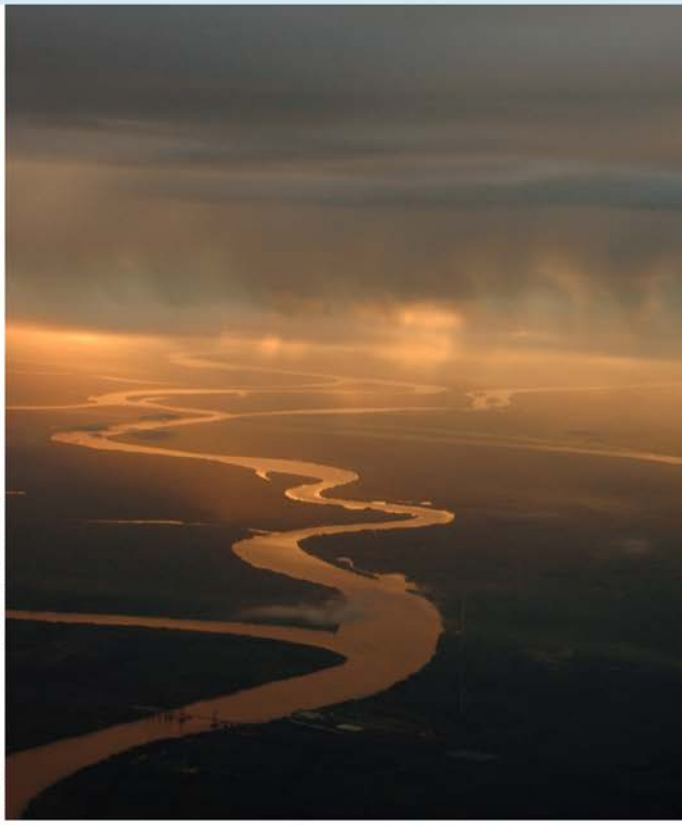
Australian Government
Bureau of Meteorology

Western Sydney Airport Climatological Review – Appendices



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Version number/type	Date of issue
1	15/04/2015

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Appendices

Appendix A: Metadata summaries and data availability listing

Basic Climatological Station Metadata

Current status

Metadata compiled: 30 OCT 2014

Station: BADGERYS CREEK AWS

Bureau of Meteorology station number: 067108
Bureau of Meteorology district name: Metropolitan (W)
State: NSW

World Meteorological Organization number: 94752
Identification: YSBC

Network Classification: National Benchmark Network for Agrometeorology
Station purpose: Synoptic, Aeronautical
Automatic Weather Station: Telmet 320

Current Station Location				
Latitude	**Decimal**	-33.8969	**Hour Min Sec**	33°53'49"S
Longitude	**Decimal**	150.7281	**Hour Min Sec**	150°43'41"E
Station Height	81.2 m	**Barometer Height**	82 m	
Method of station geographic positioning			GPS	

Year opened: 1995
Status: Open

Station summary

No summary for this site has been written as yet.

Historical metadata for this site has not been quality controlled for accuracy and completeness. Data other than current station information, particularly earlier than 1998, should be considered accordingly. Information may not be complete, as backfilling of historical data is incomplete.

Australian Government
Bureau of Meteorology

Basic Climatological Station Metadata

Current status

Station:	BADGERYS CREEK AWS			Location:	BADGERYS CREEK AWS			State:	NSW
Bureau No.:	067108	WMO No.:	94752	Aviation ID:	YSBC	Opened:	23 Oct 1995	Current Status:	Still open
Latitude:	-33.8969	Longitude:	150.7281	Elevation:	81.2 m	Barometer Elev:	82 m	Metadata compiled:	30 OCT 2014

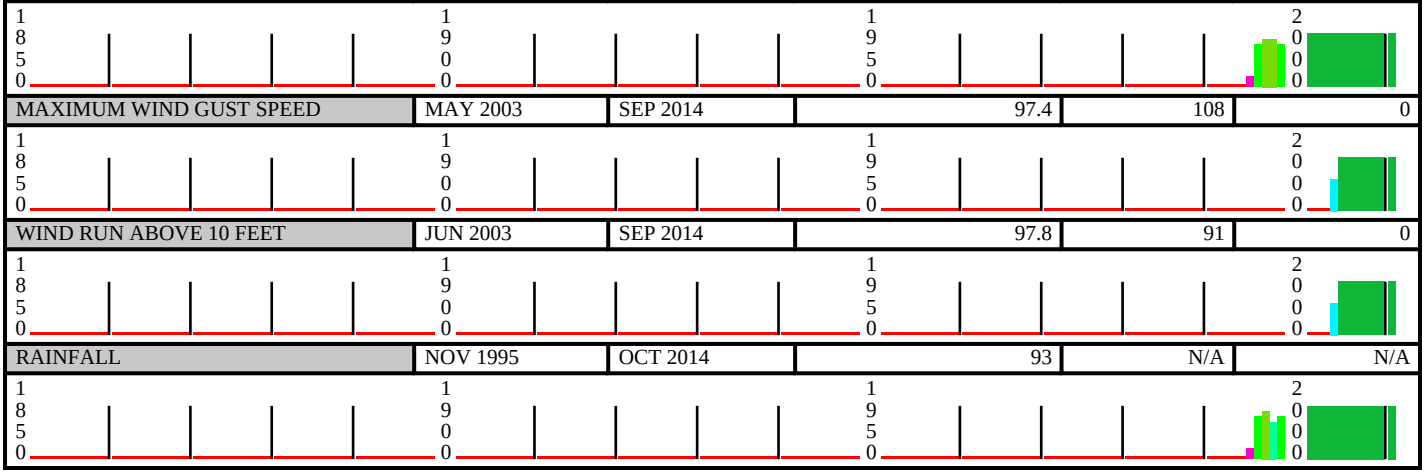
Observation summary

The table below indicates the approximate completeness of the record for individual element types within the Australian Data Archive for Meteorology. For elements not listed see the note below.

Completeness
0% → 100%

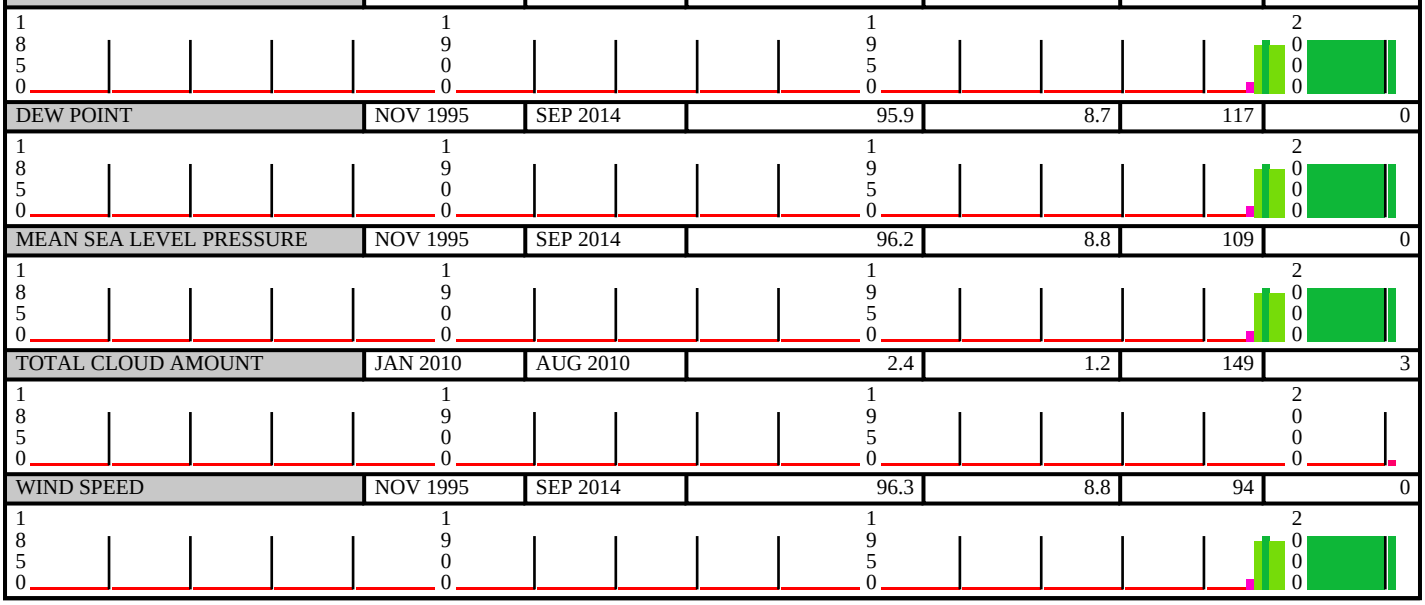
DAILY DATA HOLDINGS

OBSERVATION TYPE	FIRST MONTH	LAST MONTH	COMPLETENESS (% estimate)	SINGLE DAYS MISSED	FULL MONTHS MISSED
MAXIMUM AIR TEMPERATURE	NOV 1995	SEP 2014	94.9	351	0
MAXIMUM WIND GUST SPEED	MAY 2003	SEP 2014	97.4	108	0
WIND RUN ABOVE 10 FEET	JUN 2003	SEP 2014	97.8	91	0
RAINFALL	NOV 1995	OCT 2014	93	N/A	N/A



HOURLY DATA HOLDINGS - from 1 to 24 observations per day

OBSERVATION TYPE	FIRST MONTH	LAST MONTH	COMPLETENESS (% estimate)	FREQUENCY average daily	SINGLE DAYS MISSED	FULL MONTHS MISSED
AIR TEMPERATURE	NOV 1995	SEP 2014	96.4	8.8	96	0
DEW POINT	NOV 1995	SEP 2014	95.9	8.7	117	0
MEAN SEA LEVEL PRESSURE	NOV 1995	SEP 2014	96.2	8.8	109	0
TOTAL CLOUD AMOUNT	JAN 2010	AUG 2010	2.4	1.2	149	3
WIND SPEED	NOV 1995	SEP 2014	96.3	8.8	94	0



Historical metadata for this site has not been quality controlled for accuracy and completeness. Data other than current station information, particularly earlier than 1998, should be considered accordingly. Information may not be complete, as backfilling of historical data is incomplete.

Prepared by National Climate Centre of the Bureau of Meteorology.
Contact us by phone on (03) 9669 4082, by fax on (03) 9669 4515, or by email on climatedata@bom.gov.au

Basic Climatological Station Metadata

Current status

Station:	BADGERYS CREEK AWS			**Location:**	BADGERYS CREEK AWS			**State:**	NSW
Bureau No.:	067108	**WMO No.:**	94752	**Aviation ID:**	YSBC	**Opened:**	23 Oct 1995	**Current Status:**	Still open
Latitude:	-33.8969	**Longitude:**	150.7281	**Elevation:**	81.2 m	**Barometer Elev:**	82 m	**Metadata compiled:**	30 OCT 2014

THERE ARE NO RAINFALL INTENSITY DATA HOLDINGS

ONE-MINUTE DATA HOLDINGS

OBSERVATION TYPE	FIRST MONTH	LAST MONTH	COMPLETENESS (% estimate)	FREQUENCY average daily	SINGLE DAYS MISSED	FULL MONTHS MISSED
ALL ELEMENTS	DEC 1998	OCT 2014	93.9	1351.7	N/A	0

HALF-HOURLY DATA HOLDINGS

OBSERVATION TYPE	FIRST MONTH	LAST MONTH	COMPLETENESS (% estimate)	FREQUENCY average daily	SINGLE DAYS MISSED	FULL MONTHS MISSED
ALL ELEMENTS	JAN 1996	OCT 2014	96.9	46.5	N/A	0

THERE ARE NO UPPER-AIR EDT DATA HOLDINGS

Holdings calculated up to 01 Oct 2014

The % complete figure is the completeness of observations averaged over all months of record, for the given station and observation type, taking gaps into account. For hourly holdings, the completeness is relative to the maximum number of daily observations for the site each month, and is therefore an estimate. For daily holdings, the completeness figure shown is exact.

The single days missed figure is the total number of days for which no observation was received, not including full missed months. The full months missed figure is the total of full month gaps over the period of record. Where an element is not included assumptions can generally be made about availability, and the list to use has been suggested below.

Unlisted element	Listed element to use
Minimum air temperature	Maximum air temperature
Wet bulb temperature	Dew point
Soil temperature at 20, 50 & 100cm	10cm soil temperature
Relative humidity	Dew point
Minimum temp. of water in evaporimeter	Evaporimeter - max water temp
Visual observations eg. weather, visibility	Total cloud amount
Sea related observations	Sea state

Historical metadata for this site has not been quality controlled for accuracy and completeness. Data other than current station information, particularly earlier than 1998, should be considered accordingly. Information may not be complete, as backfilling of historical data is incomplete.

Notes on these metadata

The following notes have been compiled to assist with interpreting the metadata provided in this document. These notes are subject to change as the network evolves. Changes in station-specific metadata occur more frequently, both as recent changes are recorded and historical information is transferred from paper file to electronic database.

Reliability of the metadata

The Commonwealth Bureau of Meteorology maintains information on more than 20,000 stations which have operated since observations began in the mid 1800s. The amount of information available for each of these sites and its associated uncertainty are influenced by a number of factors including the type and purpose of the station and the time over which it operated.

Early information about stations was held only on paper file. In 1998 a corporate electronic database was established to help maintain information about the network and its components. The number of parameters recorded about a station is now much greater than before this database was established. The national database has also helped improve consistency in the metadata through the implementation of predefined fields. As a result, and through the refinement of operating procedures, station metadata recorded since 1998 are of a higher overall standard than previously, although occasional omissions and errors are still possible.

The Bureau is part way through a task of entering historical information held on paper file into the corporate database. **Until this process is completed there will remain large gaps in the information contained in these metadata documents and considerable caution should be used when deriving conclusions from the metadata.** As an example, two consecutive entries about a rain gauge dated 50 years apart may appear in the equipment metadata. This may either mean that nothing happened to that instrument over the 50 years, or that information for the intervening period has yet to be entered into the database. Similarly, if no information was available about instruments at a site when it was first established, fields which were required to have a value present may have used the earliest information available as a best-guess estimate. Sometimes this was the metadata current when the database was established in 1998. In some instances there may be gaps in metadata relevant to the post 1998 period.

For the above reasons it is recommended that all metadata prior to 1998 be considered as indicative only, and used with caution, unless it has been quality controlled. The Bureau of Meteorology should be contacted if further information or confirmation of the data is required. Depending on the nature of the inquiry there may be a fee associated with this request. Contact details are provided in the telephone book for each capital city or the Bureau's web site at:
http://www.bom.gov.au

The following pages contain explanatory notes for selected terms found in this document.

Station Number

The Bureau of Meteorology station number uniquely specifies a station and is not intended to change over time time, although on very rare occasions a station number may change or be deleted from the record (usually to correct an error). Generally a new station number is established if an existing station changes in a way that would affect the climate data record for that site (measured in terms of air temperature and precipitation). Significant station moves are an example of this.

Some stations also possess a World Meteorological Organization (WMO) station number. The WMO number is different to the Bureau of Meteorology number. It also uniquely specifies a station at any given time but can be reassigned to another station if the new station takes priority in the global reporting network. Only selected stations will have a WMO number. Significant stations may maintain their WMO number for many decades.

Notes on these metadata

Network Classification

SUPPORTING the BASIC CLIMATE SERVICE
Global Climate Observing System (GCOS)
GCOS Upper Air Network (GUAN)
GCOS Surface Network (GSN)
National Climate Network {not yet assigned}
Reference Climate Stations (RCS)
Regional Basic Climatological Network (RBCN)
CLIMAT Stations (CLC)
CLIMAT TEMP Stations (CLT)
SUPPORTING the NATIONAL WEATHER WATCH SYSTEM
WMO Global Observing System (GOS)
GOS Upper Air Network
GOS Satellite Network
Global Atmospheric Watch
Background Atmospheric Pollution Monitoring Network (BAPMON)
Basic Ozone Network
Basic Solar and Terrestrial Radiation Network
Regional Basic Synoptic Network (RBSN)
WMO Global Oceanic Observing System (GOOS)
SUPPORTING the BASIC WEATHER SERVICE (BWS)
BWS Land Network
Significant Land Locations
Capital City Mesonets
National Benchmark Network for Agrometeorology (NBNA)
BWS Marine Network
Significant Coastal Loactions
Open Ocean Network
BWS Upper Air Network
Major Significant Locations
BWS Remote Sensing Network
Weather Watch Radar Network
Fire Weather Wind Mesonets
High Resolution Satellite
SUPPORTING the BASIC HYDROLOGICAL SERVICE
Regional Flood Warning Network
Water Resources Assessment Network
Global Hydrological Network
Global Terrestrial Observing System (GTOS)
World Hydrological Cycle Observing System (WHYCOS)
National Hydrological Network

Networks of stations are defined for a variety of purposes (as defined in above table).

Notes on these metadata

Network Classification Continued....

Stations may be included in several different networks, which may change over time. The table on the previous page lists current network classifications related to the scientific purpose of the network. Some of these networks - the GCOS network for instance - are components of a global network. Entries in the database for some networks may not be complete, thus not properly representing the status of the network. The composition of the network will usually change over time. While several of the networks have international significance, other network classifications have been developed to aid operational management.

Station Purpose

The station purpose can be classified according to the observation program listed below. Parameters in brackets list some of the various different configurations which occur.

- Synoptic [Seasonal, River Height, Climatological, Telegraphic Rain, Aeronautical, Upper Air]
- Climatological [Seasonal, Telegraphic Rain]
- Aeronautical
- Rainfall [River Height]
- River Height
- Telegraphic Rain [Non-Telegraphic River Height, Telegraphic River Height]
- Non-Telegraphic Rain [Telegraphic River Height]
- Evaporation [Rainfall, River Height, Telegraphic River Height, Non-Telegraphic River Height, Telegraphic Rain, Non-Telegraphic Rain]
- Pluviograph [Rainfall, Telegraphic Rain, Non-Telegraphic Rain, River Height, Telegraphic River Height, Non-Telegraphic River Height]
- Radiation
- Lightning Flash Counter
- Public Information
- Local Conditions
- Radar Site
- Unclassified
- No Routine Observations

Note: Telegraphic observations are those which are sent by some electronic means be it a phone or telegram to the responsible Bureau office. It is a term which is historically linked to analogue non automatic data transmission.

Basic Climatological Station Metadata

Current status

Metadata compiled: 04 NOV 2014

Station: CAMDEN AIRPORT AWS

Bureau of Meteorology station number: 068192
Bureau of Meteorology district name: Illawarra
State: NSW

World Meteorological Organization number: 94755
Identification: YSCN

Network Classification:
Station purpose: Synoptic, Aeronautical
Automatic Weather Station: Almos

Current Station Location				
Latitude	**Decimal**	-34.0390	**Hour Min Sec**	34°2'20"S
Longitude	**Decimal**	150.6890	**Hour Min Sec**	150°41'20"E
Station Height	73.9 m	**Barometer Height**	74.6 m	
Method of station geographic positioning			GPS	

Year opened: 1943
Status: Open

Station summary

No summary for this site has been written as yet.

Historical metadata for this site has not been quality controlled for accuracy and completeness. Data other than current station information, particularly earlier than 1998, should be considered accordingly. Information may not be complete, as backfilling of historical data is incomplete.

Australian Government
Bureau of Meteorology

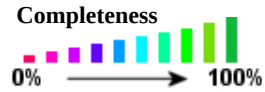
Basic Climatological Station Metadata

Current status

Station:	CAMDEN AIRPORT AWS			**Location:**	CAMDEN AIRPORT AWS			**State:**	NSW
Bureau No.:	068192	**WMO No.:**	94755	**Aviation ID:**	YSCN	**Opened:**	01 Jan 1943	**Current Status:**	Still open
Latitude:	-34.0390	**Longitude:**	150.6890	**Elevation:**	73.9 m	**Barometer Elev:**	74.6 m	**Metadata compiled:**	04 NOV 2014

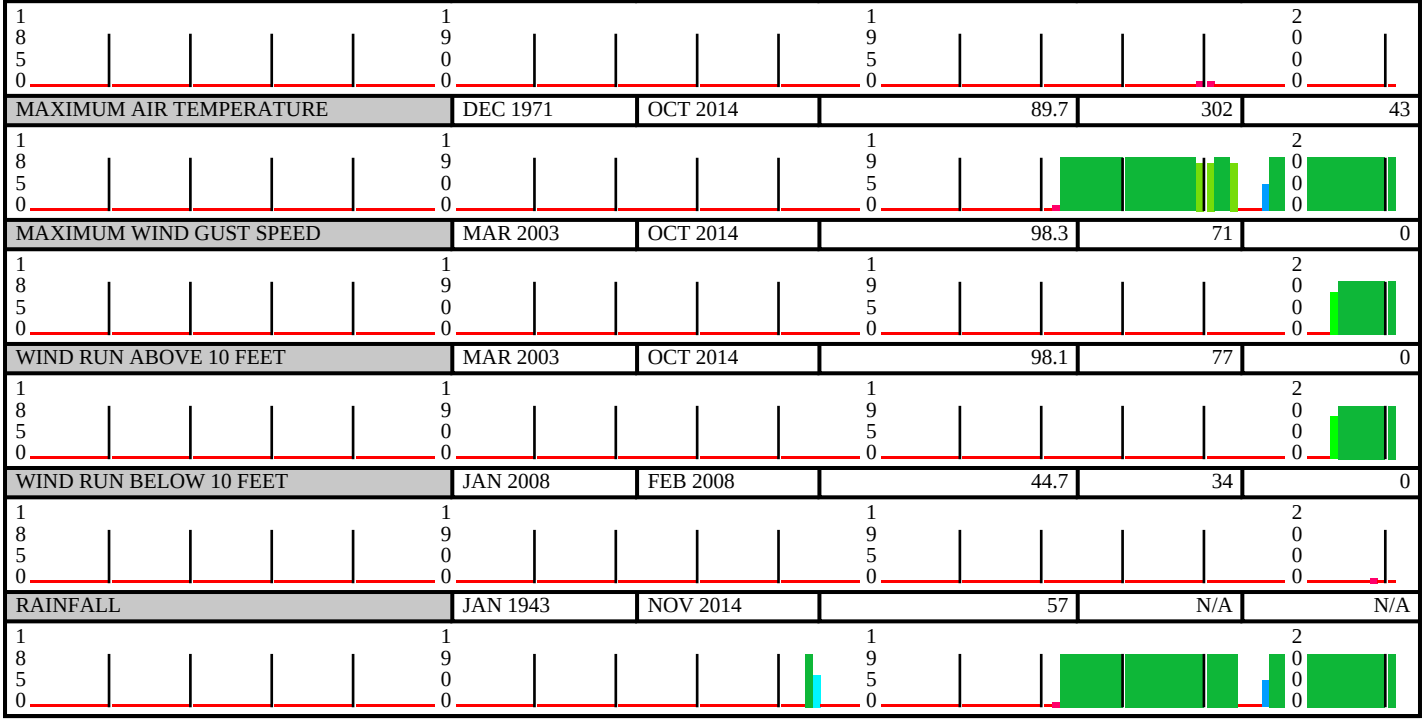
Observation summary

The table below indicates the approximate completeness of the record for individual element types within the Australian Data Archive for Meteorology. For elements not listed see the note below.



