Climate parameters of Patras in May - A summary presentation

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Foreword

This report has been prepared after the request of the Sailing Club of Patras. Its aim is to provide climatological information for the contestants participating in the J24 European Championship 2019. Therefore emphasis is given to the presentation of wind climatology. Brief descriptions of temperature and precipitation climatological data are also included.

1   Data

Due to the absence of long-term weather data in the Patras bay, that would have allowed a sound climatological analysis, we based our analysis using the ERA-Interim data set.

ERA-Interim is a dataset, showing the results of a global climate reanalysis from 1979 to date. ERA-Interim is constantly updated.

ERA stands for 'ECMWF Re-Analysis' and refers to a series of research projects at the European Center for Mesoscale Forecasts (ECMWF) which produced various datasets (ERA-Interim, ERA-40, etcetera).

ERA-Interim uses a fixed version of a numerical weather prediction (NWP) system (IFS - Cy31r2) to produce reanalyzed data. The fixed version ensures that no spurious trends are caused by an evolving NWP system, though the changing observing system can create such trends. The NWP system blends, or assimilates observations with a previous forecast to obtain the best fit to both. The result of this blending is called an analysis and is the starting point for the next forecast. In this manner, data is produced at increasingly later times.

Analyzed data is described as instantaneous, though it does represent an average over the model time step (30 minutes for ERA-Interim). Depending on the parameter, forecast data in ERA-Interim is either instantaneous or accumulated from the beginning of the forecast (twice-a-day forecasts starting at 00:00 and 12:00 UTC). Parameters such as precipitation and radiation are accumulated.

In this report we used the data for all days of May, from a 31-year period (1988 - 2018). Four values, at the synoptic hours 00:00, 06:00, 12:00 and 18:00 UTC, are available every day. Since wind speed varies significantly within the day, climatologies are presented for each synoptic hour separately.

The data come from the left circled point in Fig. 1, considered as the most representative for the needs of the current report.
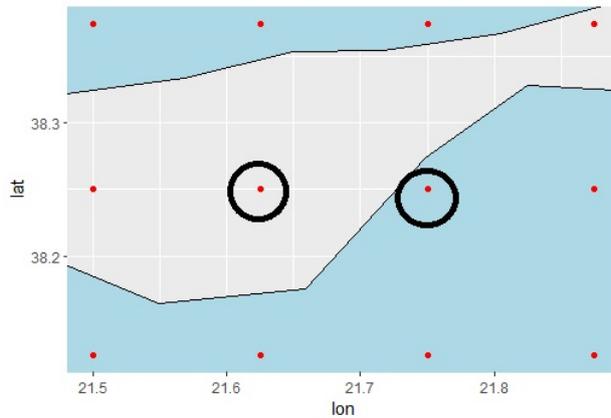
Figure 1: The data of the left circled point (38°.25 N 21°.625 E) were used.

2 Wind climatology

Figure 2 shows the wind speed histogram from May 1st to May 31st, for all synoptic hours and for every year from 1988 to 2018.
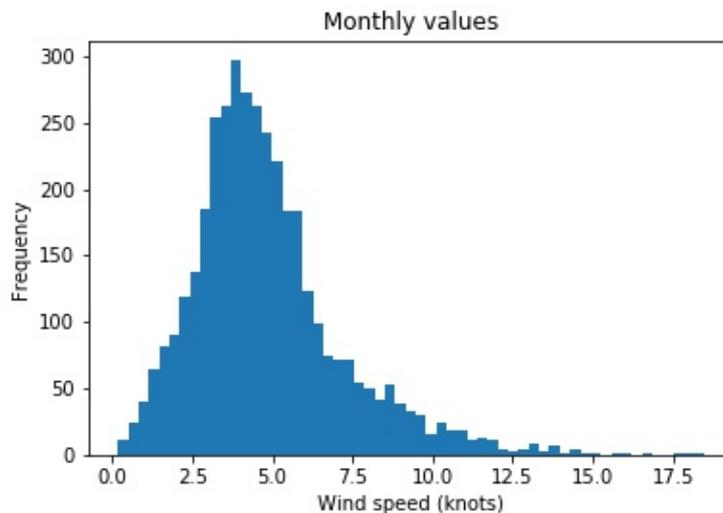

Figure 2: Wind speed histogram - all days of May, 1988 - 2018.

