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Abstract ID:8O2

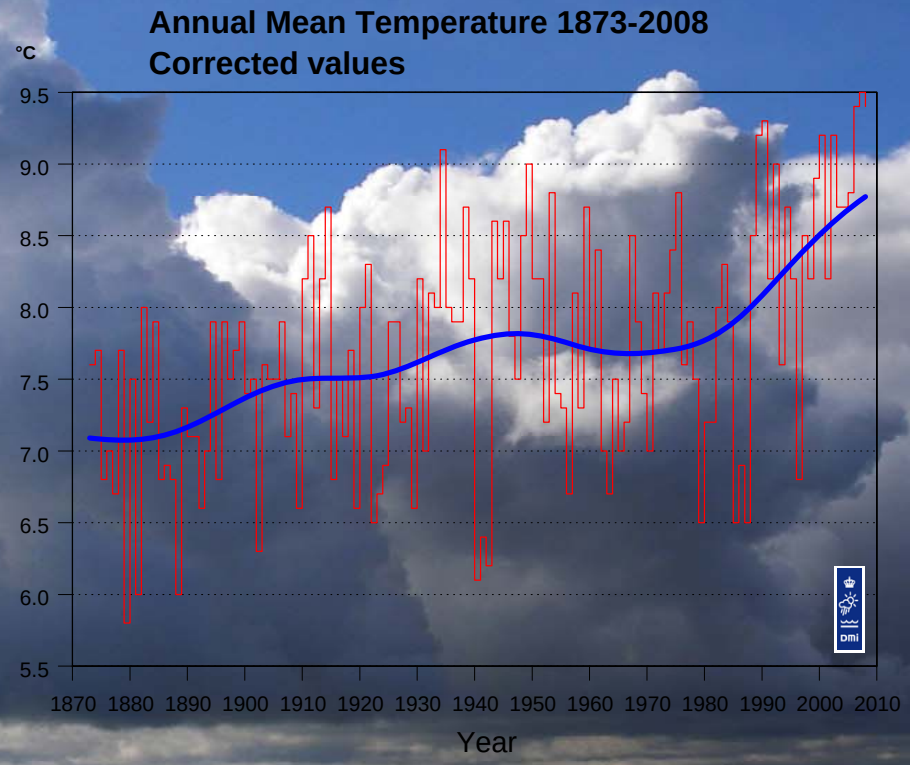
Climate Data Management - an ongoing challenge (also at DMI...)

Data management is essential to good science. Data management is the key to ensuring data are preserved, understandable, and available in the future, thereby providing future generations with a relevant data collection. The main task for the climate data responsible part of a national meteorological institute has always been as follows:

- Produce high quality climate data sets and information
- Support various climate assessments and research
- Secure a general overview and acesssibility of climate data and information

But with growing amounts of data and more and more demands from the society to get them it is essential for both data providers and users that more focus are put on the last “data discovery” item (mentioned above) in the future. The presentation address the kind of data and services the Danish Meteorological Institute can provide, suitable for climate information and research but also the ongoing challenges, with special emphasis on DMI long-term instrumental data series.

Climate Data Management – an ongoing challenge (also at DMI…)



John Cappelen, Danish Meteorological Institute, jc@dmi.dk

7th ECSN Data Management Workshop, DMI 4-6 November 2009

A very general level:
Why is Data Management so important?

- **Data management is essential to good science**

- **Data management is the key to ensuring data are preserved, understandable, and available in the future**

- **Thereby providing future generations with relevant data collections.**

Hard to disagree?

Traditional NHMS Climate Data Management

- **Produce high quality climate data sets and information for your country**

- **Support various climate assessments and research in our country**

- **Secure a general overview and acesssibility of climate data and information in your country**

We are actually really good in that business!

Trend: National -> International ->
A constantly growing need for more and more collaboration between NMHS's

European level: ECSN Data Catalogues/Platforms

- **ECA&D** European Climate Assessment & Dataset. Daily dataset European region. Monitoring and analysing changes in climate extremes.

- **GCMP** Generate Climate Monitoring Products. Generating, developing and distributing standardized climate monitoring products for the European region, on a monthly, seasonal and annual basis.

- **ECSM/EuCLIS** European Climate Information System Monitoring. Generates and distributes various climate monitoring products for the WMO Region VI.

- **HRT-GAR**: High Resolution Temperature in the Greater Alpine Region.

- **EUMETGRID**: Gridded observational climate datasets and derived products on a European scale.

- **UNIDART**. Concept aimed at the development of an information system based on Internet technologies offering uniform access to all kinds of meteorological data and products including climatological data sets.

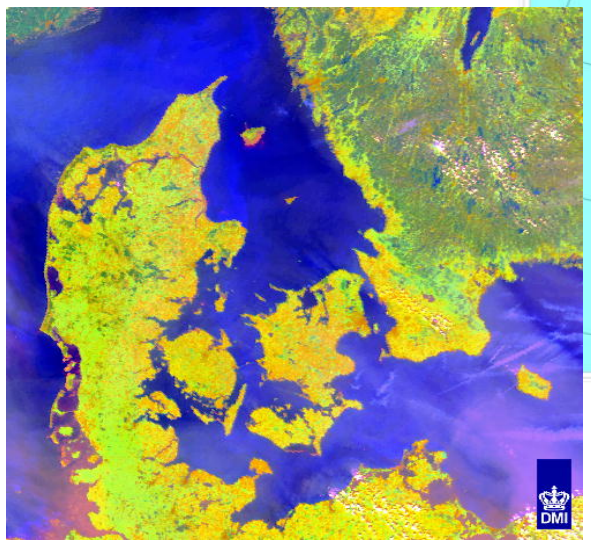
DMI Climate Data Catalogue

- DMI's area of responsibility comprises Denmark, Greenland and the Faroe Islands
- This geographical area including surrounding waters and airspace are larger than any other West-European country
- Data and services suitable for climate information and research are a natural part of DMI.
- Let's concentrate on DMI long-term instrumental data series

Instrumental met observations from DMI?

