# Seminar 05: "Always take the weather with you," and from small to big data
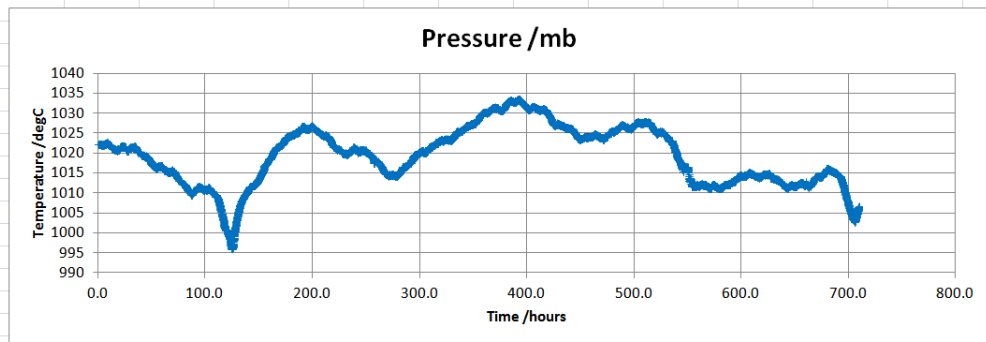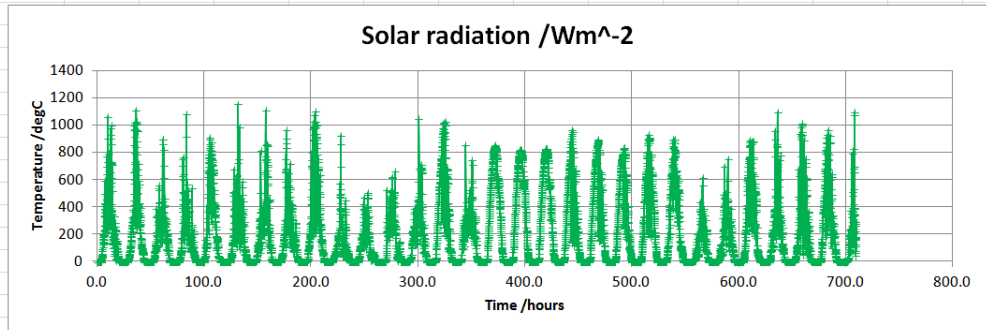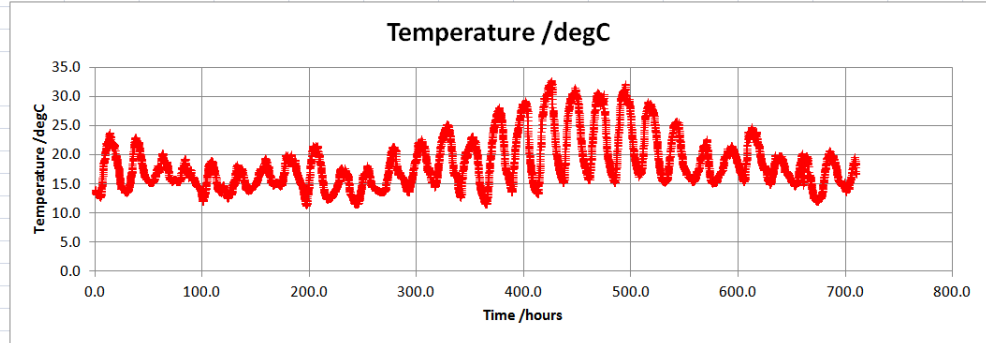
Dr Andrew French.
December 2021.

Investigate patterns in local measurements of temperature, humidity, pressure using our meteorological system on the roof of Science School. *Start with an Excel analysis of one month of data (November 2021), then investigate the MATLAB tools.*

• Run **plot_met_data.m** and generate graphs from the files in the Met data directory Can you spot any trends?

• Load a met_data file into **MATLAB**. Investigate its structure.

• Adapt code from **plot_met_data.m** to make your own graphs.

• How about temperature vs pressure, or temperature vs humidity. Are there any correlations?

