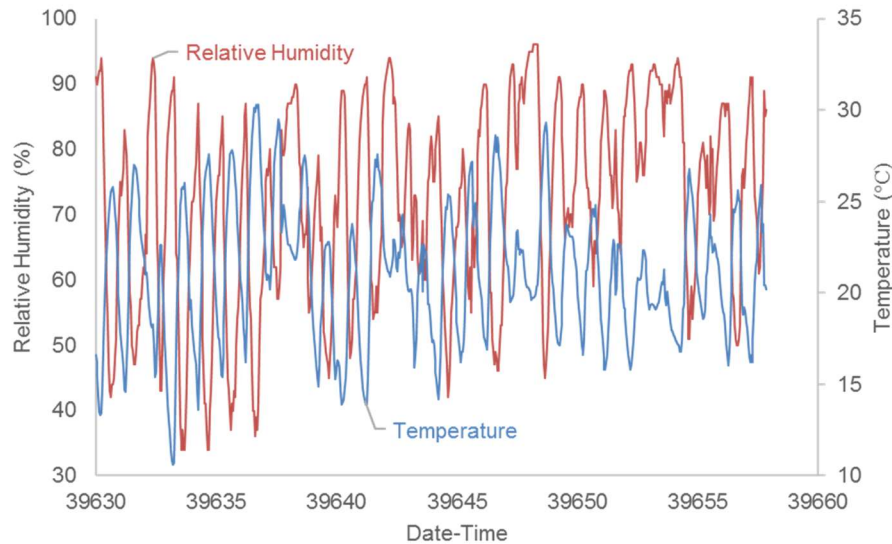


## Laboratory 5 – Multivariate series and hourly data

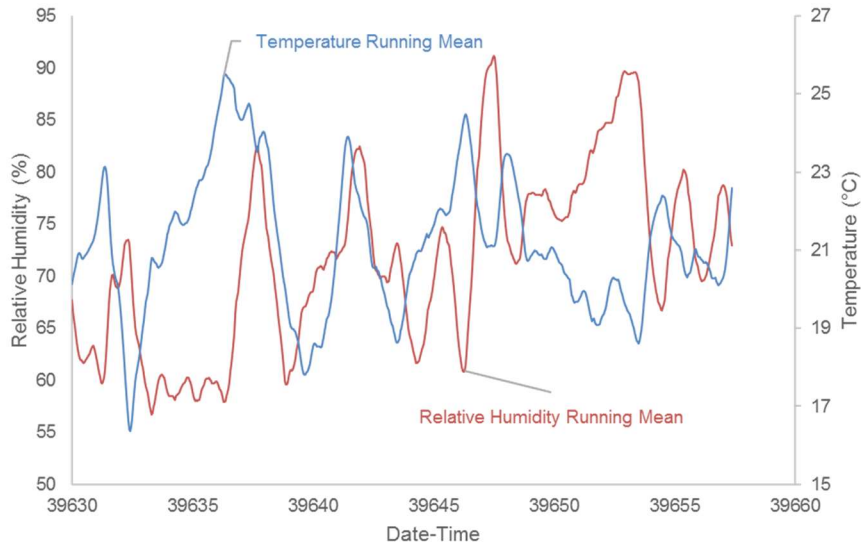
### Part 1 – Temperature and humidity

The main factor that affects humidity over the course of the day is temperature. As the temperature increases the amount of water that could be contained in the atmosphere increases. This causes the relative humidity to decrease as the humidity that is present in the morning may be the same in the afternoon, but the amount of water vapour that could be contained in the atmosphere has increased, leading to a drop in the relative humidity because of the relationship between the two:  $rH\% = [P_w/P_{ws}(t)] * 100\%$ .



Temperature and relative humidity are inversely proportional or negatively correlated, in that when one increases the other decreases. This is consistent with the definition of the equation because the relative humidity is a fraction of the water vapour in the air and the amount of condensation that is supported by the air. If the bottom of the fraction increases, the amount of water that is held by the air, while the top remains the same number, humidity level, then the percentage of relative humidity will decrease.

Over the course of one day, the function looks sinusoidal, and follows the trend of the above graph as it is negatively correlated. The relative humidity and temperature begin apart in the morning, as the temperature of the day increases, the relative humidity decreases and they cross one another around mid-day and at midnight. The relative humidity will then reach its minimum before increasing again, while the temperature reaches a maximum and begins to decrease, and the two intersect again. The same pattern can be seen over the course of a month.



