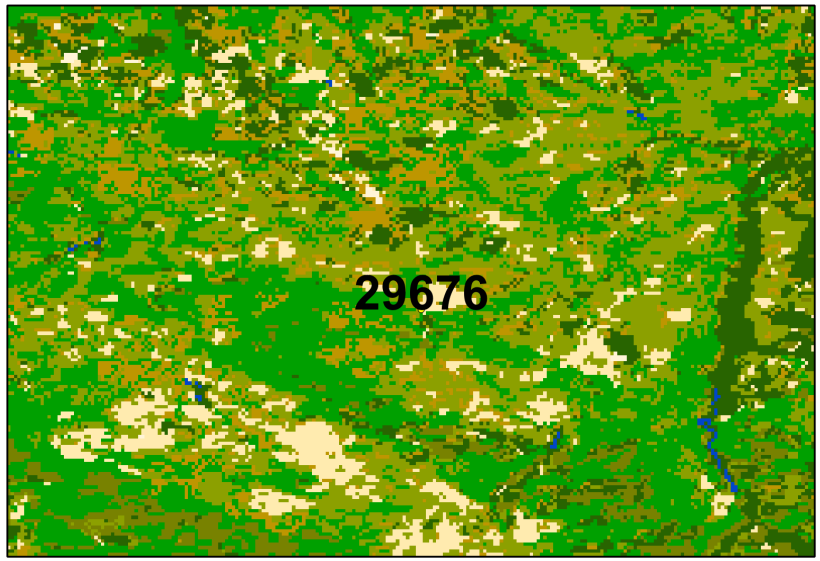
10. Snow course altitude (m)
11. Data Source (1=INTAS-SCCONE/RIHMI-WDC, 2 = Finnish Environment Institute, 3 = Environment Canada