• Could you work out the *rate* of change of temperature, time etc? (And plot this).
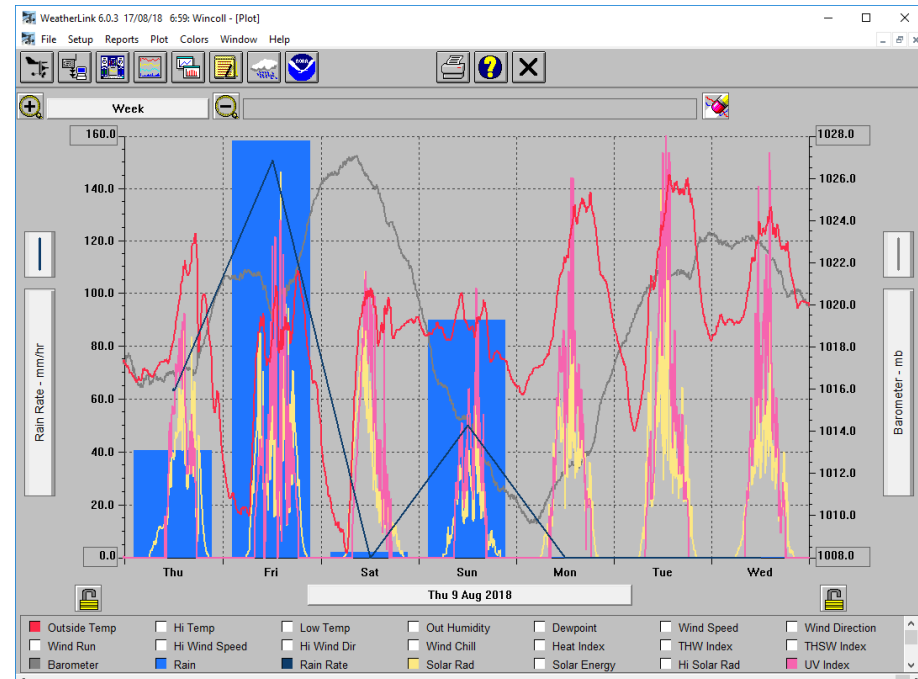
Example analysis of November 2021 Winchester College meteorological data using Microsoft Excel

time /hours	temp /degC	solar radiation /Wm^-2	UV index	wind speed /ms^-1	wind direction /deg	Pressure /mb	humidity %	rain rate /mm/hour
0.0	14.1	0	0	0		1022.3	90	0
0.1	14.1	0	0	0		1022.3	90	0
0.2	14.0	0	0	0		1022.3	91	0
0.2	13.9	0	0	0		1022.4	91	0
0.3	13.8	0	0	0		1022.4	91	0
0.4	13.7	0	0	0		1022.3	91	0
0.5	13.7	0	0	0		1022.3	91	0
0.6	13.6	0	0	0		1022.3	91	0
0.7	13.4	0	0	0		1022.3	91	0
0.8	13.4	0	0	0		1022.4	92	0
0.8	13.4	0	0	0		1022.4	92	0
0.9	13.5	0	0	0		1022.4	92	0
1.0	13.5	0	0	0		1022.4	92	0
1.1	13.4	0	0	0		1022.4	92	0
1.2	13.3	0	0	0		1022.4	92	0
1.2	13.3	0	0	0		1022.4	92	0
1.3	13.4	0	0	0		1022.4	93	0
1.4	13.3	0	0	0		1022.4	93	0
1.5	13.3	0	0	0		1022.4	93	0
1.6	13.2	0	0	0		1022.3	93	0
1.7	13.2	0	0	0		1022.4	93	0
1.7	13.2	0	0	0		1022.3	93	0
1.8	13.2	0	0	0		1022.3	93	0
1.9	13.2	0	0	0		1022.3	93	0
2.0	13.2	0	0	0		1022.3	93	0
2.1	13.2	0	0	0		1022.3	93	0
2.2	13.3	0	0	0		1022.2	94	0
2.3	13.4	0	0	0		1022.4	94	0
2.3	13.4	0	0	0		1022.4	94	0
2.4	13.4	0	0	0		1022.4	94	0
2.5	13.4	0	0	0		1022.4	94	0
2.6	13.4	0	0	0		1022.4	94	0
2.7	13.4	0	0	0		1022.3	94	0
2.7	13.4	0	0	0		1022.4	94	0
2.8	13.4	0	0	0		1022.3	94	0
2.9	13.4	0	0	0		1022.2	94	0
3.0	13.3	0	0	0		1022.2	94	0
3.1	13.3	0	0	0		1022.3	94	0
3.2	13.3	0	0	0		1022.1	93	0
3.2	13.2	0	0	0		1022.2	94	0
3.3	13.2	0	0	0		1022.1	94	0
3.4	13.2	0	0	0		1022.1	93	0
3.5	13.1	0	0	0		1022	94	0

