In [1]:
```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
import math
import os
```

In [2]:
```
os.chdir(r'D:\Sagun Shakya\Python\Data-Science-Assignments-master\Data-Science-Assignments-master\02. Pandas\06_Stats\Wind
```

In [3]:
```
# parse_dates gets 0, 1, 2 columns and parses them as the index.
# '\s+' separates the data values separated by a white space.

wind = pd.read_csv("wind.data", sep = "\s+")
```

In [4]:
```
wind.head()
```

Out[4]:

	Yr	Mo	Dy	RPT	VAL	ROS	KIL	SHA	BIR	DUB	CLA	MUL	CLO	BEL	MAL
0	61	1	1	15.04	14.96	13.17	9.29	NaN	9.87	13.67	10.25	10.83	12.58	18.50	15.04
1	61	1	2	14.71	NaN	10.83	6.50	12.62	7.67	11.50	10.04	9.79	9.67	17.54	13.83
2	61	1	3	18.50	16.88	12.33	10.13	11.17	6.17	11.25	NaN	8.50	7.67	12.75	12.71
3	61	1	4	10.58	6.63	11.75	4.58	4.54	2.88	8.63	1.79	5.83	5.88	5.46	10.88
4	61	1	5	13.33	13.25	11.42	6.17	10.71	8.21	11.92	6.54	10.92	10.34	12.92	11.83

There is a problem that the year is not 2061. Instead it is 1961. We need to fix this.

In [5]:
```
def yearFixer(yr):
    yr = yr + 1900

    return yr
```

In [6]:
```
wind['Yr'] = wind['Yr'].apply(yearFixer)
wind.head()
```

Out[6]:

	Yr	Mo	Dy	RPT	VAL	ROS	KIL	SHA	BIR	DUB	CLA	MUL	CLO	BEL	MAL
0	1961	1	1	15.04	14.96	13.17	9.29	NaN	9.87	13.67	10.25	10.83	12.58	18.50	15.04
1	1961	1	2	14.71	NaN	10.83	6.50	12.62	7.67	11.50	10.04	9.79	9.67	17.54	13.83
2	1961	1	3	18.50	16.88	12.33	10.13	11.17	6.17	11.25	NaN	8.50	7.67	12.75	12.71
3	1961	1	4	10.58	6.63	11.75	4.58	4.54	2.88	8.63	1.79	5.83	5.88	5.46	10.88
4	1961	1	5	13.33	13.25	11.42	6.17	10.71	8.21	11.92	6.54	10.92	10.34	12.92	11.83

In [7]:
```
wind['Yr'] = wind['Yr'].astype(str)
```

In [8]:
```
wind['Yr'].describe()
```

Out[8]:
```
count     6574
unique      18
top       1964
freq       366
Name: Yr, dtype: object
```

In [9]:
```
wind['Mo'] = wind['Mo'].astype(str)
```

In [10]:
```
wind['Dy'] = wind['Dy'].astype(str)
```

In [11]:
```
wind['yr_mo_da'] = wind[['Yr', 'Mo', 'Dy']].apply(lambda x: '/'.join(x), axis = 1)
```

In [12]:
```
wind.head()
```

Out[12]:

	Yr	Mo	Dy	RPT	VAL	ROS	KIL	SHA	BIR	DUB	CLA	MUL	CLO	BEL	MAL	yr_mo_da
0	1961	1	1	15.04	14.96	13.17	9.29	NaN	9.87	13.67	10.25	10.83	12.58	18.50	15.04	1961/1/1
1	1961	1	2	14.71	NaN	10.83	6.50	12.62	7.67	11.50	10.04	9.79	9.67	17.54	13.83	1961/1/2
2	1961	1	3	18.50	16.88	12.33	10.13	11.17	6.17	11.25	NaN	8.50	7.67	12.75	12.71	1961/1/3
3	1961	1	4	10.58	6.63	11.75	4.58	4.54	2.88	8.63	1.79	5.83	5.88	5.46	10.88	1961/1/4
4	1961	1	5	13.33	13.25	11.42	6.17	10.71	8.21	11.92	6.54	10.92	10.34	12.92	11.83	1961/1/5

In [13]:
```
#changing the format to date type.
wind['yr_mo_da'] = pd.to_datetime(wind['yr_mo_da'])
```

Making this the index column.

In [14]:
```
wind = wind.set_index('yr_mo_da')
```

In [15]:
```
wind.head()
```

Out[15]:

yr_mo_da	Yr	Mo	Dy	RPT	VAL	ROS	KIL	SHA	BIR	DUB	CLA	MUL	CLO	BEL	MAL
1961-01-01	1961	1	1	15.04	14.96	13.17	9.29	NaN	9.87	13.67	10.25	10.83	12.58	18.50	15.04
1961-01-02	1961	1	2	14.71	NaN	10.83	6.50	12.62	7.67	11.50	10.04	9.79	9.67	17.54	13.83
1961-01-03	1961	1	3	18.50	16.88	12.33	10.13	11.17	6.17	11.25	NaN	8.50	7.67	12.75	12.71
1961-01-04	1961	1	4	10.58	6.63	11.75	4.58	4.54	2.88	8.63	1.79	5.83	5.88	5.46	10.88
1961-01-05	1961	1	5	13.33	13.25	11.42	6.17	10.71	8.21	11.92	6.54	10.92	10.34	12.92	11.83

In [16]:
```
del wind['Yr']
del wind['Mo']
del wind['Dy']
```

In [17]:
```
wind.head(2)
```

Out[17]:

yr_mo_da	RPT	VAL	ROS	KIL	SHA	BIR	DUB	CLA	MUL	CLO	BEL	MAL
1961-01-01	15.04	14.96	13.17	9.29	NaN	9.87	13.67	10.25	10.83	12.58	18.50	15.04
1961-01-02	14.71	NaN	10.83	6.50	12.62	7.67	11.50	10.04	9.79	9.67	17.54	13.83

Check for missing values.

In [18]:
```
wind.isnull().sum()
```

Out[18]:
```
RPT    6
VAL    3
ROS    2
KIL    5
SHA    2
BIR    0
DUB    3
CLA    2
MUL    3
CLO    1
BEL    0
MAL    4
dtype: int64
```

Calculate the mean windspeeds of the windspeeds over all the locations and all the times.

- A single number - A Grand mean.

In [19]:
```
wind.mean().mean()
```

Out[19]:
```
10.227982360836924
```

Create a DataFrame called loc_stats and calculate the min, max and mean windspeeds and standard deviations of the windspeeds at each location over all the days.

In [20]:
```
loc_stats = dict()

loc_stats['loc_min'] = wind.min()
loc_stats['loc_max'] = wind.max()
loc_stats['loc_mean'] = wind.mean()
loc_stats['loc_std'] = wind.std()
```

In [21]:
```
pd.DataFrame(loc_stats)
```

Out[21]:

	loc_min	loc_max	loc_mean	loc_std
RPT	0.67	35.80	12.362987	5.618413
VAL	0.21	33.37	10.644314	5.267356
ROS	1.50	33.84	11.660526	5.008450
KIL	0.00	28.46	6.306468	3.605811
SHA	0.13	37.54	10.455834	4.936125
BIR	0.00	26.16	7.092254	3.968683
DUB	0.00	30.37	9.797343	4.977555
CLA	0.00	31.08	8.495053	4.499449
MUL	0.00	25.88	8.493590	4.166872
CLO	0.04	28.21	8.707332	4.503954
BEL	0.13	42.38	13.121007	5.835037
MAL	0.67	42.54	15.599079	6.699794

Create a DataFrame called day_stats and calculate the min, max and mean windspeed and standard deviations of the windspeeds across all the locations at each day.

In [22]:
```
wind.loc['1961-01-01'].min()
```

Out[22]: 9.29

In [23]:
```
day_stats = dict()
```

In [24]:
```
day_stats['day_min'] = wind.min(axis = 1)
day_stats['day_max'] = wind.max(axis = 1)
day_stats['day_mean'] = wind.mean(axis = 1)
day_stats['day_std'] = wind.std(axis = 1)
```

In [25]:
```
pd.DataFrame(day_stats).head()
```

Out[25]:

yr_mo_da	day_min	day_max	day_mean	day_std
1961-01-01	9.29	18.50	13.018182	2.808875
1961-01-02	6.50	17.54	11.336364	3.188994
1961-01-03	6.17	18.50	11.641818	3.681912
1961-01-04	1.79	11.75	6.619167	3.198126
1961-01-05	6.17	13.33	10.630000	2.445356

Find the average windspeed in January for each location.

- P.S We should not have deleted the columns named yr, mo, dy in the first place.

In [26]:
```
#Creating anew column named 'date' stroing the date format.
#The index column still persists.

wind['date'] = wind.index
```

In [27]:
```
#Creating new columns each for year, month and day.

wind['year'] = wind['date'].apply(lambda date: date.year)
wind['month'] = wind['date'].apply(lambda date: date.month)
wind['day'] = wind['date'].apply(lambda date: date.day)
```

In [28]:
```
wind.head(2)
```

Out[28]:

yr_mo_da	RPT	VAL	ROS	KIL	SHA	BIR	DUB	CLA	MUL	CLO	BEL	MAL	date	year	month	day
1961-01-01	15.04	14.96	13.17	9.29	NaN	9.87	13.67	10.25	10.83	12.58	18.50	15.04	1961-01-01	1961	1	1
1961-01-02	14.71	NaN	10.83	6.50	12.62	7.67	11.50	10.04	9.79	9.67	17.54	13.83	1961-01-02	1961	1	2

In [29]:
```
#Selecting the entries from the wind dataframe whose month == January.
wind_jan = wind[ wind['month'] == 1]
```

In [30]:
```
#Checking the number of rows.
wind_jan.shape
```

Out[30]:
```
(558, 16)
```

In [31]:
```
wind_jan.mean()
```

Out[31]:
```
RPT        14.847325
VAL        12.914560
ROS        13.299624
KIL         7.199498
SHA        11.667734
BIR         8.054839
DUB        11.819355
CLA         9.512047
MUL         9.543208
CLO        10.053566
BEL        14.550520
MAL        18.028763
year     1969.500000
month       1.000000
day        16.000000
dtype: float64
```

DataFrame.query(expr, inplace=False, **kwargs)

- The following are point quesries and are not performing any aggregation like averaging in groups.

Downsample the record to a yearly frequency for each location.

In [32]:
```
wind.query('month == 1 and day == 1')
```

Out[32]:

yr_mo_da	RPT	VAL	ROS	KIL	SHA	BIR	DUB	CLA	MUL	CLO	BEL	MAL	date	year	month	day
1961-01-01	15.04	14.96	13.17	9.29	NaN	9.87	13.67	10.25	10.83	12.58	18.50	15.04	1961-01-01	1961	1	1
1962-01-01	9.29	3.42	11.54	3.50	2.21	1.96	10.41	2.79	3.54	5.17	4.38	7.92	1962-01-01	1962	1	1
1963-01-01	15.59	13.62	19.79	8.38	12.25	10.00	23.45	15.71	13.59	14.37	17.58	34.13	1963-01-01	1963	1	1
1964-01-01	25.80	22.13	18.21	13.25	21.29	14.79	14.12	19.58	13.25	16.75	28.96	21.00	1964-01-01	1964	1	1
1965-01-01	9.54	11.92	9.00	4.38	6.08	5.21	10.25	6.08	5.71	8.63	12.04	17.41	1965-01-01	1965	1	1
1966-01-01	22.04	21.50	17.08	12.75	22.17	15.59	21.79	18.12	16.66	17.83	28.33	23.79	1966-01-01	1966	1	1
1967-01-01	6.46	4.46	6.50	3.21	6.67	3.79	11.38	3.83	7.71	9.08	10.67	20.91	1967-01-01	1967	1	1
1968-01-01	30.04	17.88	16.25	16.25	21.79	12.54	18.16	16.62	18.75	17.62	22.25	27.29	1968-01-01	1968	1	1
1969-01-01	6.13	1.63	5.41	1.08	2.54	1.00	8.50	2.42	4.58	6.34	9.17	16.71	1969-01-01	1969	1	1
1970-01-01	9.59	2.96	11.79	3.42	6.13	4.08	9.00	4.46	7.29	3.50	7.33	13.00	1970-01-01	1970	1	1
1971-01-01	3.71	0.79	4.71	0.17	1.42	1.04	4.63	0.75	1.54	1.08	4.21	9.54	1971-01-01	1971	1	1
1972-01-01	9.29	3.63	14.54	4.25	6.75	4.42	13.00	5.33	10.04	8.54	8.71	19.17	1972-01-01	1972	1	1
1973-01-01	16.50	15.92	14.62	7.41	8.29	11.21	13.54	7.79	10.46	10.79	13.37	9.71	1973-01-01	1973	1	1
1974-01-01	23.21	16.54	16.08	9.75	15.83	11.46	9.54	13.54	13.83	16.66	17.21	25.29	1974-01-01	1974	1	1
1975-01-01	14.04	13.54	11.29	5.46	12.58	5.58	8.12	8.96	9.29	5.17	7.71	11.63	1975-01-01	1975	1	1
1976-01-01	18.34	17.67	14.83	8.00	16.62	10.13	13.17	9.04	13.13	5.75	11.38	14.96	1976-01-01	1976	1	1
1977-01-01	20.04	11.92	20.25	9.13	9.29	8.04	10.75	5.88	9.00	9.00	14.88	25.70	1977-01-01	1977	1	1
1978-01-01	8.33	7.12	7.71	3.54	8.50	7.50	14.71	10.00	11.83	10.00	15.09	20.46	1978-01-01	1978	1	1

Downsample the record to a monthly frequency for each location.