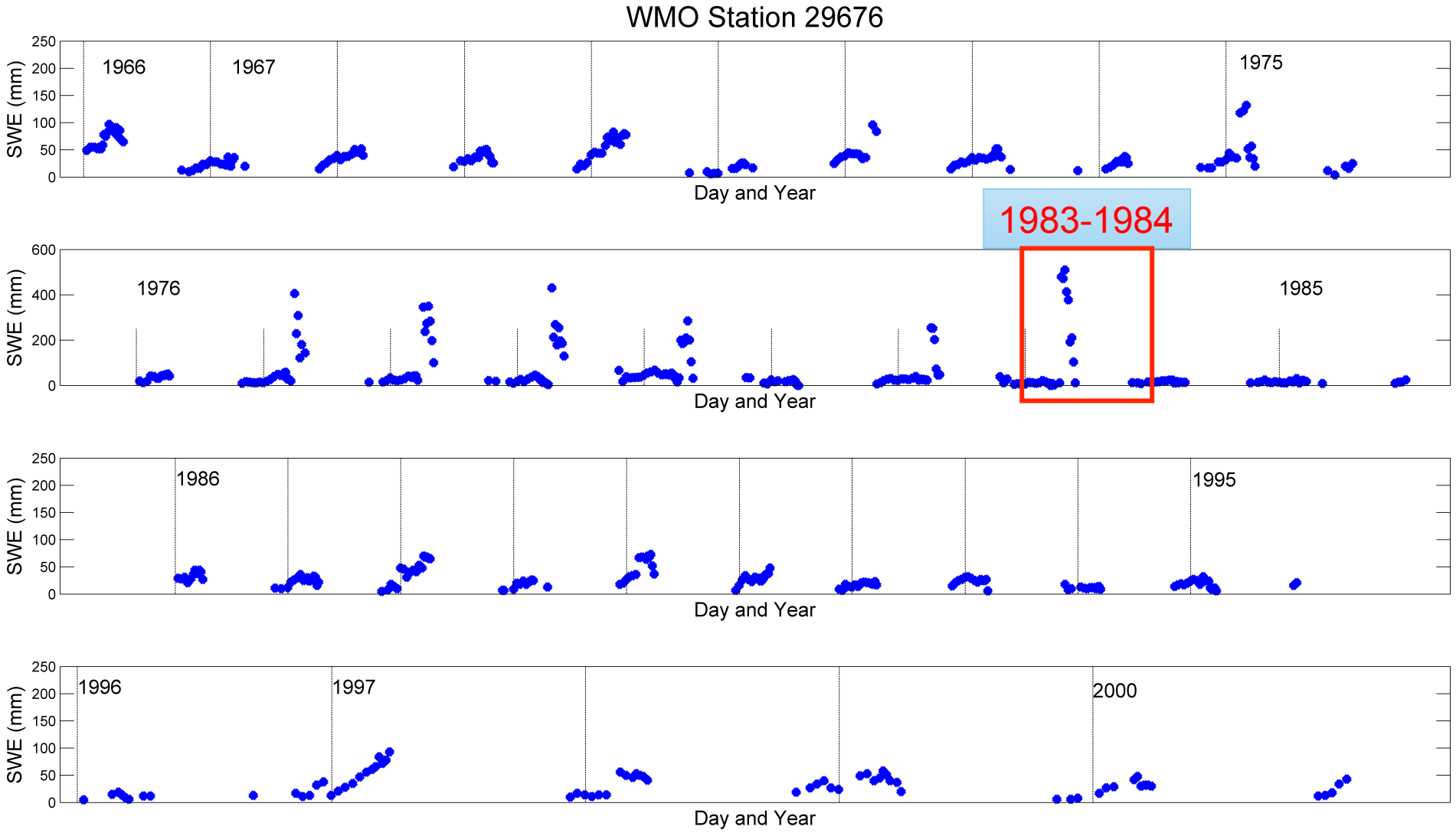
Example: WMO station 29676







Data from the course



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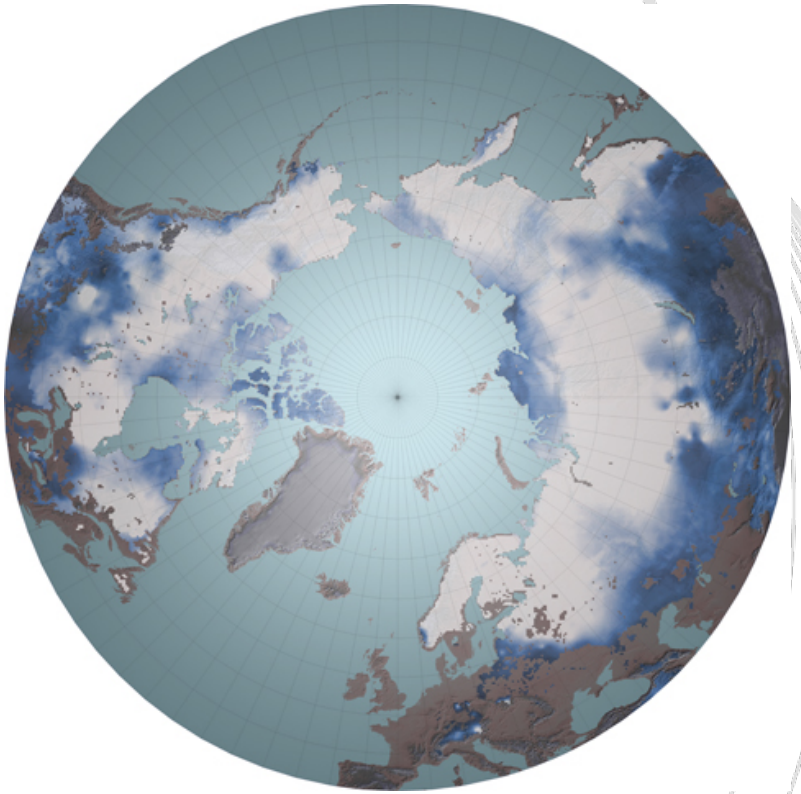
Deliverable D3.18: Prototype snow data product (GlobSnow development product) for reanalysis

Climate Data Record on snow cover:

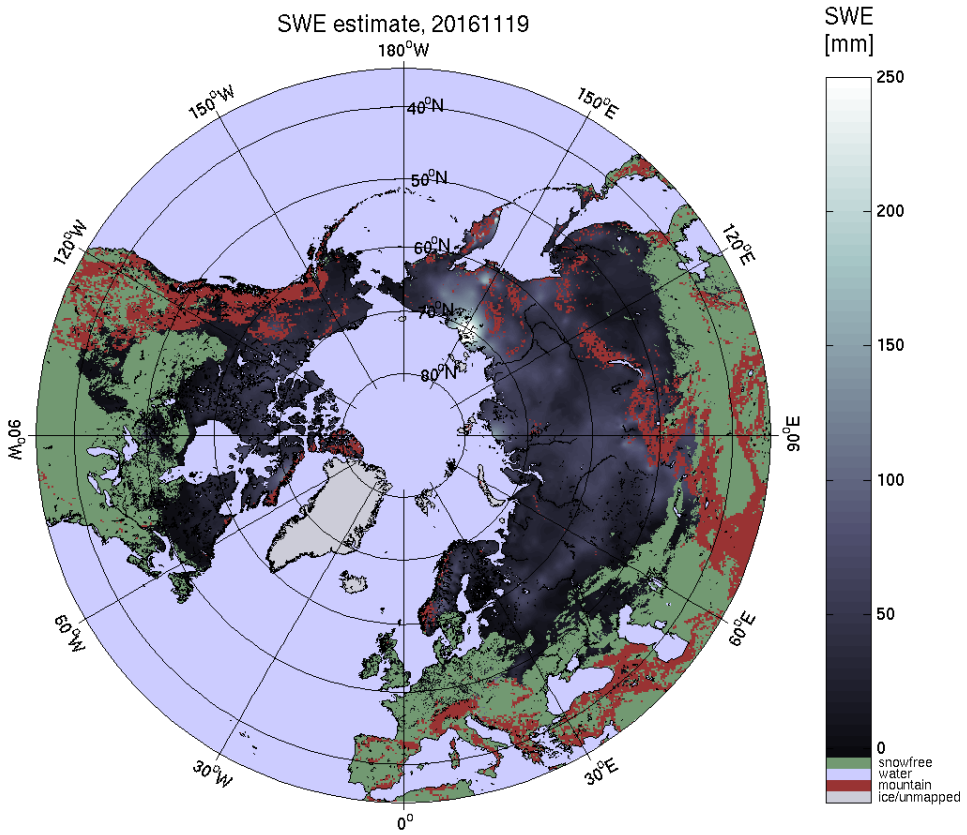
- Hemispeheric snow mass given by Snow Water Equivalent (SWE)
- Validated ERACLIM-2 data record giving daily values for the period 1979-2016
- Product based on combination of spaceborne microwave radiometer data, optical satellite data and *in situ* observed synoptic snow depth observations
- Data set available at: http://www.globsnow.info/swe/archive_v2.1_Eraclim

Snow water equivalent (example for 19.2.2017, white color indicating SWE>200 mm)