WINCHESTER COLLEGE WEATHER DATA FOR NOVEMBER 2021

Geostationary

Temperature   Wind speed
Pressure   Wind direction
Humidity   UV index
Solar radiation

We'll focus
on data collected
from this system

EUMETCAST
Earth Observation data

e.g. full hemisphere
weather every **15 minutes
at 1 pixel per km² resolution!**

Winchester College
Observatory
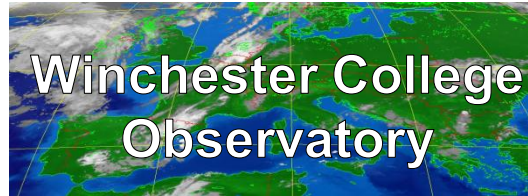
Davis Vantage Pro
**automated weather
station**

Dartcom PC based receiver
system running software to
ingest and process each data
stream simultaneously

Processed data (e.g.
temperature
variation vs time Excel
sheet, indexed images
for plotting cloud cover
over UK vs time etc)

Workstation
console in
room beneath
observatory

USB sticks/hard drives
(possibly internal network)
to Z drive / Firefly for
general Wincoll access

Humidity vs time

Measurements
7/6/18 to 21/6/18
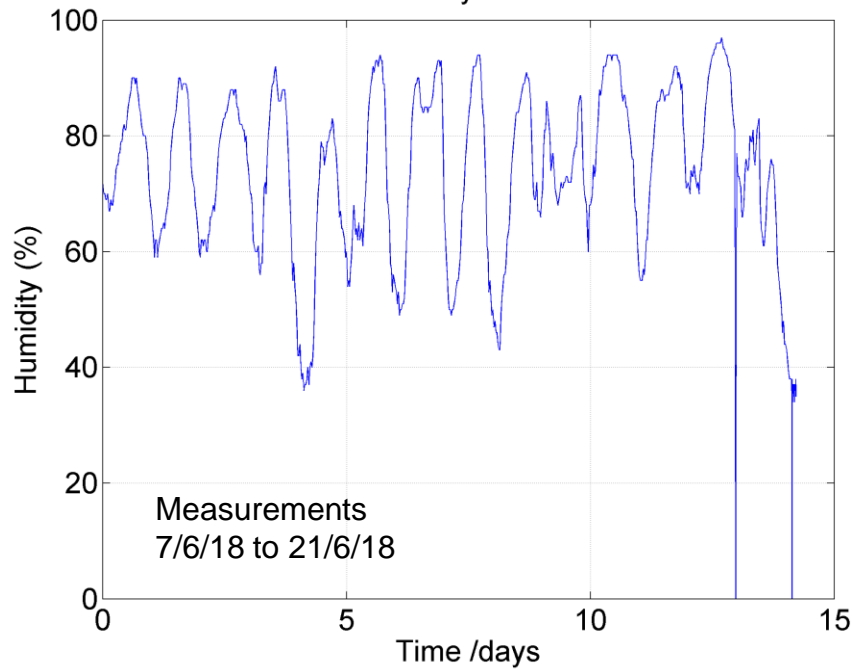
UV index vs time
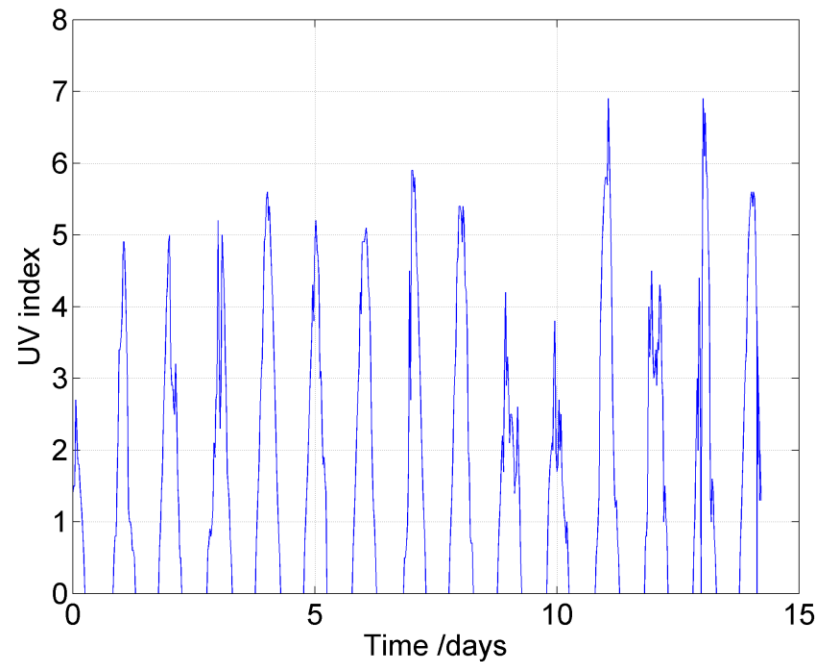
15 DAYS
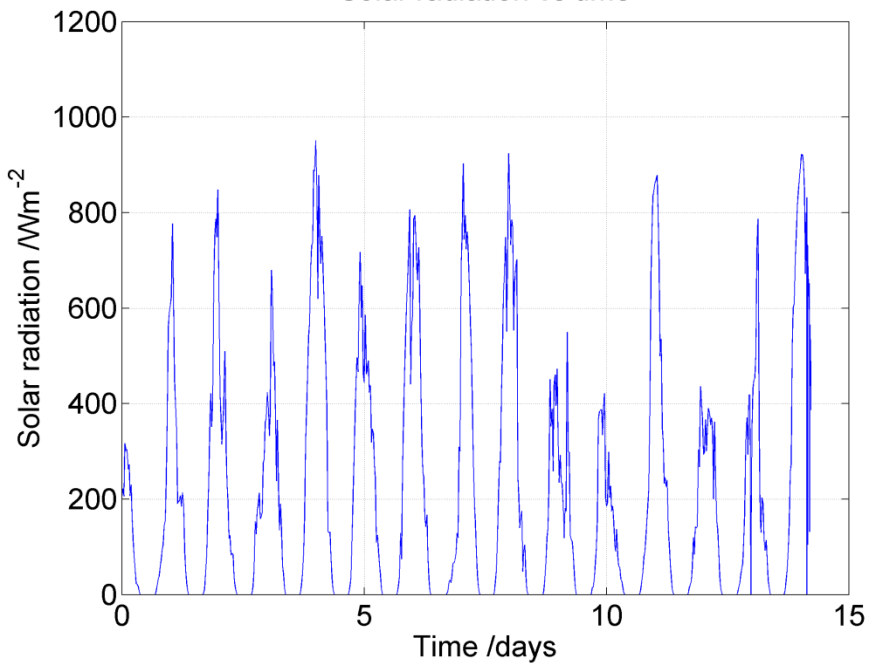
Solar radiation vs time