In [33]:
```
wind.query('day == 1')
```

Out[33]:

yr_mo_da	RPT	VAL	ROS	KIL	SHA	BIR	DUB	CLA	MUL	CLO	BEL	MAL	date	year	month	day
1961-01-01	15.04	14.96	13.17	9.29	NaN	9.87	13.67	10.25	10.83	12.58	18.50	15.04	1961-01-01	1961	1	1
1961-02-01	14.25	15.12	9.04	5.88	12.08	7.17	10.17	3.63	6.50	5.50	9.17	8.00	1961-02-01	1961	2	1
1961-03-01	12.67	13.13	11.79	6.42	9.79	8.54	10.25	13.29	NaN	12.21	20.62	NaN	1961-03-01	1961	3	1
1961-04-01	8.38	6.34	8.33	6.75	9.33	9.54	11.67	8.21	11.21	6.46	11.96	7.17	1961-04-01	1961	4	1
1961-05-01	15.87	13.88	15.37	9.79	13.46	10.17	9.96	14.04	9.75	9.92	18.63	11.12	1961-05-01	1961	5	1
1961-06-01	15.92	9.59	12.04	8.79	11.54	6.04	9.75	8.29	9.33	10.34	10.67	12.12	1961-06-01	1961	6	1
1961-07-01	7.21	6.83	7.71	4.42	8.46	4.79	6.71	6.00	5.79	7.96	6.96	8.71	1961-07-01	1961	7	1
1961-08-01	9.59	5.09	5.54	4.63	8.29	5.25	4.21	5.25	5.37	5.41	8.38	9.08	1961-08-01	1961	8	1
1961-09-01	5.58	1.13	4.96	3.04	4.25	2.25	4.63	2.71	3.67	6.00	4.79	5.41	1961-09-01	1961	9	1
1961-10-01	14.25	12.87	7.87	8.00	13.00	7.75	5.83	9.00	7.08	5.29	11.79	4.04	1961-10-01	1961	10	1

Downsample the record to a weekly frequency for each location.

In [34]:
```
wind[::7]
```

yr_mo_da																
1978-11-05	15.46	16.92	13.13	9.62	14.12	10.96	8.92	8.63	13.25	11.42	22.37	19.00	1978-11-05	1978	11	5
1978-11-12	20.41	18.88	14.17	10.41	15.50	10.08	14.96	13.50	14.25	15.59	22.63	29.04	1978-11-12	1978	11	12
1978-11-19	13.88	11.67	8.79	4.96	7.87	5.37	11.08	7.21	7.29	6.92	16.21	20.75	1978-11-19	1978	11	19
1978-11-26	9.54	8.33	7.92	1.83	6.92	3.29	8.08	3.08	3.46	3.37	8.58	11.08	1978-11-26	1978	11	26
1978-12-03	21.21	21.34	17.75	11.58	16.75	14.46	17.46	15.29	15.79	17.50	21.42	25.75	1978-12-03	1978	12	3
1978-12-10	24.92	22.54	16.54	14.62	15.59	13.00	13.21	14.12	16.21	16.17	26.08	21.92	1978-12-10	1978	12	10
1978-12-17	9.87	3.21	8.04	2.21	3.04	0.54	2.46	1.46	1.29	2.67	5.00	9.08	1978-12-17	1978	12	17
1978-12-24	8.67	5.63	12.12	4.79	5.09	5.91	12.25	9.25	10.83	11.71	11.92	31.71	1978-12-24	1978	12	24
1978-12-31	20.33	17.41	27.29	9.59	12.08	10.13	19.25	11.63	11.58	11.38	12.08	22.08	1978-12-31	1978	12	31

Isolate the years and find the monthly means for those years.

In [35]:
```
data_1961 = wind.loc[ wind['year'] == 1961]
wind_1961 = data_1961.groupby(['month']).mean().round(3)

#wind_1961 = wind_1961.loc[:, 'RPT':'MAL']
#This is done to not include the columns day and year (Try displaying data_1961).

wind_1961
```

Out[35]:

month	RPT	VAL	ROS	KIL	SHA	BIR	DUB	CLA	MUL	CLO	BEL	MAL	year	day
1	14.841	11.988	13.432	7.737	11.073	8.588	11.185	9.245	9.086	10.107	13.881	14.703	1961.0	16.0
2	16.269	14.975	14.441	9.231	13.852	10.938	11.891	11.846	11.821	12.714	18.583	15.412	1961.0	14.5
3	10.890	11.296	10.753	7.284	10.509	8.867	9.644	9.830	10.294	11.252	16.411	15.720	1961.0	16.0
4	10.723	9.428	9.998	5.831	8.435	6.495	6.925	7.095	7.342	7.237	11.147	10.278	1961.0	15.5
5	9.861	8.850	10.818	5.905	9.490	6.575	7.604	8.177	8.039	8.499	11.900	12.012	1961.0	16.0
6	9.904	8.520	8.867	6.083	10.824	6.707	9.096	8.849	9.087	9.940	13.995	14.554	1961.0	15.5
7	10.614	8.222	9.110	6.341	10.533	6.198	8.353	8.284	8.077	8.892	11.093	12.313	1961.0	16.0
8	12.035	10.134	10.336	6.846	12.715	8.442	10.094	10.461	9.112	10.545	14.410	14.345	1961.0	16.0
9	12.531	9.657	10.777	7.156	11.003	7.234	8.206	8.937	7.728	9.931	13.718	12.922	1961.0	15.5
10	14.290	10.916	12.236	8.155	11.865	8.334	11.194	9.272	8.943	11.456	14.229	16.793	1961.0	16.0
11	10.896	8.593	11.850	6.046	9.124	6.251	10.870	6.314	6.575	8.384	10.777	12.146	1961.0	15.5
12	14.974	11.904	13.980	7.074	11.324	8.302	11.754	8.163	7.966	9.247	12.239	13.099	1961.0	16.0

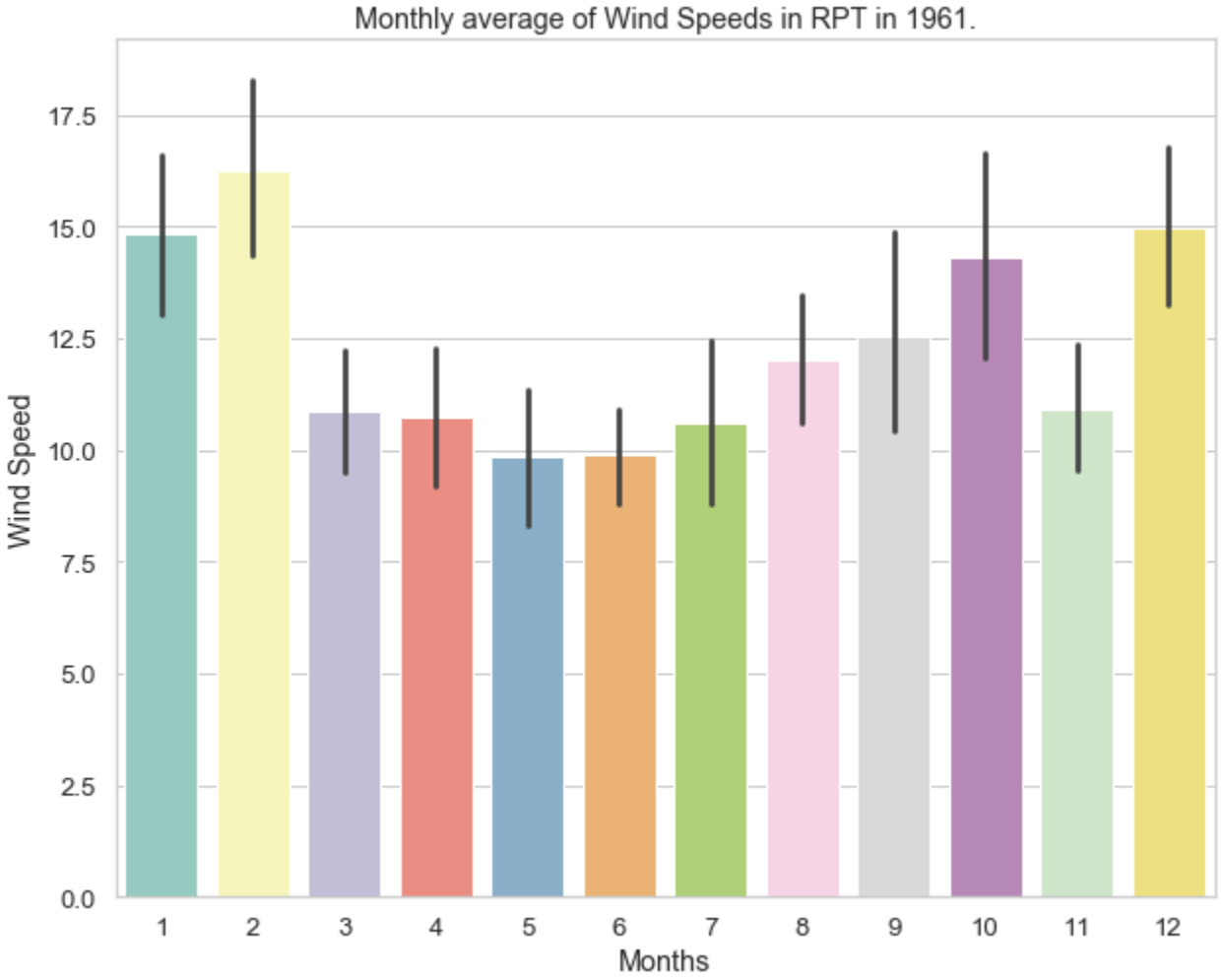
Data Visualization.

In [44]:
```
#Isolating the year wise values.
#Handy Trick.

def yearIsolation(yr):
    return wind.loc[wind['year'] == yr]

for ii in range(1961, 1978+1):
    exec(f'wind_{ii} = yearIsolation(ii)')

#For example.

print(wind_1978.head(2))
print(wind_1962.head(2))
print(wind_1975.head(2))
```

```
              RPT    VAL    ROS   KIL    SHA   BIR    DUB    CLA    MUL  \
yr_mo_da
1978-01-01   8.33   7.12   7.71  3.54   8.50  7.50  14.71  10.00  11.83
1978-01-02  14.62  11.83  10.50  7.41  14.21  9.62  17.08  13.46  13.50

              CLO    BEL    MAL       date  year  month  day
yr_mo_da
1978-01-01  10.00  15.09  20.46 1978-01-01  1978      1    1
1978-01-02  11.67  22.63  27.92 1978-01-02  1978      1    2
             RPT   VAL    ROS   KIL   SHA   BIR    DUB   CLA   MUL   CLO  \
yr_mo_da
1962-01-01  9.29  3.42  11.54  3.50  2.21  1.96  10.41  2.79  3.54  5.17
1962-01-02  6.08  3.13   5.09  0.87  0.42  0.33   8.46  0.00  0.54  4.54

             BEL   MAL       date  year  month  day
yr_mo_da
1962-01-01  4.38  7.92 1962-01-01  1962      1    1
1962-01-02  1.96  7.71 1962-01-02  1962      1    2
              RPT    VAL    ROS   KIL    SHA   BIR   DUB    CLA    MUL    CLO  \
yr_mo_da
1975-01-01  14.04  13.54  11.29  5.46  12.58  5.58  8.12   8.96   9.29   5.17
1975-01-02   9.17  11.46   9.13  2.54   8.71  4.58  8.58  13.75  10.67  10.54

              BEL    MAL       date  year  month  day
yr_mo_da
1975-01-01   7.71  11.63 1975-01-01  1975      1    1
1975-01-02  17.79  20.96 1975-01-02  1975      1    2
```

Barplot for the monthly average of wind speeds in RPT in 1961.

In [43]:
```
plt.figure( figsize = (10,8) )
sns.set(style = 'whitegrid', font_scale = 1.2)

mon = ['Jan', 'Feb', 'Mar', 'Apr', 'May', 'Jun', 'Jul', 'Aug', 'Sep', 'Oct', 'Nov', 'Dec']
sns.barplot( x = wind_1961['month'], y = wind_1961['RPT'], palette = 'Set3')
plt.xlabel('Months')
plt.ylabel('Wind Speed')
plt.title('Monthly average of Wind Speeds in RPT in 1961.')
plt.show()
```



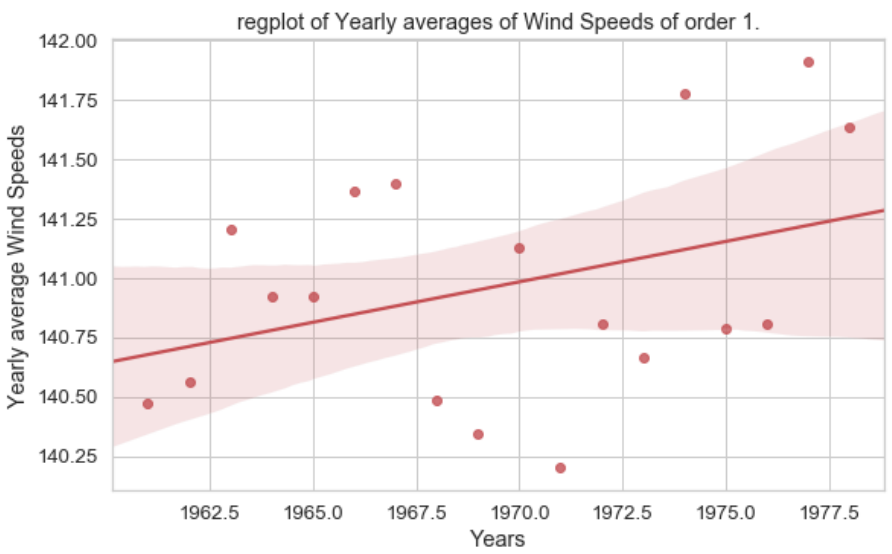
This shows that in 1961, the average wind speed was maximum in the month of February and minimum in the month of May (5) in

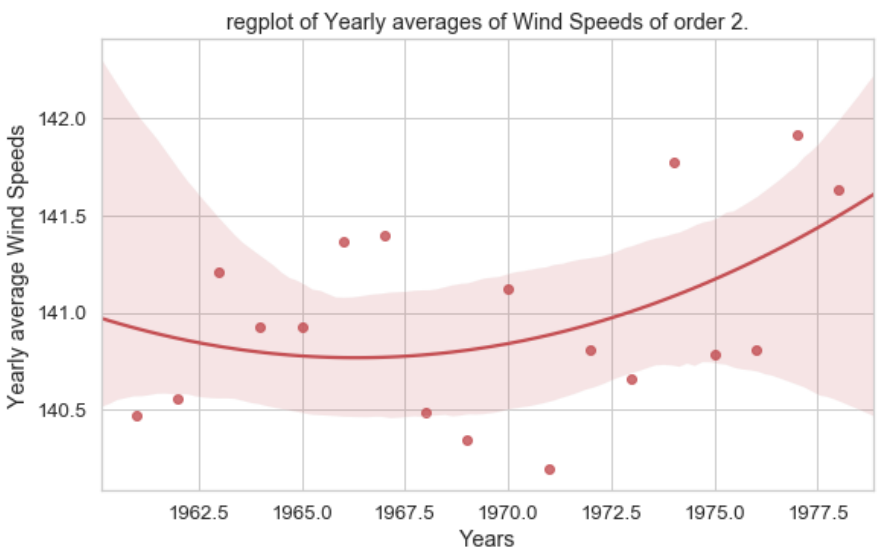
RPT.