DAILY DATA HOLDINGS

OBSERVATION TYPE	FIRST MONTH	LAST MONTH	COMPLETENESS (% estimate)	SINGLE DAYS MISSED	FULL MONTHS MISSED
GROUND MINIMUM TEMPERATURE	AUG 1989	AUG 1990	.4	60	11
MAXIMUM AIR TEMPERATURE	DEC 1971	OCT 2014	89.7	302	43
MAXIMUM WIND GUST SPEED	MAR 2003	OCT 2014	98.3	71	0
WIND RUN ABOVE 10 FEET	MAR 2003	OCT 2014	98.1	77	0
WIND RUN BELOW 10 FEET	JAN 2008	FEB 2008	44.7	34	0
RAINFALL	JAN 1943	NOV 2014	57	N/A	N/A



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Australian Government
Bureau of Meteorology

Basic Climatological Station Metadata

Current status

Station:	CAMDEN AIRPORT AWS			**Location:**	CAMDEN AIRPORT AWS			**State:**	NSW
Bureau No.:	068192	**WMO No.:**	94755	**Aviation ID:**	YSCN	**Opened:**	01 Jan 1943	**Current Status:**	Still open
Latitude:	-34.0390	**Longitude:**	150.6890	**Elevation:**	73.9 m	**Barometer Elev:**	74.6 m	**Metadata compiled:**	04 NOV 2014

HOURLY DATA HOLDINGS - from 1 to 24 observations per day

OBSERVATION TYPE	FIRST MONTH	LAST MONTH	COMPLETENESS (% estimate)	FREQUENCY average daily	SINGLE DAYS MISSED	FULL MONTHS MISSED
AIR TEMPERATURE	JAN 1943	OCT 2014	54.6	4.9	147	370
						
DEW POINT	JAN 1943	OCT 2014	53.9	4.9	202	374
						
MEAN SEA LEVEL PRESSURE	JUL 1997	OCT 2014	98.8	8.3	22	0
						
TOTAL CLOUD AMOUNT	JAN 1943	OCT 2014	38.1	3.0	571	494
						
WIND SPEED	JAN 1943	OCT 2014	54.6	4.9	159	370
						

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Prepared by National Climate Centre of the Bureau of Meteorology.
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Current status

Station:	CAMDEN AIRPORT AWS			**Location:**	CAMDEN AIRPORT AWS			**State:**	NSW
Bureau No.:	068192	**WMO No.:**	94755	**Aviation ID:**	YSCN	**Opened:**	01 Jan 1943	**Current Status:**	Still open
Latitude:	-34.0390	**Longitude:**	150.6890	**Elevation:**	73.9 m	**Barometer Elev:**	74.6 m	**Metadata compiled:**	04 NOV 2014

THERE ARE NO RAINFALL INTENSITY DATA HOLDINGS

ONE-MINUTE DATA HOLDINGS

OBSERVATION TYPE	FIRST MONTH	LAST MONTH	COMPLETENESS (% estimate)	FREQUENCY average daily	SINGLE DAYS MISSED	FULL MONTHS MISSED
ALL ELEMENTS	AUG 2010	OCT 2014	99.5	1432.3	N/A	0

HALF-HOURLY DATA HOLDINGS

OBSERVATION TYPE	FIRST MONTH	LAST MONTH	COMPLETENESS (% estimate)	FREQUENCY average daily	SINGLE DAYS MISSED	FULL MONTHS MISSED
ALL ELEMENTS	APR 1992	OCT 2014	75.0	36.0	N/A	9

THERE ARE NO UPPER-AIR EDT DATA HOLDINGS

Holdings calculated up to 01 Nov 2014

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Notes on these metadata

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GCOS Surface Network (GSN)
National Climate Network {not yet assigned}
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GOS Satellite Network
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Background Atmospheric Pollution Monitoring Network (BAPMON)
Basic Ozone Network
Basic Solar and Terrestrial Radiation Network
Regional Basic Synoptic Network (RBSN)
WMO Global Oceanic Observing System (GOOS)
SUPPORTING the BASIC WEATHER SERVICE (BWS)
BWS Land Network
Significant Land Locations
Capital City Mesonets
National Benchmark Network for Agrometeorology (NBNA)
BWS Marine Network
Significant Coastal Loactions
Open Ocean Network
BWS Upper Air Network
Major Significant Locations
BWS Remote Sensing Network
Weather Watch Radar Network
Fire Weather Wind Mesonets
High Resolution Satellite
SUPPORTING the BASIC HYDROLOGICAL SERVICE
Regional Flood Warning Network
Water Resources Assessment Network
Global Hydrological Network
Global Terrestrial Observing System (GTOS)
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Notes on these metadata

Network Classification Continued....

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- Climatological [Seasonal, Telegraphic Rain]
- Aeronautical
- Rainfall [River Height]
- River Height
- Telegraphic Rain [Non-Telegraphic River Height, Telegraphic River Height]
- Non-Telegraphic Rain [Telegraphic River Height]
- Evaporation [Rainfall, River Height, Telegraphic River Height, Non-Telegraphic River Height, Telegraphic Rain, Non-Telegraphic Rain]
- Pluviograph [Rainfall, Telegraphic Rain, Non-Telegraphic Rain, River Height, Telegraphic River Height, Non-Telegraphic River Height]
- Radiation
- Lightning Flash Counter
- Public Information
- Local Conditions
- Radar Site
- Unclassified
- No Routine Observations

Note: Telegraphic observations are those which are sent by some electronic means be it a phone or telegram to the responsible Bureau office. It is a term which is historically linked to analogue non automatic data transmission.

Basic Climatological Station Metadata

Current status

Metadata compiled: 03 NOV 2014

Station: SYDNEY AIRPORT AMO

Bureau of Meteorology station number: 066037
Bureau of Meteorology district name: Metropolitan (E)
State: NSW

World Meteorological Organization number: 94767
Identification: YSSY

Network Classification: CLIMAT Stations, Regional Basic Synoptic Network
Station purpose: Synoptic, Upper Air, Aeronautical
Automatic Weather Station: Almos

Current Station Location				
Latitude	**Decimal**	-33.9465	**Hour Min Sec**	33°56'47"S
Longitude	**Decimal**	151.1731	**Hour Min Sec**	151°10'23"E
Station Height	6 m	**Barometer Height**	5 m	
Method of station geographic positioning			SURVEY	

Year opened: 1929
Status: Open

Station summary

No summary for this site has been written as yet.

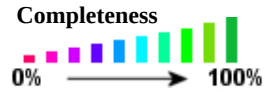
Historical metadata for this site has not been quality controlled for accuracy and completeness. Data other than current station information, particularly earlier than 1998, should be considered accordingly. Information may not be complete, as backfilling of historical data is incomplete.

Basic Climatological Station Metadata
Current status

Station:	SYDNEY AIRPORT AMO			**Location:**	SYDNEY AIRPORT AMO			**State:**	NSW
Bureau No.:	066037	**WMO No.:**	94767	**Aviation ID:**	YSSY	**Opened:**	01 Jan 1929	**Current Status:**	Still open
Latitude:	-33.9465	**Longitude:**	151.1731	**Elevation:**	6 m	**Barometer Elev:**	5 m	**Metadata compiled:**	03 NOV 2014

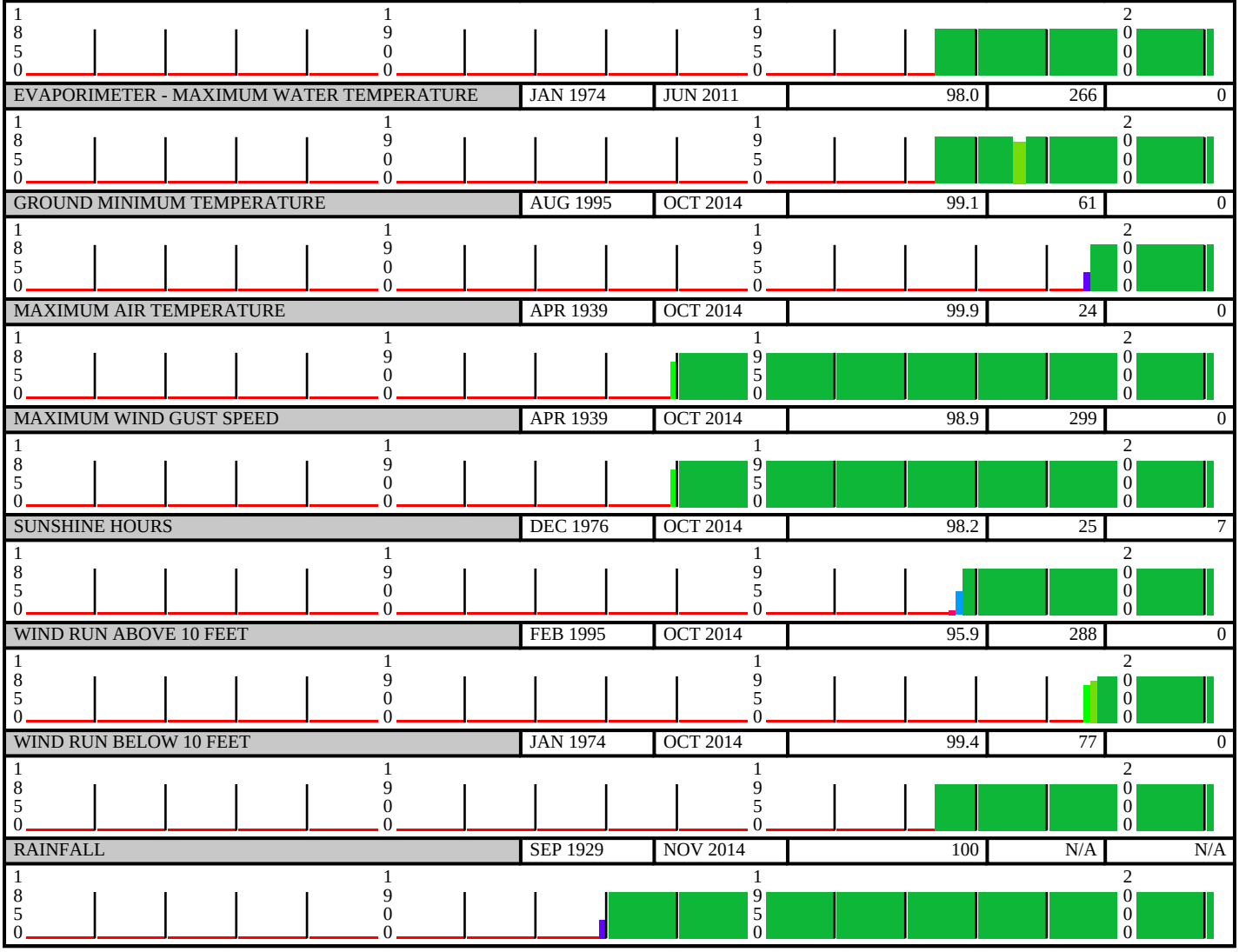
Observation summary

The table below indicates the approximate completeness of the record for individual element types within the Australian Data Archive for Meteorology. For elements not listed see the note below.



DAILY DATA HOLDINGS

OBSERVATION TYPE	FIRST MONTH	LAST MONTH	COMPLETENESS (% estimate)	SINGLE DAYS MISSED	FULL MONTHS MISSED
EVAPORATION	JAN 1974	OCT 2014	99.3	102	0
EVAPORIMETER - MAXIMUM WATER TEMPERATURE	JAN 1974	JUN 2011	98.0	266	0
GROUND MINIMUM TEMPERATURE	AUG 1995	OCT 2014	99.1	61	0
MAXIMUM AIR TEMPERATURE	APR 1939	OCT 2014	99.9	24	0
MAXIMUM WIND GUST SPEED	APR 1939	OCT 2014	98.9	299	0
SUNSHINE HOURS	DEC 1976	OCT 2014	98.2	25	7
WIND RUN ABOVE 10 FEET	FEB 1995	OCT 2014	95.9	288	0
WIND RUN BELOW 10 FEET	JAN 1974	OCT 2014	99.4	77	0
RAINFALL	SEP 1929	NOV 2014	100	N/A	N/A



Historical metadata for this site has not been quality controlled for accuracy and completeness. Data other than current station information, particularly earlier than 1998, should be considered accordingly. Information may not be complete, as backfilling of historical data is incomplete.

Basic Climatological Station Metadata

Current status

Station:	SYDNEY AIRPORT AMO			**Location:**	SYDNEY AIRPORT AMO			**State:**	NSW
Bureau No.:	066037	**WMO No.:**	94767	**Aviation ID:**	YSSY	**Opened:**	01 Jan 1929	**Current Status:**	Still open
Latitude:	-33.9465	**Longitude:**	151.1731	**Elevation:**	6 m	**Barometer Elev:**	5 m	**Metadata compiled:**	03 NOV 2014

HOURLY DATA HOLDINGS - from 1 to 24 observations per day

OBSERVATION TYPE	FIRST MONTH	LAST MONTH	COMPLETENESS (% estimate)	FREQUENCY average daily	SINGLE DAYS MISSED	FULL MONTHS MISSED
AIR TEMPERATURE	APR 1939	OCT 2014	99.0	8.1	53	0
						
DEW POINT	MAY 1939	OCT 2014	84.6	8.4	6	136
						
MEAN SEA LEVEL PRESSURE	JUL 1951	OCT 2014	99.8	8.4	0	0
						
SOIL TEMPERATURE - 10cm	JUL 2001	OCT 2014	98.9	2.0	6	0
						
TOTAL CLOUD AMOUNT	APR 1939	OCT 2014	99.0	7.7	54	0
						
WIND SPEED	APR 1939	OCT 2014	99.0	8.1	55	0
						
UPPER AIR TEMPERATURE	JUL 1976	OCT 2014	90.1	2.0	233	1
						
UPPER AIR WIND SPEED	JAN 1946	OCT 2014	86.8	4.0	1098	17
						

Historical metadata for this site has not been quality controlled for accuracy and completeness. Data other than current station information, particularly earlier than 1998, should be considered accordingly. Information may not be complete, as backfilling of historical data is incomplete.

Australian Government
Bureau of Meteorology

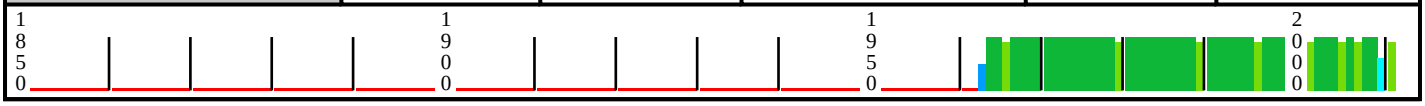
Basic Climatological Station Metadata

Current status

Station:	SYDNEY AIRPORT AMO			**Location:**	SYDNEY AIRPORT AMO			**State:**	NSW
Bureau No.:	066037	**WMO No.:**	94767	**Aviation ID:**	YSSY	**Opened:**	01 Jan 1929	**Current Status:**	Still open
Latitude:	-33.9465	**Longitude:**	151.1731	**Elevation:**	6 m	**Barometer Elev:**	5 m	**Metadata compiled:**	03 NOV 2014

RAINFALL INTENSITY DATA HOLDINGS

OBSERVATION TYPE	FIRST MONTH	LAST MONTH	COMPLETENESS (% estimate)	SINGLE DAYS MISSED	FULL MONTHS MISSED
RAINFALL INTENSITY	JUL 1962	JUN 2013	91.0	907	25



ONE-MINUTE DATA HOLDINGS

OBSERVATION TYPE	FIRST MONTH	LAST MONTH	COMPLETENESS (% estimate)	FREQUENCY average daily	SINGLE DAYS MISSED	FULL MONTHS MISSED
ALL ELEMENTS	DEC 1998	OCT 2014	97.0	1397.4	N/A	0

HALF-HOURLY DATA HOLDINGS

OBSERVATION TYPE	FIRST MONTH	LAST MONTH	COMPLETENESS (% estimate)	FREQUENCY average daily	SINGLE DAYS MISSED	FULL MONTHS MISSED
ALL ELEMENTS	OCT 1948	OCT 2014	100.7	48.3	N/A	244

UPPER-AIR EDT DATA HOLDINGS

OBSERVATION TYPE	FIRST MONTH	LAST MONTH	COMPLETENESS (% estimate)	FREQUENCY average daily	SINGLE DAYS MISSED	FULL MONTHS MISSED
Wind only flights	Jul 1998	Sep 2014	N/A	3.0	141	2
Wind, temperature and pressure flights	May 1991	Nov 2014	N/A	1.9	140	1

Holdings calculated up to 01 Nov 2014

The % complete figure is the completeness of observations averaged over all months of record, for the given station and observation type, taking gaps into account. For hourly holdings, the completeness is relative to the maximum number of daily observations for the site each month, and is therefore an estimate. For daily holdings, the completeness figure shown is exact.

The single days missed figure is the total number of days for which no observation was received, not including full missed months. The full months missed figure is the total of full month gaps over the period of record. Where an element is not included assumptions can generally be made about availability, and the list to use has been suggested below.

Unlisted element	Listed element to use
Minimum air temperature	Maximum air temperature
Wet bulb temperature	Dew point
Soil temperature at 20, 50 & 100cm	10cm soil temperature
Relative humidity	Dew point
Minimum temp. of water in evaporimeter	Evaporimeter - max water temp
Visual observations eg. weather, visibility	Total cloud amount
Sea related observations	Sea state

Notes on these metadata

The following notes have been compiled to assist with interpreting the metadata provided in this document. These notes are subject to change as the network evolves. Changes in station-specific metadata occur more frequently, both as recent changes are recorded and historical information is transferred from paper file to electronic database.

Reliability of the metadata

The Commonwealth Bureau of Meteorology maintains information on more than 20,000 stations which have operated since observations began in the mid 1800s. The amount of information available for each of these sites and its associated uncertainty are influenced by a number of factors including the type and purpose of the station and the time over which it operated.

Early information about stations was held only on paper file. In 1998 a corporate electronic database was established to help maintain information about the network and its components. The number of parameters recorded about a station is now much greater than before this database was established. The national database has also helped improve consistency in the metadata through the implementation of predefined fields. As a result, and through the refinement of operating procedures, station metadata recorded since 1998 are of a higher overall standard than previously, although occasional omissions and errors are still possible.

The Bureau is part way through a task of entering historical information held on paper file into the corporate database. **Until this process is completed there will remain large gaps in the information contained in these metadata documents and considerable caution should be used when deriving conclusions from the metadata.** As an example, two consecutive entries about a rain gauge dated 50 years apart may appear in the equipment metadata. This may either mean that nothing happened to that instrument over the 50 years, or that information for the intervening period has yet to be entered into the database. Similarly, if no information was available about instruments at a site when it was first established, fields which were required to have a value present may have used the earliest information available as a best-guess estimate. Sometimes this was the metadata current when the database was established in 1998. In some instances there may be gaps in metadata relevant to the post 1998 period.

For the above reasons it is recommended that all metadata prior to 1998 be considered as indicative only, and used with caution, unless it has been quality controlled. The Bureau of Meteorology should be contacted if further information or confirmation of the data is required. Depending on the nature of the inquiry there may be a fee associated with this request. Contact details are provided in the telephone book for each capital city or the Bureau's web site at:
http://www.bom.gov.au

The following pages contain explanatory notes for selected terms found in this document.

Station Number

The Bureau of Meteorology station number uniquely specifies a station and is not intended to change over time time, although on very rare occasions a station number may change or be deleted from the record (usually to correct an error). Generally a new station number is established if an existing station changes in a way that would affect the climate data record for that site (measured in terms of air temperature and precipitation). Significant station moves are an example of this.

Some stations also possess a World Meteorological Organization (WMO) station number. The WMO number is different to the Bureau of Meteorology number. It also uniquely specifies a station at any given time but can be reassigned to another station if the new station takes priority in the global reporting network. Only selected stations will have a WMO number. Significant stations may maintain their WMO number for many decades.

Notes on these metadata

Network Classification

SUPPORTING the BASIC CLIMATE SERVICE
Global Climate Observing System (GCOS)
GCOS Upper Air Network (GUAN)
GCOS Surface Network (GSN)
National Climate Network {not yet assigned}
Reference Climate Stations (RCS)
Regional Basic Climatological Network (RBCN)
CLIMAT Stations (CLC)
CLIMAT TEMP Stations (CLT)
SUPPORTING the NATIONAL WEATHER WATCH SYSTEM
WMO Global Observing System (GOS)
GOS Upper Air Network
GOS Satellite Network
Global Atmospheric Watch
Background Atmospheric Pollution Monitoring Network (BAPMON)
Basic Ozone Network
Basic Solar and Terrestrial Radiation Network
Regional Basic Synoptic Network (RBSN)
WMO Global Oceanic Observing System (GOOS)
SUPPORTING the BASIC WEATHER SERVICE (BWS)
BWS Land Network
Significant Land Locations
Capital City Mesonets
National Benchmark Network for Agrometeorology (NBNA)
BWS Marine Network
Significant Coastal Loactions
Open Ocean Network
BWS Upper Air Network
Major Significant Locations
BWS Remote Sensing Network
Weather Watch Radar Network
Fire Weather Wind Mesonets
High Resolution Satellite
SUPPORTING the BASIC HYDROLOGICAL SERVICE
Regional Flood Warning Network
Water Resources Assessment Network
Global Hydrological Network
Global Terrestrial Observing System (GTOS)
World Hydrological Cycle Observing System (WHYCOS)
National Hydrological Network

Networks of stations are defined for a variety of purposes (as defined in above table).

Notes on these metadata

Network Classification Continued....

Stations may be included in several different networks, which may change over time. The table on the previous page lists current network classifications related to the scientific purpose of the network. Some of these networks - the GCOS network for instance - are components of a global network. Entries in the database for some networks may not be complete, thus not properly representing the status of the network. The composition of the network will usually change over time. While several of the networks have international significance, other network classifications have been developed to aid operational management.

Station Purpose

The station purpose can be classified according to the observation program listed below. Parameters in brackets list some of the various different configurations which occur.