Temperature vs time

TWO MONTHS
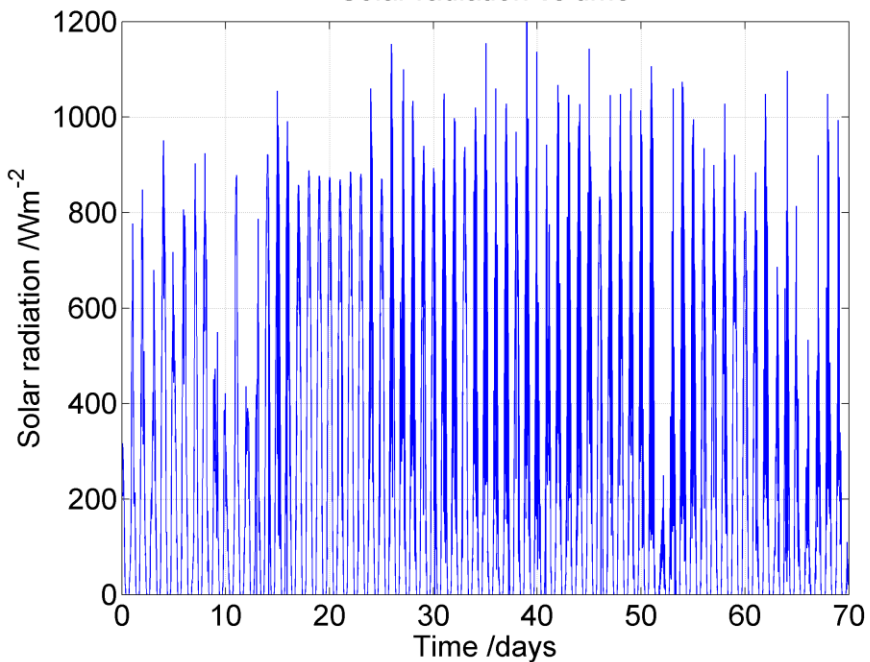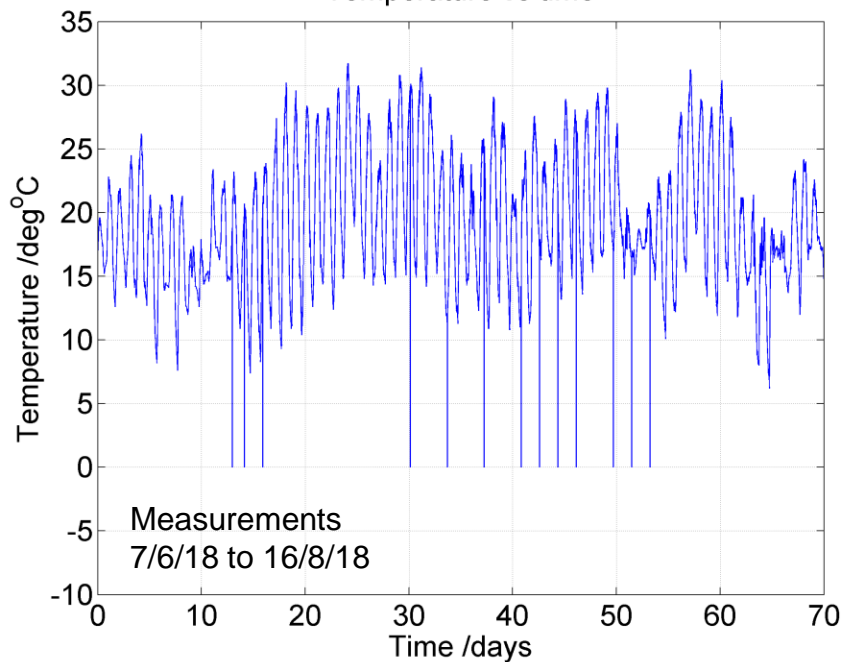