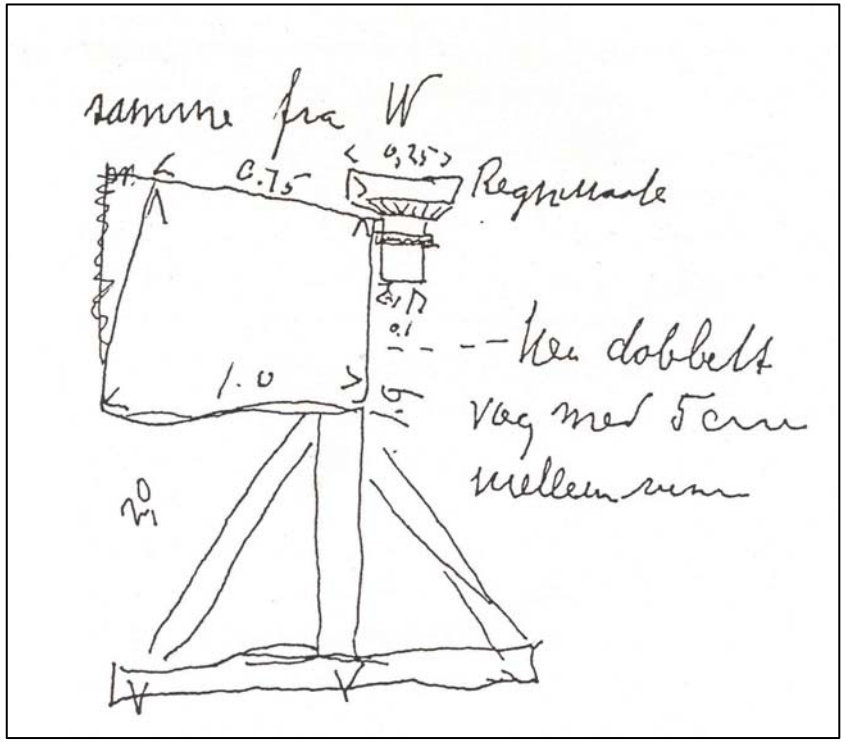
The foundation of The Danish Meteorological Institute in 1872 marked the beginning of most of the official instrumental meteorological series from DMI.

From 1873-1983 yearbooks have been produced with varying contents and size.



From app. 1958 digitised observations exist in the climate databases at DMI…

…and lot's of metadata too, published in several reports



Thermometer and raingauge arrangement July 1923 in Jacobshavn, Greenland

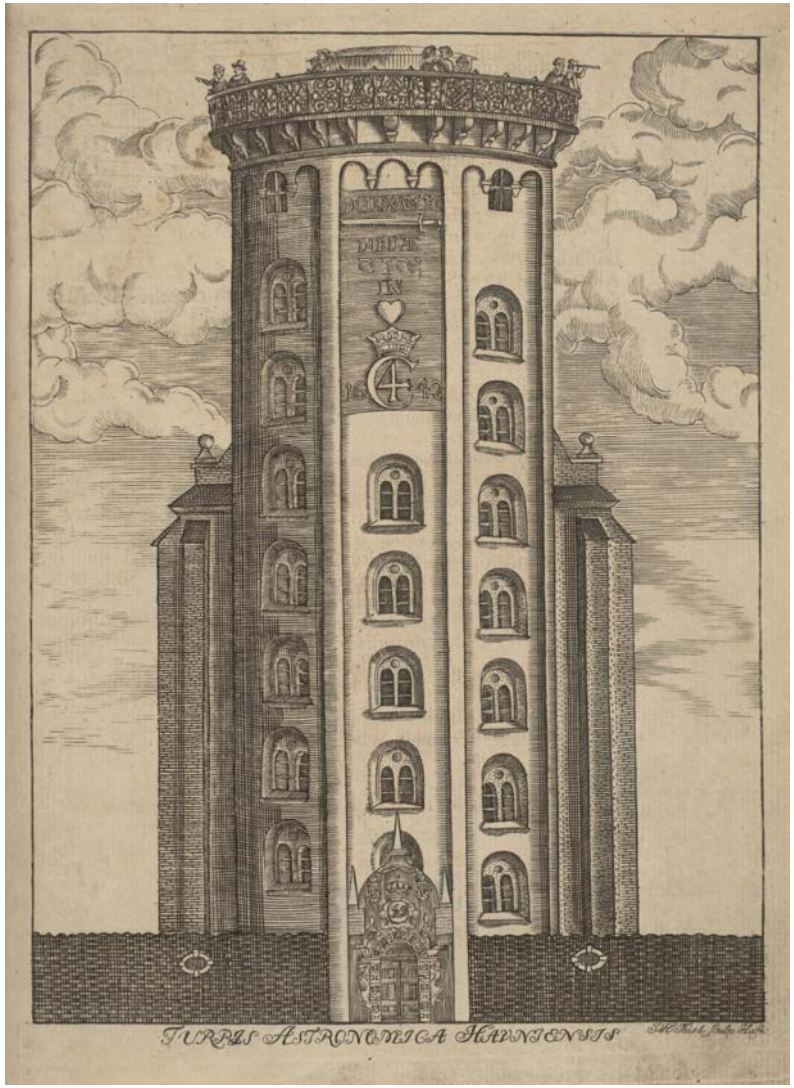
Observer Guldager by his instruments. Jacobshavn 1923

Before 1873 in Denmark?