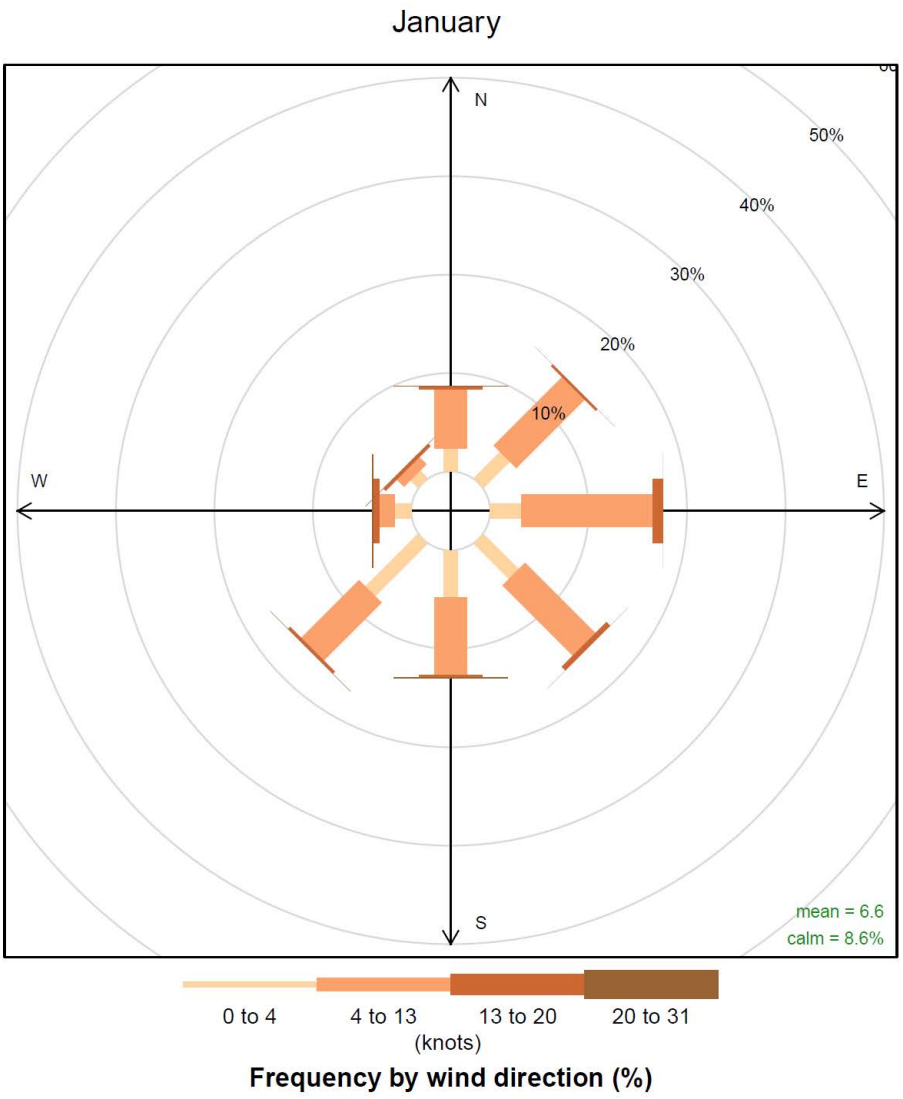
- Synoptic [Seasonal, River Height, Climatological, Telegraphic Rain, Aeronautical, Upper Air]
- Climatological [Seasonal, Telegraphic Rain]
- Aeronautical
- Rainfall [River Height]
- River Height
- Telegraphic Rain [Non-Telegraphic River Height, Telegraphic River Height]
- Non-Telegraphic Rain [Telegraphic River Height]
- Evaporation [Rainfall, River Height, Telegraphic River Height, Non-Telegraphic River Height, Telegraphic Rain, Non-Telegraphic Rain]
- Pluviograph [Rainfall, Telegraphic Rain, Non-Telegraphic Rain, River Height, Telegraphic River Height, Non-Telegraphic River Height]
- Radiation
- Lightning Flash Counter
- Public Information
- Local Conditions
- Radar Site
- Unclassified
- No Routine Observations

Note: Telegraphic observations are those which are sent by some electronic means be it a phone or telegram to the responsible Bureau office. It is a term which is historically linked to analogue non automatic data transmission.

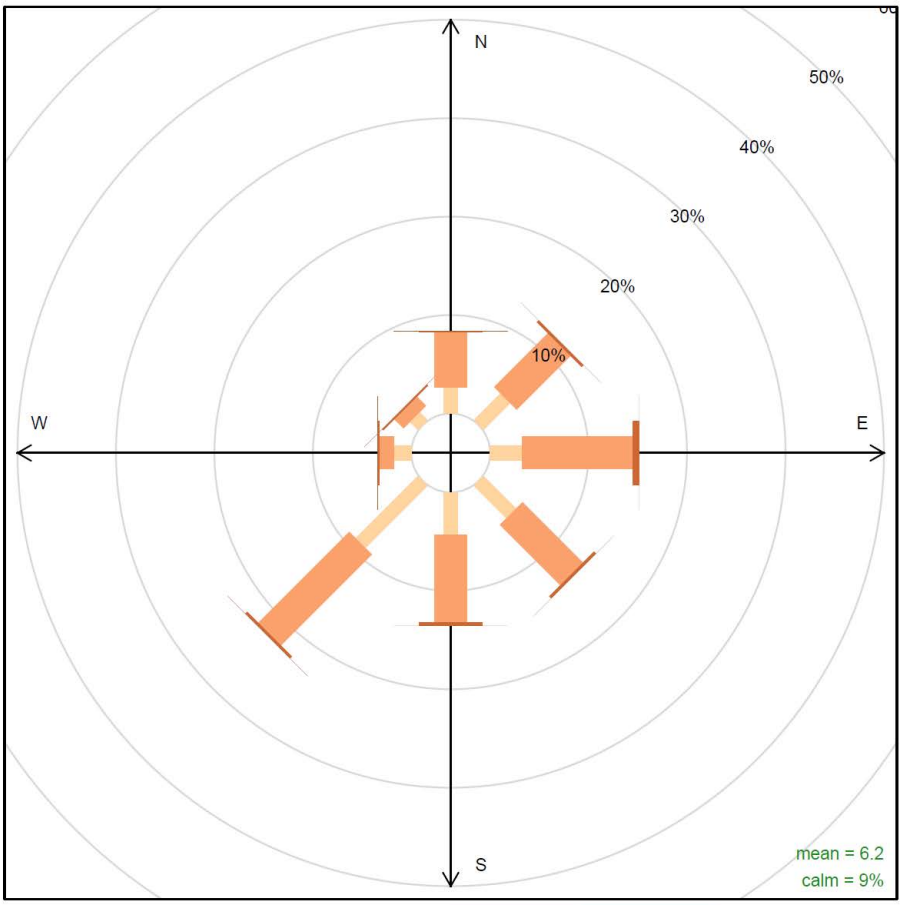
Appendix B: Monthly wind analyses

Badgerys Creek wind analysis

Wind roses

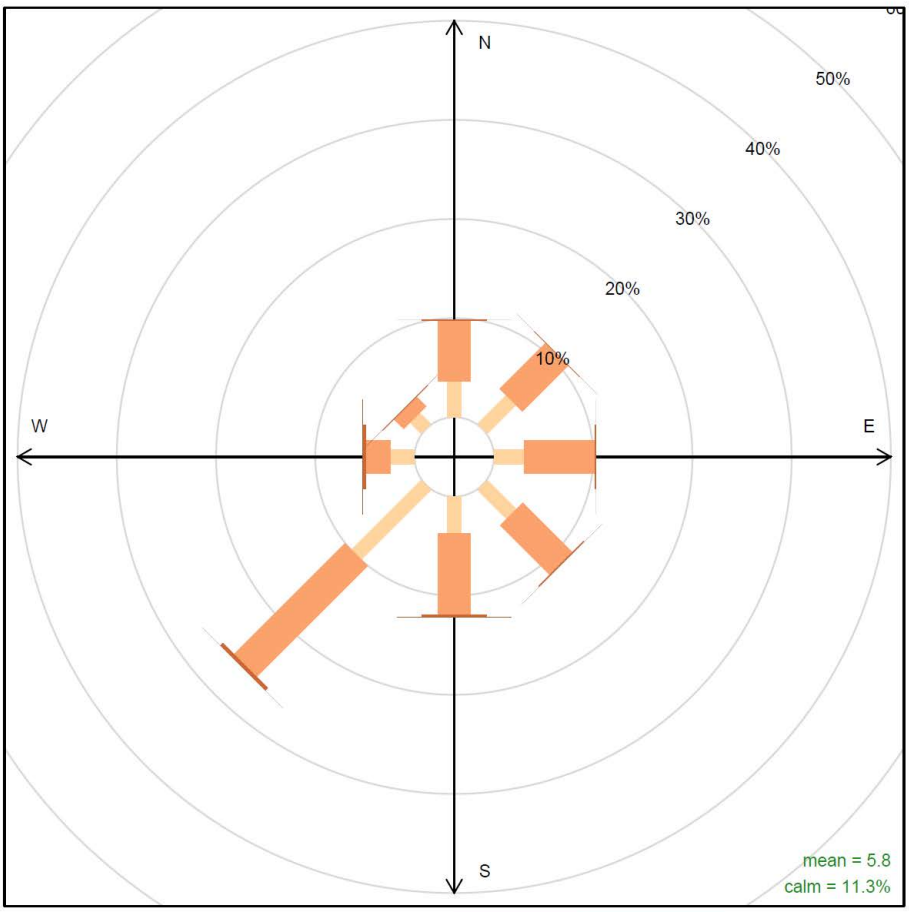


February



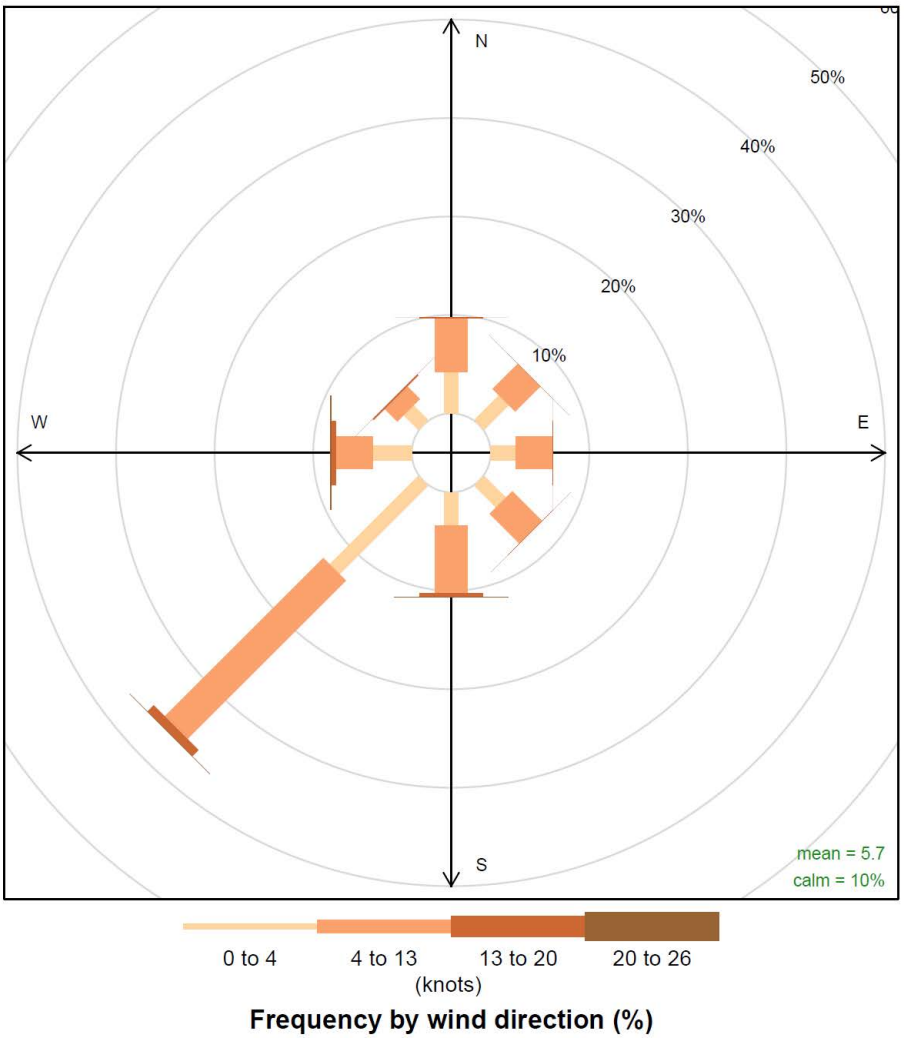
Frequency by wind direction (%)

March



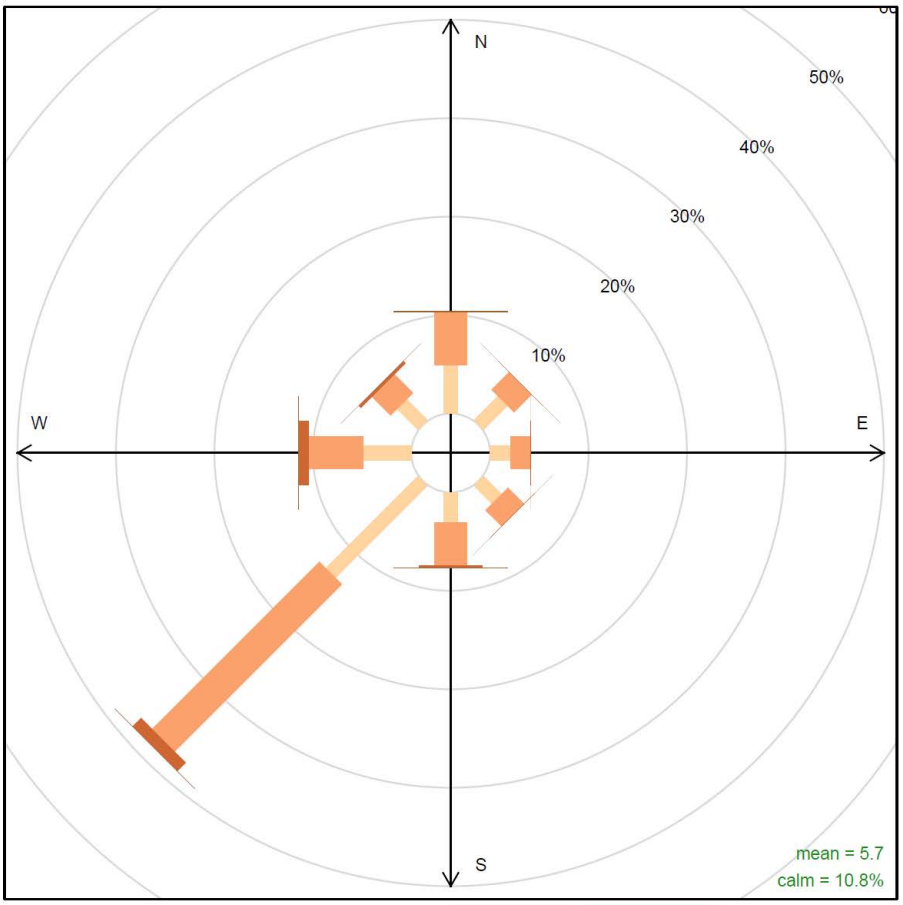
Frequency by wind direction (%)

April



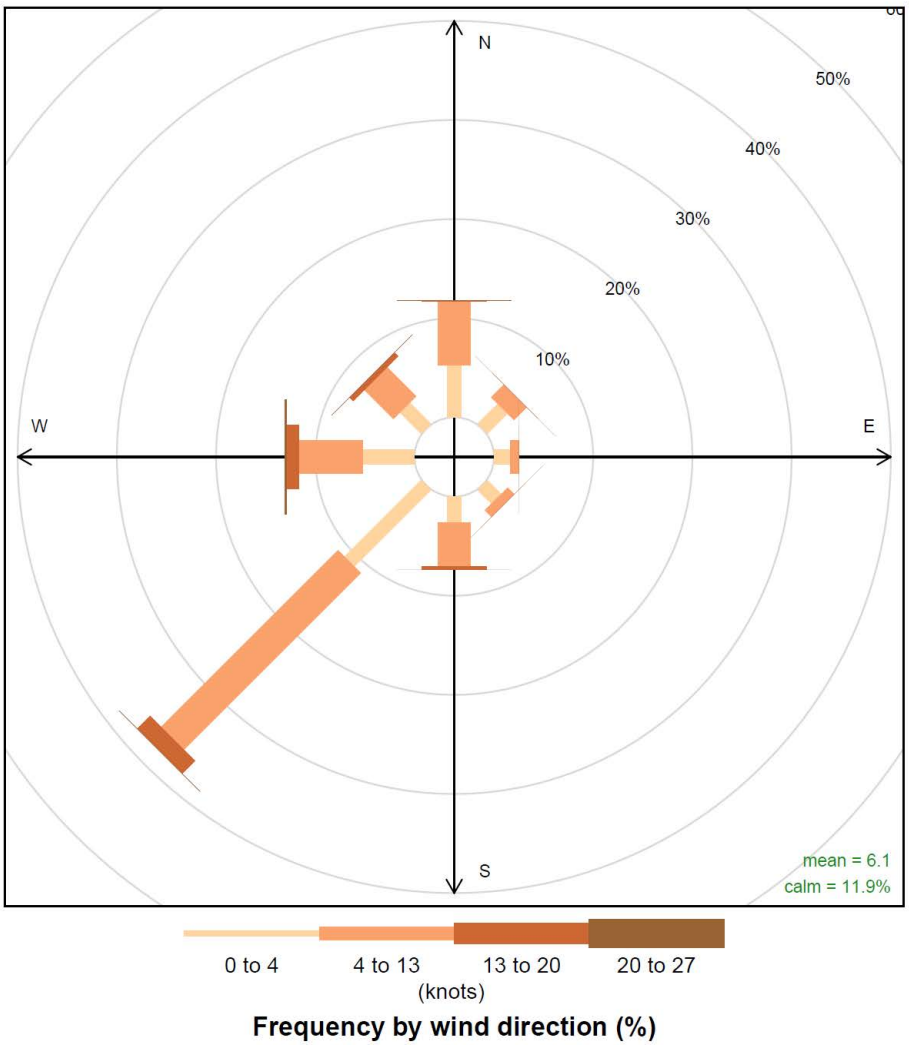
Frequency by wind direction (%)

May



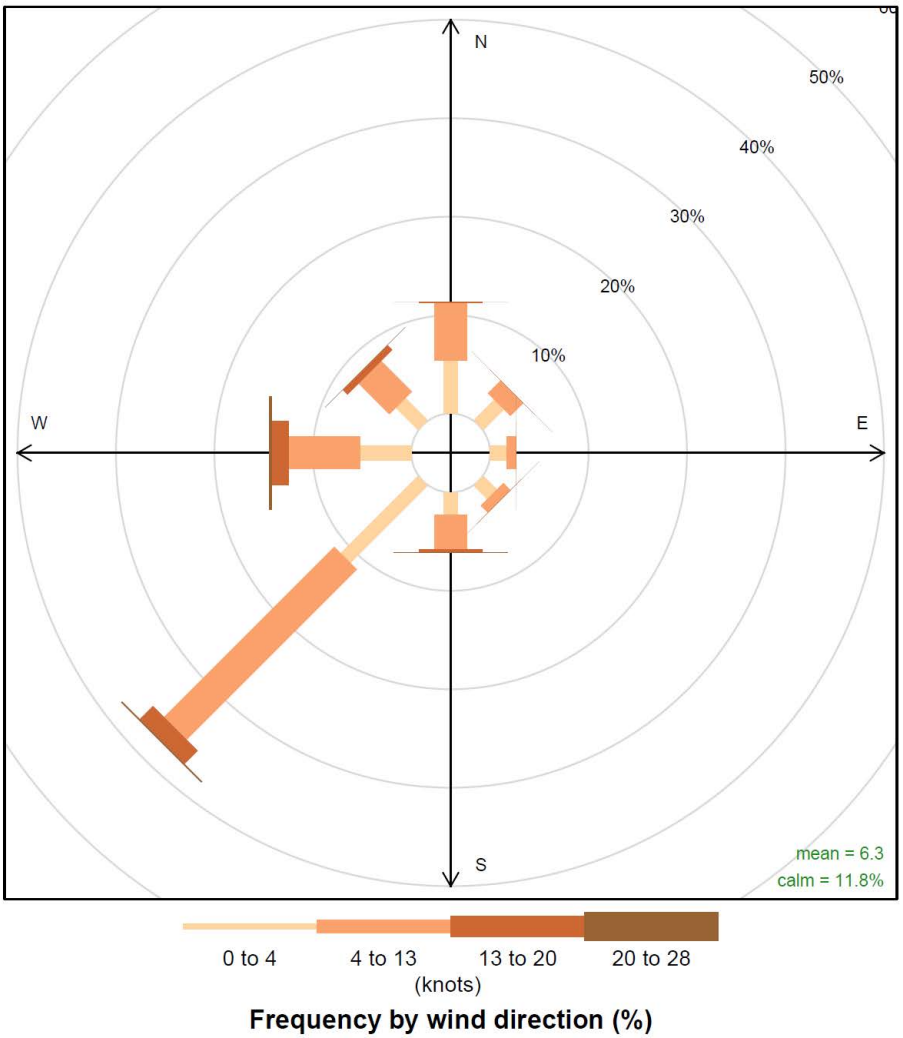
Frequency by wind direction (%)