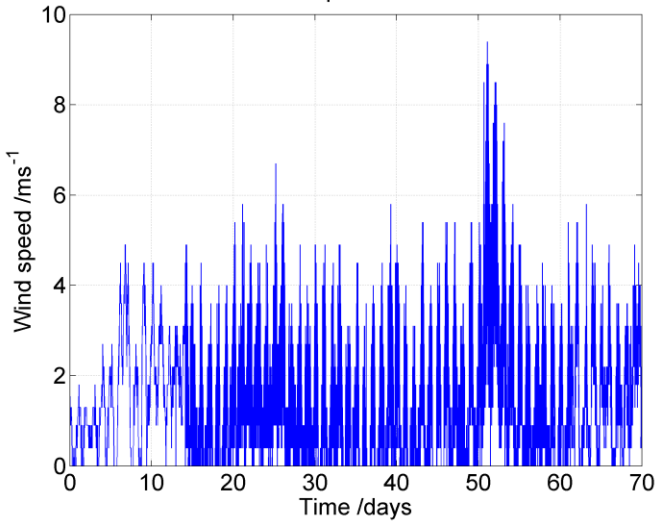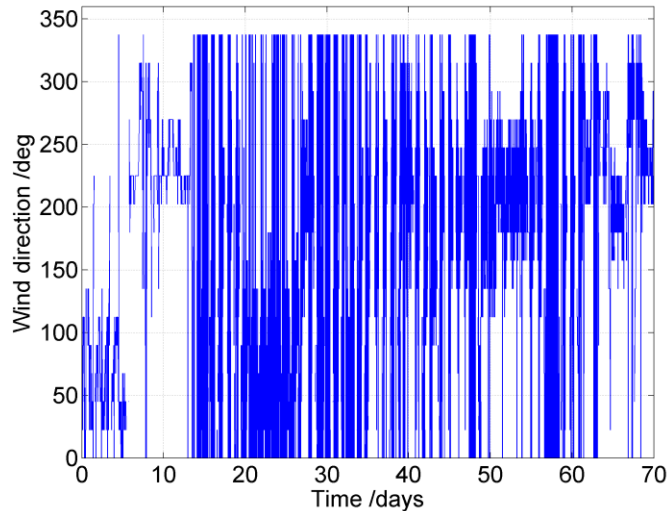