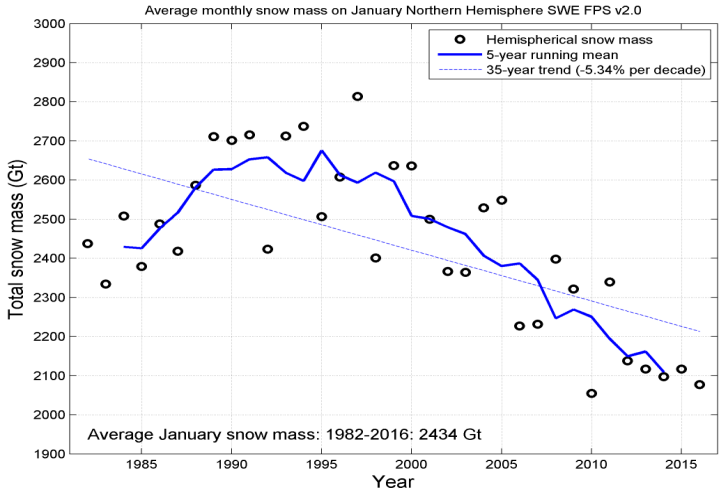


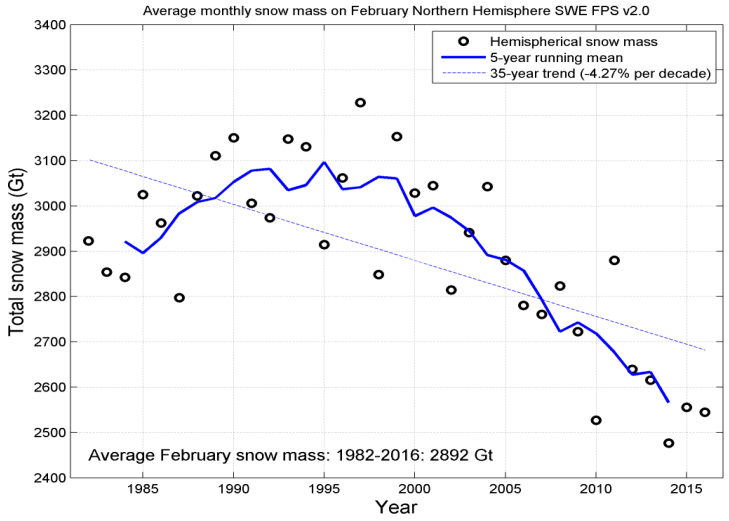
SWE product
and its utilization example for climate monitoring