The summary statistics of the wind speed, expressed in kts - no rounding applied, is shown in the following table:

We observe that 50% of the measurements are below 4.6 kts· the maximum reaches 34 kts, while the mean value equals 5 kts.

Figure 3 shows the wind rose of the complete time series.

The wind rose reveals two main sectors, the East - Northeast, which is the

Table 1: Descriptive statistics for wind speed.

	m/s
mean	5.05
std	2.46
min	0.09
25%	3.48
50%	4.58
75%	6.12
max	23.00

most frequent and the West - Northwest. Top speeds are observed in both of the above sectors.

Wind speed and directions vary within the day. This is clearly illustrated in the following figures, showing the wind speed histograms and the corresponding wind roses for the complete time period at 00:00, 06:00, 12:00 and 18:00 UTC respectively.

Examining Figs. 4, 6, 8 and 10, we observe that, on average, the wind speed starts to increase around 00:00 UTC, becomes maximum around 12:00 UTC and decreases around 18:00 UTC.

The wind roses (Figs. 5, 7, 9 and 11) show that:

- Around 00:00 and 06:00 UTC prevail winds from the North - Northeast sector; the strongest winds (rarely exceeding 12 kts) from the same sector are also expected.

- The situation changes significantly around 12:00 UTC; the prevailing wind direction sector is Northwest - West - Southwest. Maximum speed now rarely exceeds 16 knots. Winds from the East - Northeast sector are also probable, however with a lower probability of occurrence.

- The picture around 18:00 UTC, as far as the wind direction is concerned, is similar to that at 12:00, but the speed is significantly lower, rarely exceeding 5 kts when coming from the western sectors. However, in the less probable event of Northeast direction, the wind speed may, sometimes, exceed 12 kts.
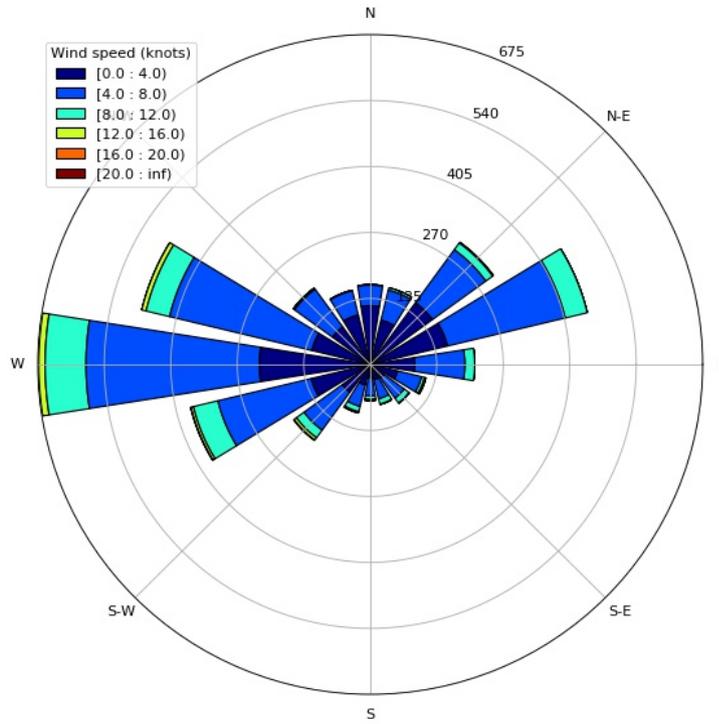
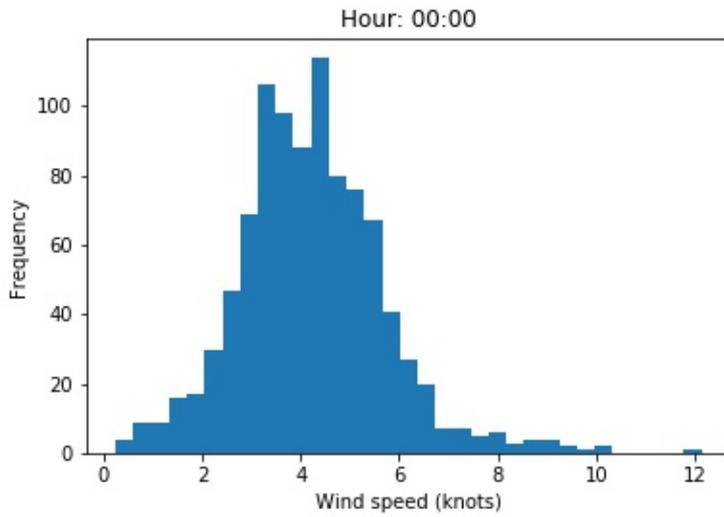Figure 3: Wind rose - all days of May, 1988 - 2018.