In 1751 meteorological observations in the Round Tower in Copenhagen were initiated.

From 1751 to 1766 the thermometer was situated inside a room in the little observatory on the top of the tower (!)
In 1767 the thermometer was situated outside the observatory facing north.

DMI are in possession of the meteorological observations from the Round Tower from the period 1767 – 1819. From 1818 meteorological observations from the old Botanical Garden in Copenhagen also are available.



Source: Ane Marie Closter, Rikke Margrethe Closter, John Cappelen, Jens Hesselbjerg Christensen, Kirsten Christoffersen (FBL) and Claus Kern-Hansen (2006):
Temperature measurements in Copenhagen from 1767 to 1860. DMI Technical Report No. 06-13.
Link:
http://www.dmi.dk/dmi/tr06-13.pdf
http://www.dmi.dk/dmi/rundetaarn_data.zip

Before 1873 in Greenland?

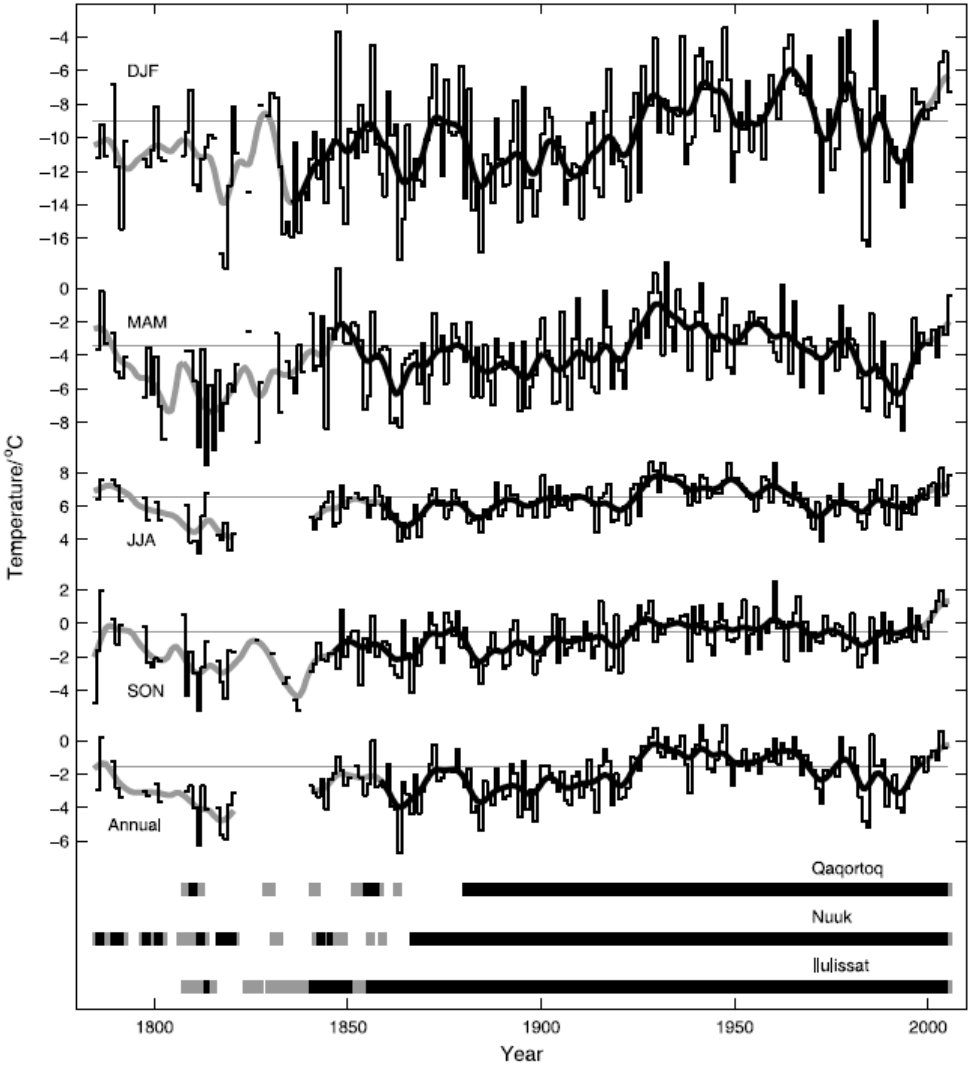
1760's marked the beginning of the very first systematic observations in Greenland….

From 1784 a composite SW Greenland temperature series is processed….not least because of H.H. Lamb.

Composed of series from Qaqortoq, Nuuk and Ilulissat.