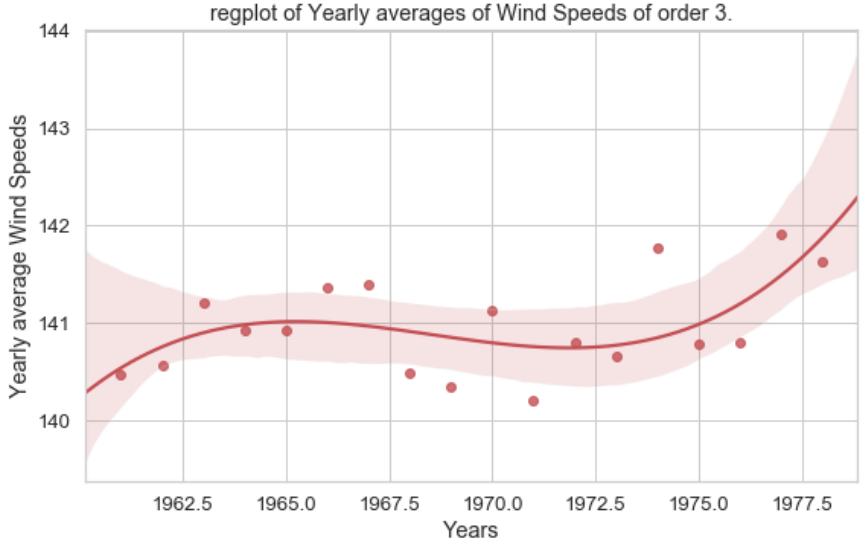
How does the wind speed change over the years?

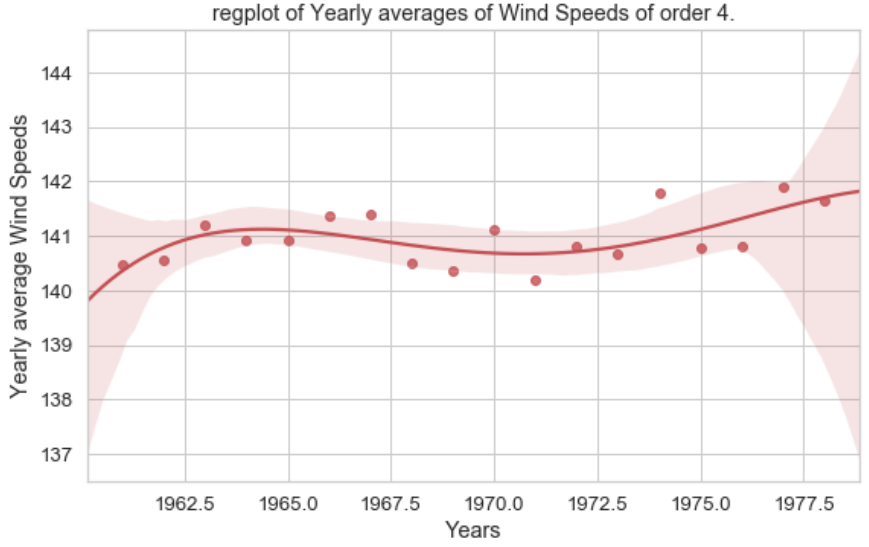
In [52]:
```
mean_1961_to_1978  = list()

mean_1961_to_1978.append(wind_1961.mean().mean())
mean_1961_to_1978.append(wind_1962.mean().mean())
mean_1961_to_1978.append(wind_1963.mean().mean())
mean_1961_to_1978.append(wind_1964.mean().mean())
mean_1961_to_1978.append(wind_1965.mean().mean())
mean_1961_to_1978.append(wind_1966.mean().mean())
mean_1961_to_1978.append(wind_1967.mean().mean())
mean_1961_to_1978.append(wind_1968.mean().mean())
mean_1961_to_1978.append(wind_1969.mean().mean())
mean_1961_to_1978.append(wind_1970.mean().mean())
mean_1961_to_1978.append(wind_1971.mean().mean())
mean_1961_to_1978.append(wind_1972.mean().mean())
mean_1961_to_1978.append(wind_1973.mean().mean())
mean_1961_to_1978.append(wind_1974.mean().mean())
mean_1961_to_1978.append(wind_1975.mean().mean())
mean_1961_to_1978.append(wind_1976.mean().mean())
mean_1961_to_1978.append(wind_1977.mean().mean())
mean_1961_to_1978.append(wind_1978.mean().mean())

#Rounding off to three decimal figures.
mean_1961_to_1978 = np.array(mean_1961_to_1978)
mean_1961_to_1978 = mean_1961_to_1978.round(3)
```

In [88]:
```
#Plotting a regplot for orders 1,2,3 and 4.

plt.figure( figsize = (20,12) )
sns.set(style = 'whitegrid', font_scale = 1.2)

years = np.arange(1961,1979)

for ii in range(4):
    plt.subplot(2,2,ii+1)
    sns.regplot( x = years , y = mean_1961_to_1978, color = 'r', order = ii+1)
    plt.xlabel('Years')
    plt.ylabel('Yearly average Wind Speeds')
    plt.title('regplot of Yearly averages of Wind Speeds of order ' + str(ii+1) + '.')

plt.show()
```



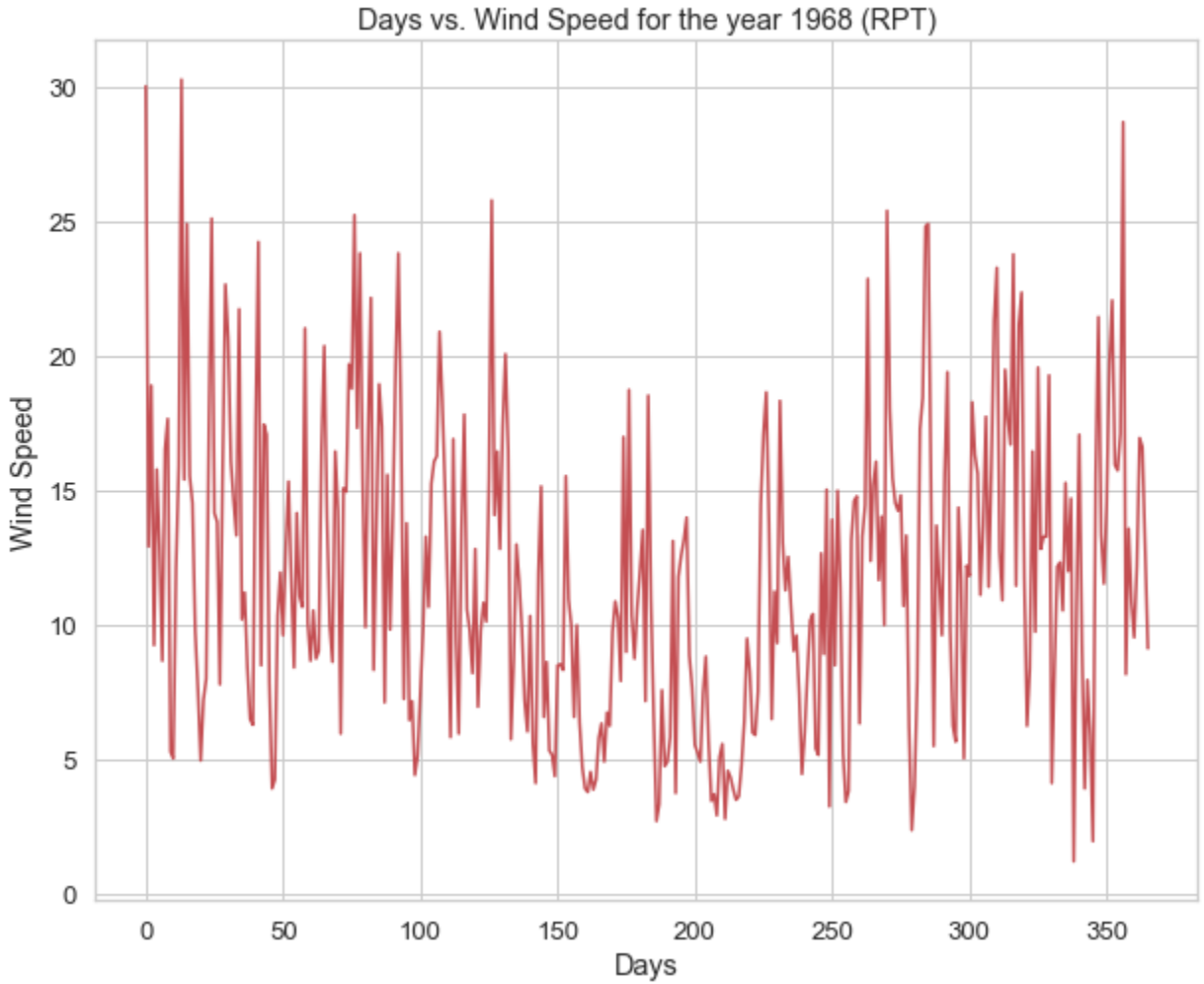






Plotting days vs. wind speed for RPT for the year 1968.

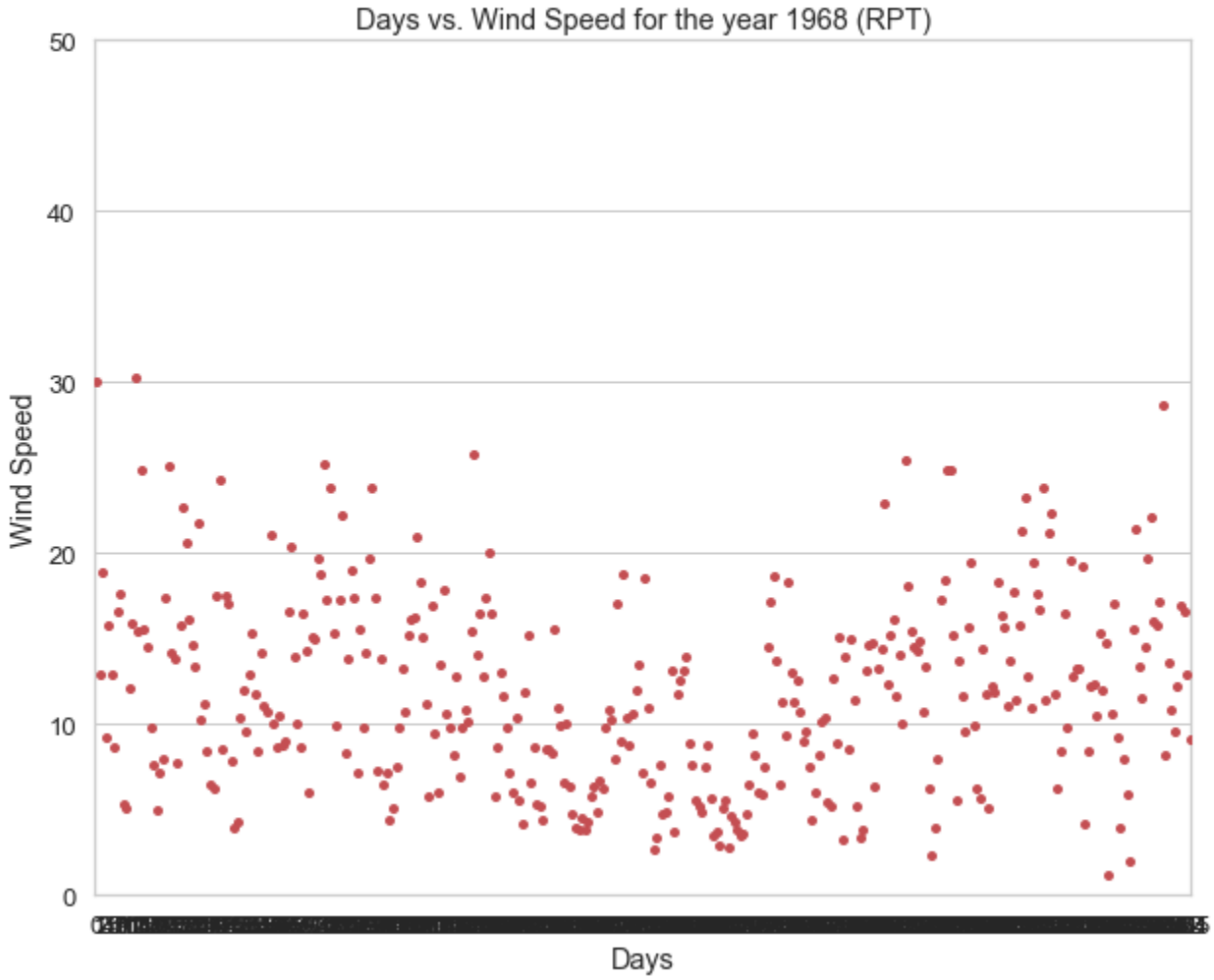
In [86]:
```
plt.figure( figsize = (10,8) )
sns.set(style = 'whitegrid', font_scale = 1.2)

plt.plot(np.arange(len(wind_1968)) , wind_1968['RPT'], 'r')
plt.xlabel('Days')
plt.ylabel('Wind Speed')
plt.title('Days vs. Wind Speed for the year 1968 (RPT)')
plt.show()
```



Not much significant as we can't really see the trend.