Figure 4: Wind speed histogram at 00:00 UTC - all days of May, 1988 - 2018.
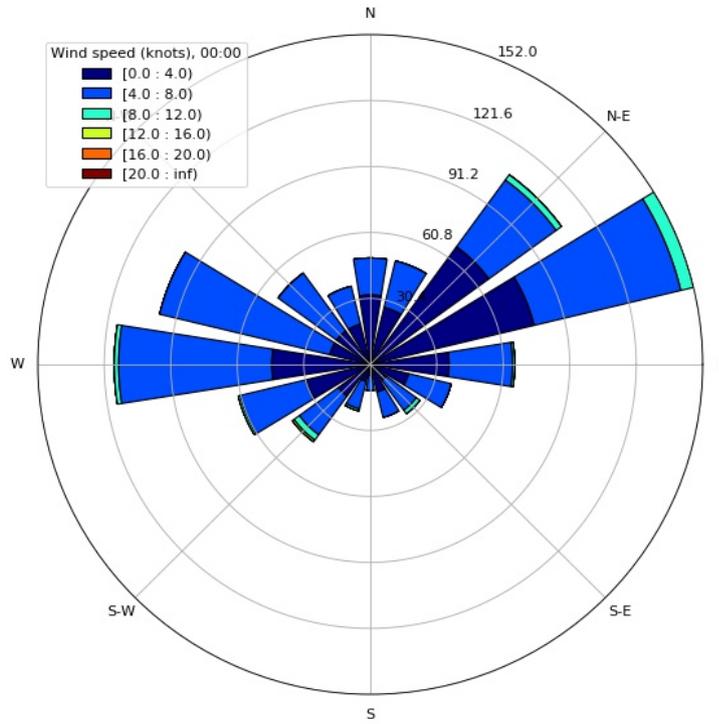
Figure 5: Wind rose at 00:00 UTC - all days of May, 1988 - 2018.
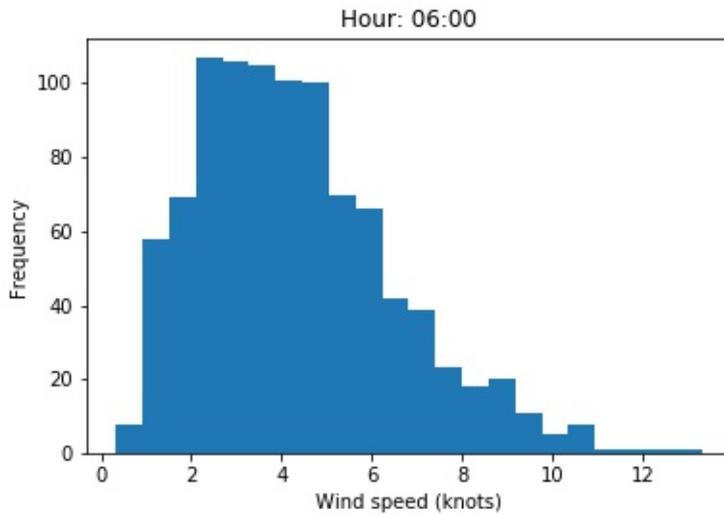

