From Correlation to Autocorrelation

Recall the Demo of **Covariance** between w and T:


Covariance Demo

w'	T'	w'T'
−3	−5	15
0	1	0
−2	−5	10
−1	1	−1
−2	−2	4
2	5	10
1	5	5
0	0	0
4	7	28
3	4	12
1	0	0
2	3	6
0	−2	0
1	1	1
−1	1	−1
0	−3	0
−3	−8	24
−2	−3	6

mean =

| 0 | 0 | 6.611 | is covariance (w'T')bar |

st.dev =

| 1.944 | 3.859 | 0.882 | r = correlation coef. |
| sigma_w | sigma_T | r = covar / (sigma_w * sigma_T) | |

w' and T' vary together, hence covariance
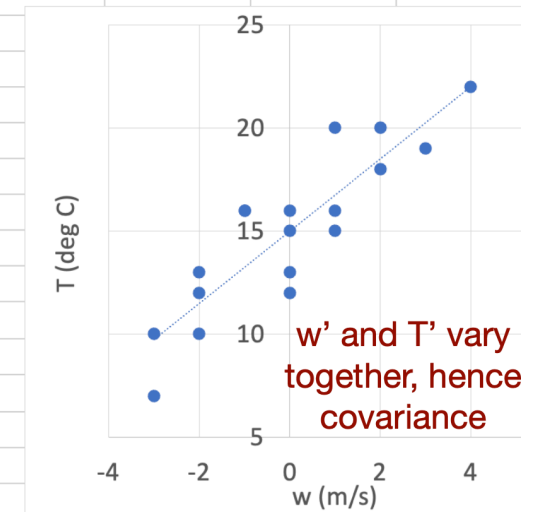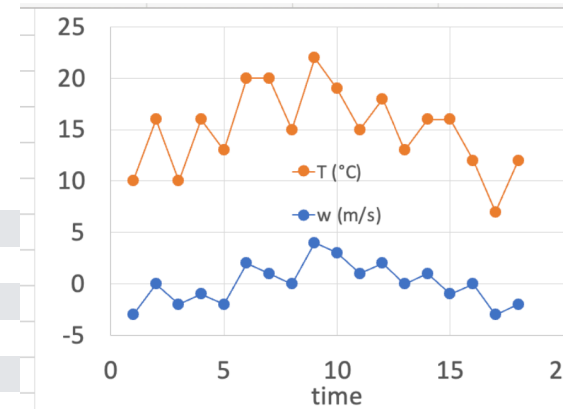
The covariance divided by the st. deviation of each variable is the correlation coefficient   r between two those variables, where r is normalized so that -1 ≤ r ≤ 1 , & where r=1 implies perfect correlation.

Autocorrelation Demo
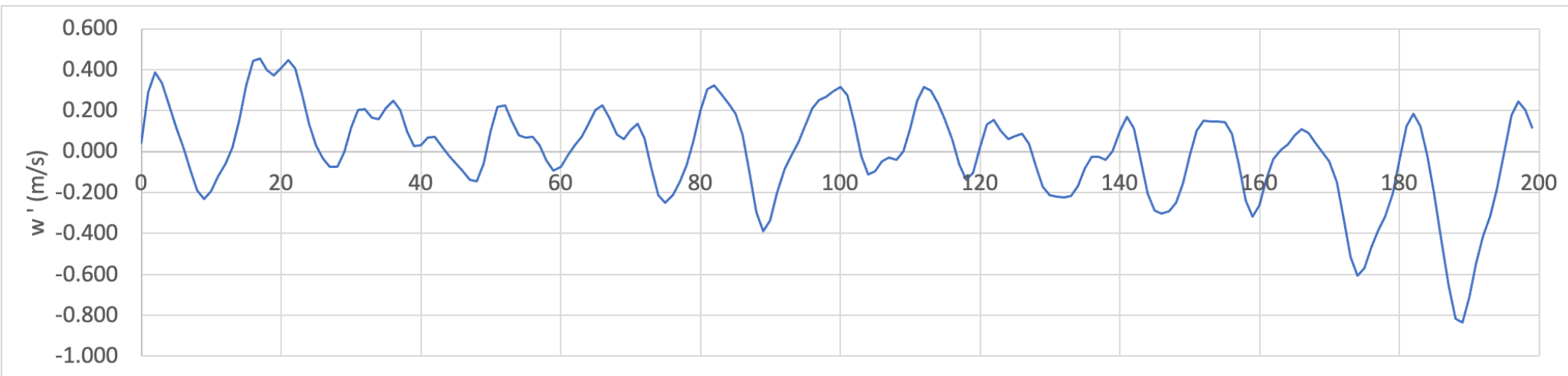
t (s)	w (m/s)	w' (m/s)	lag 1s	lag 2s	etc. for other lags
0	0.370	0.042			
1	0.617	0.289	0.042		
2	0.715	0.387	0.289	0.042	
3	0.663	0.335	0.387	0.289	
4	0.547	0.219	0.335	0.387	
5	0.442	0.114	0.219	0.335	
6	0.348	0.020	0.114	0.219	
7	0.239	−0.089	0.020	0.114	
8	0.138	−0.190	−0.089	0.020	
9	0.098	−0.230	−0.190	−0.089	
10	0.134	−0.194	−0.230	−0.190	
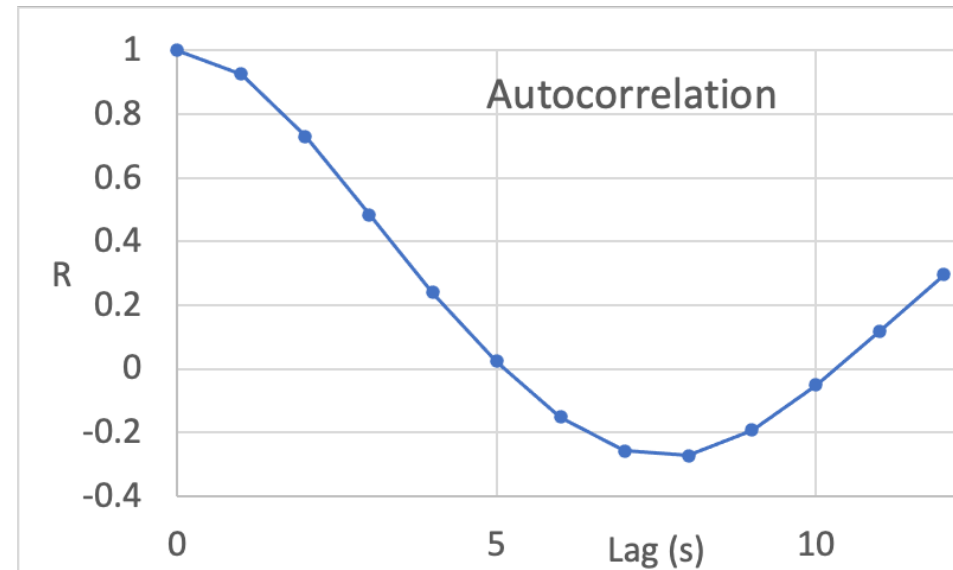
**Autocorrelation R   is just the correlation coefficient r
between a variable and itself at a later time.**