Source: Vinther, B. M., K. K. Andersen, P. D. Jones, K. R. Briffa and J. Cappelen (2006): Extending Greenland Temperature Records into the late 18th Century. J. Geophys. Res. 111, D11105, doi:10.1029/2005JD006810, 2006

Link:
http://www.cru.uea.ac.uk/cru/data/greenland/



In general: The Climate of Greenland, The Faroe Islands and Denmark

Monthly time series app. 1961-1999 and Climatological Standard Normals 1961-90

- A large number of stations
- Many parameters
- Descriptions of the Climate in text

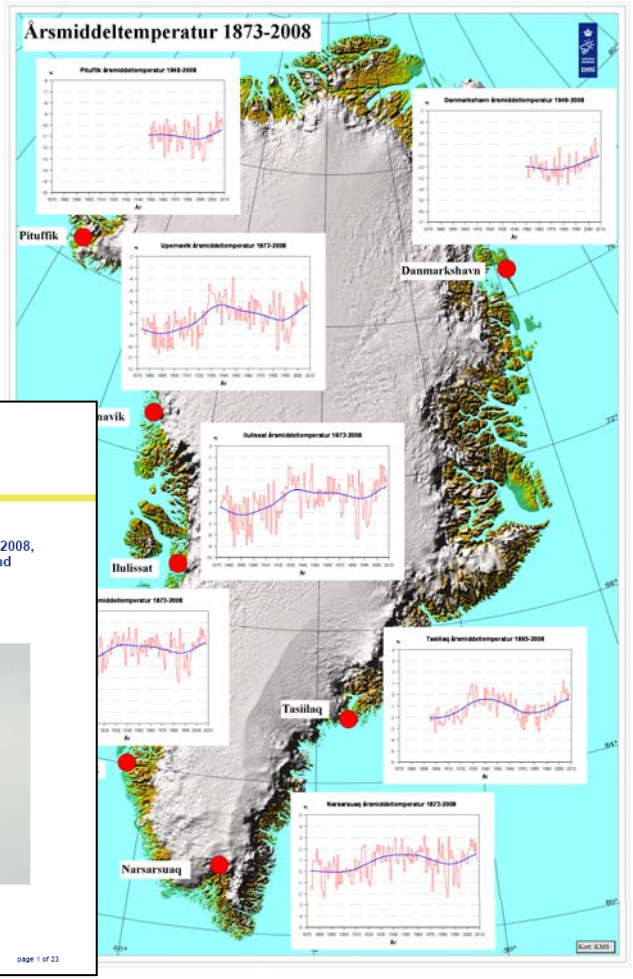
And many more….

Example:
John Cappelen et al. (2000):
The Observed Climate of Greenland, 1958-99 - with Climatological Standard Normals, 1961-90.
DMI Technical Report No. 00-18.

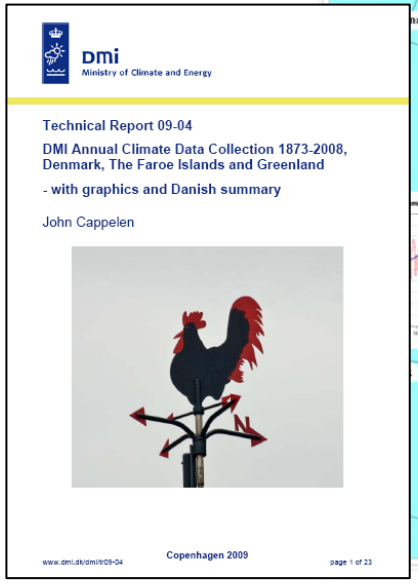
Link:
http://www.dmi.dk/dmi/tr00-18.pdf
http://www.dmi.dk/dmi/tr00-18-data_files.zip
http://www.dmi.dk/dmi/tr00-18-wind_roses.zip

Long-term annual series from 1873…

Continuously updated series of annual temperatures from 1873 from seven locations in Greenland, one at the Faroe Island and one in Denmark.
Annual mean temperature, precipitation, hours of bright sunshine and cloud cover for Denmark as a whole from 1873.