June



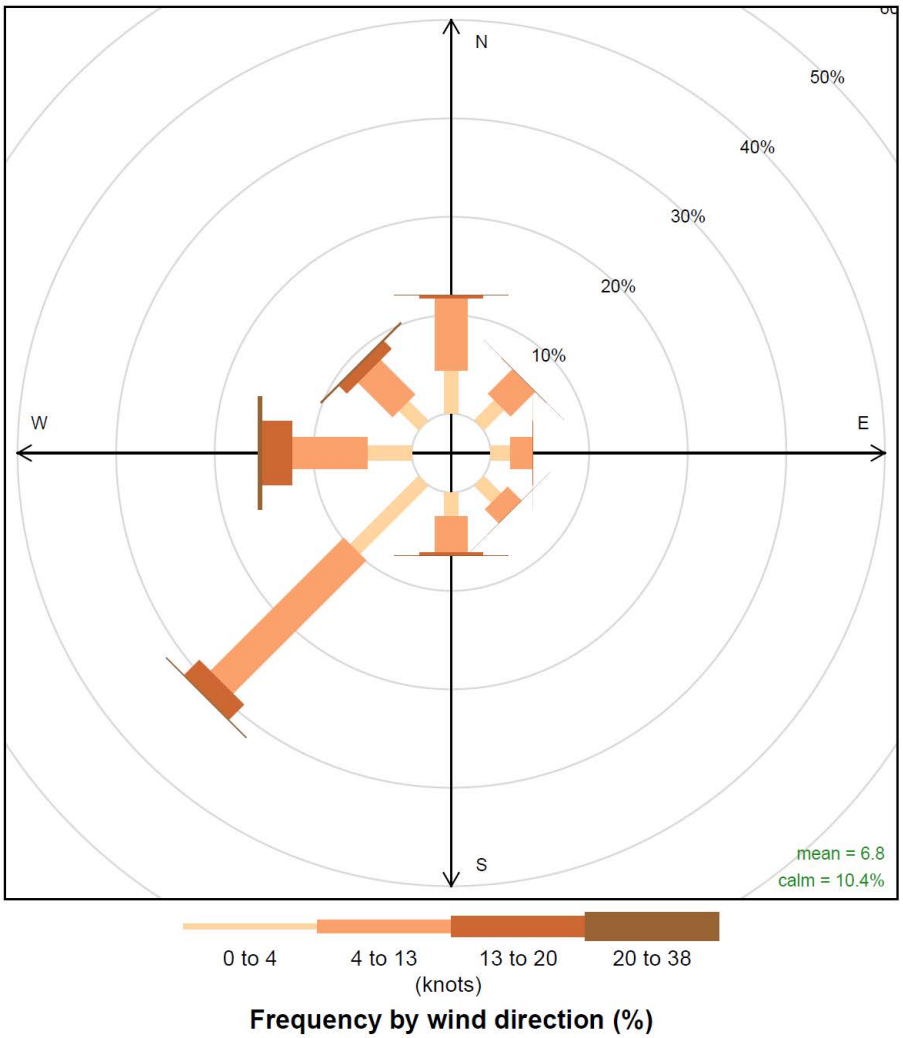
Frequency by wind direction (%)

July



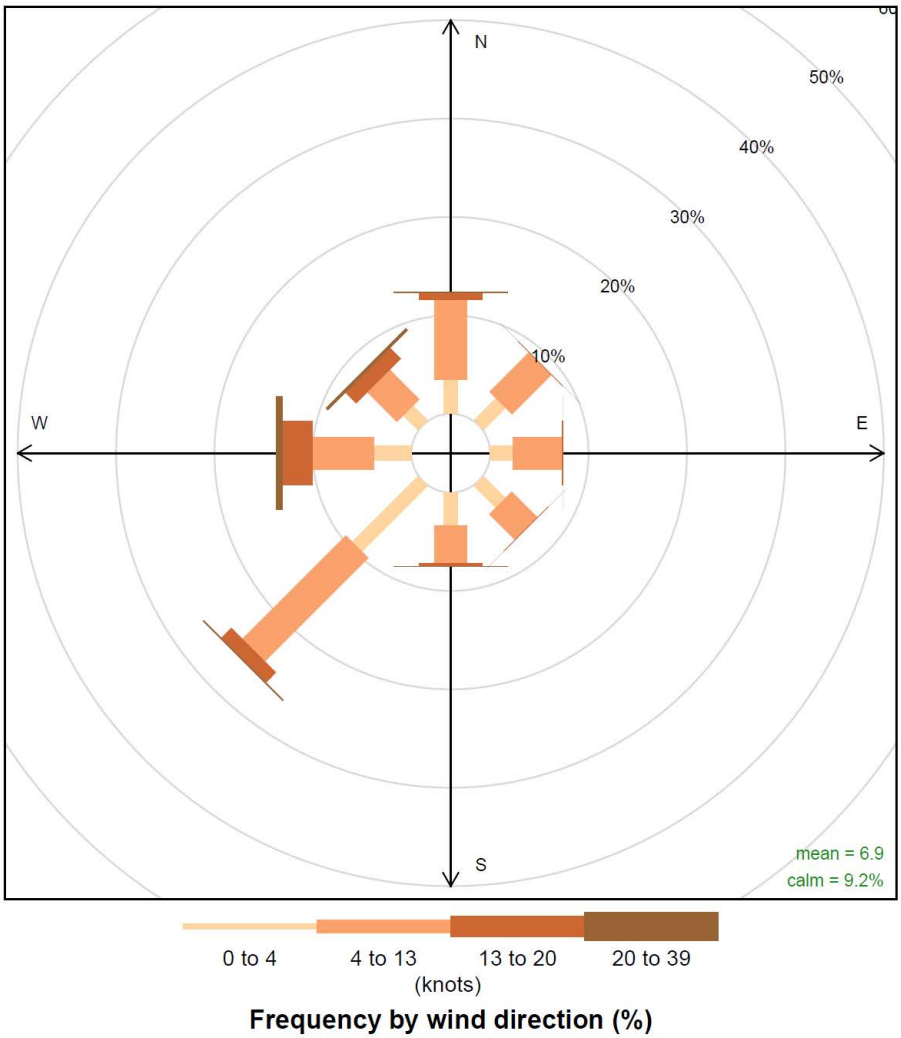
Frequency by wind direction (%)

August



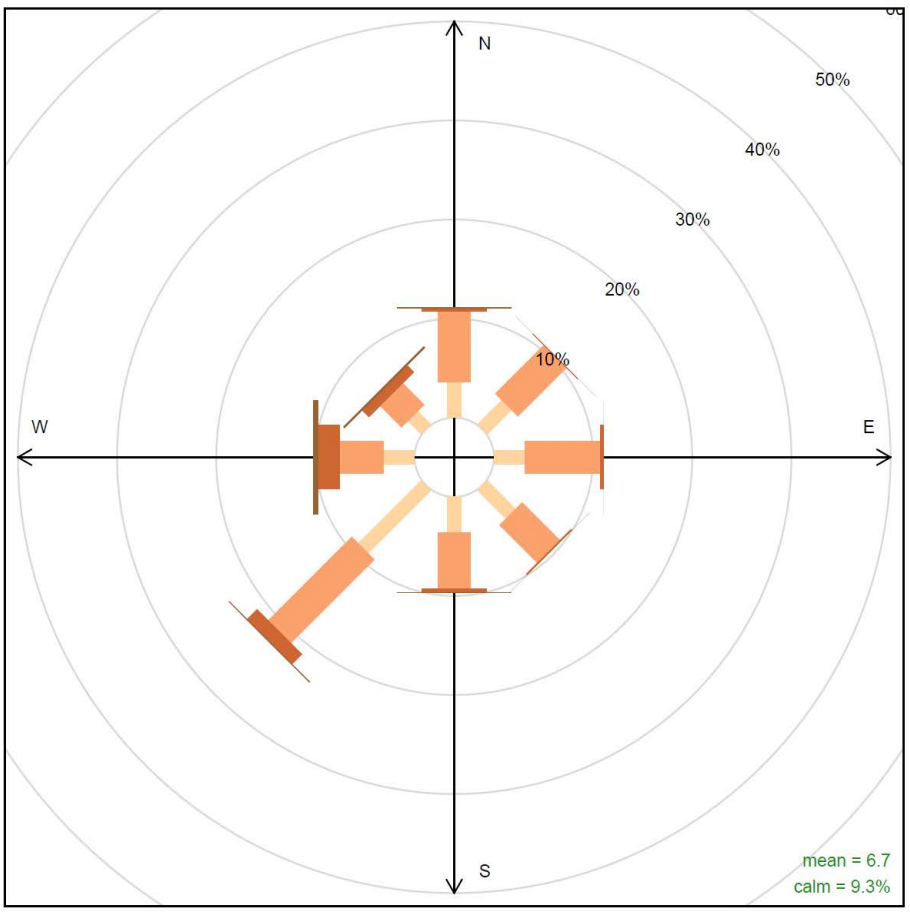
Frequency by wind direction (%)

September



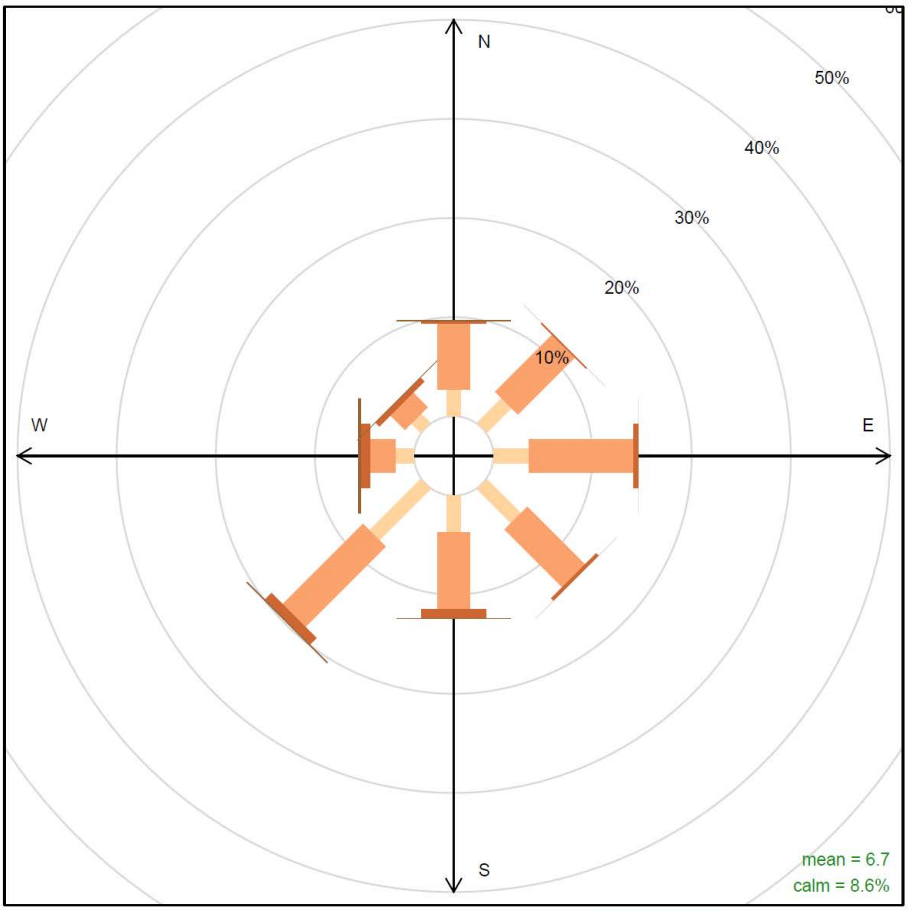
Frequency by wind direction (%)

October



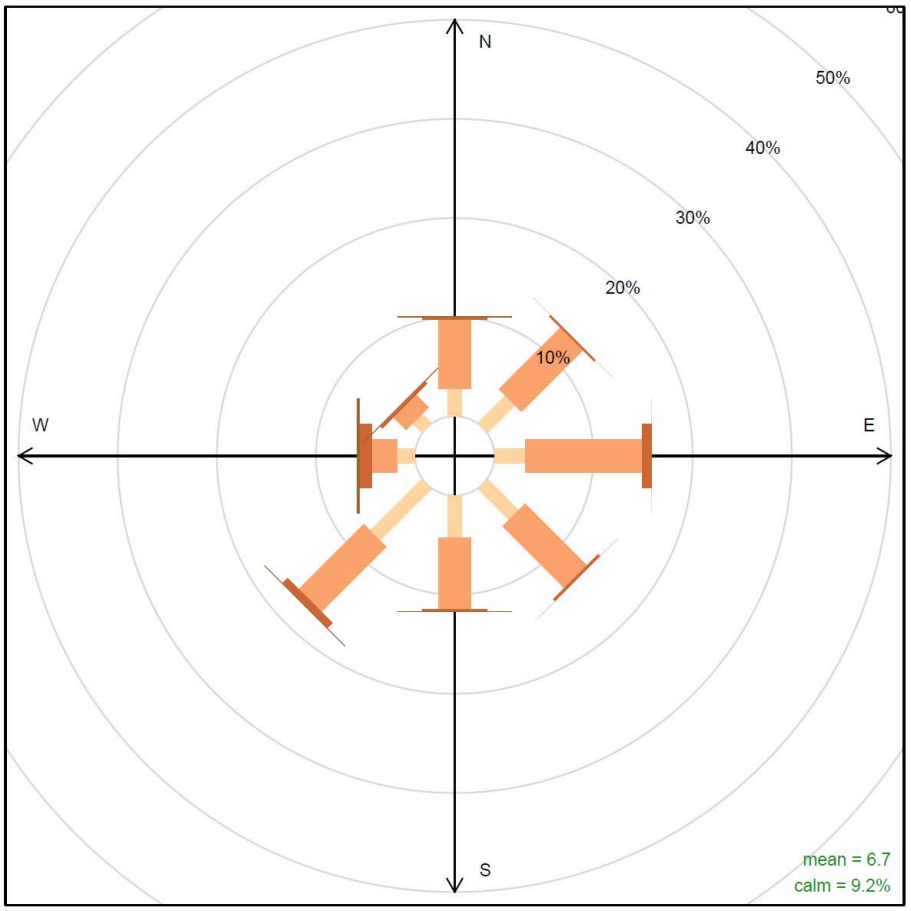
Frequency by wind direction (%)

November



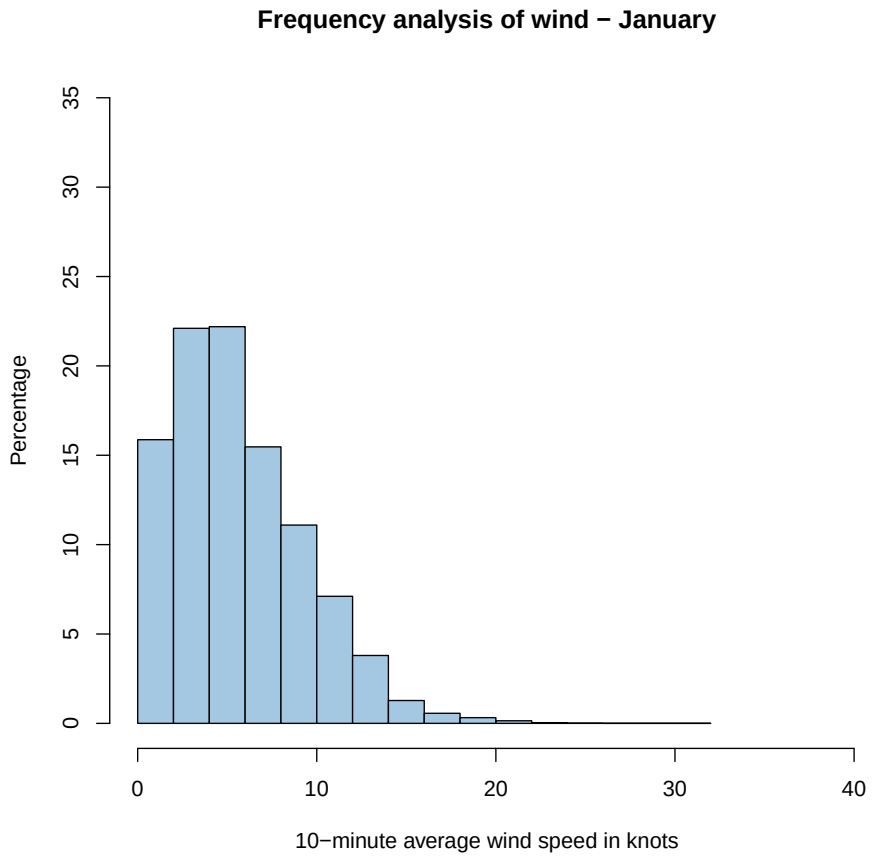
Frequency by wind direction (%)

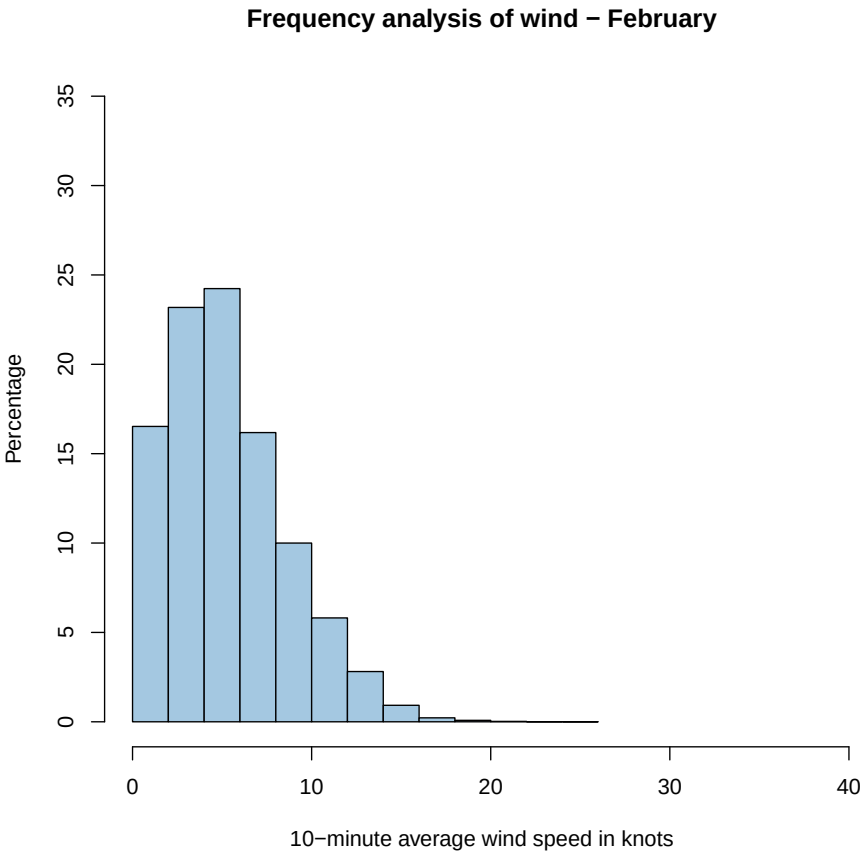
December

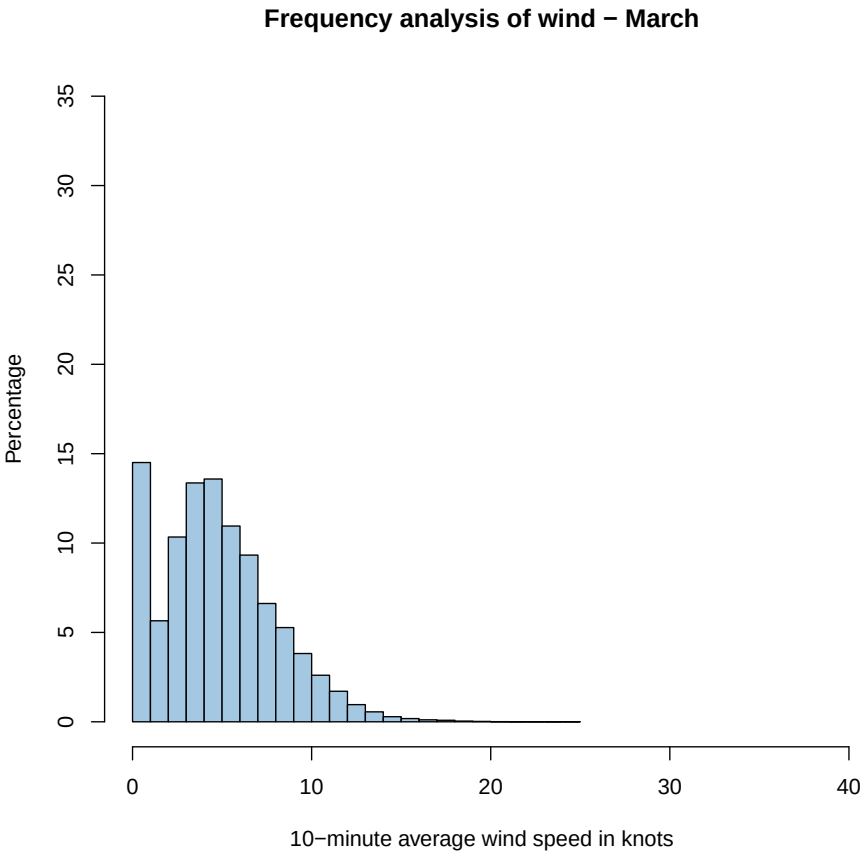


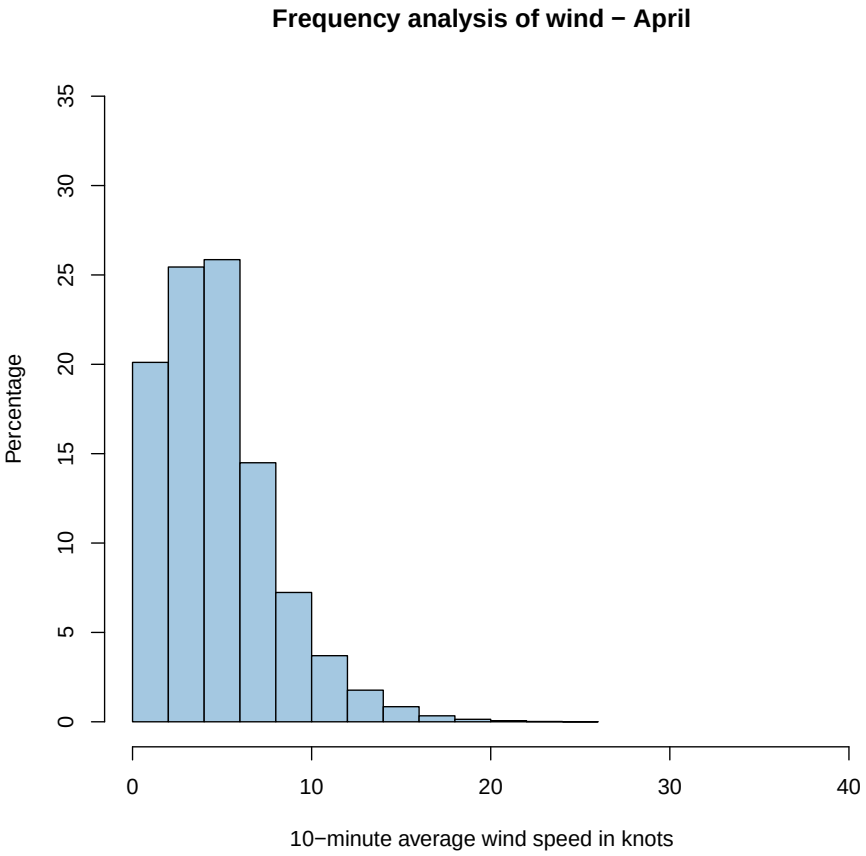
Frequency by wind direction (%)