Creating a swarmplot to see if we can find some trend.

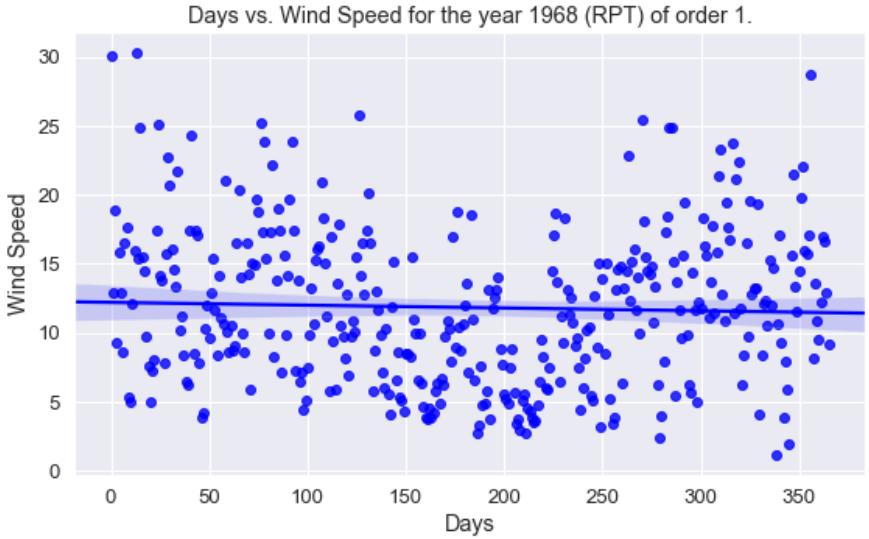
In [92]:
```
plt.figure( figsize = (10,8) )
sns.set(style = 'whitegrid', font_scale = 1.2)

sns.swarmplot(np.arange(len(wind_1968['date'])) , wind_1968['RPT'], color = 'r')
plt.ylim(0,50)
plt.xlabel('Days')
plt.ylabel('Wind Speed')
plt.title('Days vs. Wind Speed for the year 1968 (RPT)')
plt.show()
```

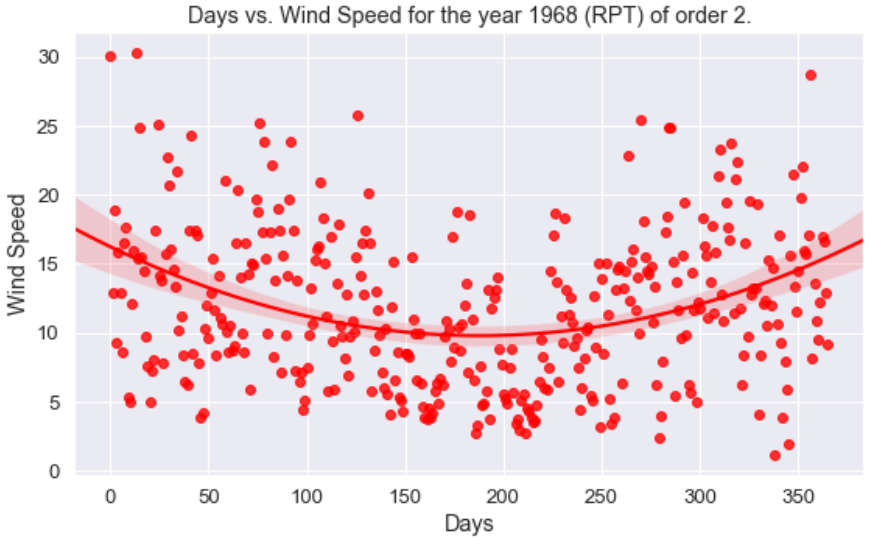


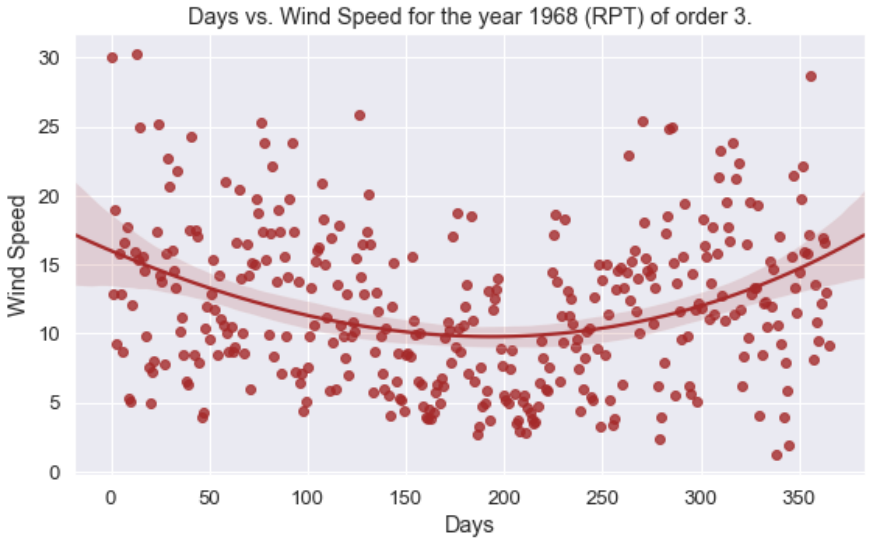
Not that much!

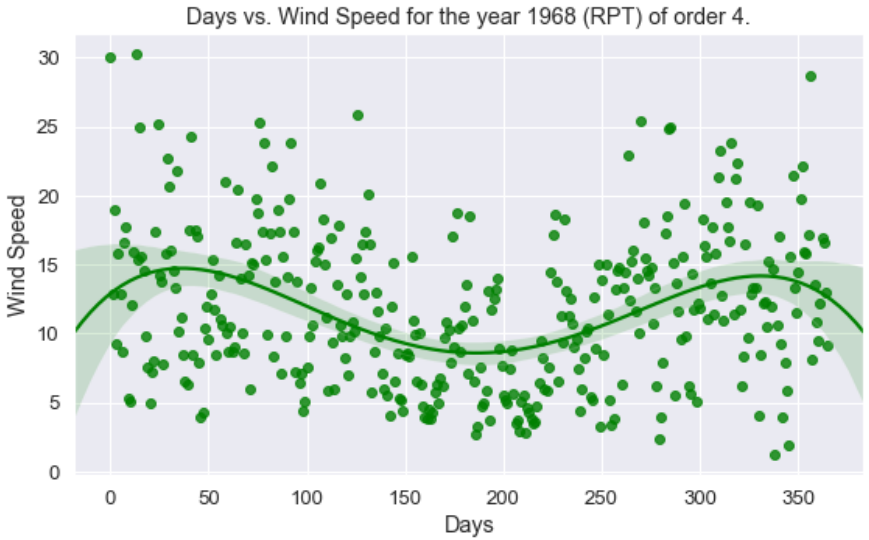
Creating a reg plot of different orders.

In [106]:
```
plt.figure( figsize = (20,12) )
sns.set(style = 'darkgrid', font_scale = 1.2)
colors = ['blue', 'red', 'brown', 'green']

for ii in range(1,4+1):
    plt.subplot(2,2,ii)
    sns.regplot(np.arange(len(wind_1968['date'])) , wind_1968['RPT'], color = colors[ii-1],order = ii)

    plt.xlabel('Days')
    plt.ylabel('Wind Speed')
    plt.title('Days vs. Wind Speed for the year 1968 (RPT) of order '+str(ii)+'.')

plt.subplots_adjust(hspace = 0.3)
'''plt.subplots_adjust(left=None, bottom=None, right=None, top=None, wspace=None, hspace=None)
    Default values:
    right = 0.9   # the right side of the subplots of the figure
    bottom = 0.1  # the bottom of the subplots of the figure
    top = 0.9     # the top of the subplots of the figure
    wspace = 0.2  # the amount of width reserved for space between subplots,
                  # expressed as a fraction of the average axis width
    hspace = 0.2  # the amount of height reserved for space between subplots,
                  # expressed as a fraction of the average axis height'''
plt.show()
```



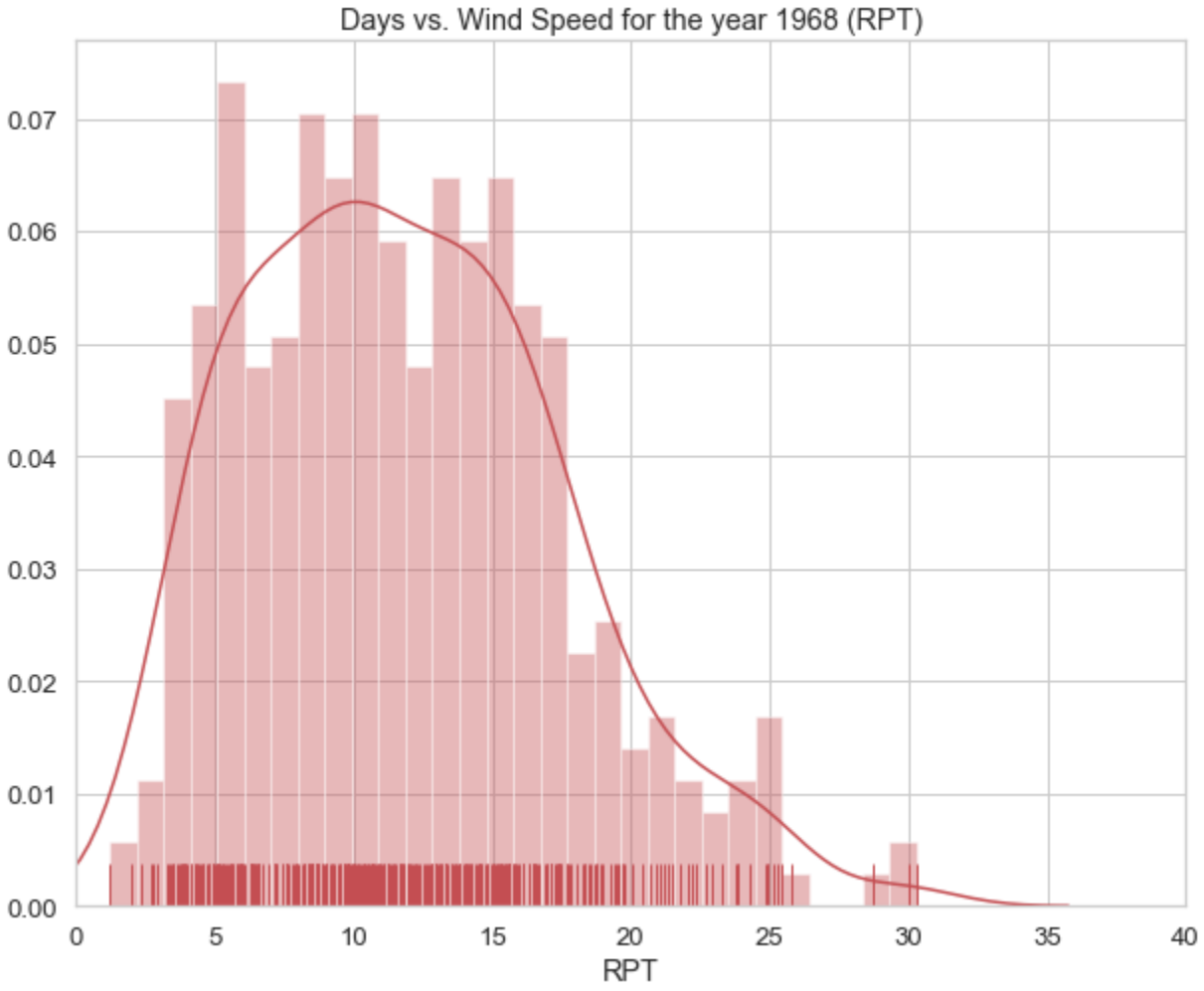






Drops down in the middle of the year and increases again.

In [122]:
```
plt.figure( figsize = (10,8) )
sns.set(style = 'whitegrid', font_scale = 1.2)

sns.distplot(wind_1968['RPT'],bins = 30, color = 'r', rug = True, kde = True, hist = 1)


plt.title('Days vs. Wind Speed for the year 1968 (RPT)')
plt.xlim(0,40)
plt.show()
```



In [123]:
```
wind_1968['RPT'].mean()
```

Out[123]:
```
11.835628415300544
```

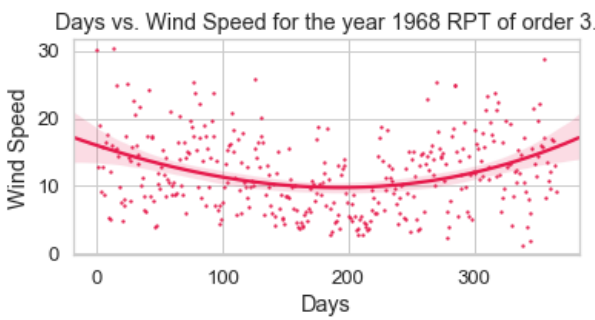
Creating a regplot of order 3 for all the locations day-wisely for the year 1968.