Daily SWE

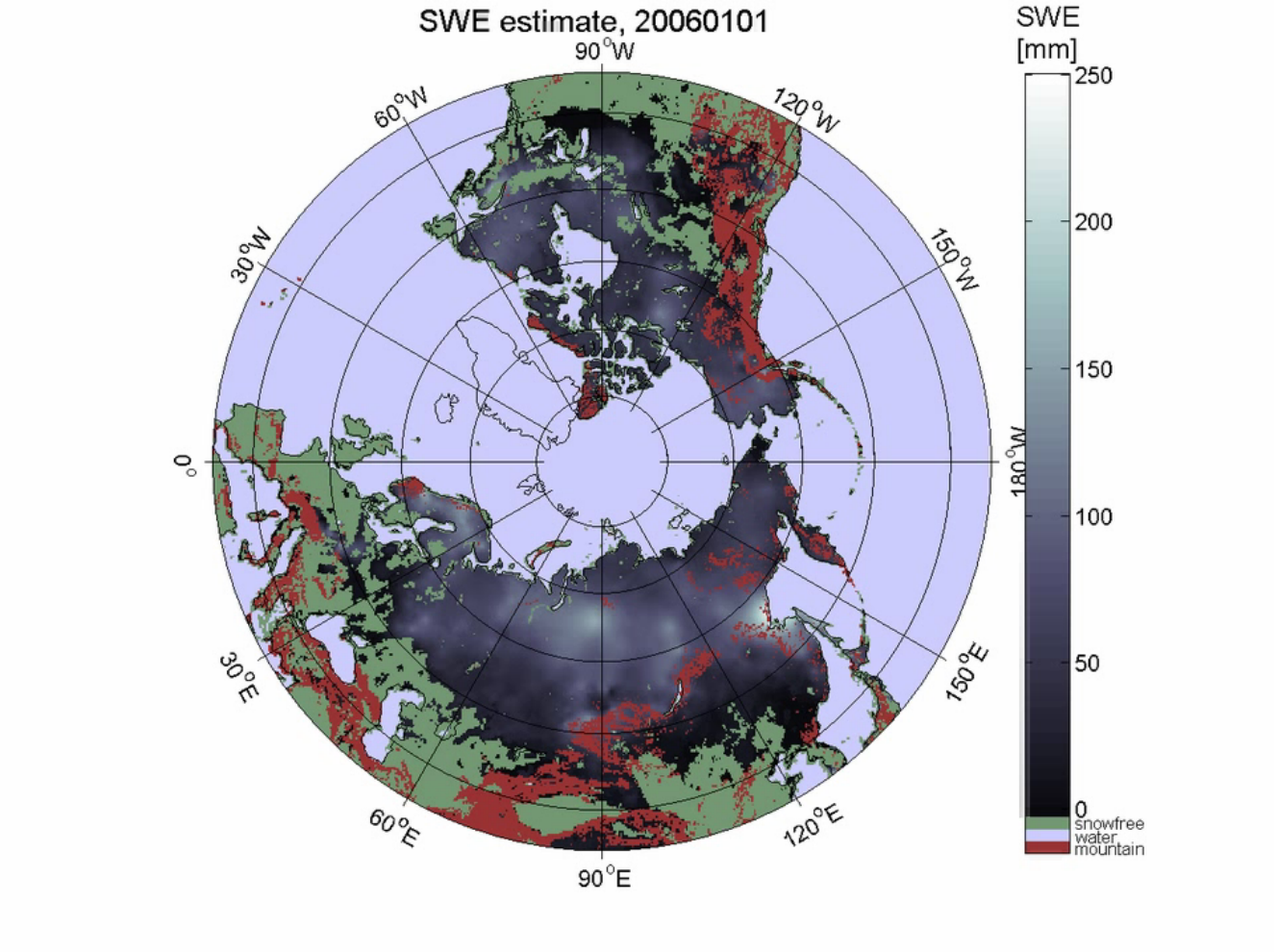


35+ years NH SWE trends



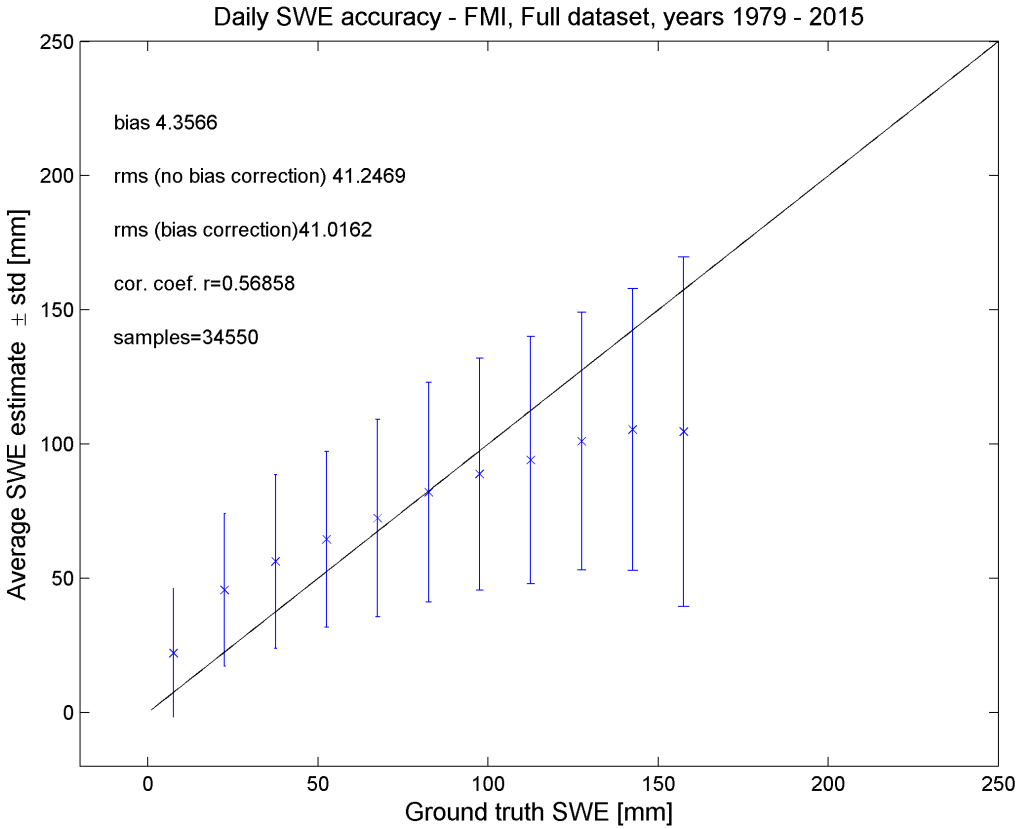


SWE animation

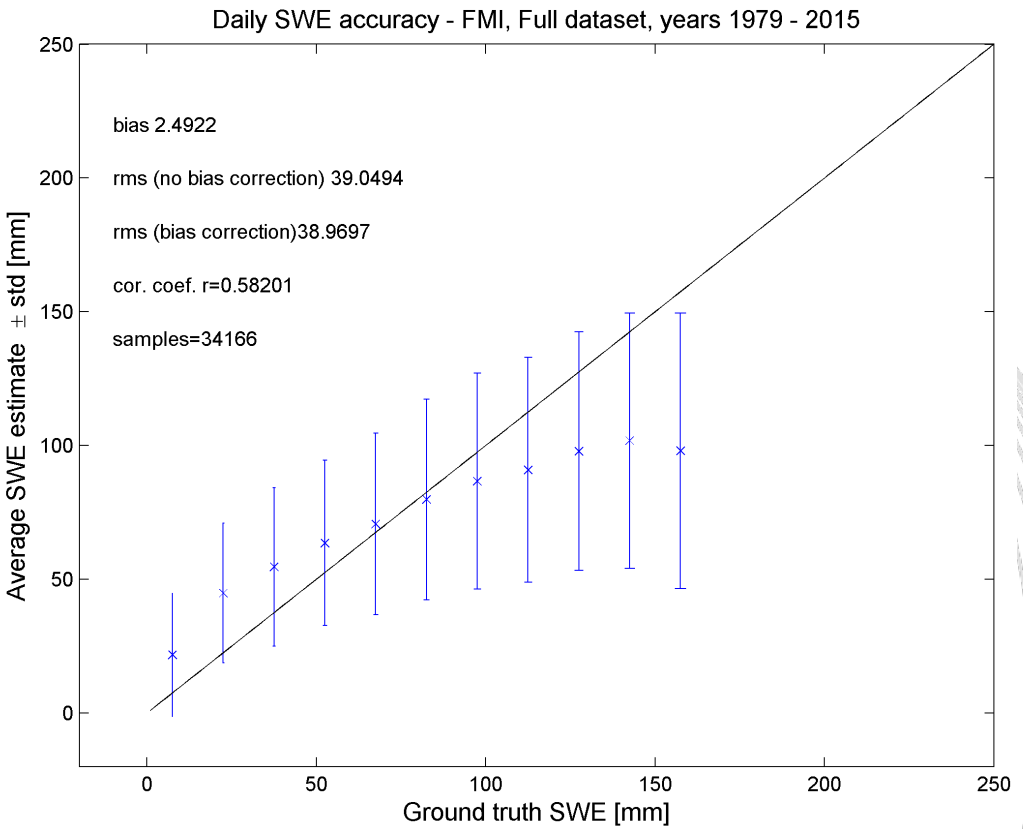


