Group E Presentation

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Outline

- Data cleaning
- 5 interesting analyses
    - Temperatures of one specific day over the years in a location
    - Warmest and coldest day in the years of a location
    - Temperatures in everyday over the years of a location
    - How temperatures change w.r.t. latitudes
    - How temperatures change w.r.t. time (years)

Data Cleaning

- Some small manual changes first
- Programming language - Python
- Function: clean_data(data_dir, save_dir, city_name)
- CSV file ===> .dat file
- Output format: [year, month, day, temperature]

1	Datum;Tid (UTC);Lufttemperatur;Kvalitet
2	1961-01-01;06:00:00;0.4;G
3	1961-01-01;12:00:00;0.6;G
4	1961-01-01;18:00:00;1.8;G
5	1961-01-02;06:00:00;3.0;G
6	1961-01-02;12:00:00;2.6;G
7	1961-01-02;18:00:00;0.8;G
8	1961-01-03;06:00:00;2.0;G
9	1961-01-03;12:00:00;0.8;G
10	1961-01-03;18:00:00;3.8;G
11	1961-01-04;06:00:00;1.4;G
12	1961-01-04;12:00:00;2.5;G

```
1961.0 1.0 1.0 0.6
1961.0 1.0 1.0 1.8
1961.0 1.0 2.0 3.0
1961.0 1.0 2.0 2.6
1961.0 1.0 2.0 0.8
1961.0 1.0 3.0 2.0
1961.0 1.0 3.0 0.8
1961.0 1.0 3.0 3.8
1961.0 1.0 4.0 1.4
1961.0 1.0 4.0 2.5
1961.0 1.0 4.0 2.5
1961.0 1.0 5.0 1.8
1961.0 1.0 5.0 2.8
1961.0 1.0 5.0 2.2
```

Input oneDay

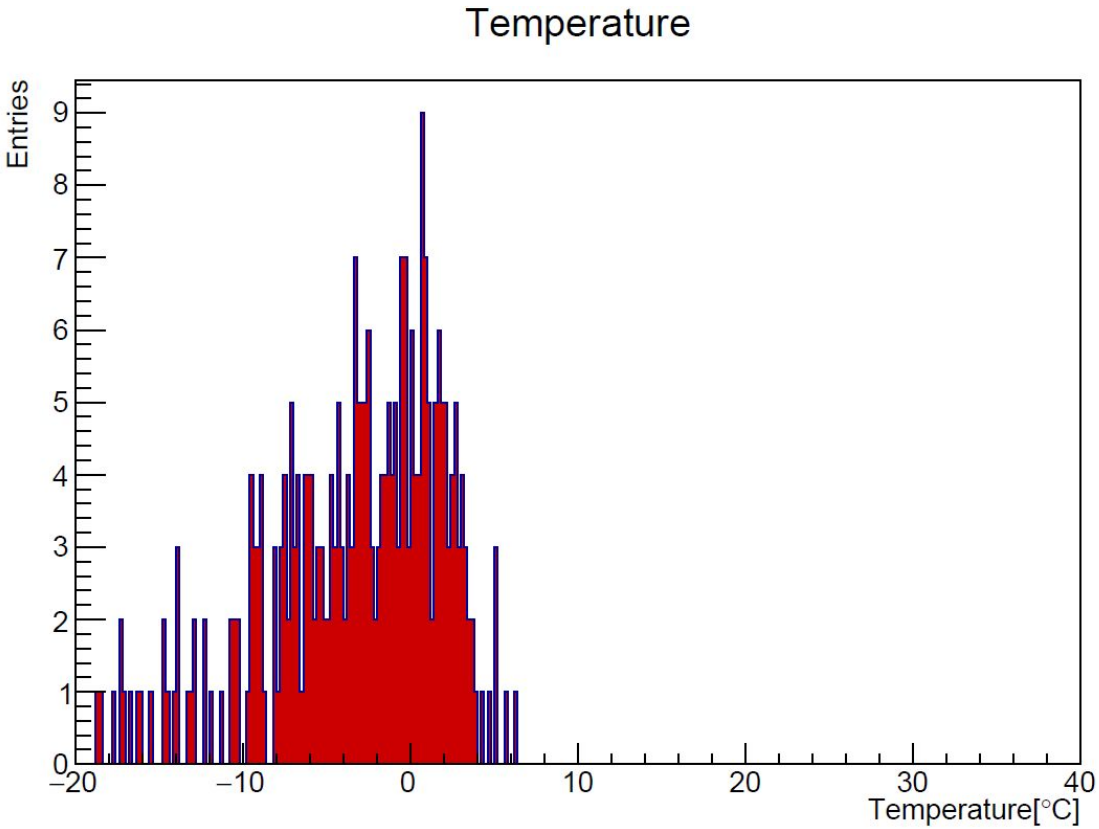
- oneDayMDI(filepath(string), month, day, plot)
- oneDay(filepath(string), date, plot)
- oneDayProb(filepath(string), month, day, temperature, error range)