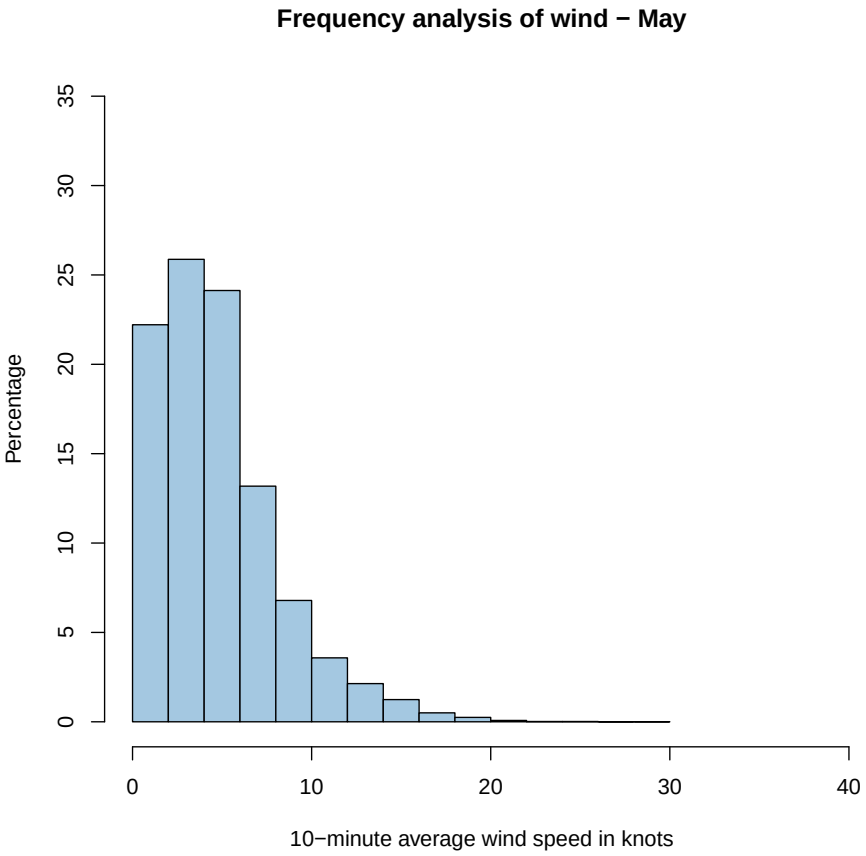
10-minute average wind speed histograms

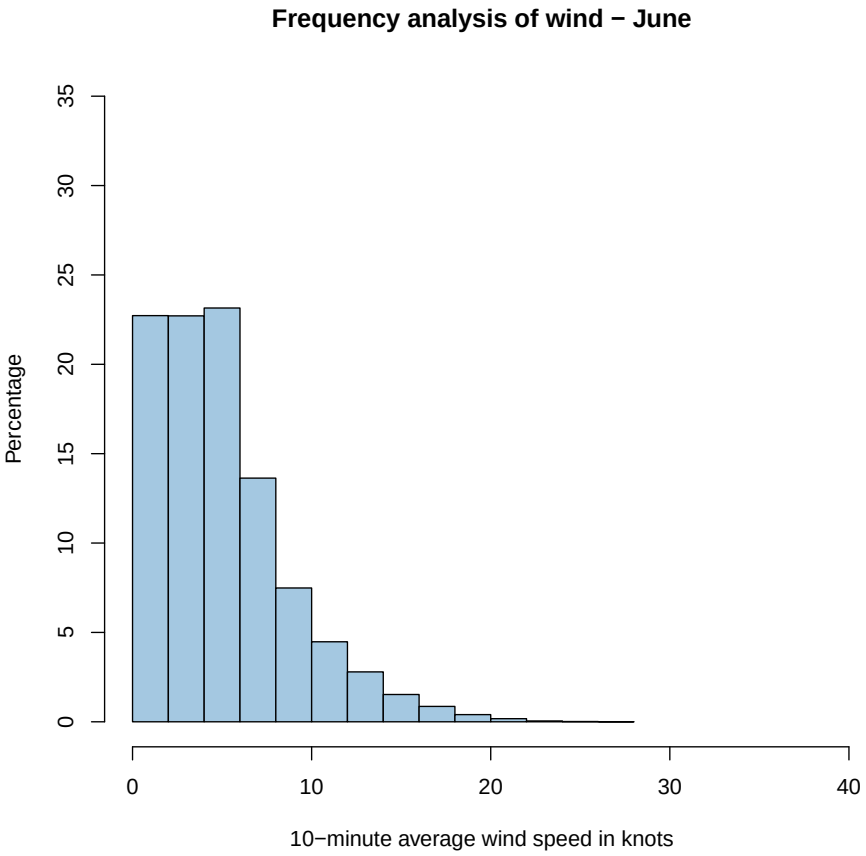


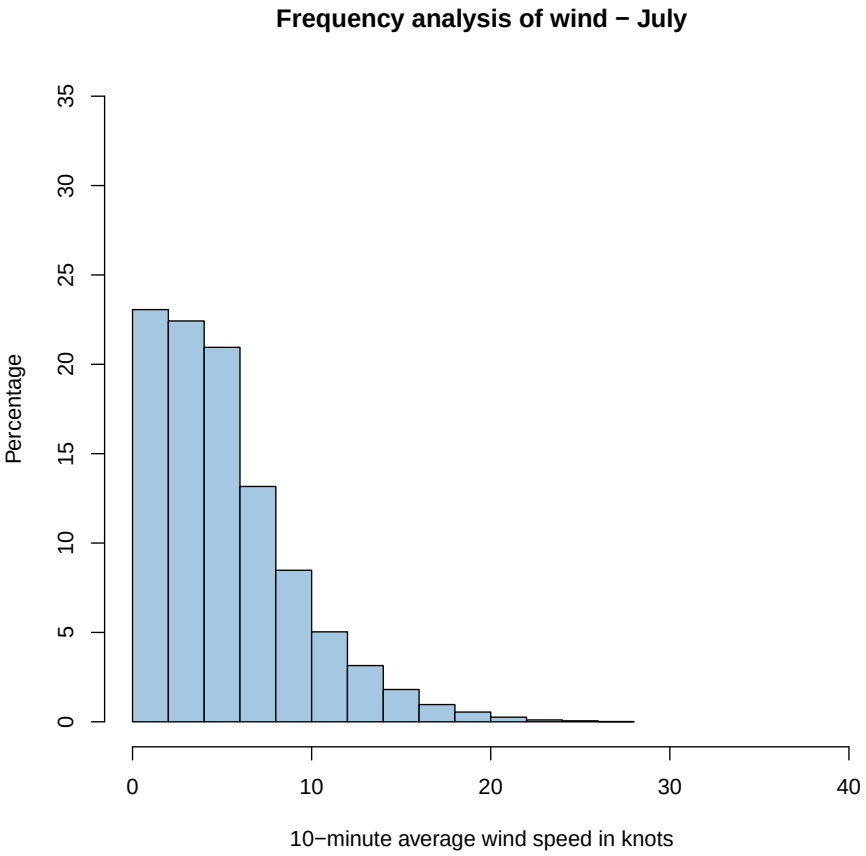

Frequency analysis of wind − February
Percentage
0
5
10
15
20
25
30
35
0
10
20
30
40
10−minute average wind speed in knots

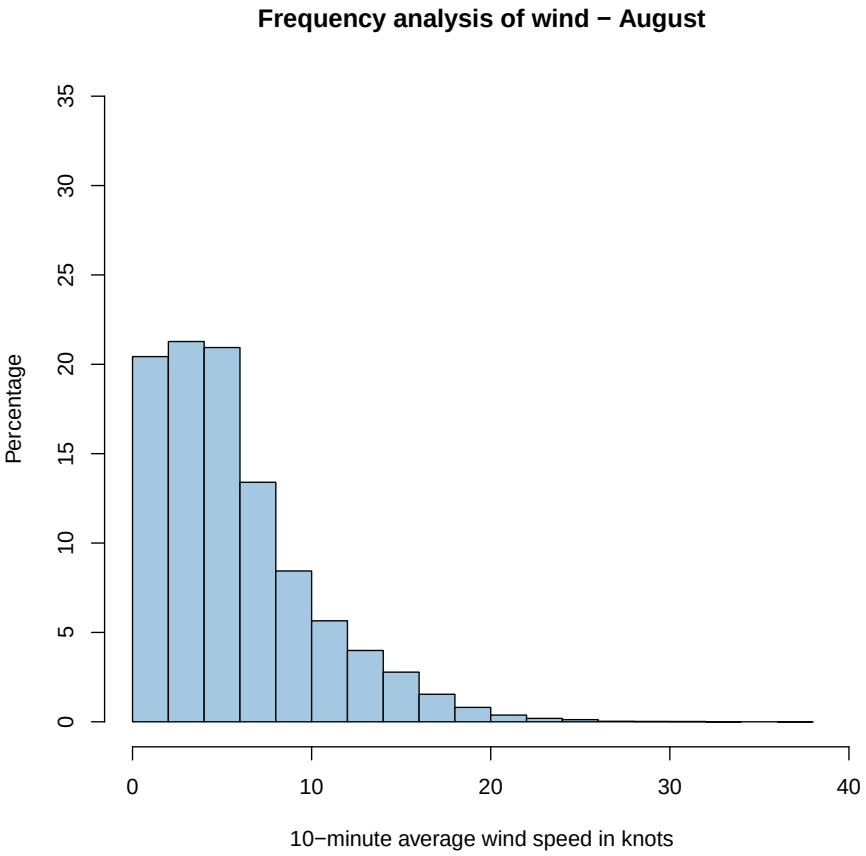

Frequency analysis of wind − March
Percentage
0
5
10
15
20
25
30
35
0
10
20
30
40
10−minute average wind speed in knots

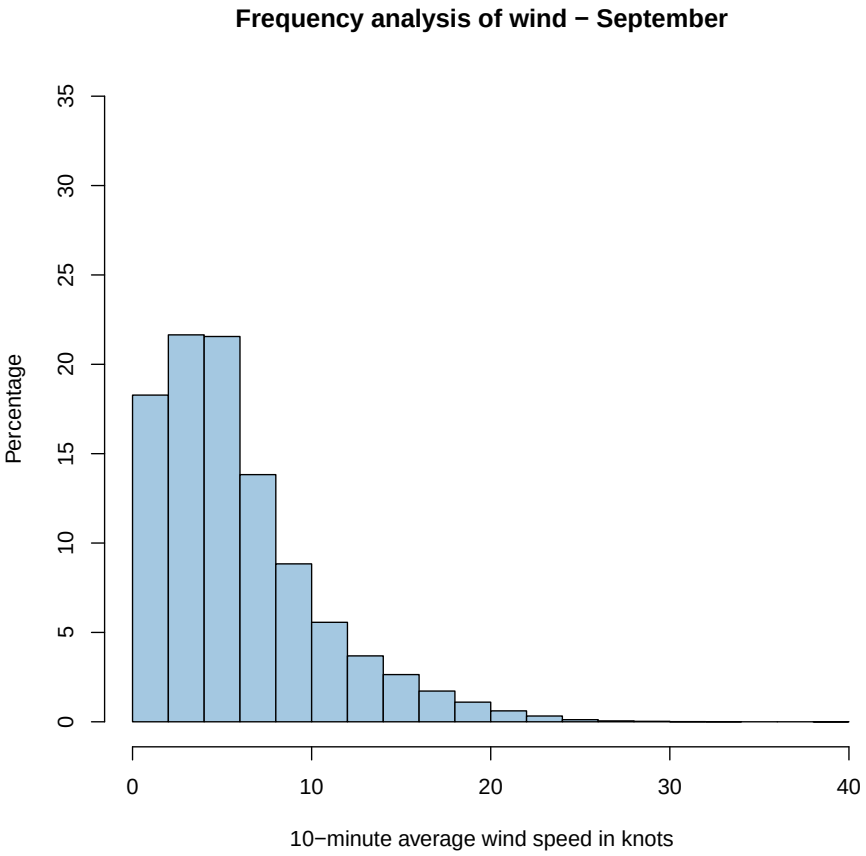

Frequency analysis of wind − April
Percentage
0
5
10
15
20
25
30
35
0
10
20
30
40
10−minute average wind speed in knots

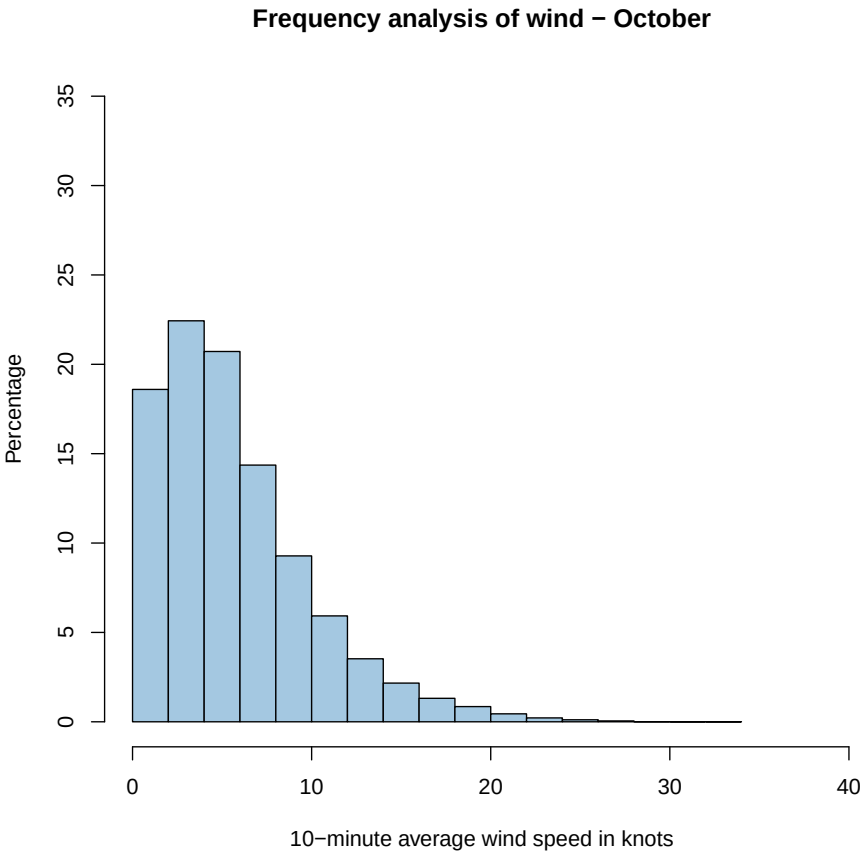

Frequency analysis of wind − May
Percentage
0
5
10
15
20
25
30
35
0
10
20
30
40
10−minute average wind speed in knots

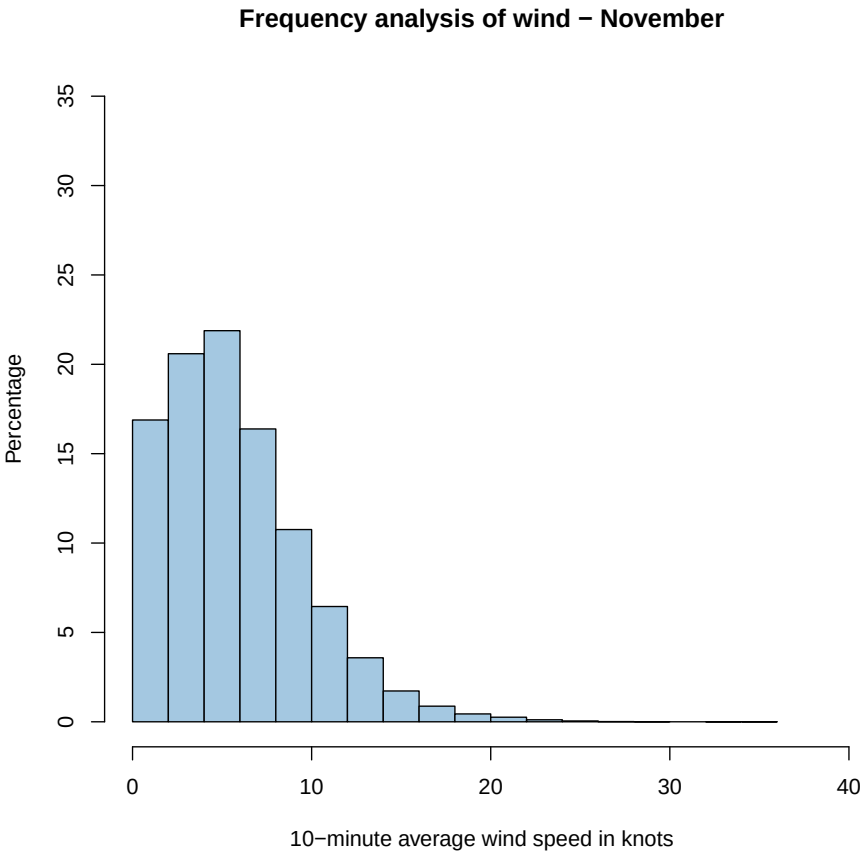

Frequency analysis of wind − June
Percentage
0
5
10
15
20
25
30
35
0
10
20
30
40
10−minute average wind speed in knots

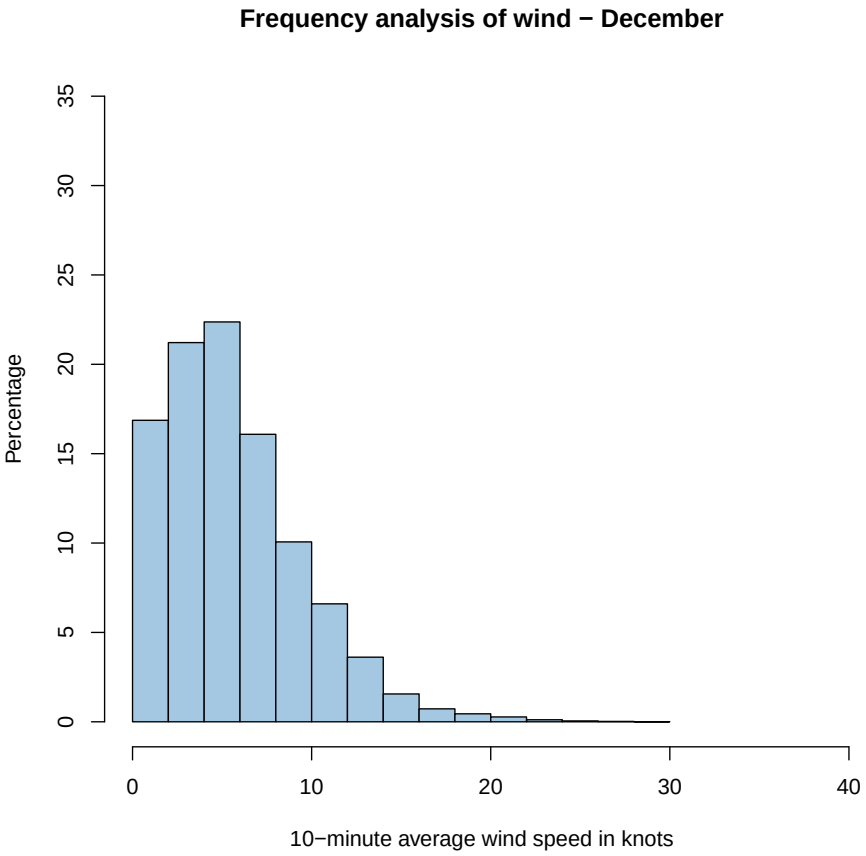

Frequency analysis of wind − July
Percentage
0
5
10
15
20
25
30
35
0
10
20
30
40
10−minute average wind speed in knots

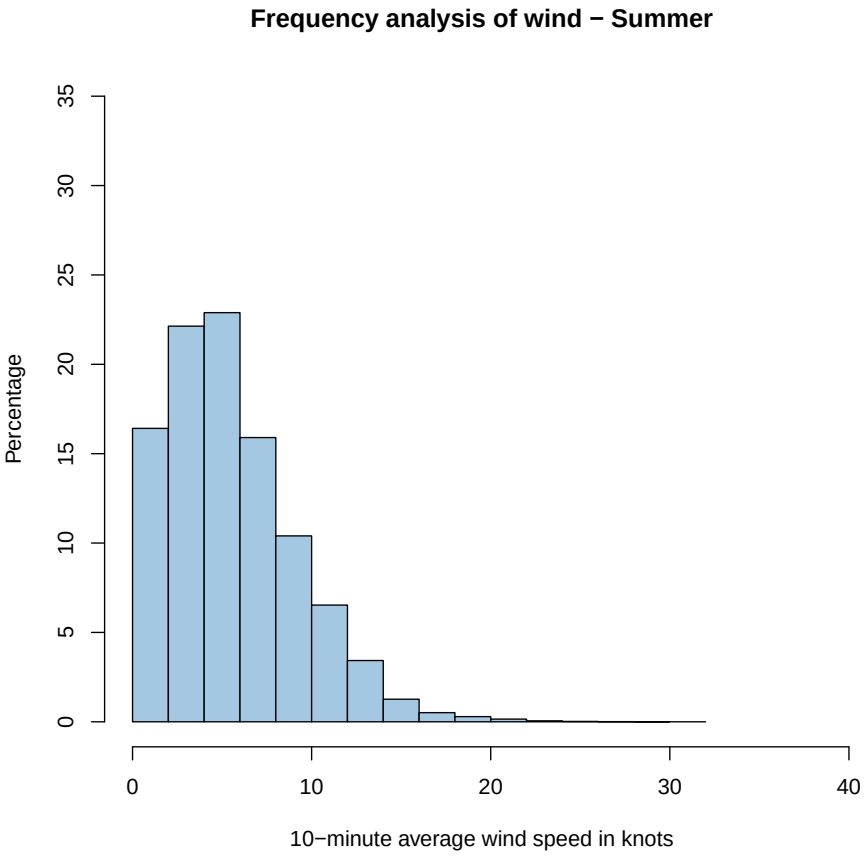

Frequency analysis of wind − August
Percentage
0
5
10
15
20
25
30
35
0
10
20
30
40
10−minute average wind speed in knots