SWE retrieval accuracy (SWE <150mm) 1979-2004 Canada snow course data 1935-2004

GlobSnow SWE v2.0 baseline

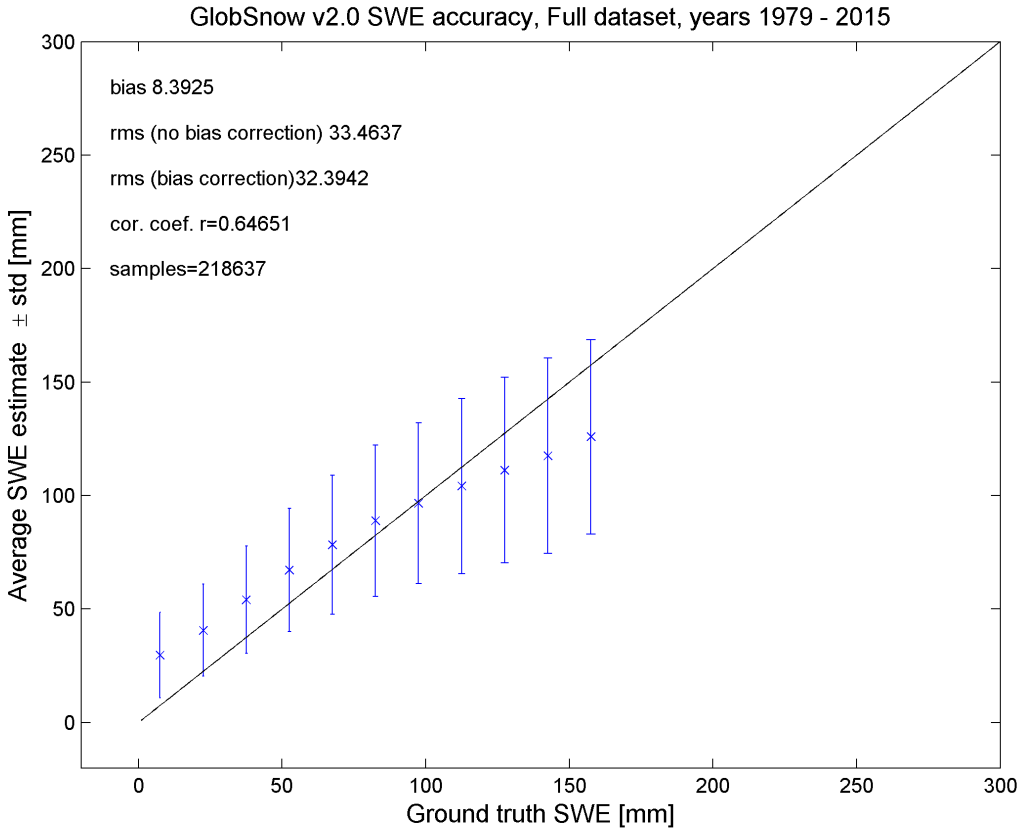


SWE v2.1 "new approach"

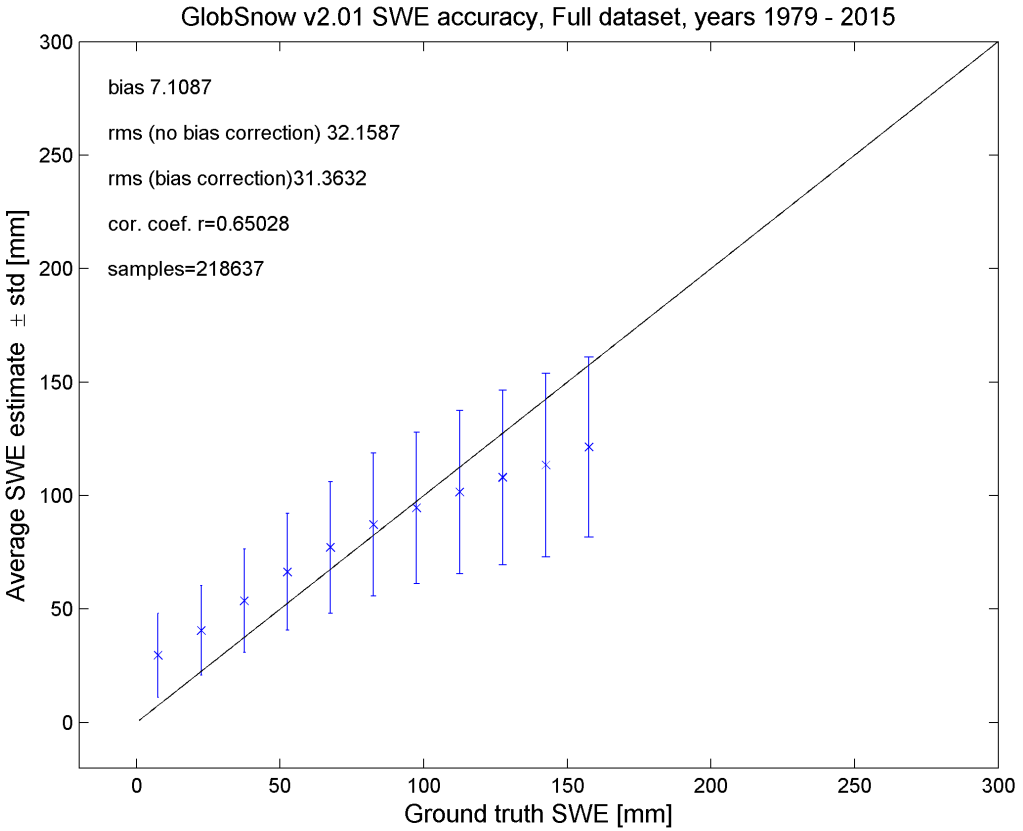


SWE retrieval accuracy (SWE <150mm) 1979-2015 Russian snow course data 1966-2015

GlobSnow SWE v2.0 baseline



SWE v2.1 ”new approach”




Thank You for Your Attention!