Output oneDay

Christmas day temperature in Uppsala from 1722 to 2013.

Mean: -3.41712

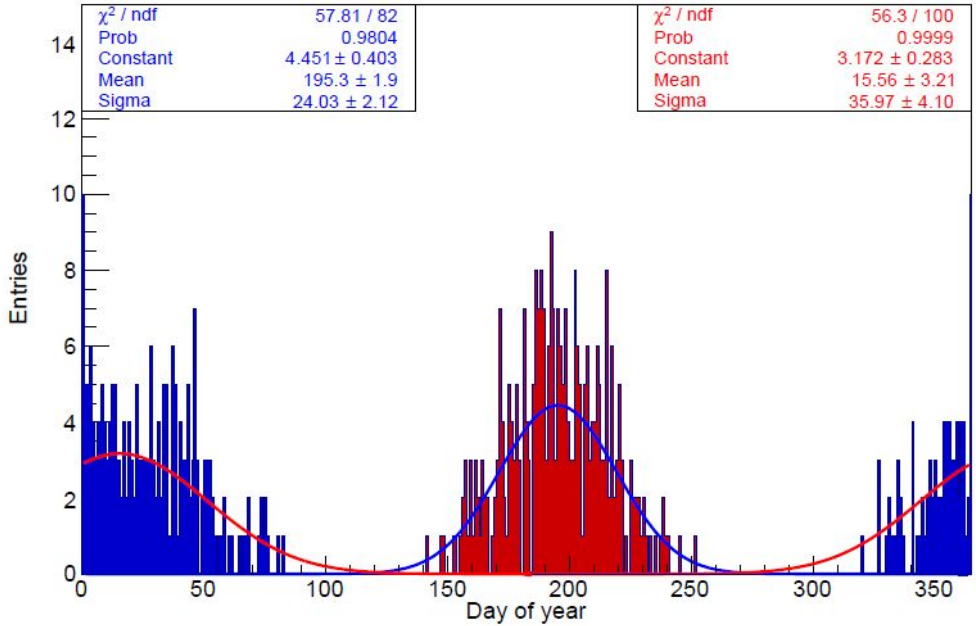
STDL 5.29738



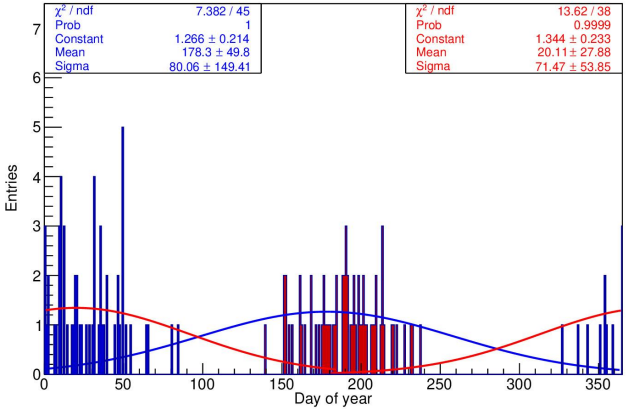
Input WarmColdDay

WarmColdDay(location name)