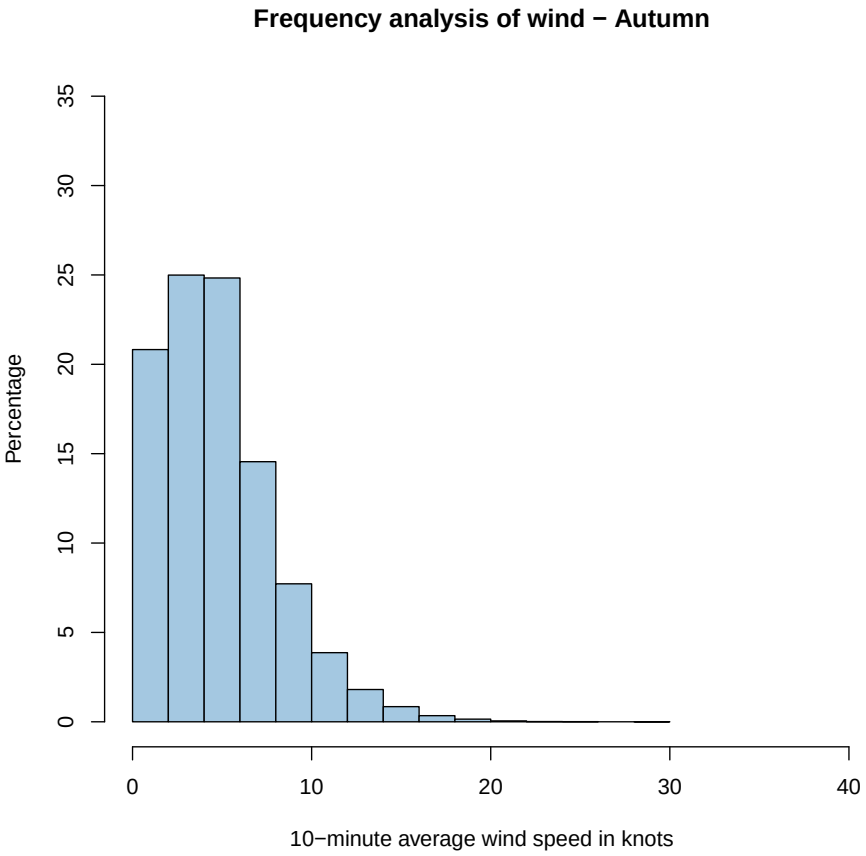

Frequency analysis of wind − September
Percentage
0
5
10
15
20
25
30
35
0
10
20
30
40
10−minute average wind speed in knots

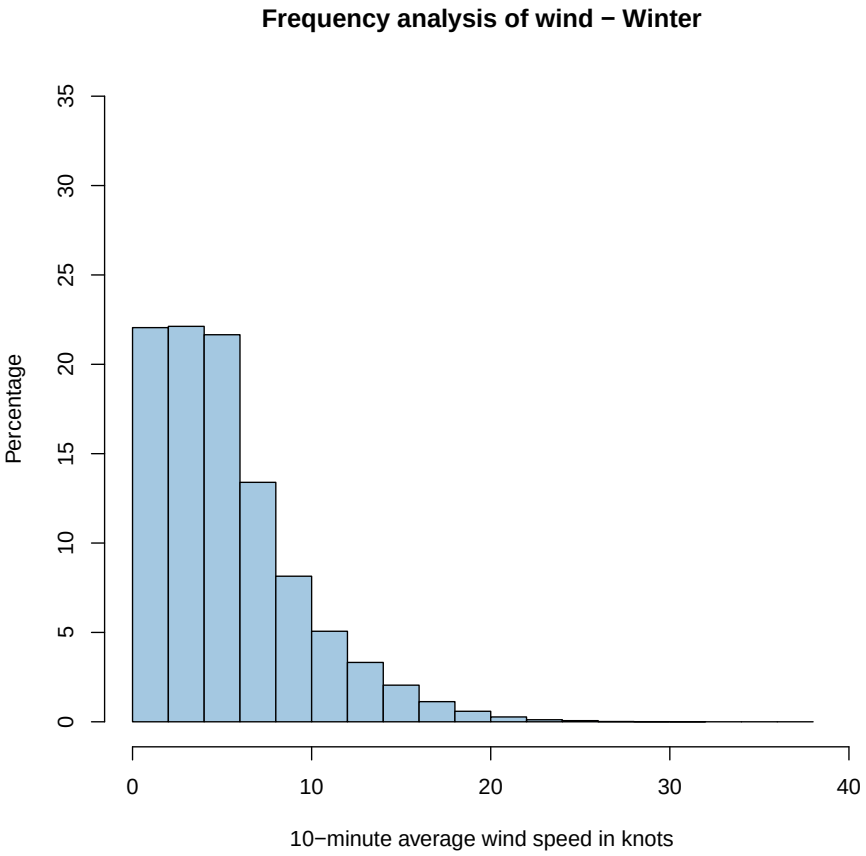

Frequency analysis of wind − October
Percentage
0
5
10
15
20
25
30
35
0
10
20
30
40
10−minute average wind speed in knots

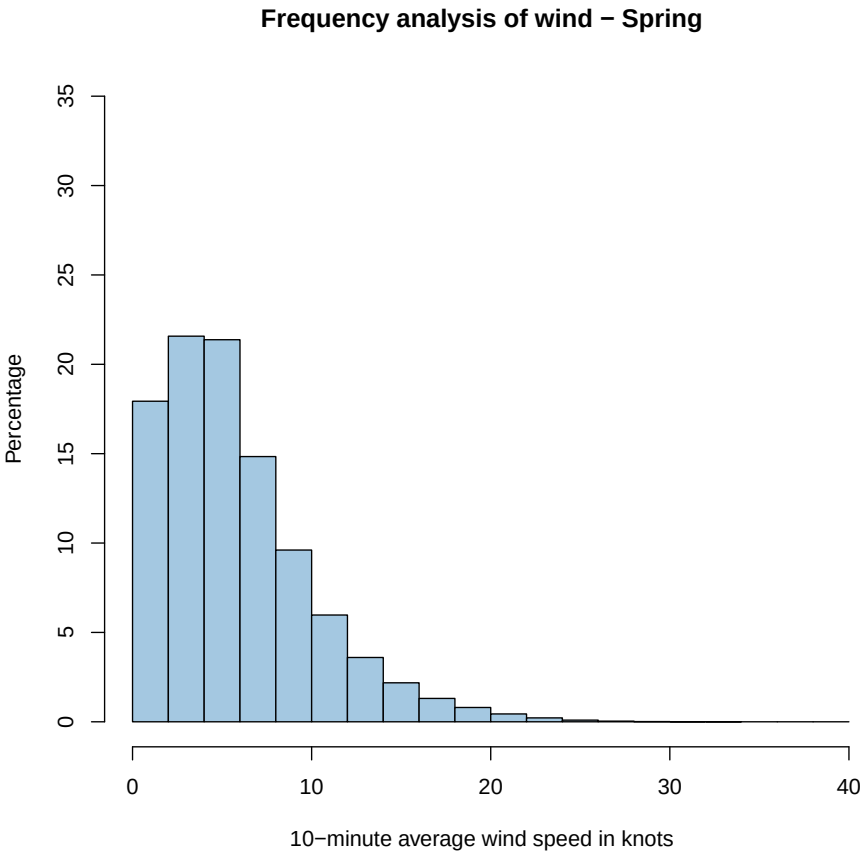

Frequency analysis of wind − November
Percentage
0
5
10
15
20
25
30
35
0
10
20
30
40
10−minute average wind speed in knots


Frequency analysis of wind − December
Percentage
0
5
10
15
20
25
30
35
0
10
20
30
40
10−minute average wind speed in knots


Frequency analysis of wind − Summer
Percentage
0
5
10
15
20
25
30
35
0
10
20
30
40
10−minute average wind speed in knots


Frequency analysis of wind − Autumn
Percentage
0
5
10
15
20
25
30
35
0
10
20
30
40
10−minute average wind speed in knots


Frequency analysis of wind − Winter
Percentage
0
5
10
15
20
25
30
35
0
10
20
30
40
10−minute average wind speed in knots


Frequency analysis of wind − Spring
Percentage
0
5
10
15
20
25
30
35
0
10
20
30
40
10−minute average wind speed in knots

Wind speed frequency bins tables

	% < 4 knots	% < 8 knots	% < 12 knots	% total	Frequency
N	5.13	9.31	9.86	10.35	7237
NE	2.06	6.36	7.98	8.19	5726
E	2.89	7.68	10.27	10.88	7602
SE	1.95	5.80	10.22	11.82	8261
S	2.73	6.93	10.08	10.92	7632
SW	3.64	7.23	8.92	9.44	6601
W	3.20	7.14	8.67	8.94	6250
NW	3.63	7.85	8.67	8.80	6154

Table 1: January wind speed frequency bin table

	% < 4 knots	% < 8 knots	% < 12 knots	% total	Frequency
N	5.97	13.09	13.82	14.12	8901
NE	2.41	6.24	7.22	7.36	4642
E	2.63	6.77	8.82	9.35	5897
SE	1.98	5.67	8.97	9.98	6292
S	2.93	6.56	9.06	9.57	6034
SW	3.11	6.53	8.10	8.45	5329
W	2.99	7.07	9.00	9.42	5939
NW	4.15	9.77	11.16	11.38	7177

Table 2: February wind speed frequency bin table

	% < 4 knots	% < 8 knots	% < 12 knots	% total	Frequency
N	7.35	16.30	17.41	17.91	12646
NE	2.75	6.54	7.27	7.35	5188
E	2.54	5.89	7.16	7.25	5117
SE	2.04	4.81	6.64	6.77	4776
S	2.46	5.43	7.34	7.53	5319
SW	3.03	5.79	7.21	7.41	5229
W	2.21	5.90	7.57	7.86	5547
NW	4.01	10.26	12.08	12.34	8711

Table 3: March wind speed frequency bin table

	% < 4 knots	% < 8 knots	% < 12 knots	% total	Frequency
N	10.14	23.64	25.66	26.41	17834
NE	2.56	5.27	5.68	5.71	3856
E	2.06	3.96	4.23	4.24	2862
SE	1.61	3.51	4.12	4.14	2796
S	2.26	4.43	5.19	5.25	3545
SW	1.82	3.84	4.60	4.72	3189
W	2.17	5.02	6.68	7.12	4806
NW	4.73	11.68	14.22	15.10	10198

Table 4: April wind speed frequency bin table

	% < 4 knots	% < 8 knots	% < 12 knots	% total	Frequency
N	10.84	25.04	28.63	30.19	20800
NE	2.81	5.13	5.49	5.54	3818
E	1.78	2.77	2.85	2.85	1962
SE	1.29	2.51	2.66	2.69	1854
S	1.73	3.08	3.37	3.42	2358
SW	1.70	2.92	3.20	3.22	2222
W	2.10	4.03	4.79	5.03	3467
NW	4.69	11.18	13.55	14.40	9925

Table 5: May wind speed frequency bin table

	% < 4 knots	% < 8 knots	% < 12 knots	% total	Frequency
N	9.06	23.23	27.40	29.61	19443
NE	2.57	4.45	4.69	4.70	3088
E	1.41	2.07	2.10	2.11	1387
SE	1.02	1.50	1.56	1.58	1035
S	1.25	1.75	1.78	1.78	1167
SW	1.40	2.17	2.29	2.32	1525
W	1.78	3.67	4.63	4.94	3247
NW	3.99	10.67	13.40	14.56	9563

Table 6: June wind speed frequency bin table

	% < 4 knots	% < 8 knots	% < 12 knots	% total	Frequency
N	9.39	23.00	28.21	30.21	20692
NE	2.61	4.41	4.67	4.70	3217
E	1.39	2.04	2.08	2.08	1427
SE	1.16	1.70	1.76	1.76	1206
S	1.17	1.73	1.76	1.76	1208
SW	1.35	2.06	2.22	2.24	1533
W	1.48	2.99	3.72	3.98	2724
NW	3.85	9.02	11.99	13.66	9358

Table 7: July wind speed frequency bin table

	% < 4 knots	% < 8 knots	% < 12 knots	% total	Frequency
N	8.22	19.23	23.35	26.55	18526
NE	2.57	5.46	6.14	6.22	4338
E	1.46	2.81	2.97	3.00	2093
SE	1.37	2.57	2.87	2.88	2010
S	1.64	2.78	3.09	3.09	2158
SW	1.42	2.38	2.71	2.73	1905
W	1.66	3.18	3.96	4.27	2978
NW	3.59	7.76	9.91	11.07	7723

Table 8: August wind speed frequency bin table

	% < 4 knots	% < 8 knots	% < 12 knots	% total	Frequency
N	7.75	16.65	18.93	21.14	14513
NE	2.31	6.15	7.19	7.36	5054
E	1.78	4.28	5.05	5.11	3510
SE	1.59	3.69	4.94	5.07	3477
S	1.93	3.72	4.60	4.69	3218
SW	2.37	3.86	4.46	4.54	3114
W	2.15	3.79	4.57	4.89	3358
NW	3.35	7.27	8.94	9.72	6674

Table 9: September wind speed frequency bin table

	% < 4 knots	% < 8 knots	% < 12 knots	% total	Frequency
N	7.18	13.76	15.54	17.41	12158
NE	2.44	6.37	7.62	7.77	5427
E	2.25	5.50	6.69	6.84	4779
SE	1.94	4.64	6.86	7.41	5178
S	2.55	5.21	6.66	6.96	4858
SW	2.67	4.65	5.58	5.78	4039
W	2.31	4.84	6.03	6.47	4521
NW	3.57	7.34	8.92	9.66	6746

Table 10: October wind speed frequency bin table

	% < 4 knots	% < 8 knots	% < 12 knots	% total	Frequency
N	5.09	10.50	11.55	12.55	8324
NE	2.34	6.66	8.05	8.27	5484
E	2.15	5.97	7.64	7.95	5278
SE	2.48	6.02	9.37	10.03	6652
S	2.88	6.45	8.96	9.37	6220
SW	3.26	6.35	7.78	8.25	5474
W	2.50	6.10	7.64	8.49	5634
NW	3.44	8.53	10.10	11.01	7302

Table 11: November wind speed frequency bin table

	% < 4 knots	% < 8 knots	% < 12 knots	% total	Frequency
N	5.11	9.96	10.95	12.10	8374
NE	2.48	6.93	8.27	8.47	5862
E	2.49	6.55	8.70	9.27	6414
SE	2.01	5.84	9.52	10.82	7486
S	2.99	7.28	9.77	10.22	7069
SW	2.89	6.03	7.46	7.83	5416
W	2.64	6.28	7.50	7.75	5364
NW	3.53	7.58	8.45	8.77	6066

Table 12: December wind speed frequency bin table

	% < 4 knots	% < 8 knots	% < 12 knots	% total	Frequency
N	5.39	10.71	11.47	12.13	24512
NE	2.31	6.52	7.84	8.03	16230
E	2.68	7.01	9.28	9.85	19913
SE	1.98	5.77	9.59	10.90	22039
S	2.88	6.94	9.65	10.26	20735
SW	3.22	6.60	8.17	8.58	17346
W	2.95	6.82	8.37	8.68	17553
NW	3.76	8.36	9.37	9.60	19397

Table 13: Summer wind speed frequency bin table

	% < 4 knots	% < 8 knots	% < 12 knots	% total	Frequency
N	9.42	21.60	23.83	24.77	51280
NE	2.71	5.66	6.16	6.21	12862
E	2.13	4.22	4.77	4.80	9941
SE	1.65	3.62	4.50	4.55	9426
S	2.15	4.32	5.32	5.42	11222
SW	2.19	4.20	5.02	5.14	10640
W	2.16	4.99	6.35	6.68	13820
NW	4.47	11.03	13.27	13.93	28834

Table 14: Autumn wind speed frequency bin table

	% < 4 knots	% < 8 knots	% < 12 knots	% total	Frequency
N	8.88	21.78	26.29	28.76	58661
NE	2.58	4.78	5.18	5.22	10643
E	1.42	2.31	2.39	2.41	4907
SE	1.19	1.93	2.08	2.08	4251
S	1.36	2.10	2.22	2.22	4533
SW	1.39	2.20	2.41	2.43	4963
W	1.64	3.27	4.09	4.39	8949
NW	3.80	9.12	11.73	13.06	26644

Table 15: Winter wind speed frequency bin table

	% < 4 knots	% < 8 knots	% < 12 knots	% total	Frequency
N	6.70	13.67	15.38	17.09	34995
NE	2.36	6.39	7.61	7.79	15965
E	2.06	5.24	6.45	6.62	13567
SE	2.00	4.77	7.03	7.47	15307
S	2.45	5.12	6.71	6.98	14296
SW	2.76	4.94	5.92	6.16	12627
W	2.32	4.90	6.06	6.60	13513
NW	3.45	7.70	9.31	10.12	20722

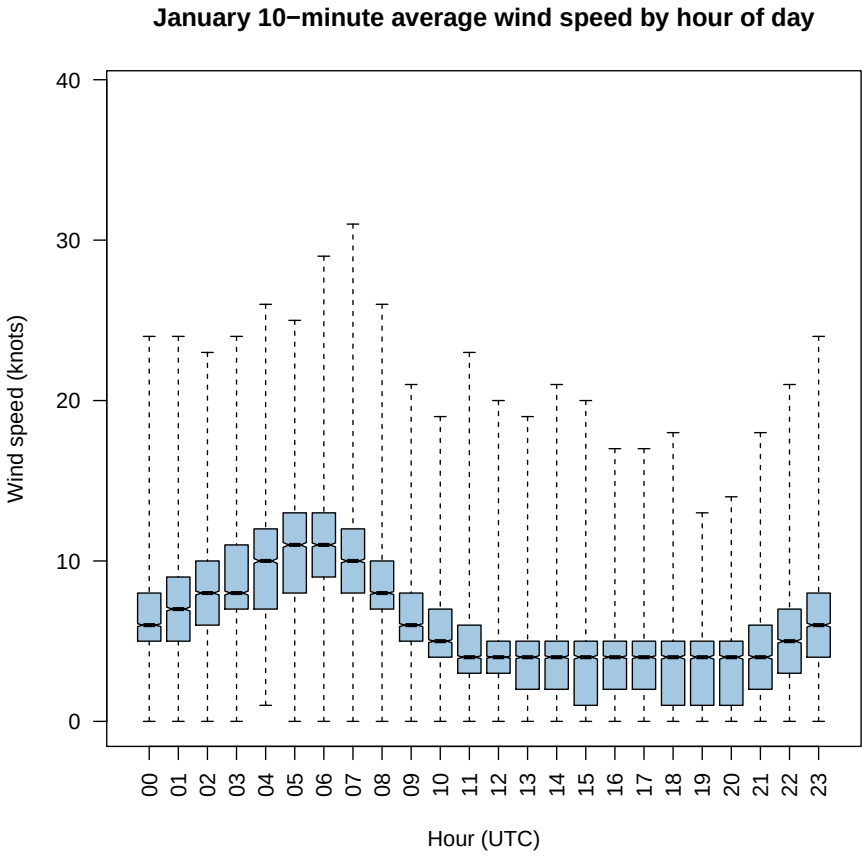
Table 16: Spring wind speed frequency bin table

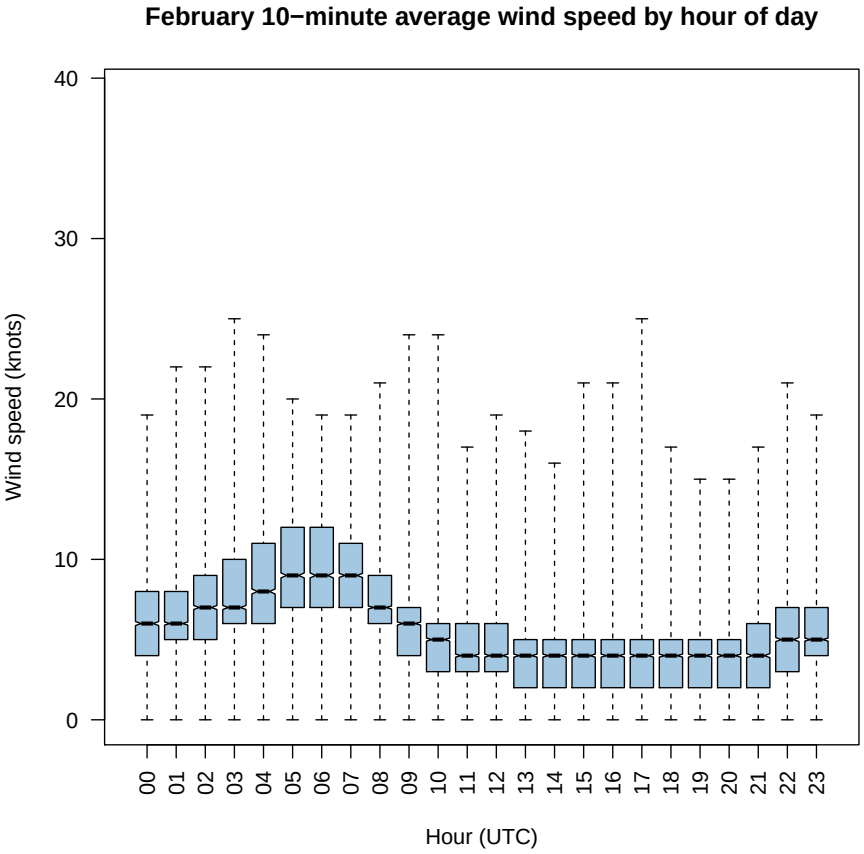
Calm percentage and prevailing wind direction and percentage

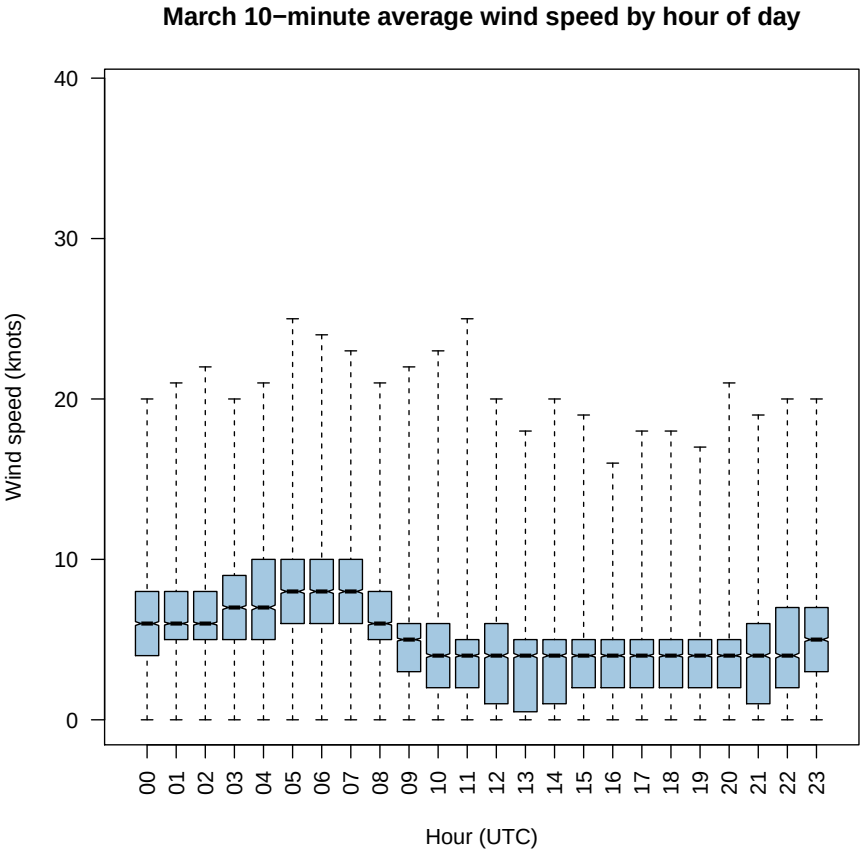
	Calm %	Prevailing wind
January	8.60	SE (11.82%)
February	9.00	N (14.12%)
March	11.30	N (17.91%)
April	10.00	N (26.41%)
May	10.80	N (30.19%)
June	11.90	N (29.61%)
July	11.80	N (30.21%)
August	10.40	N (26.55%)
September	9.20	N (21.14%)
October	9.30	N (17.41%)
November	8.60	N (12.55%)
December	9.20	N (12.10%)
Summer	8.90	N (12.13%)
Autumn	10.70	N (24.77%)
Winter	11.30	N (28.76%)
Spring	9.00	N (17.09%)