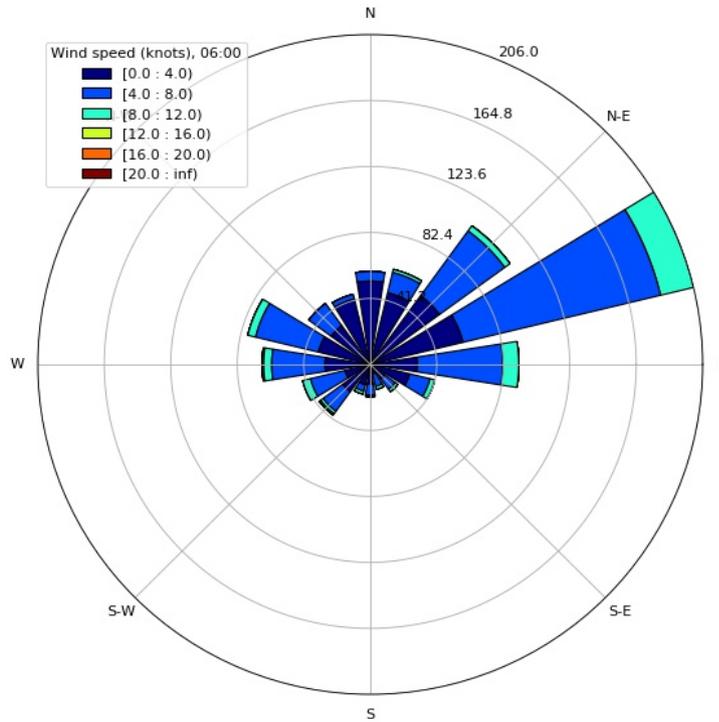Figure 6: Wind speed histogram at 06:00 UTC - all days of May, 1988 - 2018.

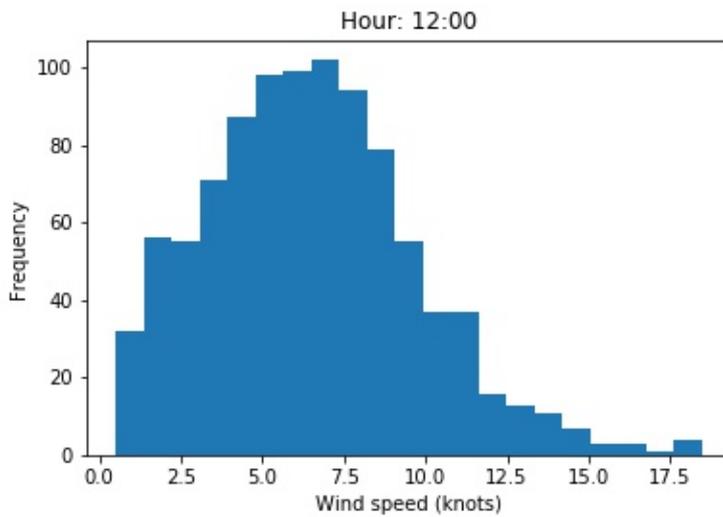Figure 7: Wind rose at 06:00 UTC - all days of May, 1988 - 2018.

Figure 8: Wind speed histogram at 12:00 UTC - all days of May, 1988 - 2018.
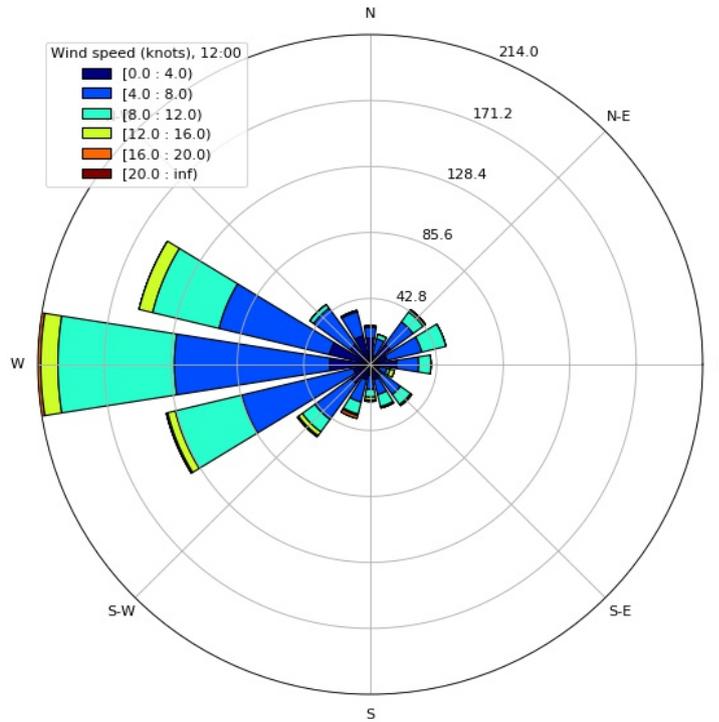
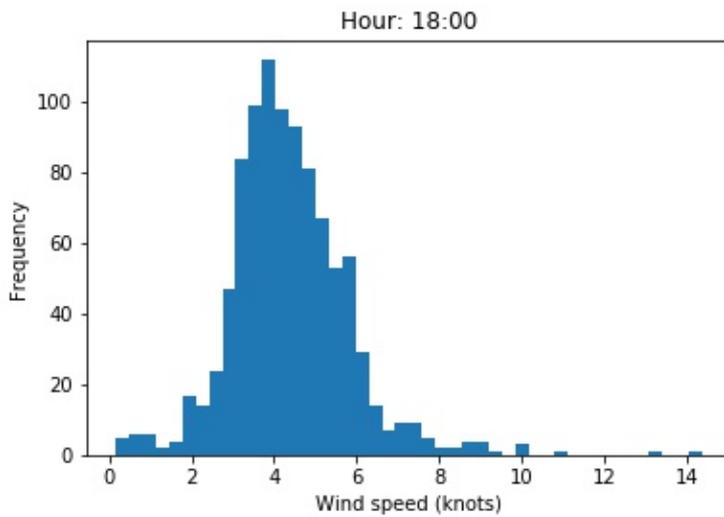Figure 9: Wind rose at 12:00 UTC - all days of May, 1988 - 2018.