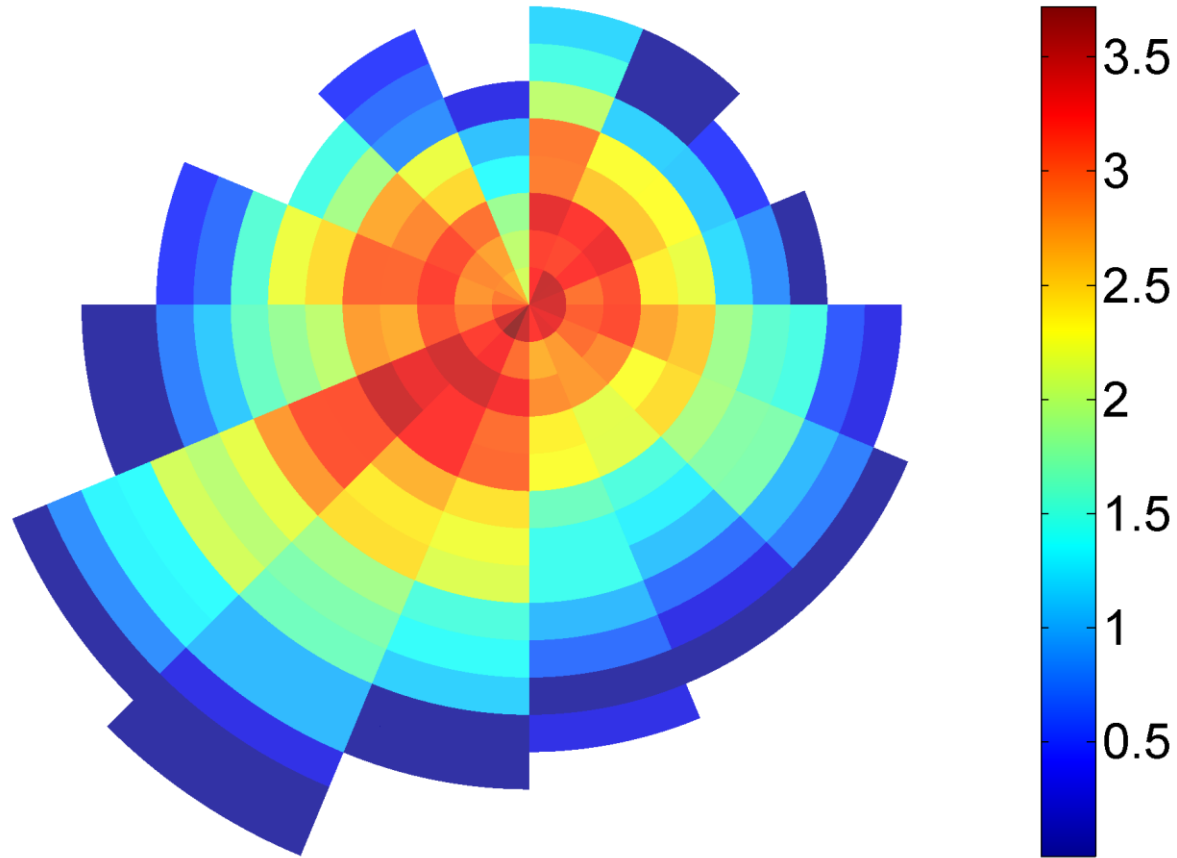
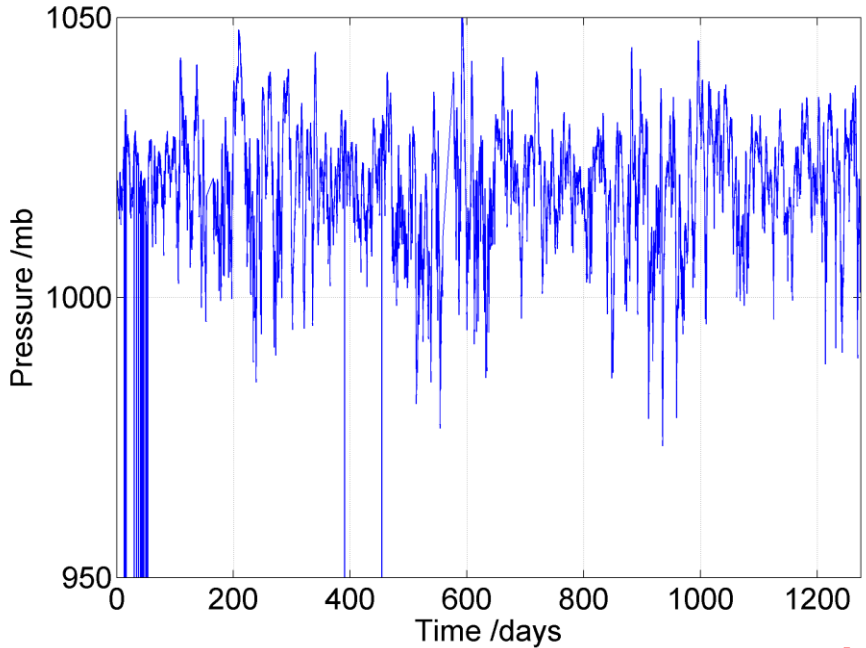Wind speed vs time