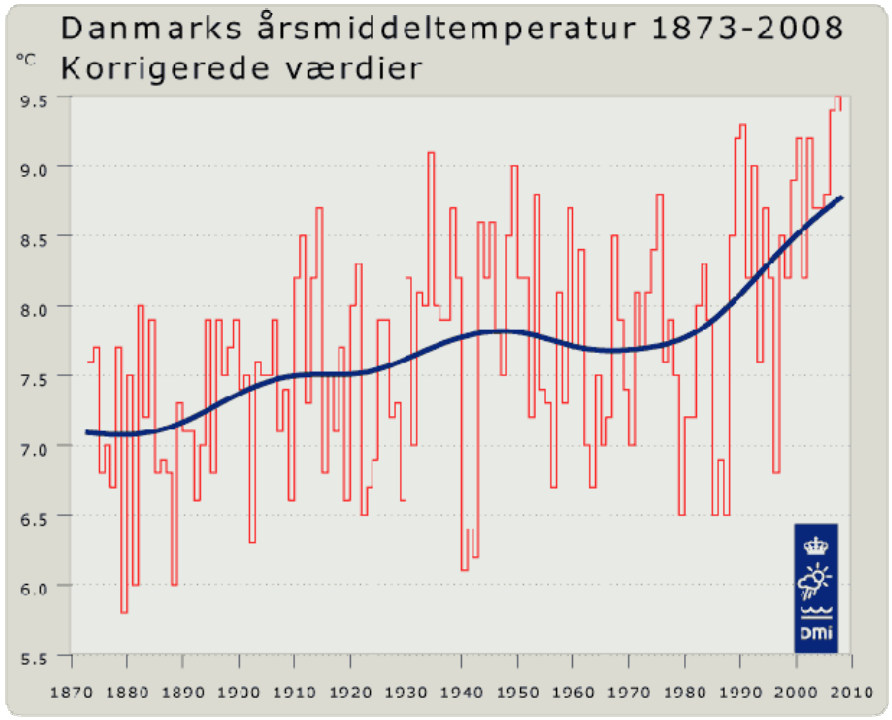


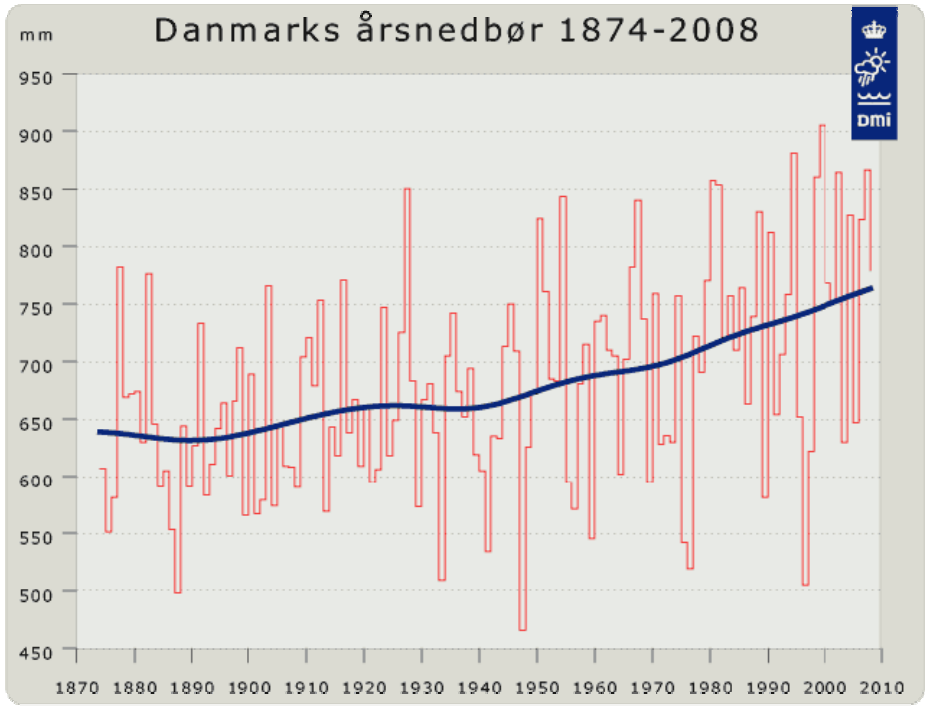
The series have been quality checked the best way possible including the processing of NACD - North Atlantic Climatological Dataset 1890-1990.



Source: DMI Technical Report 09-04
John Cappelen, 2009:
DMI Annual Climate Data Collection 1873-2008, Denmark, The Faroe Islands and Greenland - with graphics and Danish summary

Link (latest version):
http://www.dmi.dk/dmi/tr09-04.pdf (Report)
http://www.dmi.dk/dmi/tr09-04_data.zip (data)
http://www.dmi.dk/dmi/tr09-04_grafik.zip (Graphics)

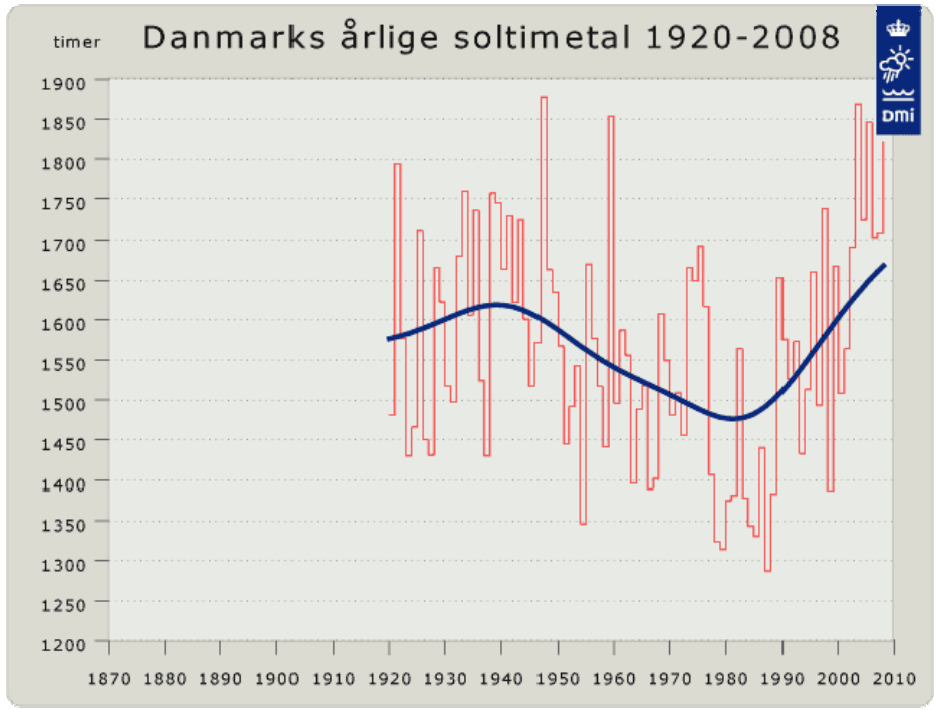




- **Temperatures in Denmark have since 1870 shown a rising trend – about 1,5°C. Since 1990s a sharply rising trend.**