Figure 10: Wind speed histogram at 18:00 UTC - all days of May, 1988 - 2018.
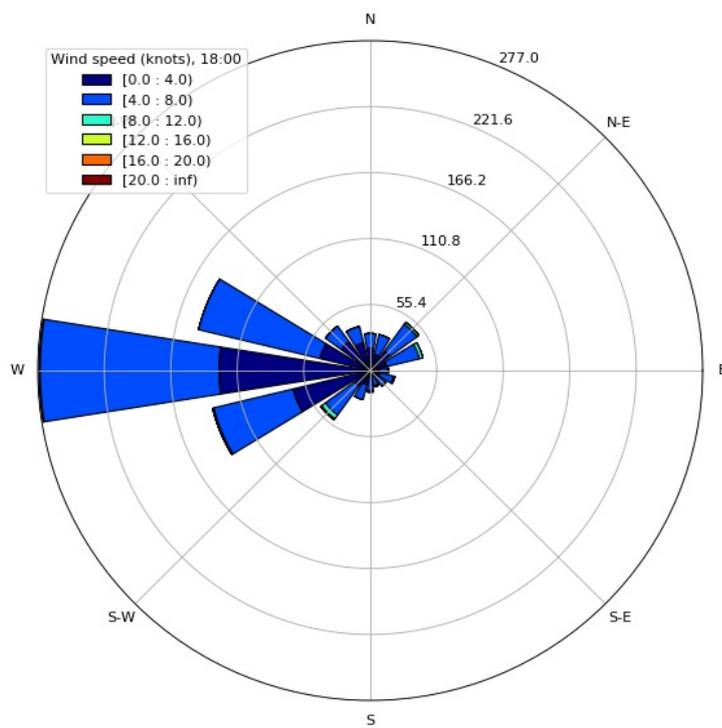
Figure 11: Wind rose at 18:00 UTC - all days of May from 1988 to 2018.

3 Precipitation climatology

The evolution of daily precipitation during May for the period 1988 to 2018 is shown in Fig. 12.
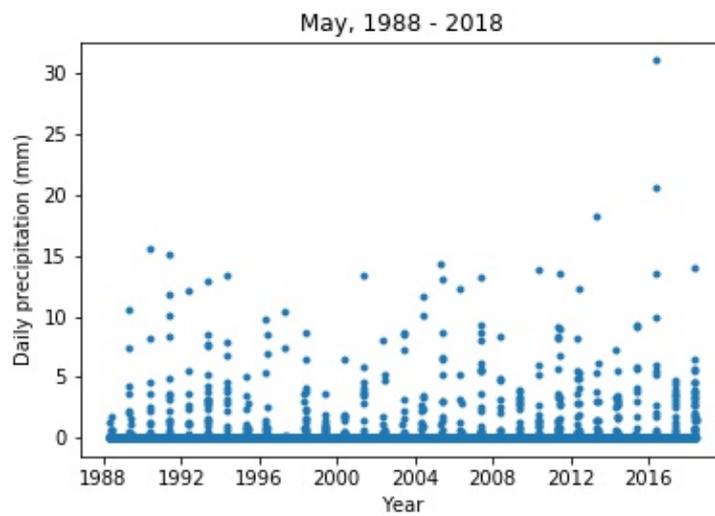

Figure 12: Daily precipitation of May, 1988 - 2018.