Wind direction vs time

Measurements
7/6/18 to 16/8/18

Wind speed vs angle. Max speed = 20m/s
Max colour means frequency of $10^{3.7}$ = 5247

This 'wind rose' displays the frequency of wind measurements in circular sectors. Angle corresponds to 16 wind direction sectors (e.g. N, NNE etc) and range corresponds to wind speed. The colour scale is the *logarithm* of frequency.
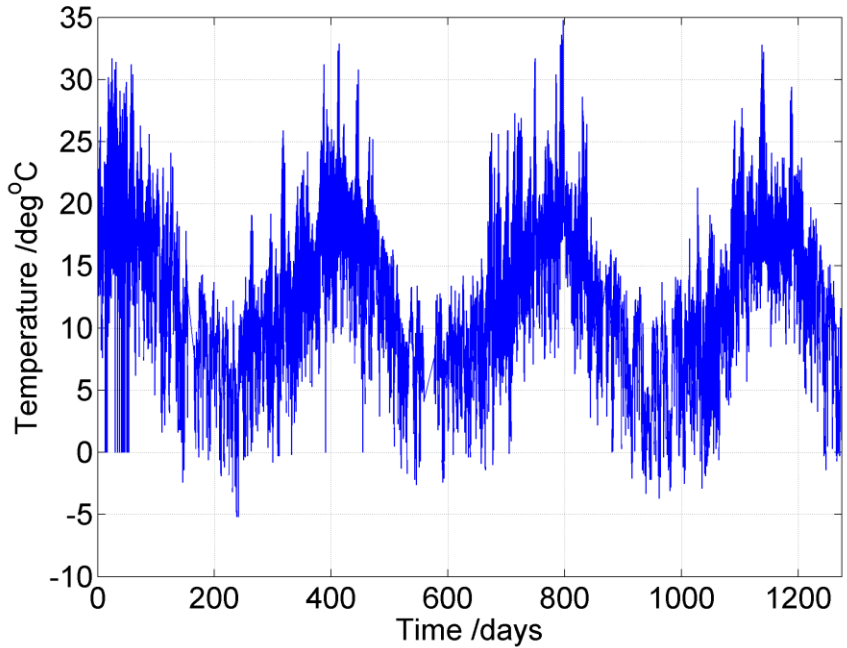
Pressure vs time
07/06/18 to 02/12/21