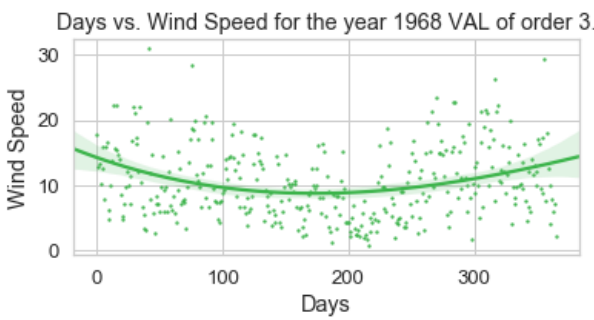
In [137]:
```
locations = list(wind_1968.columns)

#Removing the last 4 columns.
for ii in range(4):
    locations.pop()

print(locations)
print(len(locations))
```

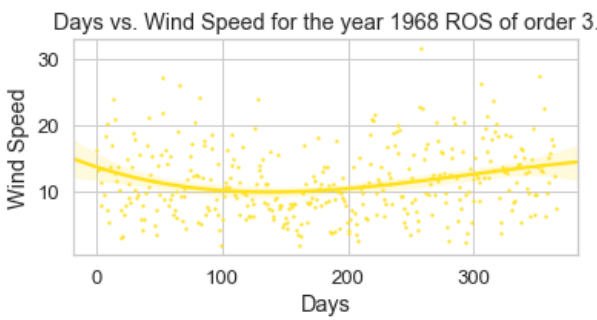
```
['RPT', 'VAL', 'ROS', 'KIL', 'SHA', 'BIR', 'DUB', 'CLA', 'MUL', 'CLO', 'BEL', 'MAL']
12
```

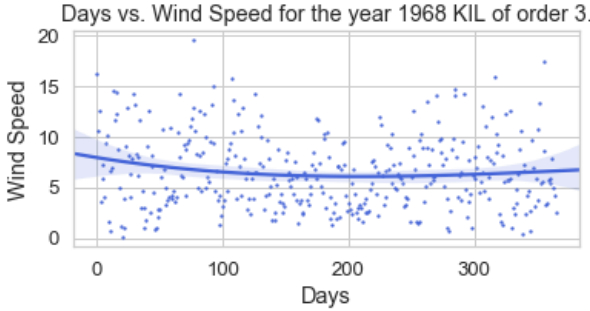
In [147]:

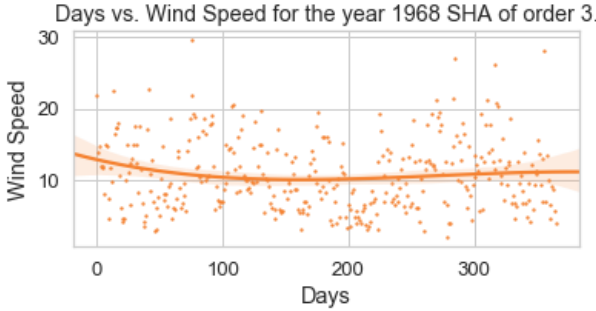
```
plt.figure( figsize = (20,15) )
sns.set(style = 'whitegrid', font_scale = 1.2)
colors = ['#e6194b', '#3cb44b', '#ffe119',
          '#4363d8', '#f58231','#911eb4',
          '#46f0f0', '#f032e6', '#bcf60c',
          '#fabebe', '#008080', '#e6beff']

for ii in range( len(locations) ):
    plt.subplot(4,3, ii+1)
    sns.regplot( x = np.arange(len(wind_1968['date'])), y = wind_1968[ locations[ii] ],
                order = 3, scatter_kws={'s':2}, color = colors[ii] )


    plt.xlabel('Days')
    plt.ylabel('Wind Speed')
    plt.title('Days vs. Wind Speed for the year 1968 ' + str(locations[ii])+ ' of order 3.')

plt.subplots_adjust(hspace = 0.6)
plt.show()
```

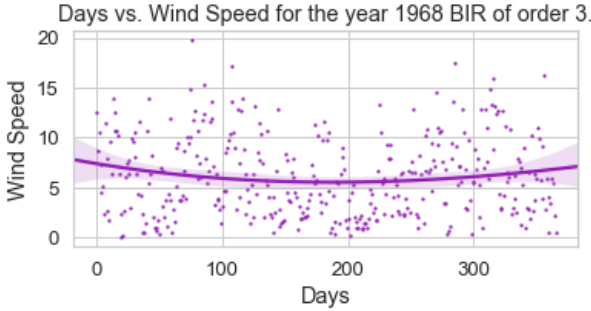


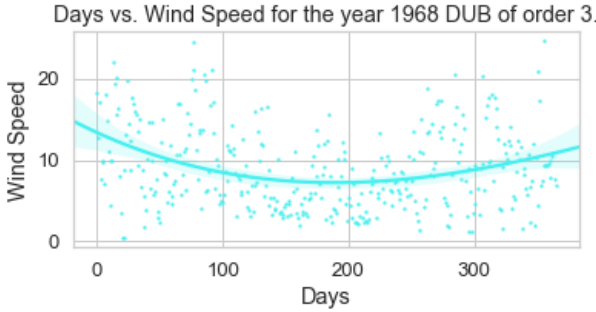


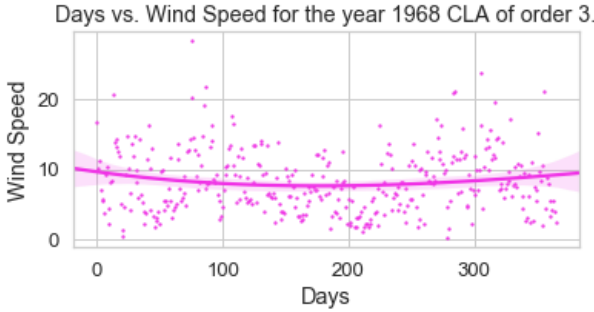


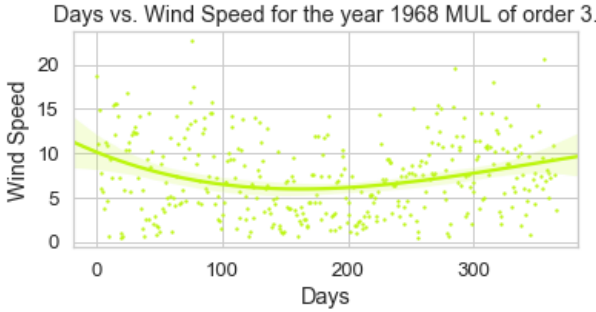


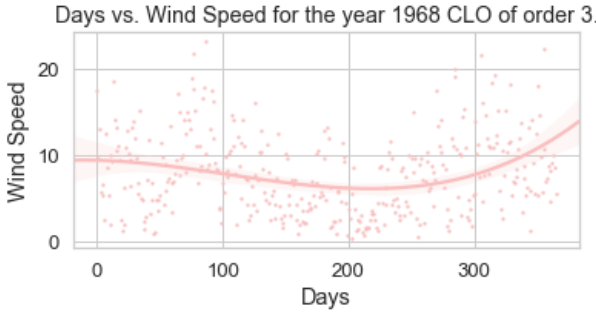


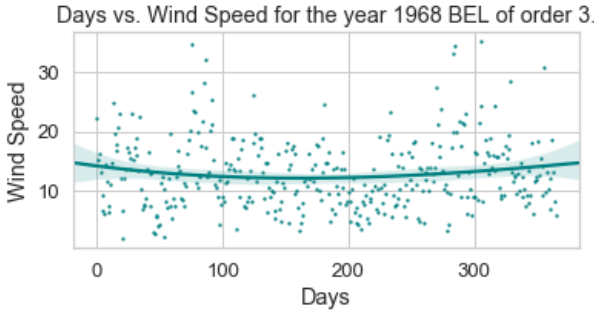


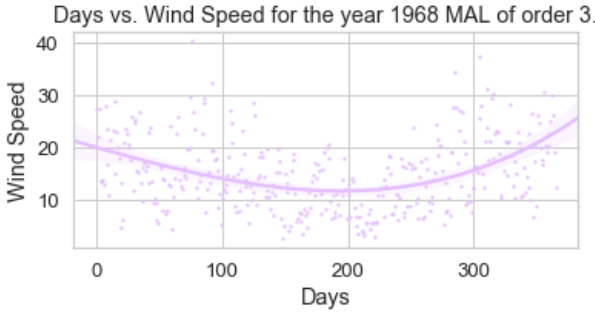








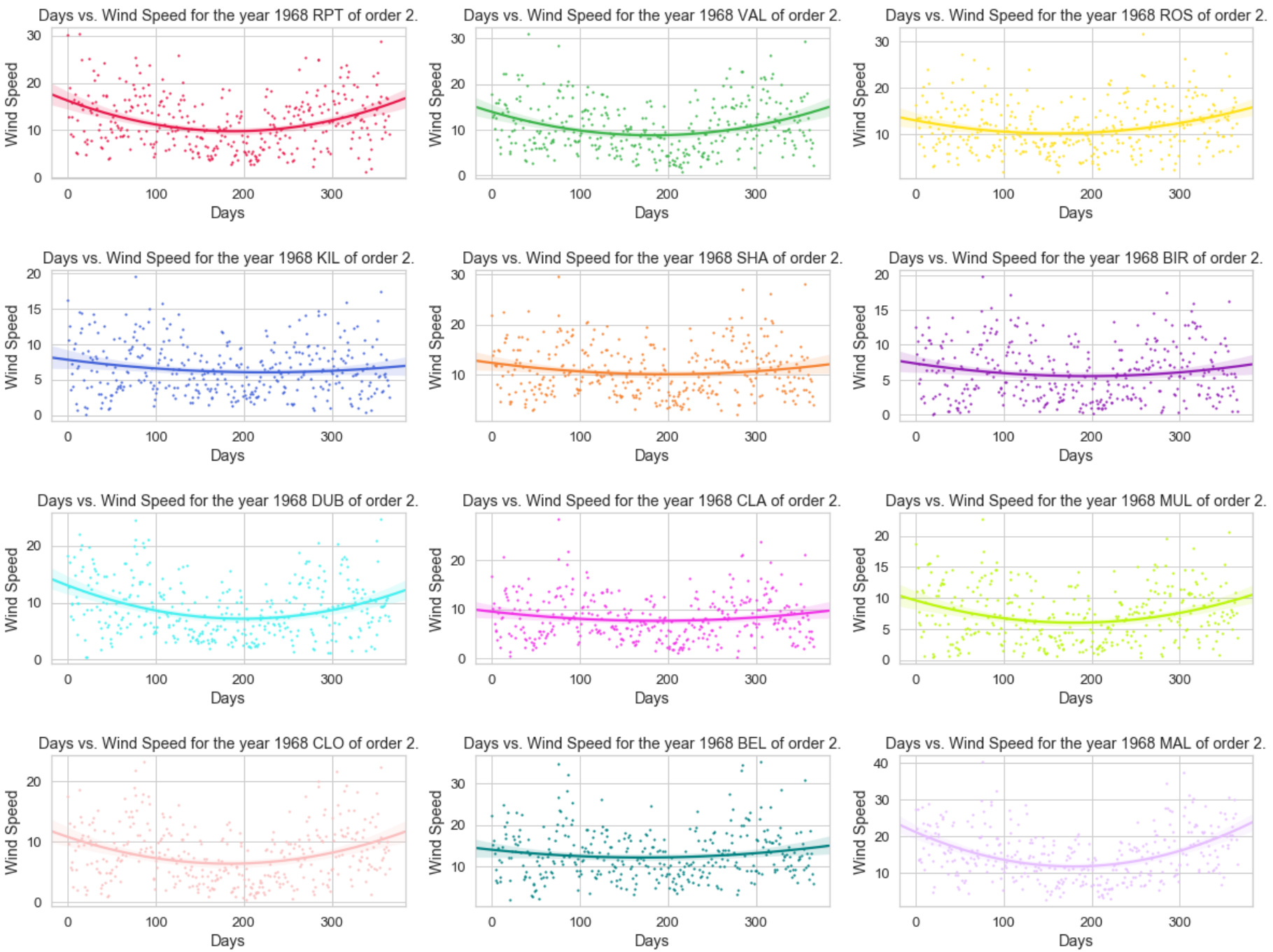




More or less the same trend throughout the year.

In [150]:

```
plt.figure( figsize = (20,15) )
sns.set(style = 'whitegrid', font_scale = 1.2)
colors = ['#e6194b', '#3cb44b', '#ffe119',
          '#4363d8', '#f58231','#911eb4',
          '#46f0f0', '#f032e6', '#bcf60c',
          '#fabebe', '#008080', '#e6beff']

for ii in range( len(locations) ):
    plt.subplot(4,3, ii+1)
    sns.regplot( x = np.arange(len(wind_1968['date'])), y = wind_1968[ locations[ii] ],
                order = 2, scatter_kws={'s':2}, color = colors[ii] )


    plt.xlabel('Days')
    plt.ylabel('Wind Speed')
    plt.title('Days vs. Wind Speed for the year 1968 ' + str(locations[ii])+ ' of order 2.')

plt.subplots_adjust(hspace = 0.6)
plt.show()
```



The depression is clearer for order 2.

Creating a regplot of order 3 for all the locations day-wisely for the year 1961.