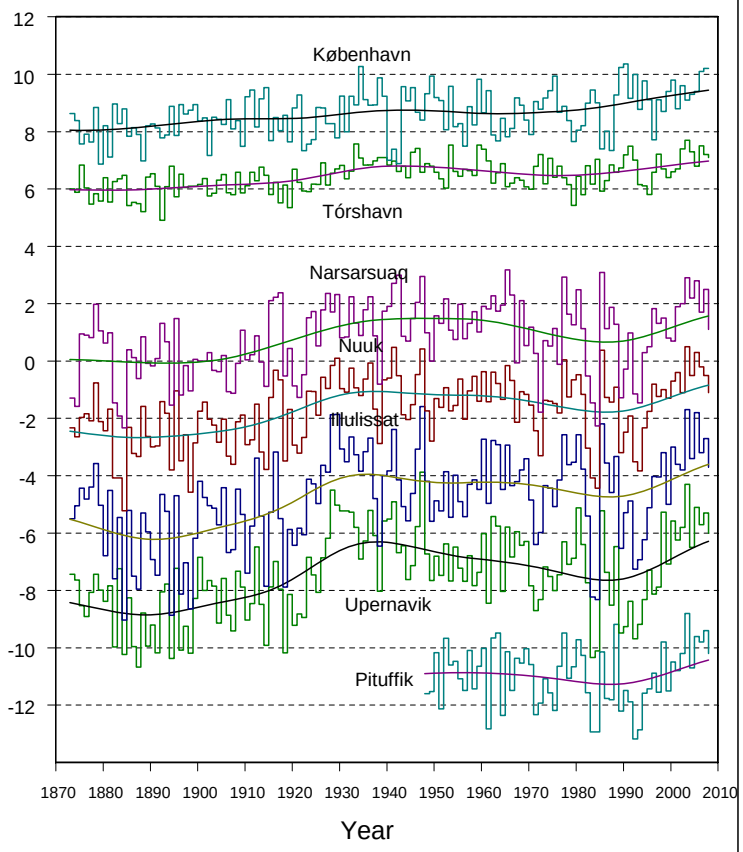
- **Annual preciptation in Denmark has increased by about 100 mm since 1870.**

- **Since 1980, the trend has been towards more hours of sunshine and on the other and less cloud cover.**



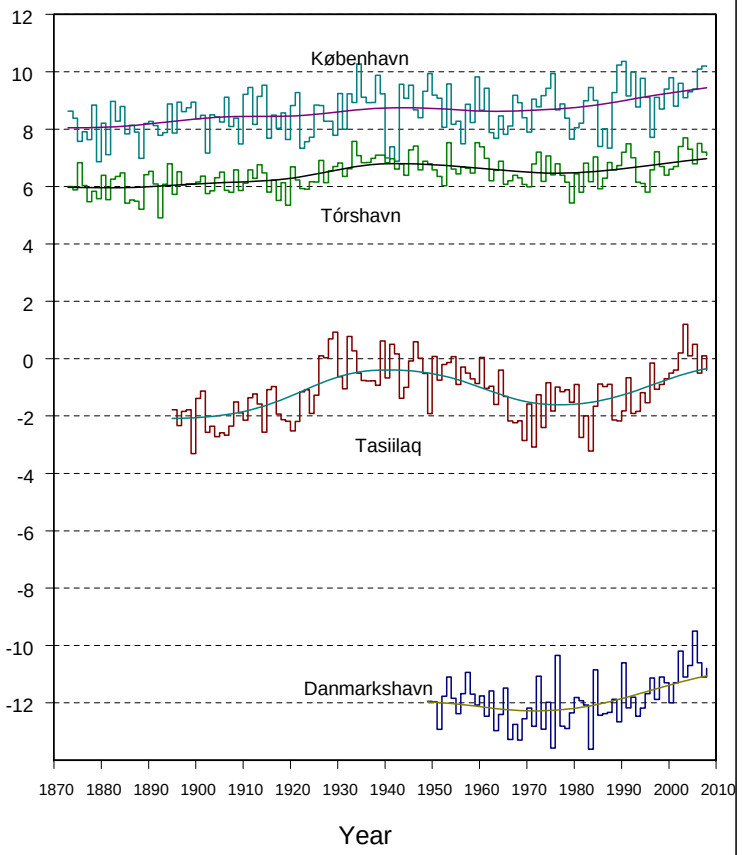
Annual Mean Temperature 1873-2008

Denmark, The Faroe Islands and West Greenland



Annual Mean Temperature 1873-2008

Denmark, The Faroe Islands and East Greenland

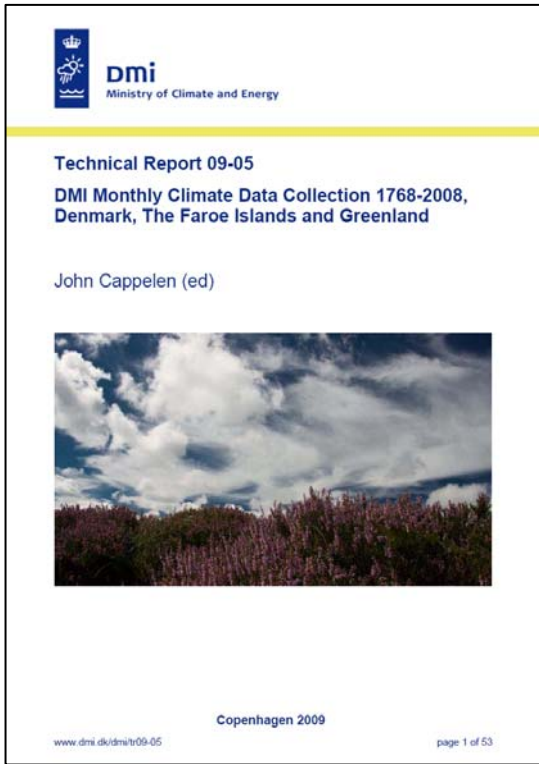


Long-term monthly series from 1873

Continuously updated….