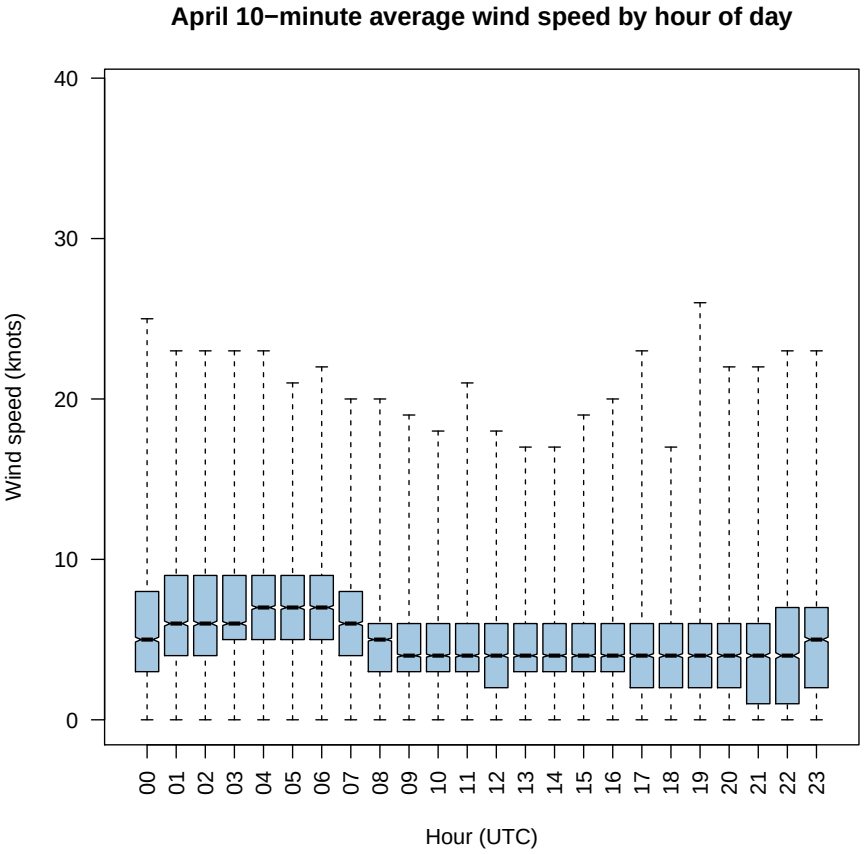
Table 1: Calm percentage and prevailing wind direction and percentage

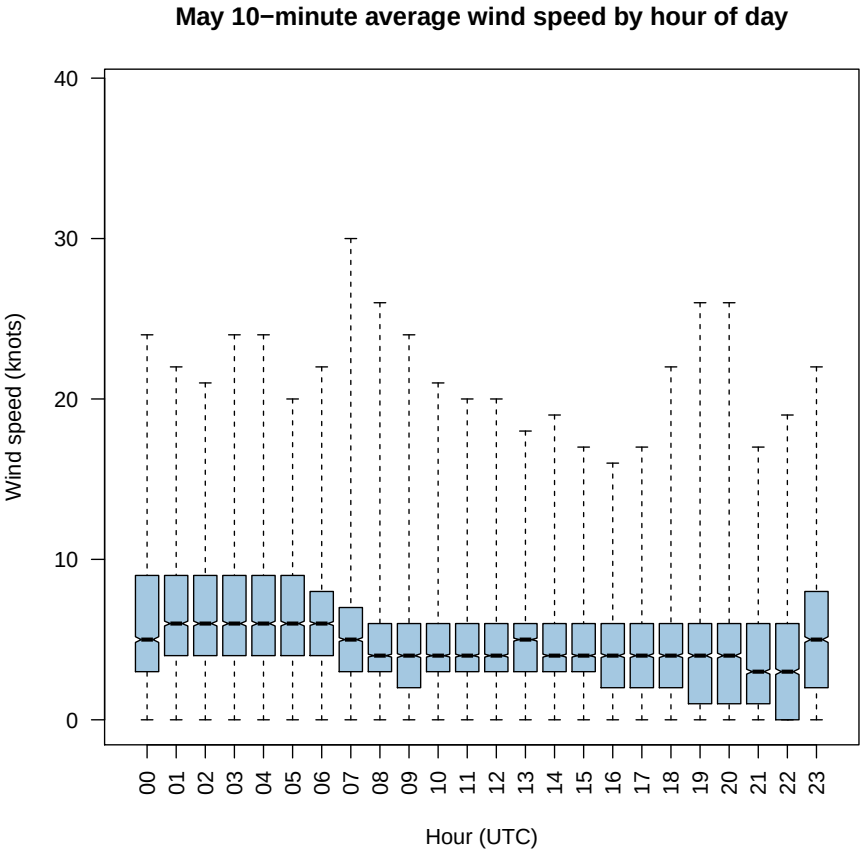
10-minute average wind speed by hour of day

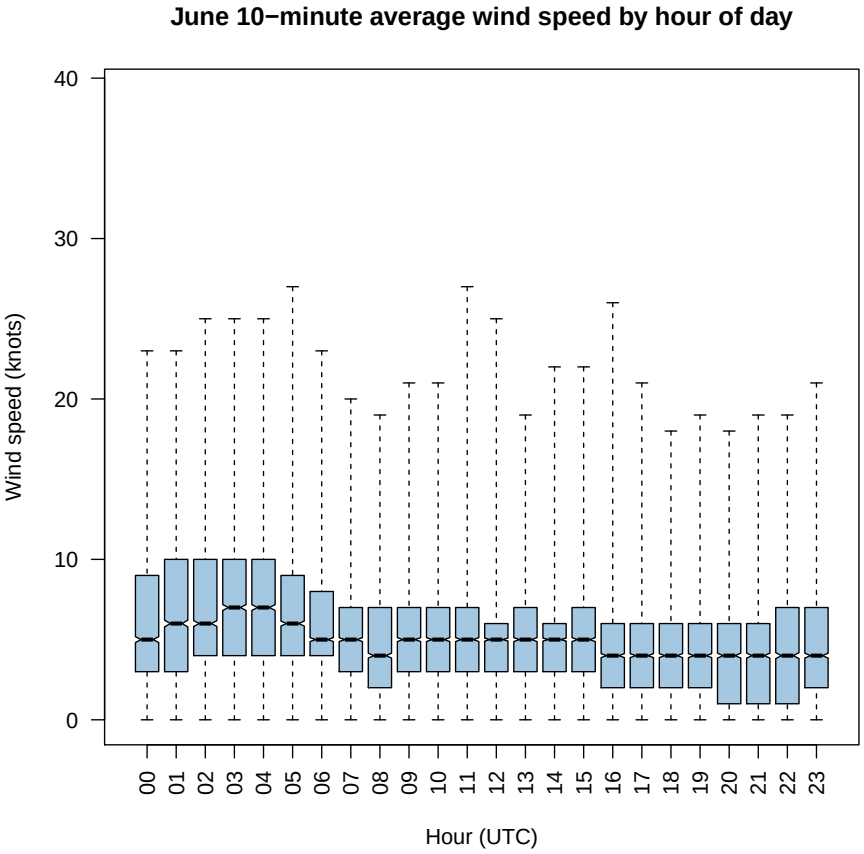


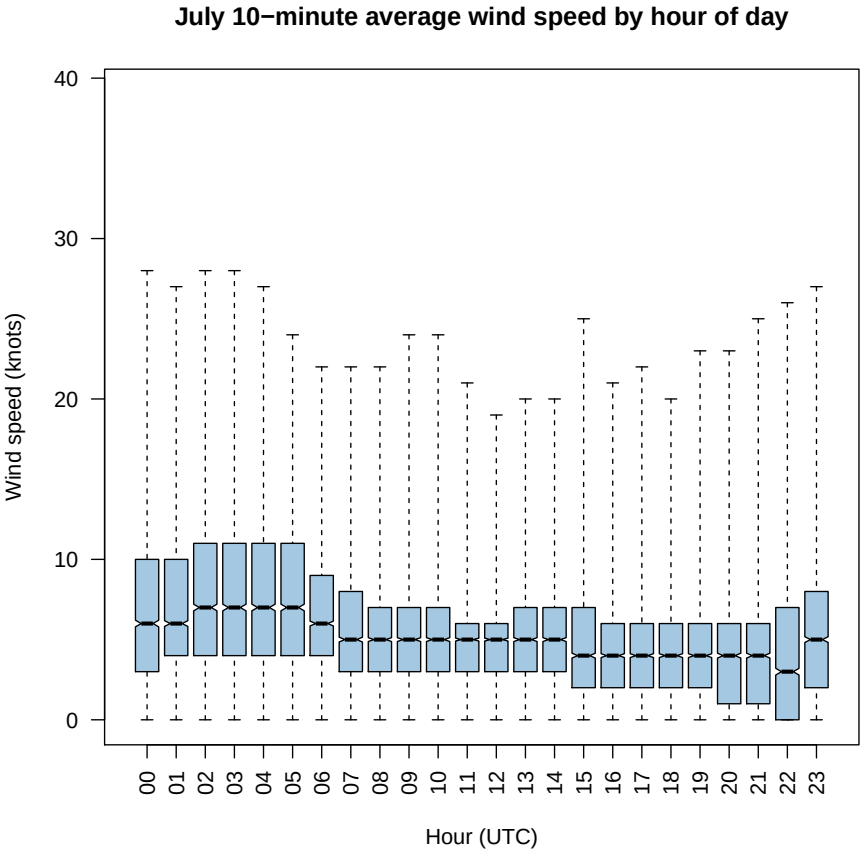

February 10−minute average wind speed by hour of day
Wind speed (knots)
0
10
20
30
40
00
01
02
03
04
05
06
07
08
09
10
11
12
13
14
15
16
17
18
19
20
21
22
23
Hour (UTC)

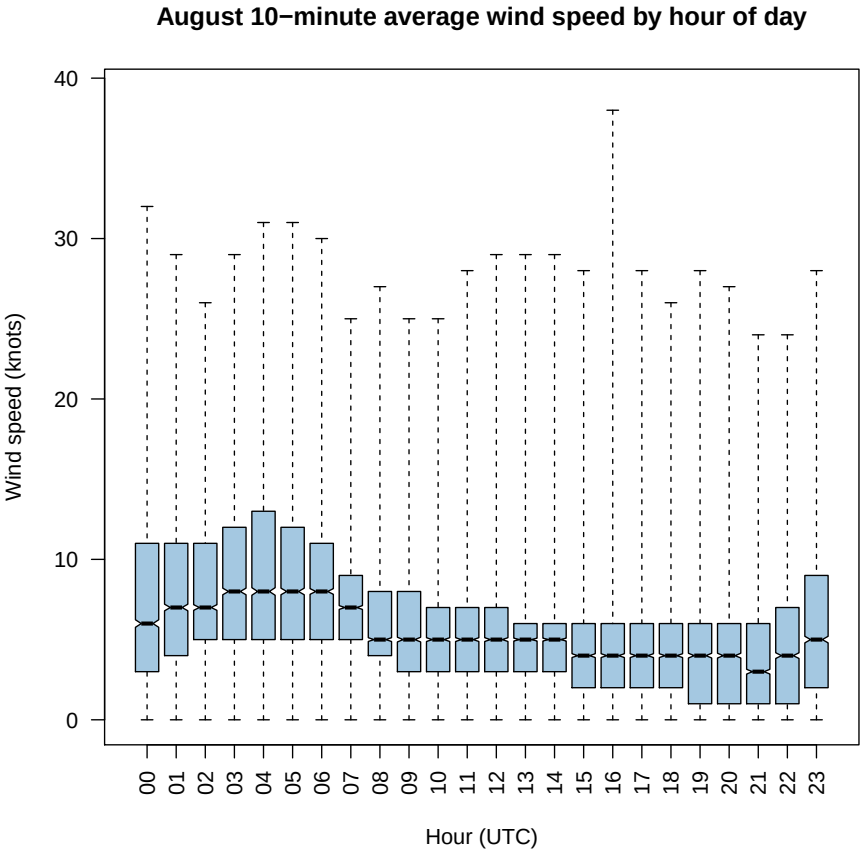

March 10−minute average wind speed by hour of day
Wind speed (knots)
0
10
20
30
40
00
01
02
03
04
05
06
07
08
09
10
11
12
13
14
15
16
17
18
19
20
21
22
23
Hour (UTC)

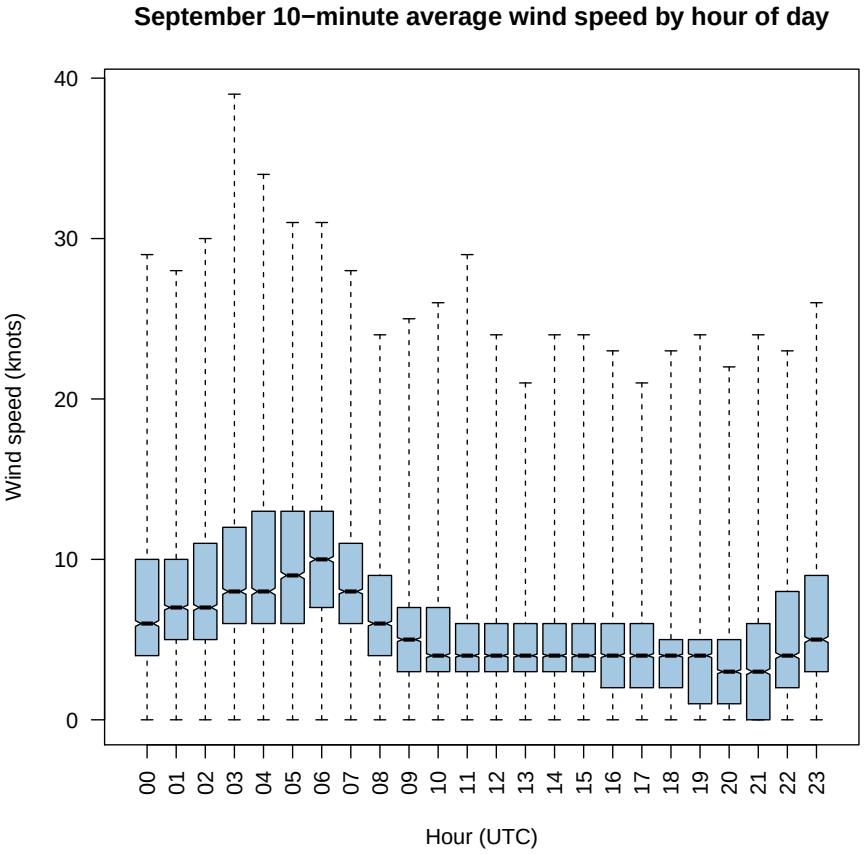

April 10−minute average wind speed by hour of day
Wind speed (knots)
0
10
20
30
40
00
01
02
03
04
05
06
07
08
09
10
11
12
13
14
15
16
17
18
19
20
21
22
23
Hour (UTC)

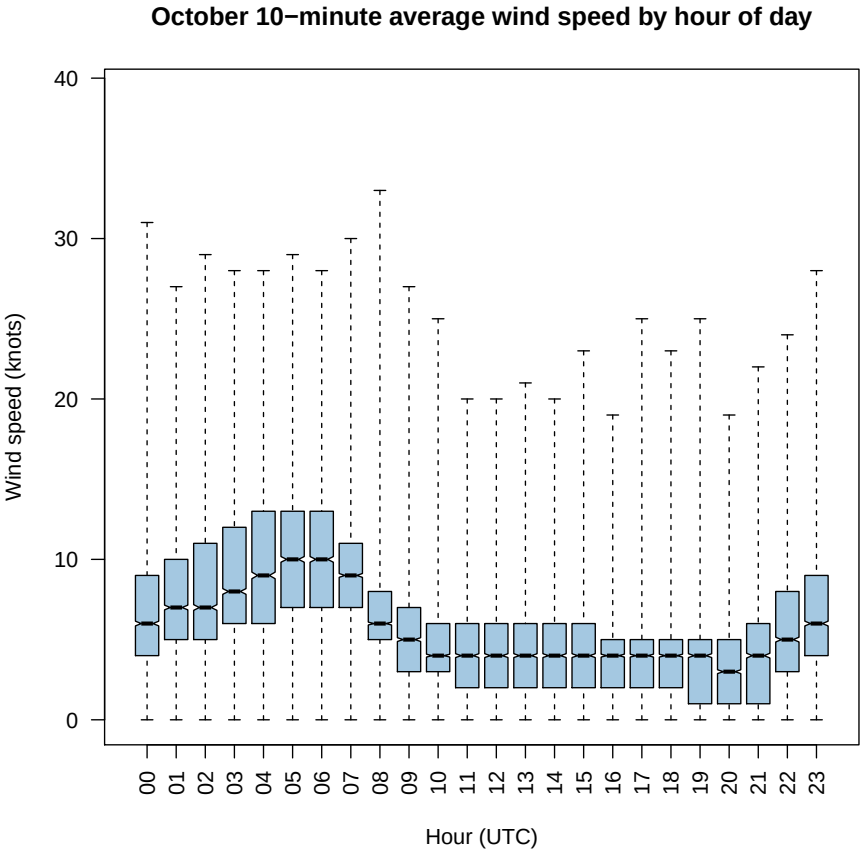

May 10−minute average wind speed by hour of day
Wind speed (knots)
0
10
20
30
40
00
01
02
03
04
05
06
07
08
09
10
11
12
13
14
15
16
17
18
19
20
21
22
23
Hour (UTC)

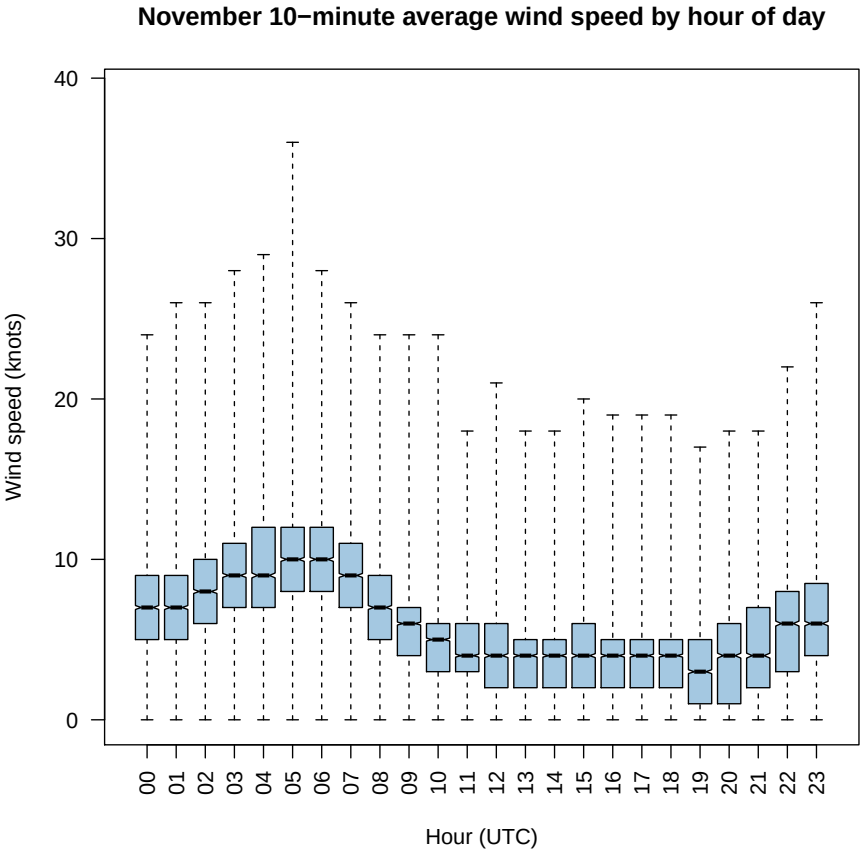

June 10−minute average wind speed by hour of day
Wind speed (knots)
0
10
20
30
40
00
01
02
03
04
05
06
07
08
09
10
11
12
13
14
15
16
17
18
19
20
21
22
23
Hour (UTC)

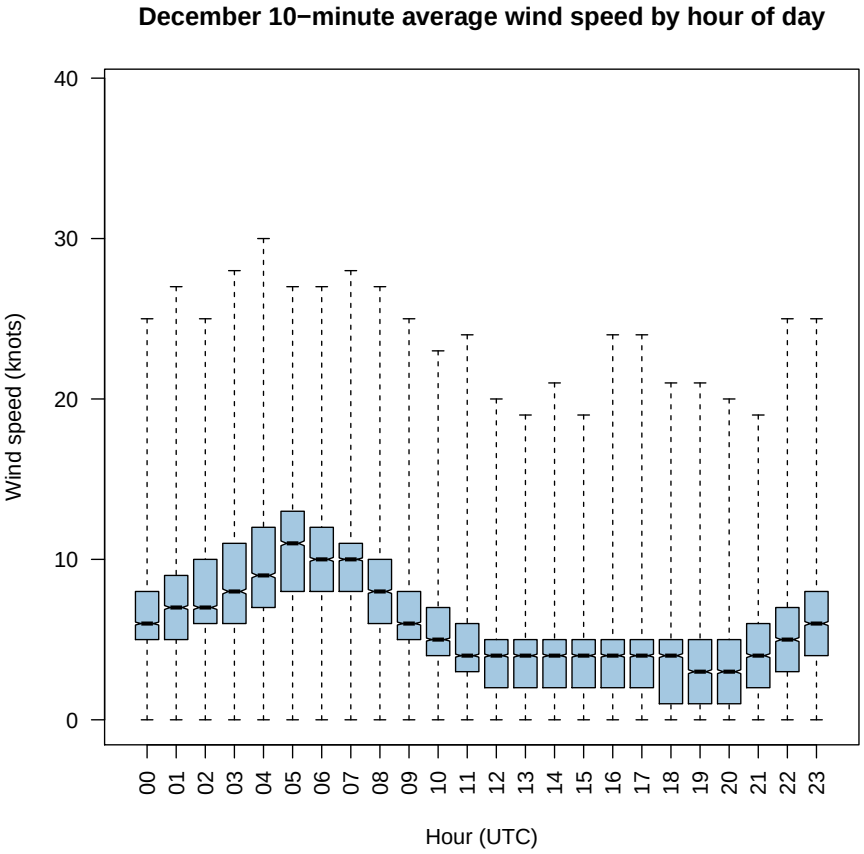

July 10−minute average wind speed by hour of day
Wind speed (knots)
0
10
20
30
40
00
01
02
03
04
05
06
07
08
09
10
11
12
13
14
15
16
17
18
19
20
21
22
23
Hour (UTC)