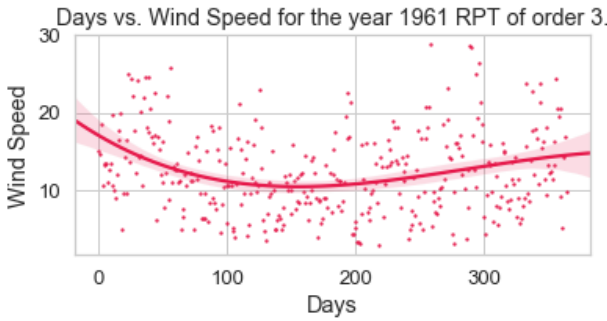
In [148]:

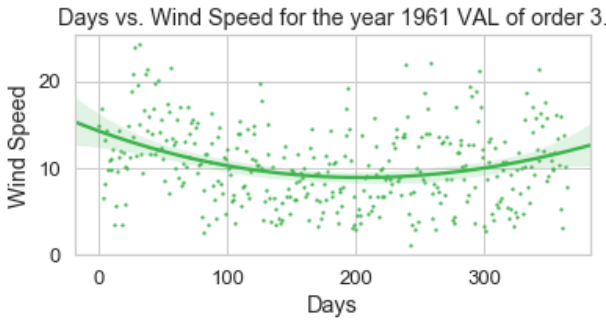
```
locations = list(wind_1961.columns)

#Removing the last 4 columns.
for ii in range(4):
    locations.pop()

print(locations)
print(len(locations))

```

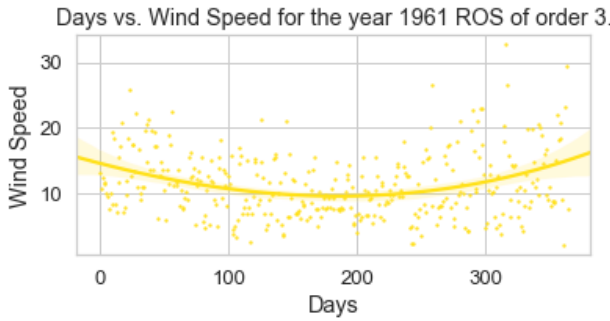
```
['RPT', 'VAL', 'ROS', 'KIL', 'SHA', 'BIR', 'DUB', 'CLA', 'MUL', 'CLO', 'BEL', 'MAL']
12
```

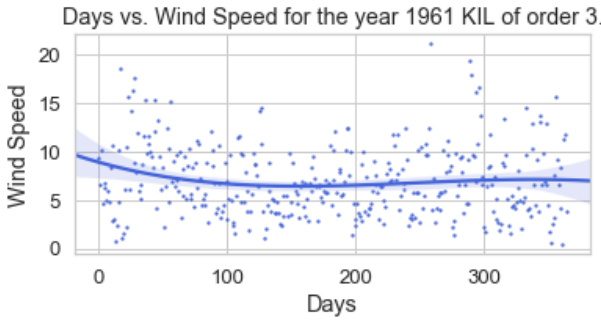
In [151]:

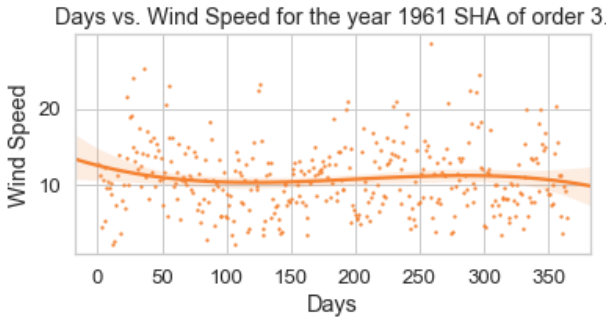
```
#order = 3
plt.figure( figsize = (20,15) )
sns.set(style = 'whitegrid', font_scale = 1.2)
colors = ['#e6194b', '#3cb44b', '#ffe119',
          '#4363d8', '#f58231','#911eb4',
          '#46f0f0', '#f032e6', '#bcf60c',
          '#fabebe', '#008080', '#e6beff']

for ii in range( len(locations) ):
    plt.subplot(4,3, ii+1)
    sns.regplot( x = np.arange(len(wind_1961['date'])), y = wind_1961[ locations[ii] ],
                order = 3, scatter_kws={'s':2}, color = colors[ii] )


    plt.xlabel('Days')
    plt.ylabel('Wind Speed')
    plt.title('Days vs. Wind Speed for the year 1961 ' + str(locations[ii])+ ' of order 3.')

plt.subplots_adjust(hspace = 0.6)
plt.show()
```

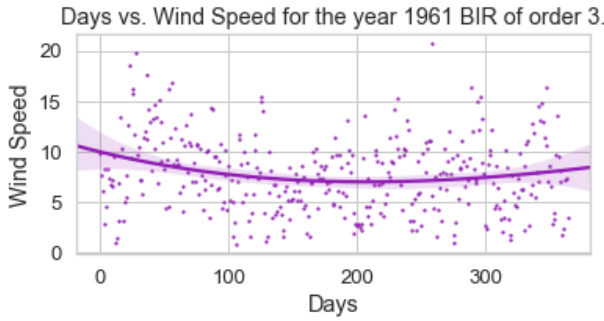

Days vs. Wind Speed for the year 1961 RPT of order 3.
Wind Speed
Days

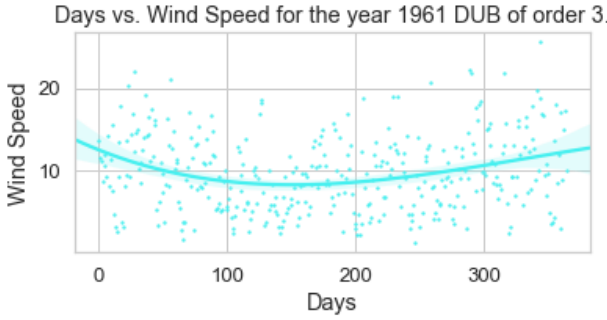

Days vs. Wind Speed for the year 1961 VAL of order 3.
Wind Speed
Days

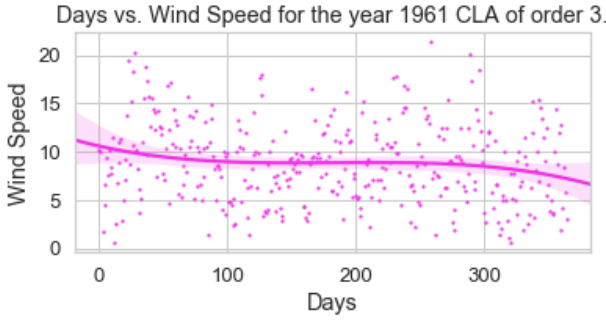

Days vs. Wind Speed for the year 1961 ROS of order 3.
Wind Speed
Days

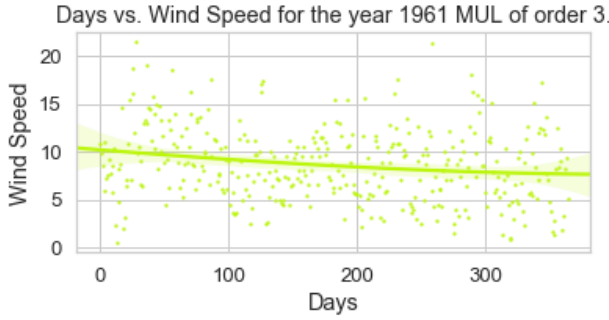

Days vs. Wind Speed for the year 1961 KIL of order 3.
Wind Speed
Days

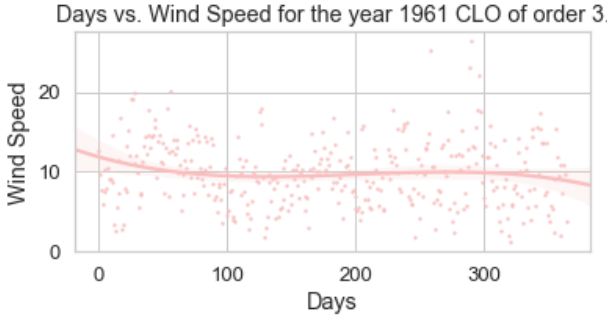

Days vs. Wind Speed for the year 1961 SHA of order 3.
Wind Speed
Days

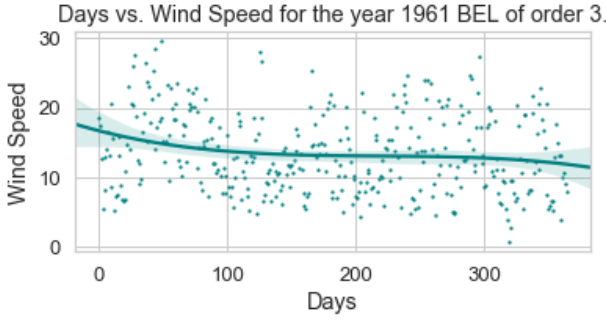

Days vs. Wind Speed for the year 1961 BIR of order 3.
Wind Speed
Days

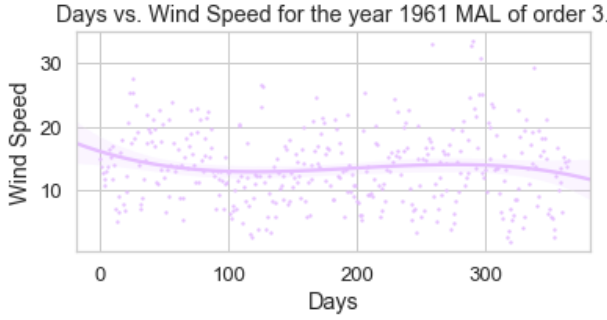

Days vs. Wind Speed for the year 1961 DUB of order 3.
Wind Speed
Days


Days vs. Wind Speed for the year 1961 CLA of order 3.
Wind Speed
Days


Days vs. Wind Speed for the year 1961 MUL of order 3.
Wind Speed
Days

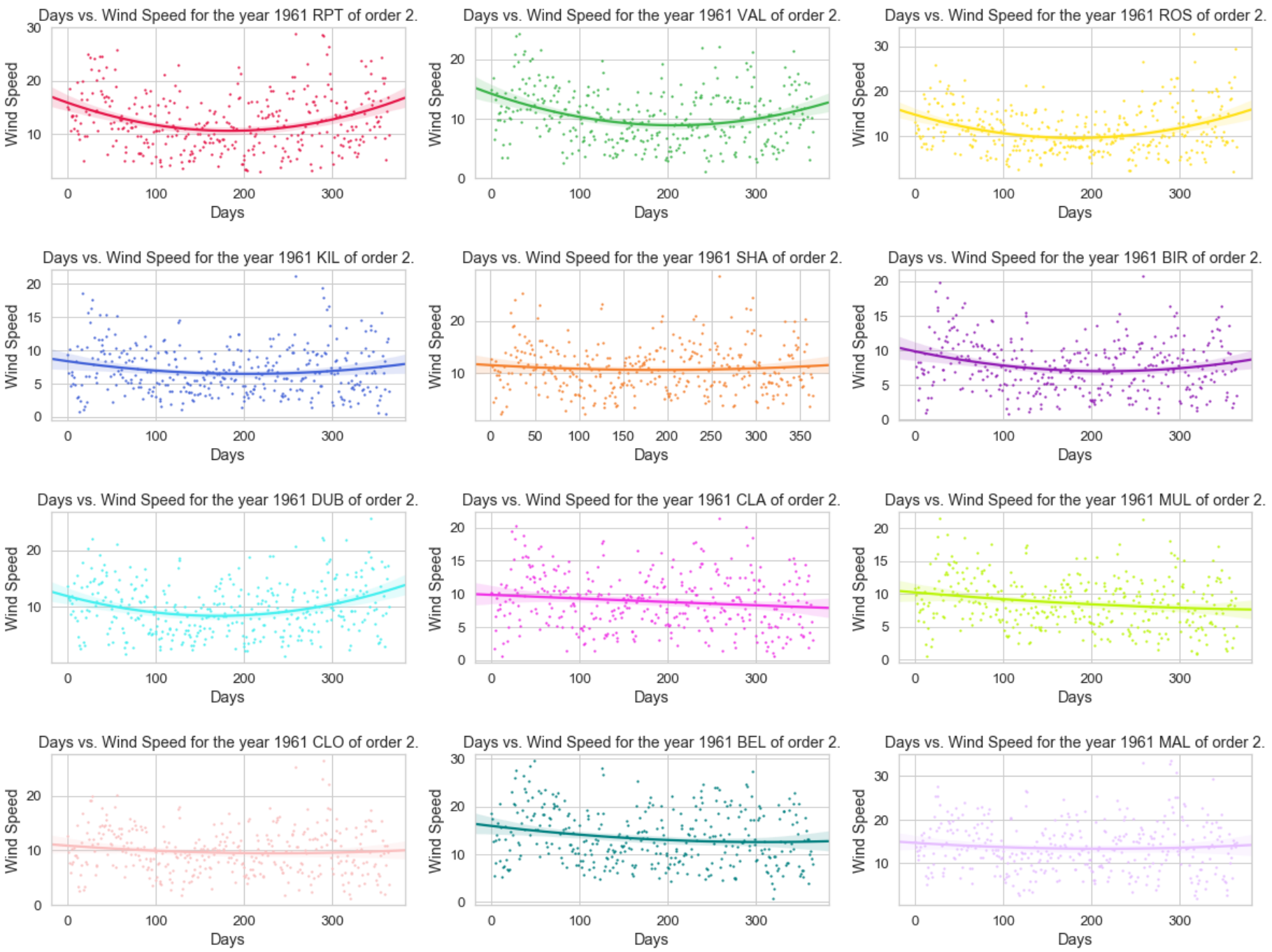

Days vs. Wind Speed for the year 1961 CLO of order 3.
Wind Speed
Days


Days vs. Wind Speed for the year 1961 BEL of order 3.
Wind Speed
Days


Days vs. Wind Speed for the year 1961 MAL of order 3.
Wind Speed
Days

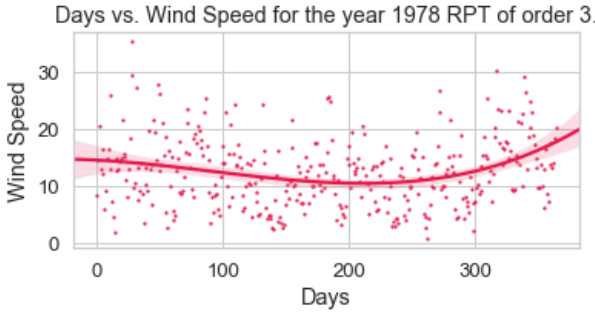
In [152]:

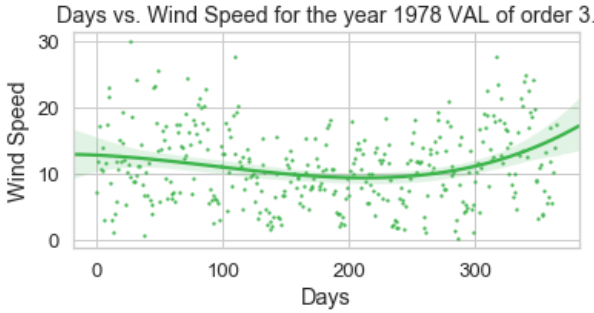
```
#order =2
plt.figure( figsize = (20,15) )
sns.set(style = 'whitegrid', font_scale = 1.2)
colors = ['#e6194b', '#3cb44b', '#ffe119',
          '#4363d8', '#f58231','#911eb4',
          '#46f0f0', '#f032e6', '#bcf60c',
          '#fabebe', '#008080', '#e6beff']

for ii in range( len(locations) ):
    plt.subplot(4,3, ii+1)
    sns.regplot( x = np.arange(len(wind_1961['date'])), y = wind_1961[ locations[ii] ],
                order = 2, scatter_kws={'s':2}, color = colors[ii] )


    plt.xlabel('Days')
    plt.ylabel('Wind Speed')
    plt.title('Days vs. Wind Speed for the year 1961 ' + str(locations[ii])+ ' of order 2.')

plt.subplots_adjust(hspace = 0.6)
plt.show()
```

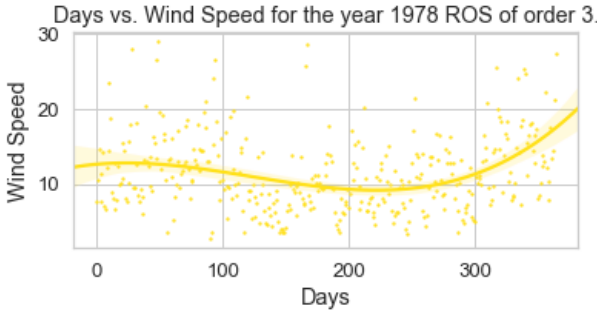


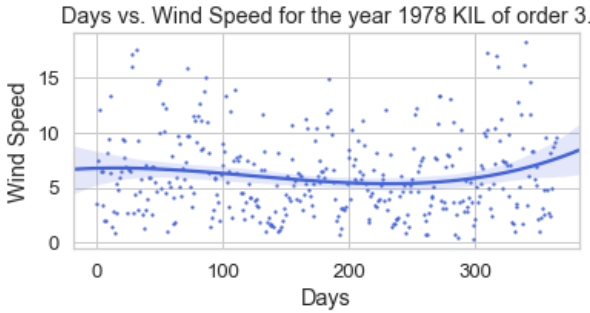
Doing the same for the year 1978.