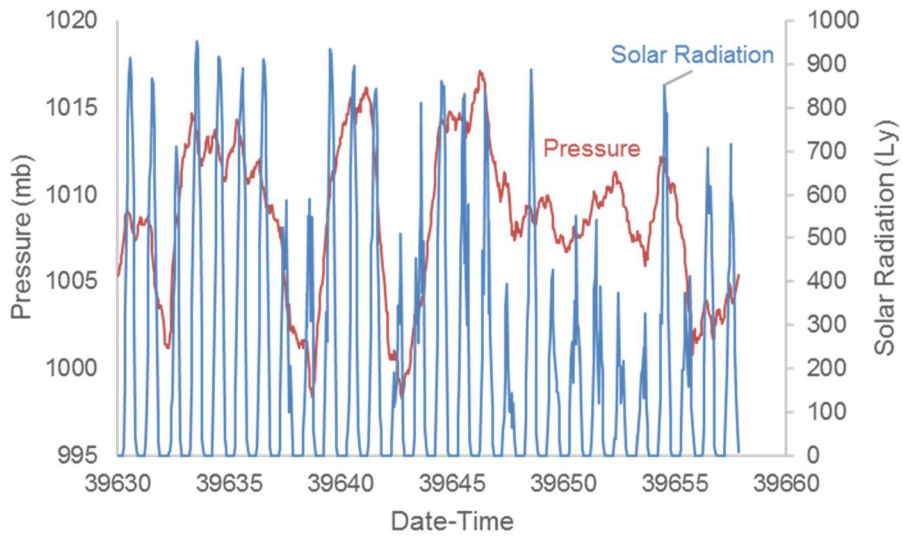
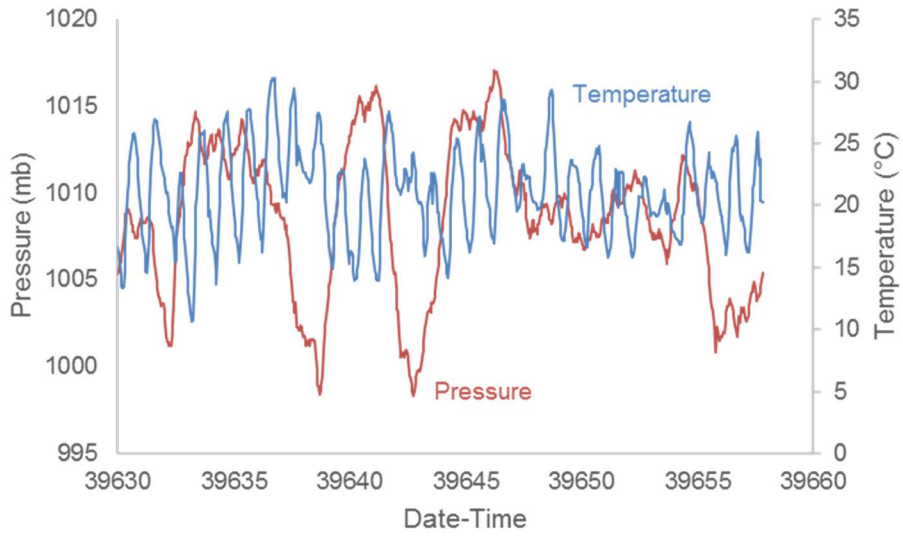
The running mean for temperature and relative humidity are for the most part negatively correlated. In some areas, it seems as though the graph is positively correlated, for example just before the 39640 date-time and around the 39645 date-time. For the day and month timescale, the temperature and relative humidity are negatively correlated. These results are fitting because the relative humidity would decrease throughout the day while the temperature increases throughout the day.

## **Part 2 – Temperature, pressure, solar radiation and precipitation**

There are significant decreases in pressure in the above graph. The temperature at these dips in pressure does not vary by a large amount, especially not in the overall trend of the temperature. The level of precipitation does not increase or decrease with the level of pressure, not according to the data given. Pressure does effect the amount of precipitation that falls but most likely the weather station was not accurate to record this, or the pressure was at a higher level.

Pressure in the above graph and the solar radiation are correlated in the sense that at times when the pressure is not high, the level of solar radiation decreases as well. When there is a large amount of pressure, the solar radiation increases because solar radiation is an index of cloudiness, and the level of clouds would increase when pressure increases, and decreases when the pressure decreases because there are no more clouds.

**July 2008**



# January 2008