Wind speed vs angle. Max speed = 20m/s
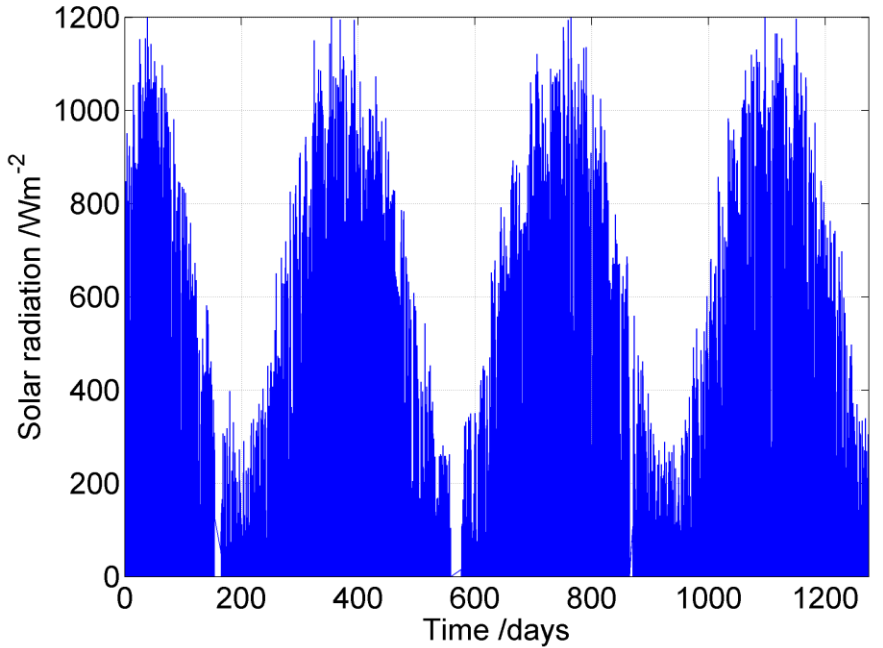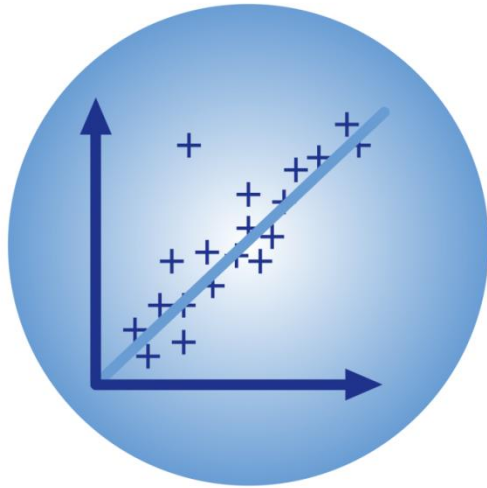Max colour means frequency of $10^{4.9}$ = 80384
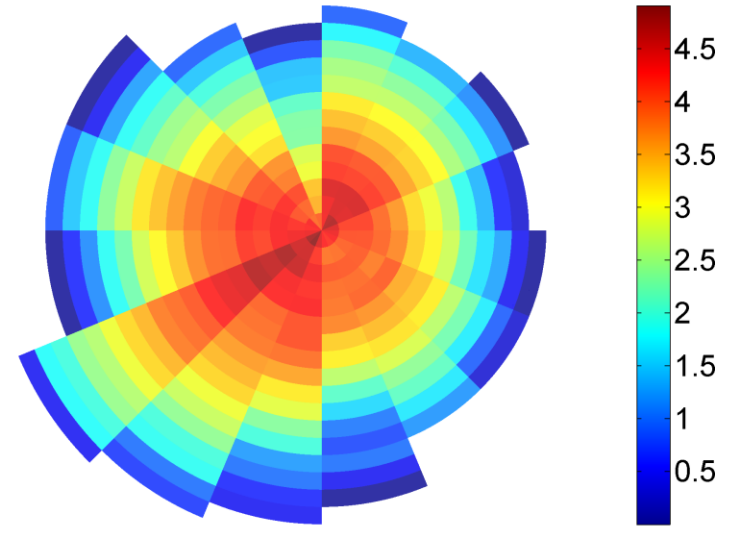
7/18 to 12/21

Temperature vs time
07/06/18 to 02/12/21

Solar radiation vs time
07/06/18 to 02/12/21

- Suggested homework
- Q&A