Further analysis reveals that for 95% of the days of May from 1988 to 2018, precipitation is zero.

4 Temperature climatology

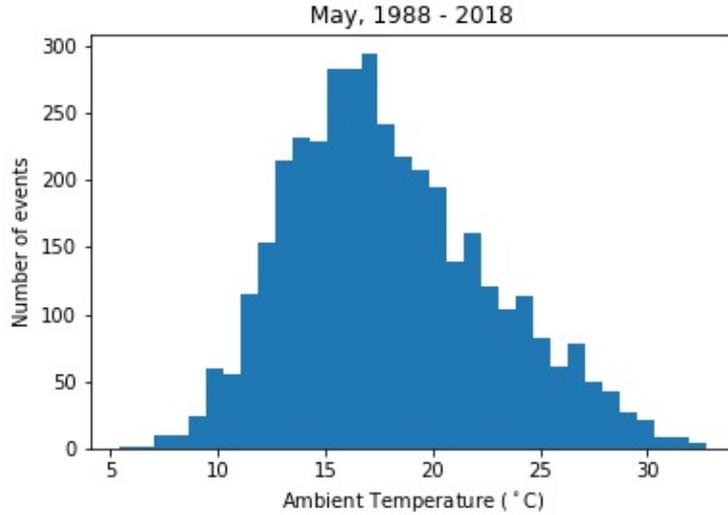The temperature histogram for all available data is shown in Fig. 13.

Figure 13: Temperature histogram - all days of May, 1988 - 2018.

The following table shows the descriptive statistics for the temperature in May. The mean temperature is 18.0 °C, while the median is 17.4 °C.

Table 2: Descriptive statistics for temperature.

	°C
mean	18.0
std	4.7
min	5.4
25%	14.6
50%	17.4
75%	21.0
max	32.7

Descriptive statistics for the temperature is summarized in Fig. 14 showing the boxplot of the temperature data in May.
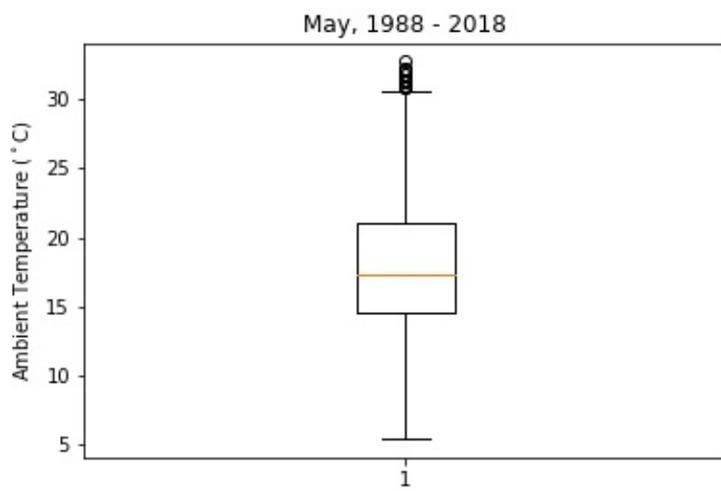
Figure 14: Temperature histogram - all days of May, 1988 - 2018.

5   Miscellaneous

Near real time weather data in Patras are available from the automatic weather station of the Laboratory of Atmospheric Physics at `http://mymeasurements.eu/u/lapup/meteo.php?lang=en`.

Near real time air quality data for Patras are available by the particulate measurement network of the Laboratory of Atmospheric Physics at `http://www.patrasair.gr/` The site is available only in Greek for the time being, but the graphs are quite explicit.

For accurate wind forecasts we suggest the WRF mesoscale model. Results are not presented in a fancy way, but are accurate; available at `http://www.meteociel.fr/modeles/wrfnmm.php?ech=3&mode=3&map=20`