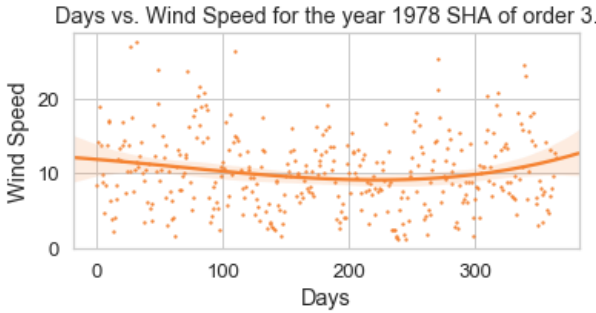
In [153]:
```
#order = 3
plt.figure( figsize = (20,15) )
sns.set(style = 'whitegrid', font_scale = 1.2)
colors = ['#e6194b', '#3cb44b', '#ffe119',
          '#4363d8', '#f58231','#911eb4',
          '#46f0f0', '#f032e6', '#bcf60c',
          '#fabebe', '#008080', '#e6beff']

for ii in range( len(locations) ):
    plt.subplot(4,3, ii+1)
    sns.regplot( x = np.arange(len(wind_1978['date'])), y = wind_1978[ locations[ii] ],
                order = 3, scatter_kws={'s':2}, color = colors[ii] )


    plt.xlabel('Days')
    plt.ylabel('Wind Speed')
    plt.title('Days vs. Wind Speed for the year 1978 ' + str(locations[ii])+ ' of order 3.')

plt.subplots_adjust(hspace = 0.6)
plt.show()
```

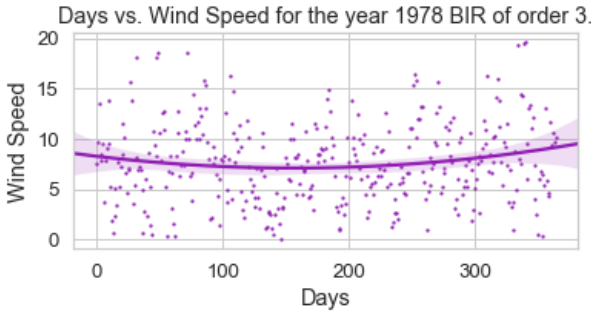

Days vs. Wind Speed for the year 1978 RPT of order 3.
Wind Speed
Days

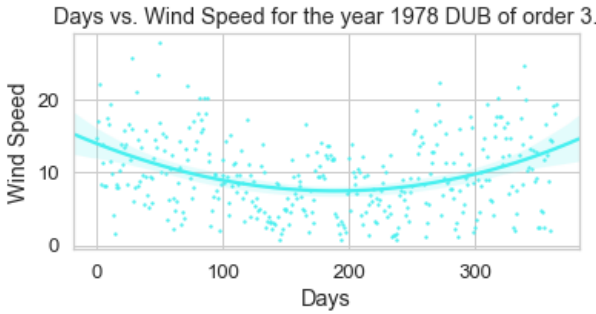

Days vs. Wind Speed for the year 1978 VAL of order 3.
Wind Speed
Days

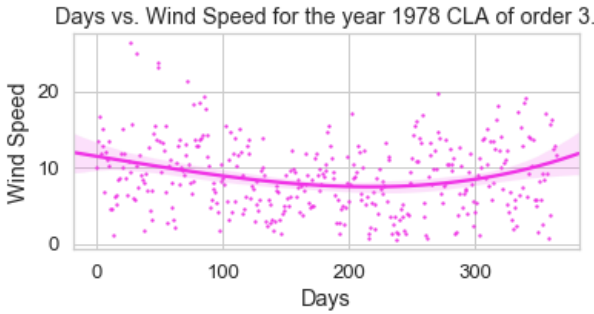

Days vs. Wind Speed for the year 1978 ROS of order 3.
Wind Speed
Days

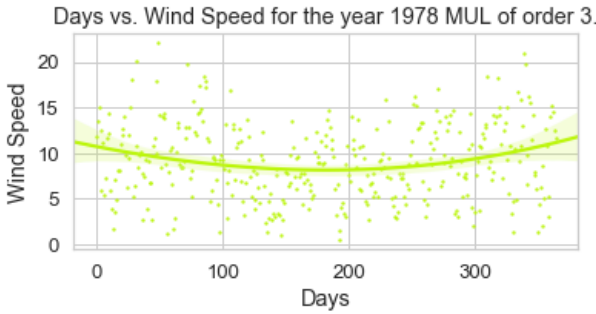

Days vs. Wind Speed for the year 1978 KIL of order 3.
Wind Speed
Days

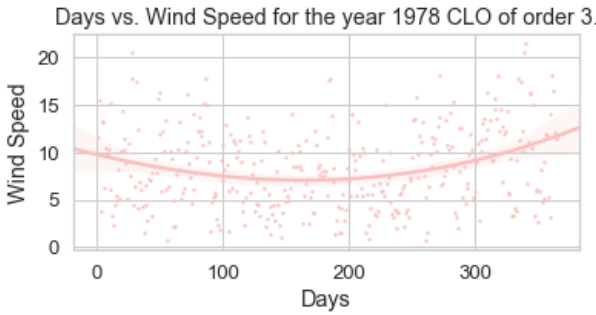

Days vs. Wind Speed for the year 1978 SHA of order 3.
Wind Speed
Days

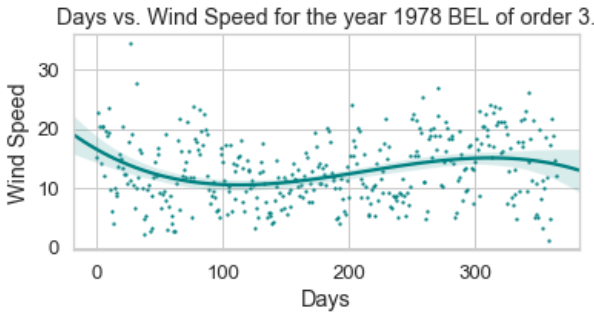

Days vs. Wind Speed for the year 1978 BIR of order 3.
Wind Speed
Days

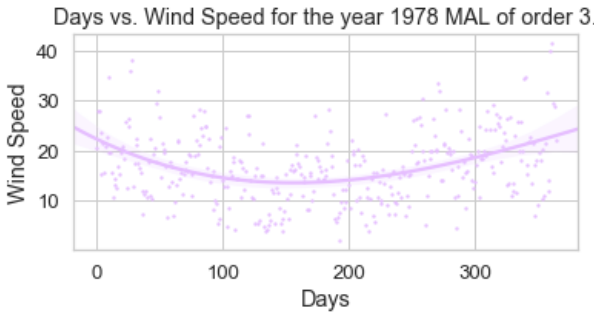

Days vs. Wind Speed for the year 1978 DUB of order 3.
Wind Speed
Days


Days vs. Wind Speed for the year 1978 CLA of order 3.
Wind Speed
Days


Days vs. Wind Speed for the year 1978 MUL of order 3.
Wind Speed
Days

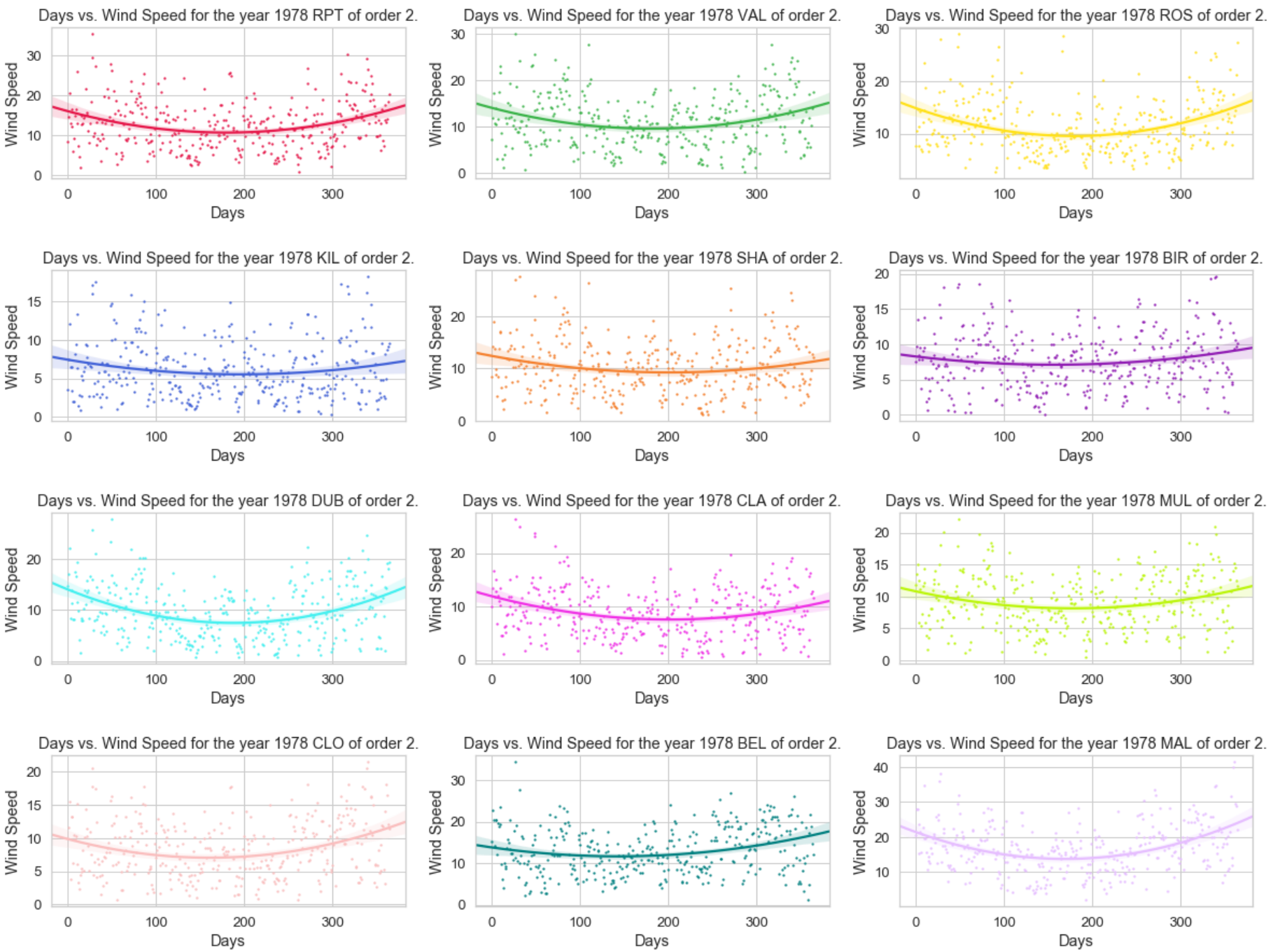

Days vs. Wind Speed for the year 1978 CLO of order 3.
Wind Speed
Days


Days vs. Wind Speed for the year 1978 BEL of order 3.
Wind Speed
Days


Days vs. Wind Speed for the year 1978 MAL of order 3.
Wind Speed
Days

In [154]:

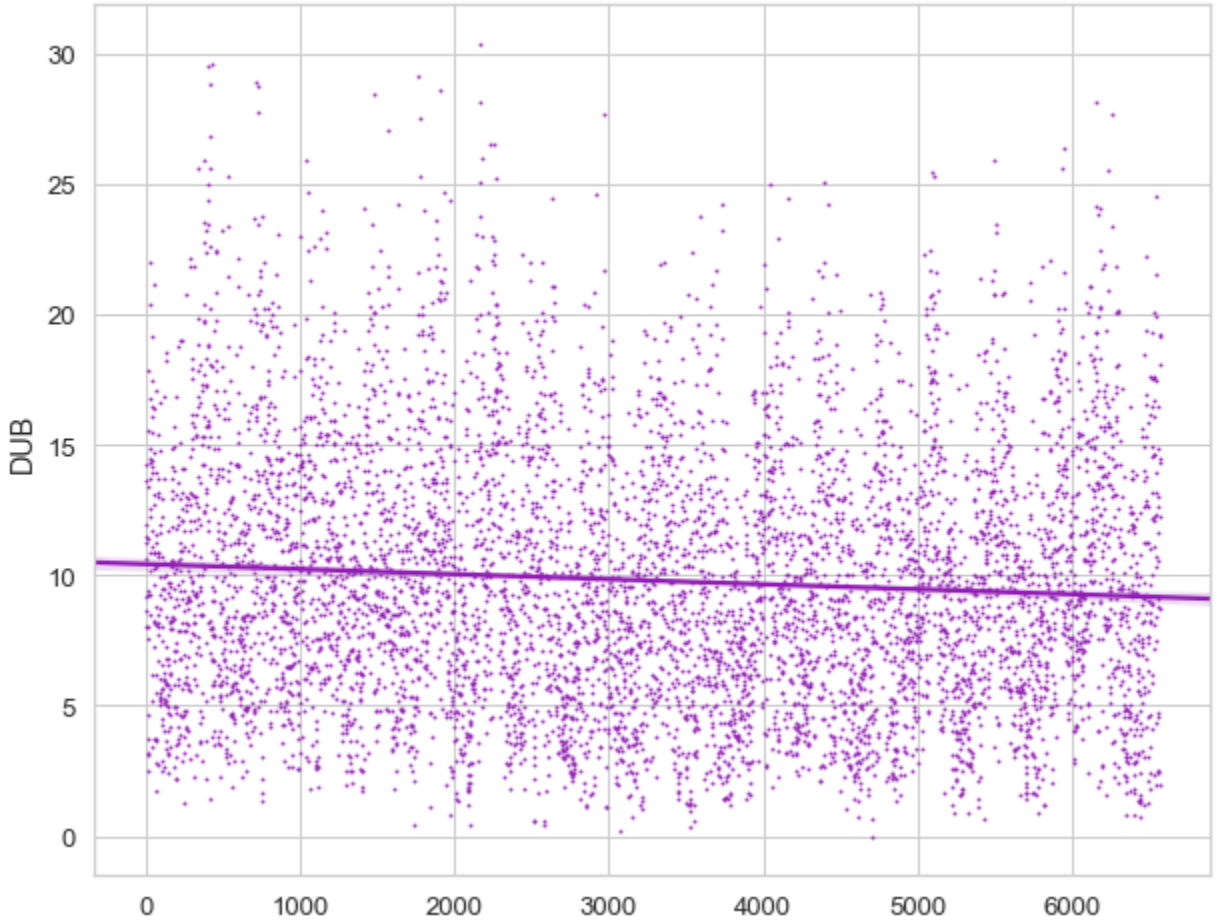
```
#order =2
plt.figure( figsize = (20,15) )
sns.set(style = 'whitegrid', font_scale = 1.2)
colors = ['#e6194b', '#3cb44b', '#ffe119',
          '#4363d8', '#f58231','#911eb4',
          '#46f0f0', '#f032e6', '#bcf60c',
          '#fabebe', '#008080', '#e6beff']

for ii in range( len(locations) ):
    plt.subplot(4,3, ii+1)
    sns.regplot( x = np.arange(len(wind_1978['date'])), y = wind_1978[ locations[ii] ],
                order = 2, scatter_kws={'s':2}, color = colors[ii] )


    plt.xlabel('Days')
    plt.ylabel('Wind Speed')
    plt.title('Days vs. Wind Speed for the year 1978 ' + str(locations[ii])+ ' of order 2.')

plt.subplots_adjust(hspace = 0.6)
plt.show()
```



Better seen for order 2.

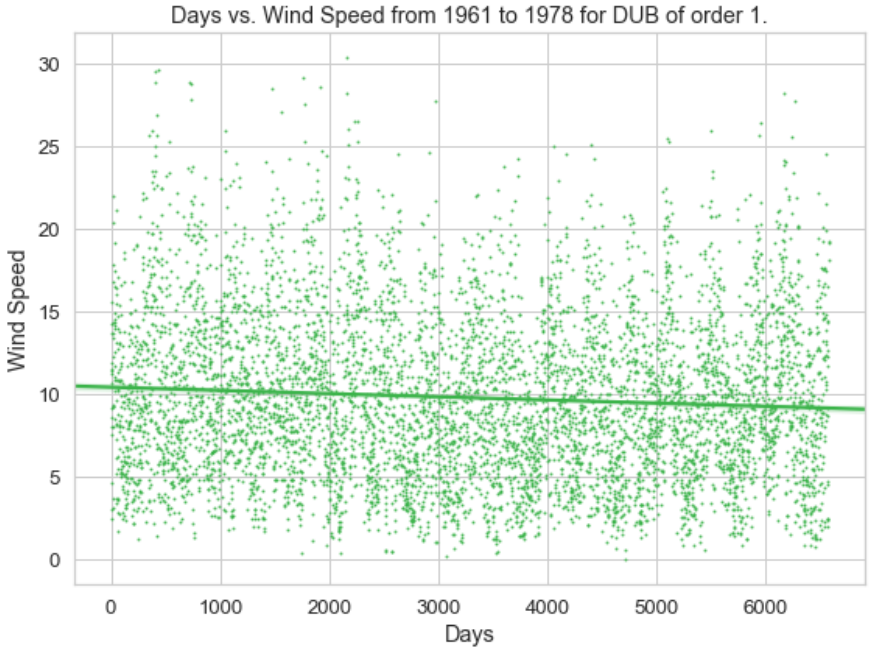
For a particular location, say, DUB, finding the trend from 1961 to 1978 as a whole.

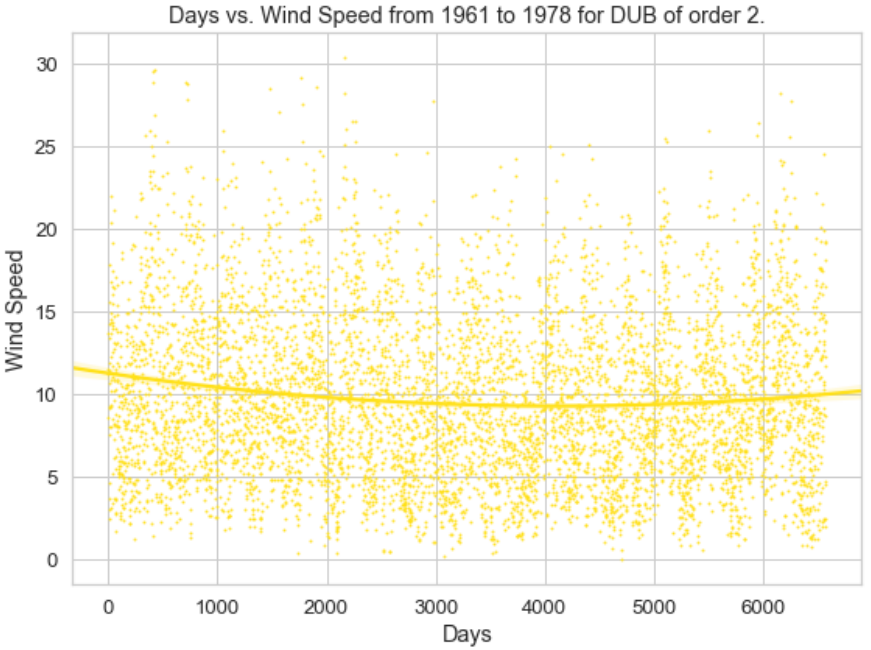
In [168]:
```
plt.figure( figsize = (10,8) )
sns.set(style = 'whitegrid', font_scale = 1.2)
colors = ['#e6194b', '#3cb44b', '#ffe119',
          '#4363d8', '#f58231','#911eb4',
          '#46f0f0', '#f032e6', '#bcf60c',
          '#fabebe', '#008080', '#e6beff']

#wind_DUB_1961_1978
sns.regplot( x = np.arange(wind.shape[0]), y = wind['DUB'],
                order = 1, scatter_kws={'s':1}, color = colors[5] )
plt.show()
```

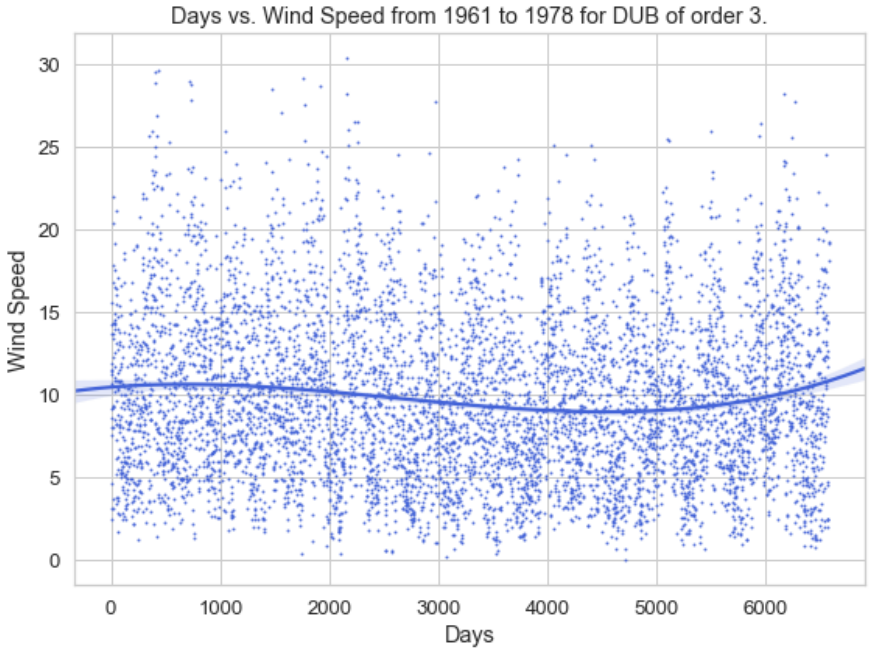


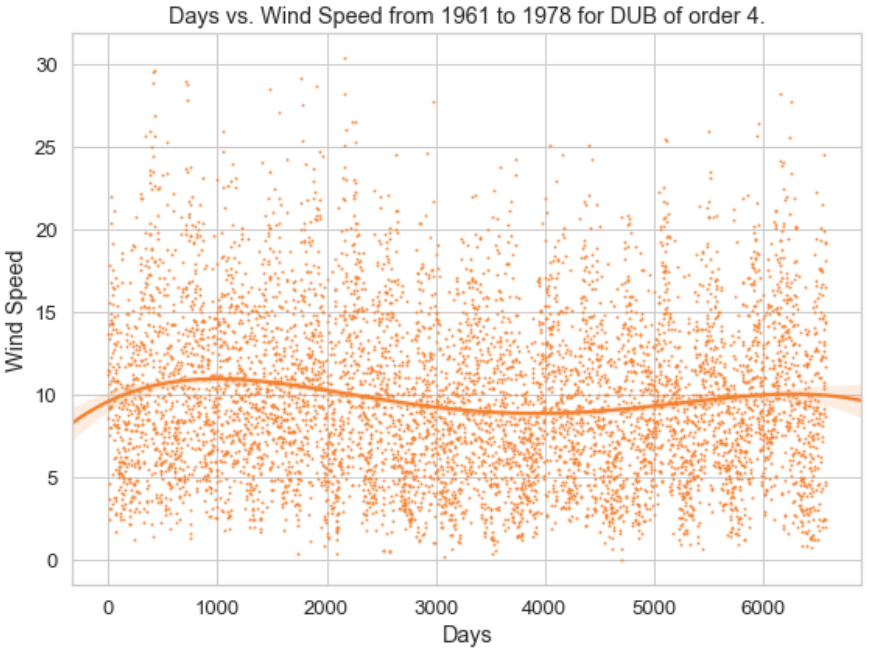
In [174]:

```
plt.figure( figsize = (20,15) )
sns.set(style = 'whitegrid', font_scale = 1.2)
colors = ['#e6194b', '#3cb44b', '#ffe119',
          '#4363d8', '#f58231','#911eb4',
          '#46f0f0', '#f032e6', '#bcf60c',
          '#fabebe', '#008080', '#e6beff']

for ii in range(1,4+1):
    plt.subplot(2,2,ii)
    sns.regplot( x = np.arange(wind.shape[0]), y = wind['DUB'],
                order = ii, scatter_kws={'s':1}, color = colors[ii] )
    plt.xlabel('Days')
    plt.ylabel('Wind Speed')
    plt.title('Days vs. Wind Speed from 1961 to 1978 for DUB of order '+ str(ii)+ '.')

plt.subplots_adjust(hspace = 0.3)
plt.show()
```


Days vs. Wind Speed from 1961 to 1978 for DUB of order 1.
Wind Speed
Days
0
5
10
15
20
25
30
0
1000
2000
3000
4000
5000
6000


Days vs. Wind Speed from 1961 to 1978 for DUB of order 2.
Wind Speed
Days
0
5
10
15
20
25
30
0
1000
2000
3000
4000
5000
6000


Days vs. Wind Speed from 1961 to 1978 for DUB of order 3.
Wind Speed
Days
0
5
10
15
20
25
30
0
1000
2000
3000
4000
5000
6000


Days vs. Wind Speed from 1961 to 1978 for DUB of order 4.
Wind Speed
Days
0
5
10
15
20
25
30
0
1000
2000
3000
4000
5000
6000

In [173]:
```
wind.describe()
```

Out[173]:

	RPT	VAL	ROS	KIL	SHA	BIR	DUB	CLA	MUL	CLO	B
count	6568.000000	6571.000000	6572.000000	6569.000000	6572.000000	6574.000000	6571.000000	6572.000000	6571.000000	6573.000000	6574.000(
mean	12.362987	10.644314	11.660526	6.306468	10.455834	7.092254	9.797343	8.495053	8.493590	8.707332	13.121(
std	5.618413	5.267356	5.008450	3.605811	4.936125	3.968683	4.977555	4.499449	4.166872	4.503954	5.835(
min	0.670000	0.210000	1.500000	0.000000	0.130000	0.000000	0.000000	0.000000	0.000000	0.040000	0.130(
25%	8.120000	6.670000	8.000000	3.580000	6.750000	4.000000	6.000000	5.090000	5.370000	5.330000	8.710(
50%	11.710000	10.170000	10.920000	5.750000	9.960000	6.830000	9.210000	8.080000	8.170000	8.290000	12.500(
75%	15.920000	14.040000	14.670000	8.420000	13.540000	9.670000	12.960000	11.420000	11.190000	11.630000	16.880(
max	35.800000	33.370000	33.840000	28.460000	37.540000	26.160000	30.370000	31.080000	25.880000	28.210000	42.380(

In [ ]:
```

```