Mean temperature
Mean of daily maximum temperature
Highest temperature
Mean of daily minimum temperature
Lowest temperature
Mean atmospheric pressure
Hours of bright sunshine (Star level)
Accumulated precipitation
Highest 24-hour precipitation
No. of days with snow cover (> 50 % covered)
Mean cloud cover

Hammer Odde Fyr	06193
Vestervig	06051
Nordby	06088
Tranebjerg	06132
København	06186
Tórshavn	06011
Strond Kraftstation	33054
Upernavik	04211
Ilulissat	04221
Nuuk	04250
Ivittuut/Narsarsuaq	04270
Danmarkshavn	04320
Illoqqortoormiut	04339
Tasiilaq	04360



Source: DMI Technical Report No. 09-05
John Cappelen (ed), 2009:
DMI monthly Climate Data Collection 1768-2008, Denmark, The Faroe Islands and Greenland

Link (latest version):
http://www.dmi.dk/dmi/tr09-05.pdf (report)
http://www.dmi.dk/dmi/tr09-05.zip (data)

Long-term daily series from 1873

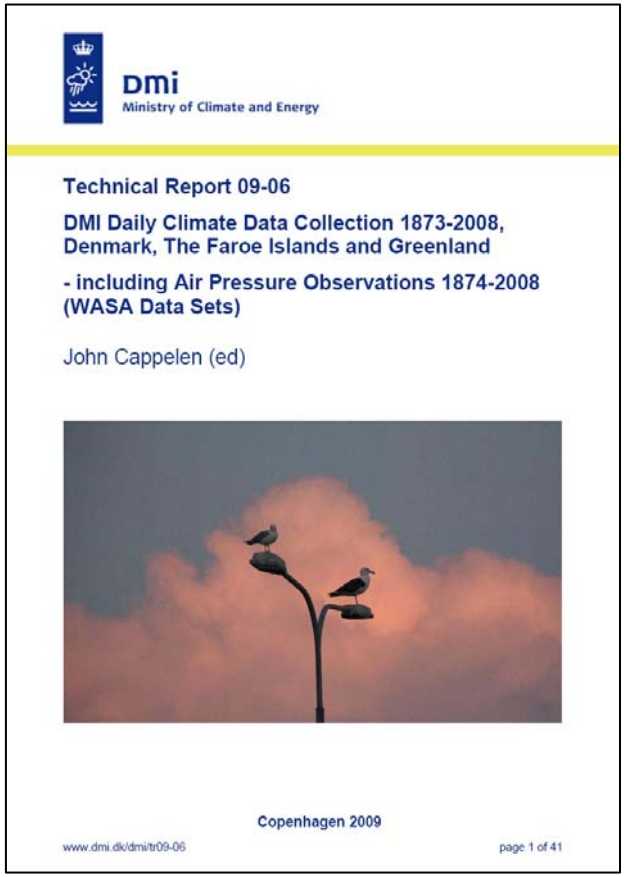
Continuously updated….

Max. og min. temperatures
Precipitation
Cloud cover
Air pressure

7 locations in Denmark
1 Faroe Islands
2 Greenland

+ observations of atmospheric air pressure (msl) (WASA data sets)

3 locations in Denmark
1 Faroe islands
1 Greenland



Source:
DMI Technical Report No. 09-06
John Cappelen (ed), 2009:
DMI Daily Climate Data Collection 1873-2008, Denmark, The Faroe Islands and Greenland - including Air Pressure Observations 1874-2008 (WASA Data Sets)

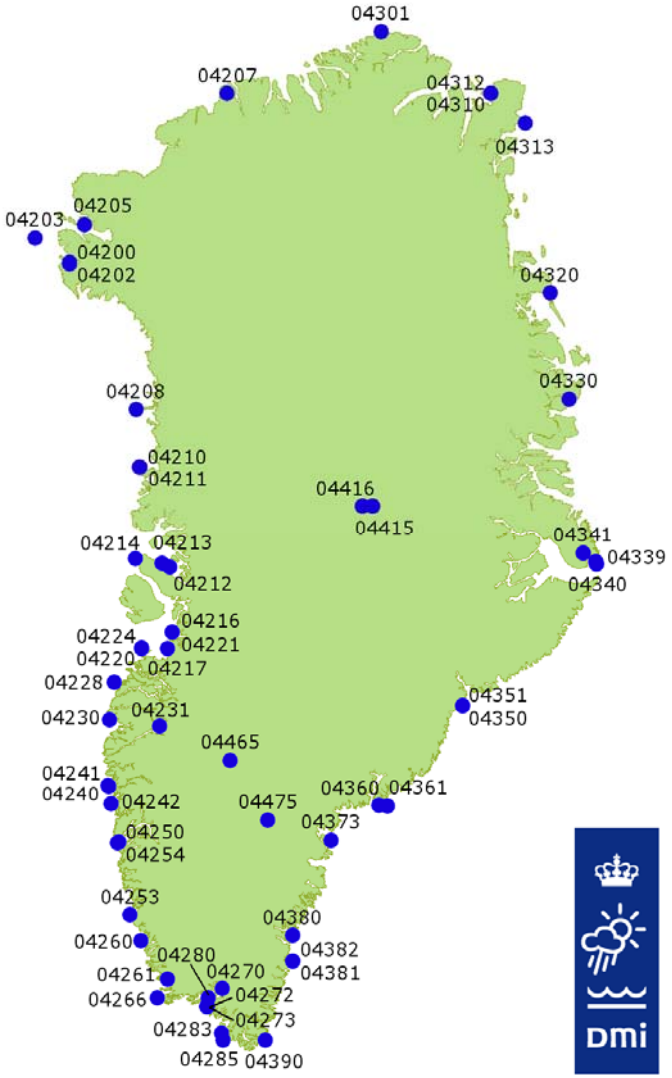
Link (latest version):
http://www.dmi.dk/dmi/tr09-06.pdf (report)
http://www.dmi.dk/dmi/tr09-06.zip (data)