Output WarmColdDay Uppsala



Output WarmColdDay



Location	Mean Value		Standard Deviation	
	Cold	Warm	Cold	Warm
Uppsala	15.6 ± 3.2	195.3 ± 1.9	36.0 ± 4.1	24.0 ± 2.1
Luleå	20 ± 28	178 ± 50	71 ± 54	80 ± 149
Umeå	23 ± 44	187 ± 91	82 ± 95	122 ± 143
Visby	29 ± 55	211 ± 73	144 ± 212	92 ± 166
Lund	25 ± 60	184 ± 8	105 ± 188	81 ± 84

Input everyDay

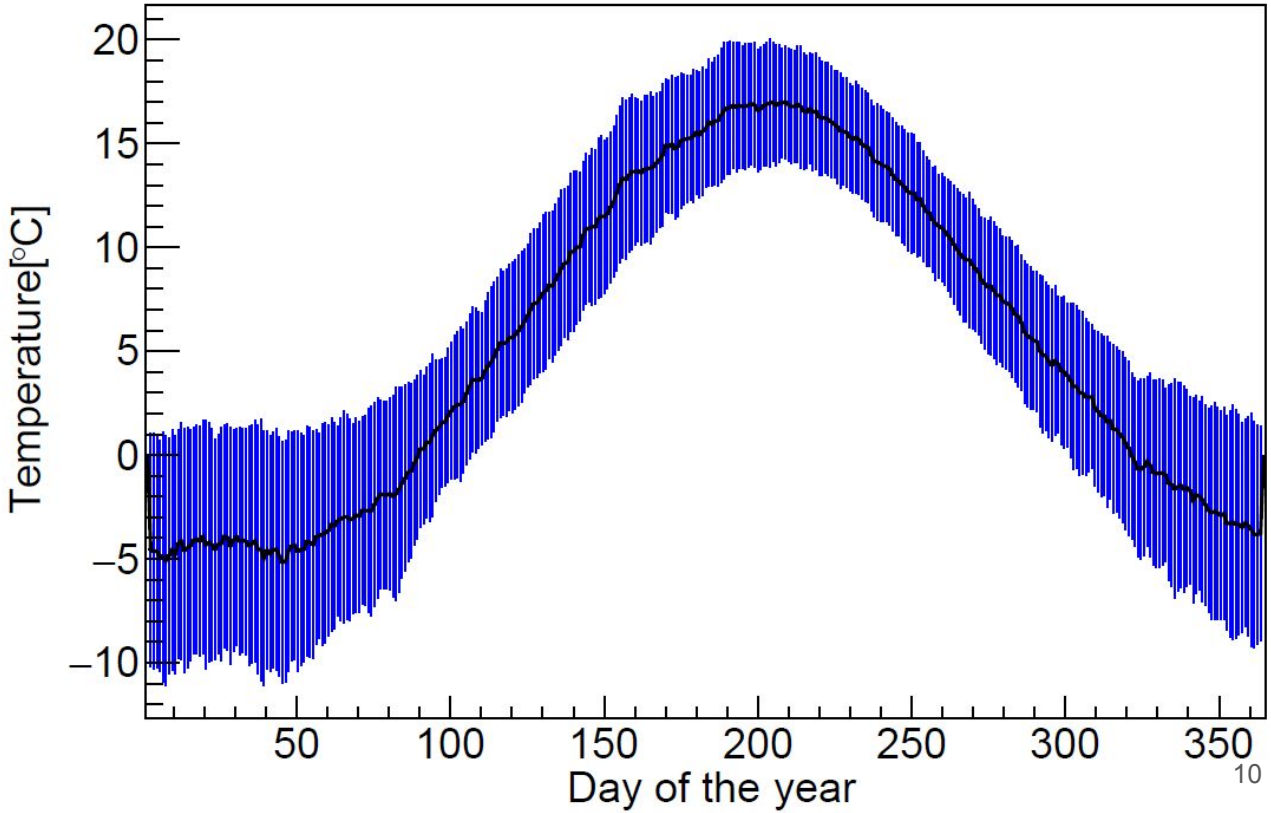
everyDay(filepath(string) = “../clean_data/upsala_clean.dat”)