A new DMI approach

Greenland Dataset 1958-2008 available for Research and Education, free of charge

Observations of:

Dry bulb, max. and min. temperatures
Precipitation
Wind direction
Wind Speed
Cloud cover
Cloud Cover
Air pressure
Humidity
Depth of snow



Source:
DMI Technical Report No. 09-11
Lone Seir Carstensen and Bent Wraa Jørgensen, 2009: Weather and Climate Data from Greenland 1958-2008, Dataset available for Research and Education, Temperatures, Preciptation, Wind, Cloud Cover, Air Pressure, humidity and depth of snow.

A guide to DMI climate data exist…

Besides data open to the public other data and services are available for a fee.

DMI provides free (besides delivery costs) and unrestricted access to meteorological data and products for educational and research purposes, if some conditions are met.

USER STATEMENT

concerning delivery of Meteorological and Climatological Information from the Danish Meteorological Institute for the use in Research and Educational projects, without payment of the Information value.

DMI J.nr:

Date/init:

User name:

Address:

Phone:

E-mail:

Invoice address:

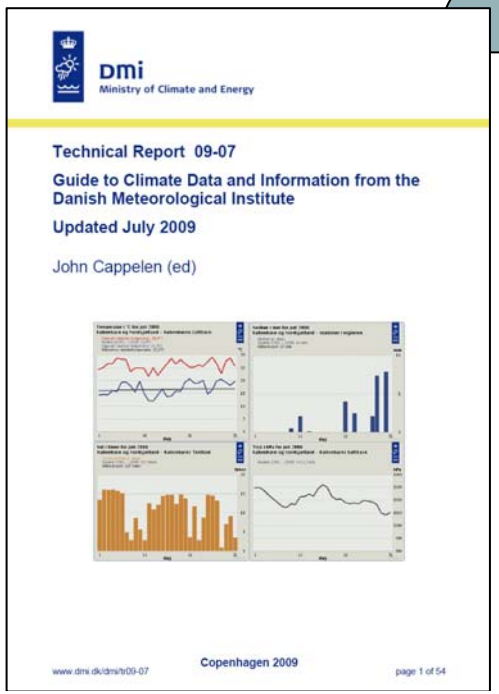
Vat. no

Data material:

Data delivery form: ☐ e-mail ☐ cd-rom

Information value - not to be invoiced/DMI contribution to the project: (DKK excl VAT)

Approx. delivery cost - will be invoiced/to be paid by the user: (DKK excl VAT)



DMI
Ministry of Climate and Energy

Technical Report 09-07

Guide to Climate Data and Information from the Danish Meteorological Institute

Updated July 2009

John Cappelen (ed)

Copenhagen 2009

Source:
DMI Technical Report No. 09-07
John Cappelen (ed), 2009:
Guide to Climate Data and Information from the Danish Meteorological Institute, Updated July 2009

Link (latest version :
http://www.dmi.dk/dmi/tr09-07.pdf

Overview: DMI Climate data availability

- **Before 1873: Few series: The Round Tower/Old Botanical Garden, Cph (from 1768) and composite SW Greenland monthly temp. series (from 1784).**
- **From 1873:**
  - **Annual temperature series from several locations DK, FR, GR.**
  - **Annual DK series of temperature, preciptitation, sunshine and cloud cover**
  - **Monthly series, 11 parameters from several locations DK, FR, GR.**
  - **Daily series, 5 parameters from several locations DK, FR, GR.**
  - **Observations of atmospheric air pressure (msl) (WASA data sets)**

- **From 1958: Digitised obs. in the climate databases at DMI**
- **From 1958: Greenland Dataset available for Research and Education, free of charge**
- **From 1961: The climate of Greenland, The Faroes Islands and Denmark in general with normals 1961-90 and other monthly data app. 1961-1999 for many parameters and stations.**

- **Climatic Data Guide and Data Policy exist.**

The constantly growing challenges for all of us….

With growing amounts of data and more and more demands from the society to get them:

“it is essential for both data providers and users that more focus are put on the continously securement of general policies, praxtices, exchanges, overviews and acesssibility of climate data in the future”

Towards a better more common Data Management in Europe?

Present situation:

A bit scattered picture and strategy, but fast growing national and international initiatives – slowly converging against each other.

Important in the future:

The Network of European Meteorological Data Providers should be encouraged and continue to work towards a more common and more coordinated Data Management taking into account both activities on national and international level:

Data Policy
Data Practice
Data exchange
Outreach


The End –
Thank you for your attention