Only works for cleaned data in clean_data folder

Output everyDay

It's what we expect

Seasons visible

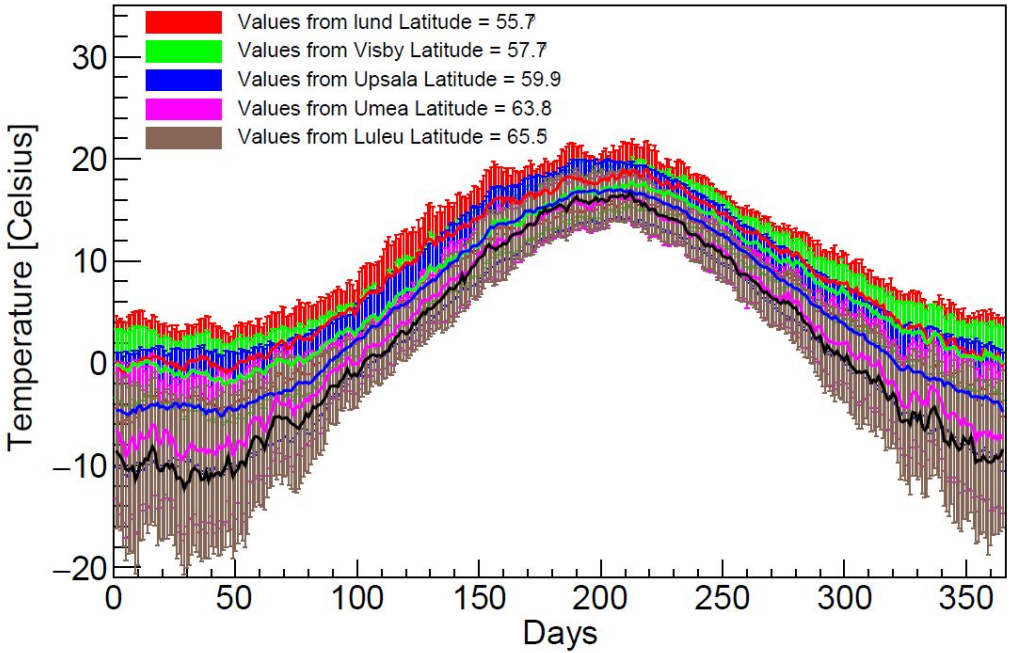


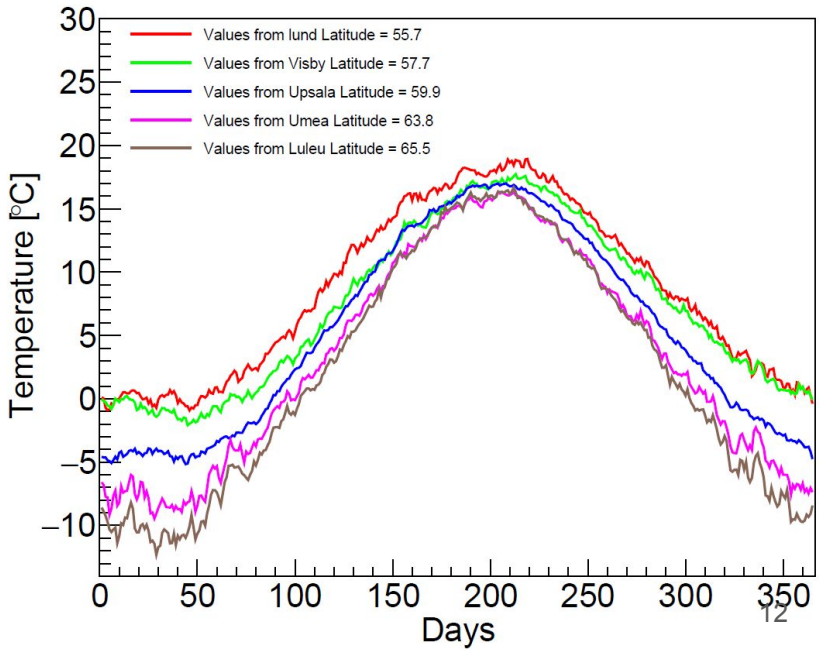
Input LattDiff

LattDiff()

Output LattDiff

We see effect the of latitude





Input getTemperature

```
getTemperature(std::string loc = "lund")
```

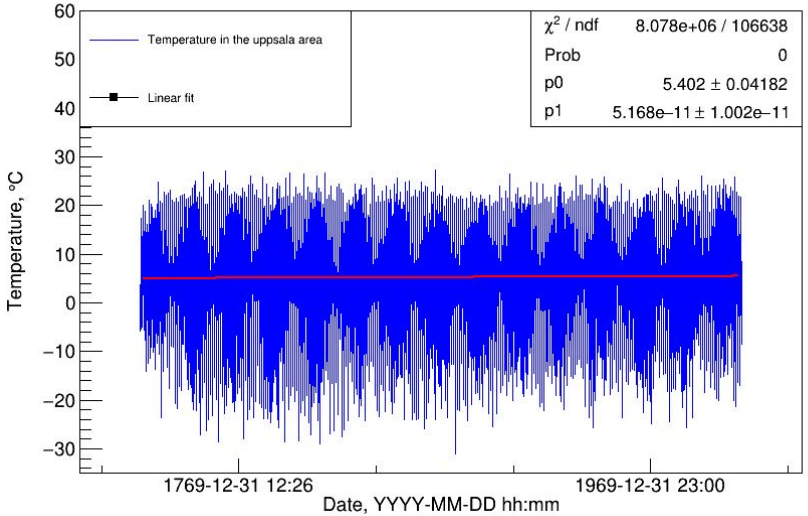
Locations:

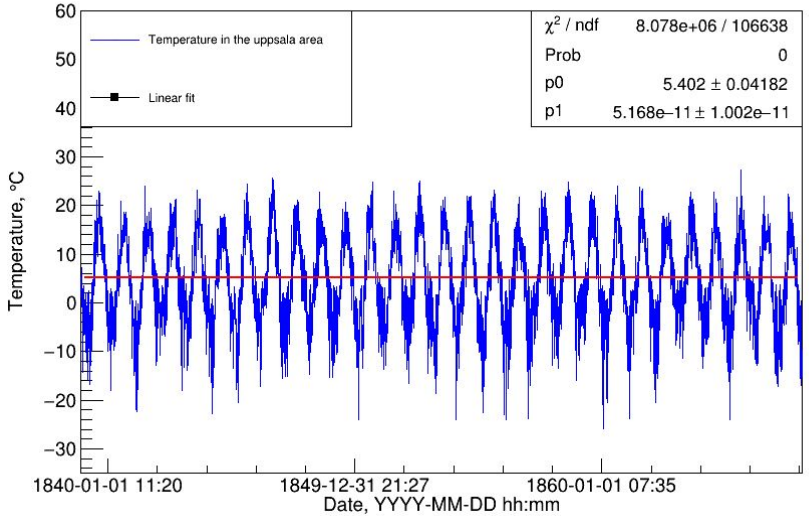
- Boras
- Falsterbo
- Falun (First 10 years are skipped)
- Karlstad
- Lulea
- Lund
- Soderarm
- Umea
- Uppsala (Largest data sample, different data format)
- Visby

The function plots a `TGraph` of temperature against time for a selected location and fits the data with a polinom of first order. The result and a zoomed in part of 10% of the data in the center area of the `TGraph` are saved as a .pdf files.

The temperature unit on the plot is °C, the time unit is s.

Output getTemperature





getTemperature results

Analysis shows that for each data sample, a positive change of average temperature is observed.

This change is especially noticeable for the data gathered in 20 century. This fact could indicate a connection between the temperature and increase of power consumption by society in the recent 100 years.

Another noticeable fact is that the change of average temperature is the highest in the locations with lowest
temperature in the analysed data.

Location	Average temperature, °C	Change of average temperature, °C/year
Boras	6.59±0.05	0.015±0.002
Falsterbo	8.13±0.02	0.030±0.001
Falun	4.85±0.08	0.020±0.003
Karlstad	6.31±0.02	0.002±0.001
Lulea	1.91±0.02	0.024±0.001
Lund	8.36±0.05	0.011±0.002
Soderarm	5.61±0.02	0.038±0.001
Umea	2.42±0.02	0.041±0.001
Uppsala	5.40±0.04	0.002±0.000
Visby	6.93±0.01	0.022±0.001