August 10−minute average wind speed by hour of day
Wind speed (knots)
0
10
20
30
40
00
01
02
03
04
05
06
07
08
09
10
11
12
13
14
15
16
17
18
19
20
21
22
23
Hour (UTC)

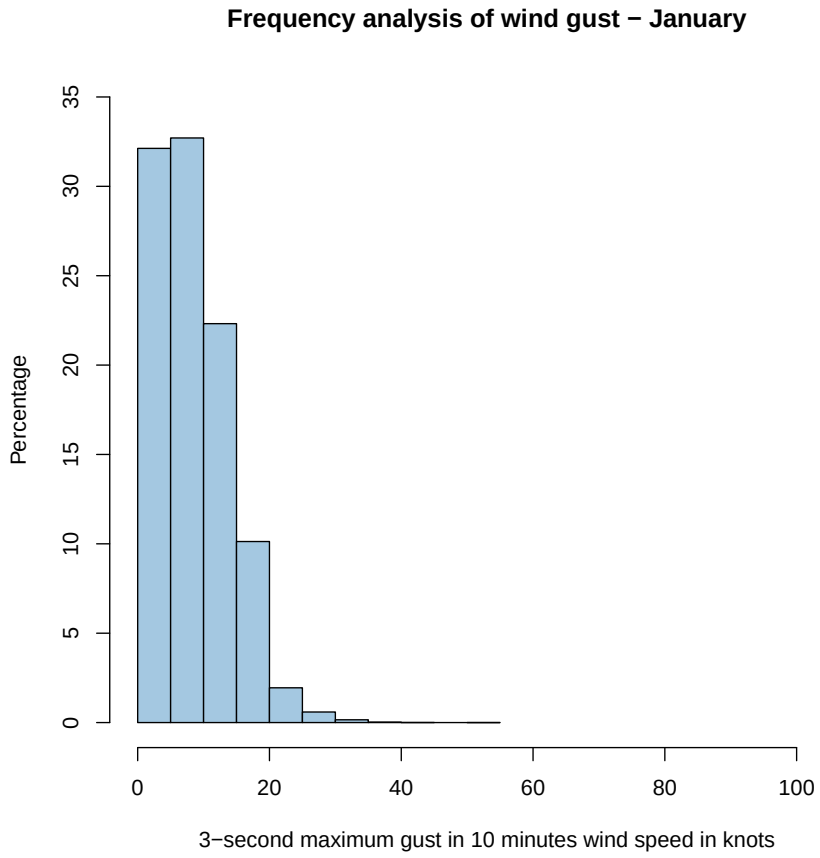

September 10−minute average wind speed by hour of day
Wind speed (knots)
0
10
20
30
40
00
01
02
03
04
05
06
07
08
09
10
11
12
13
14
15
16
17
18
19
20
21
22
23
Hour (UTC)

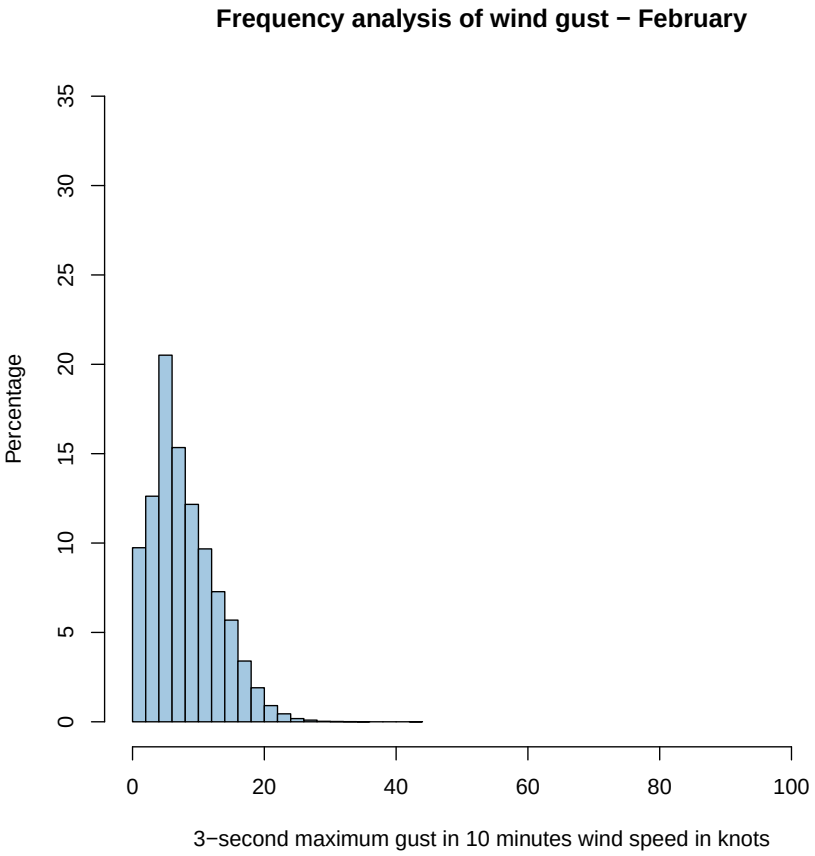

October 10−minute average wind speed by hour of day
Wind speed (knots)
0
10
20
30
40
00
01
02
03
04
05
06
07
08
09
10
11
12
13
14
15
16
17
18
19
20
21
22
23
Hour (UTC)

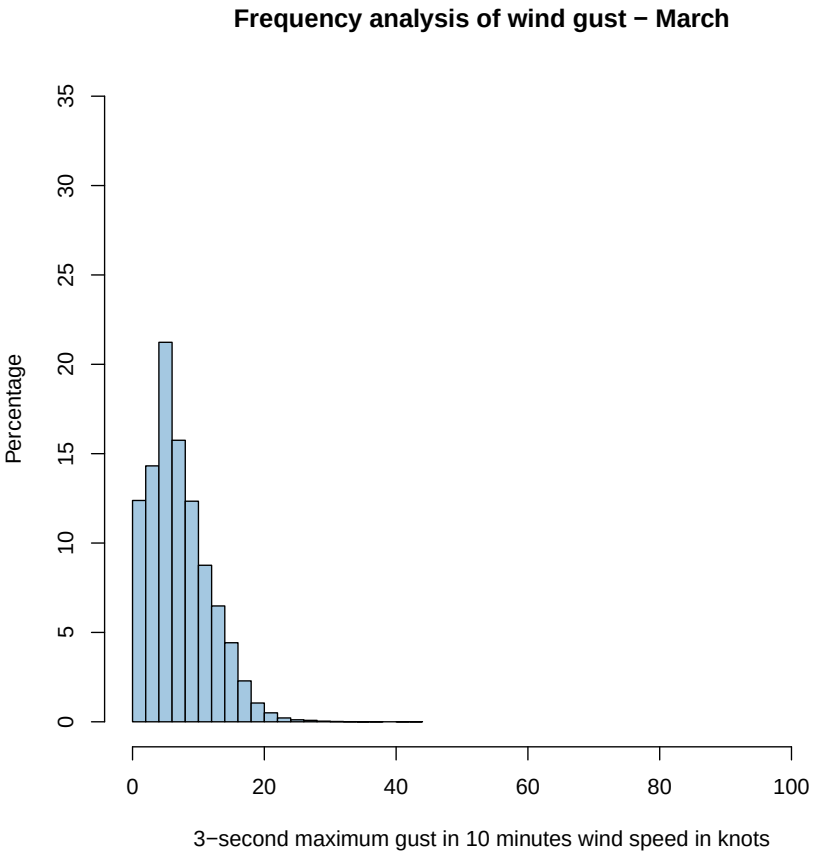

November 10−minute average wind speed by hour of day
Wind speed (knots)
0
10
20
30
40
00
01
02
03
04
05
06
07
08
09
10
11
12
13
14
15
16
17
18
19
20
21
22
23
Hour (UTC)

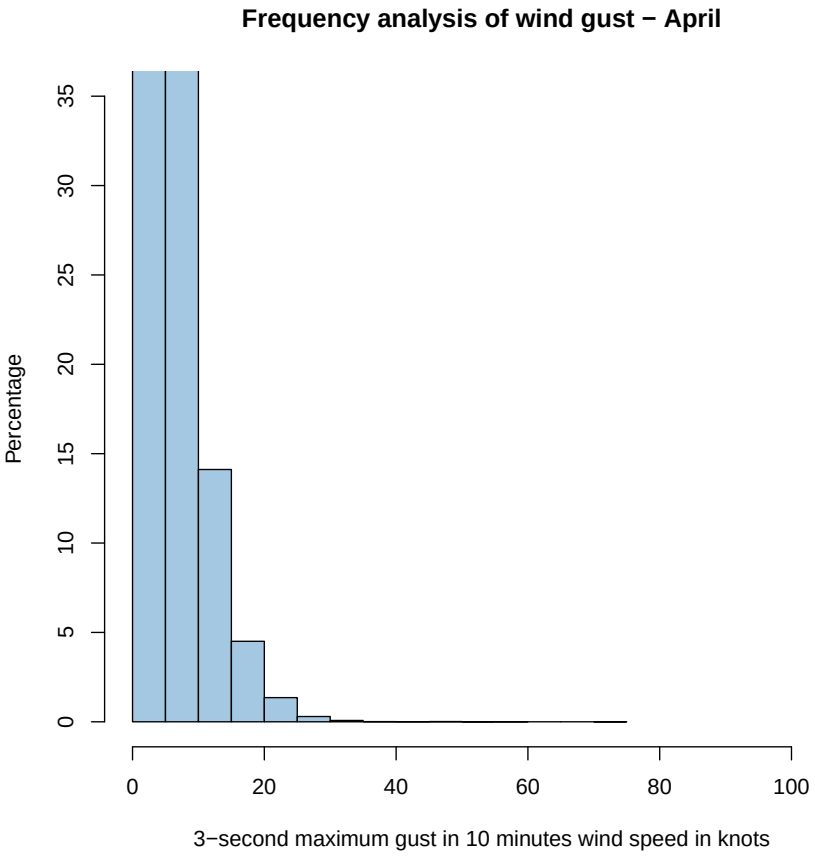

December 10−minute average wind speed by hour of day
Wind speed (knots)
0
10
20
30
40
00
01
02
03
04
05
06
07
08
09
10
11
12
13
14
15
16
17
18
19
20
21
22
23
Hour (UTC)

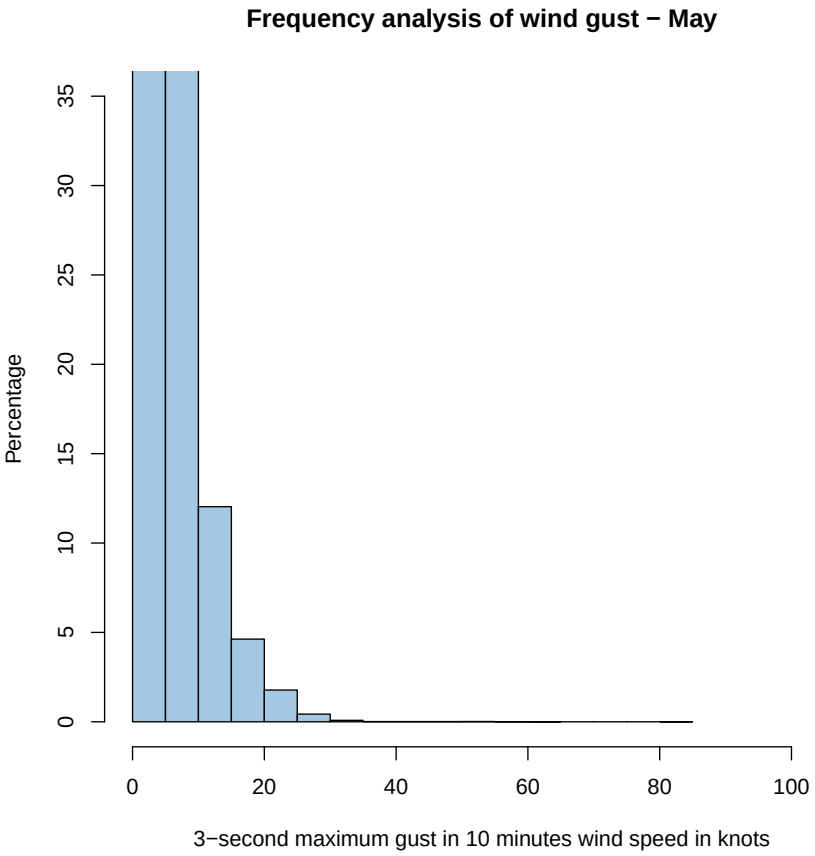
3-second maximum gust in 10 minutes wind speed histograms

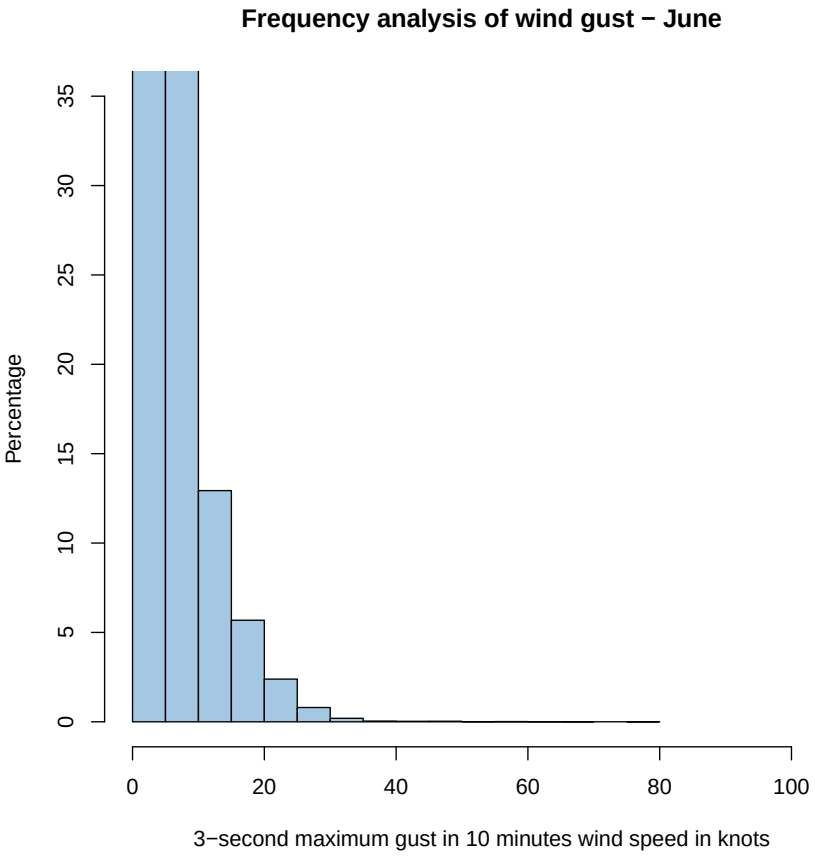


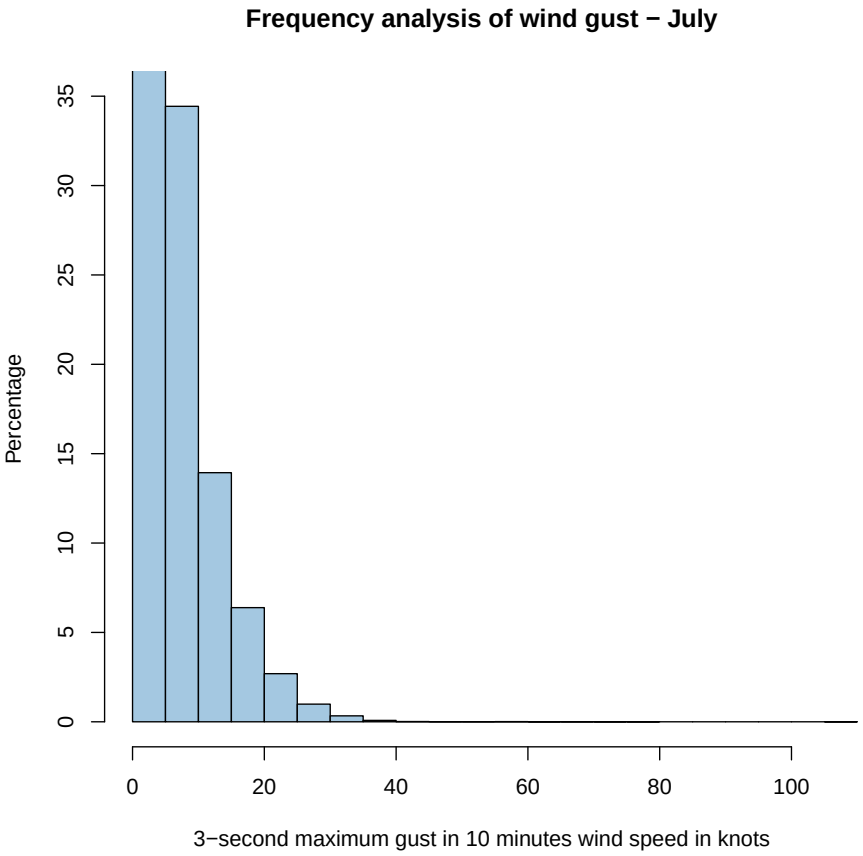

Frequency analysis of wind gust − February
Percentage
0
5
10
15
20
25
30
35
0
20
40
60
80
100
3−second maximum gust in 10 minutes wind speed in knots

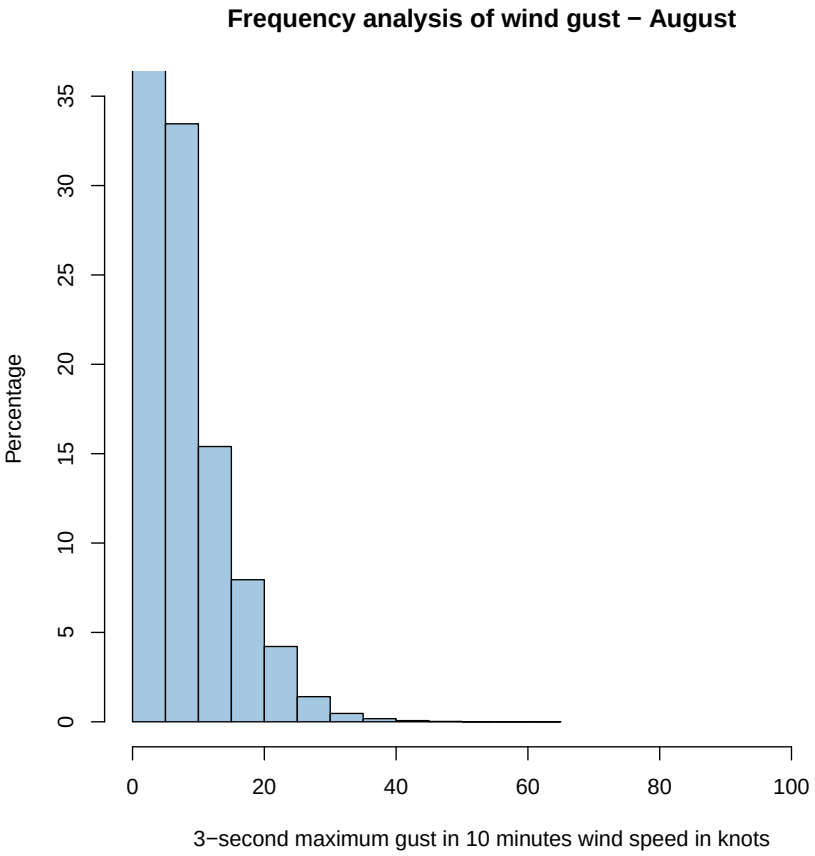

Frequency analysis of wind gust − March
Percentage
0
5
10
15
20
25
30
35
0
20
40
60
80
100
3−second maximum gust in 10 minutes wind speed in knots

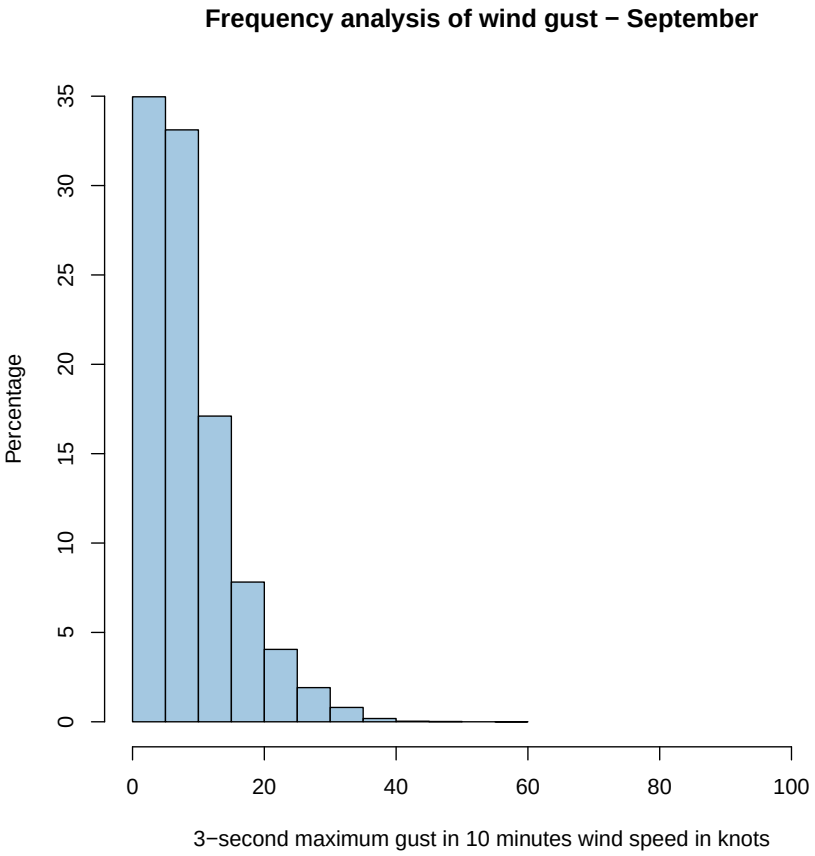

Frequency analysis of wind gust − April
Percentage
0
5
10
15
20
25
30
35
0
20
40
60
80
100
3−second maximum gust in 10 minutes wind speed in knots

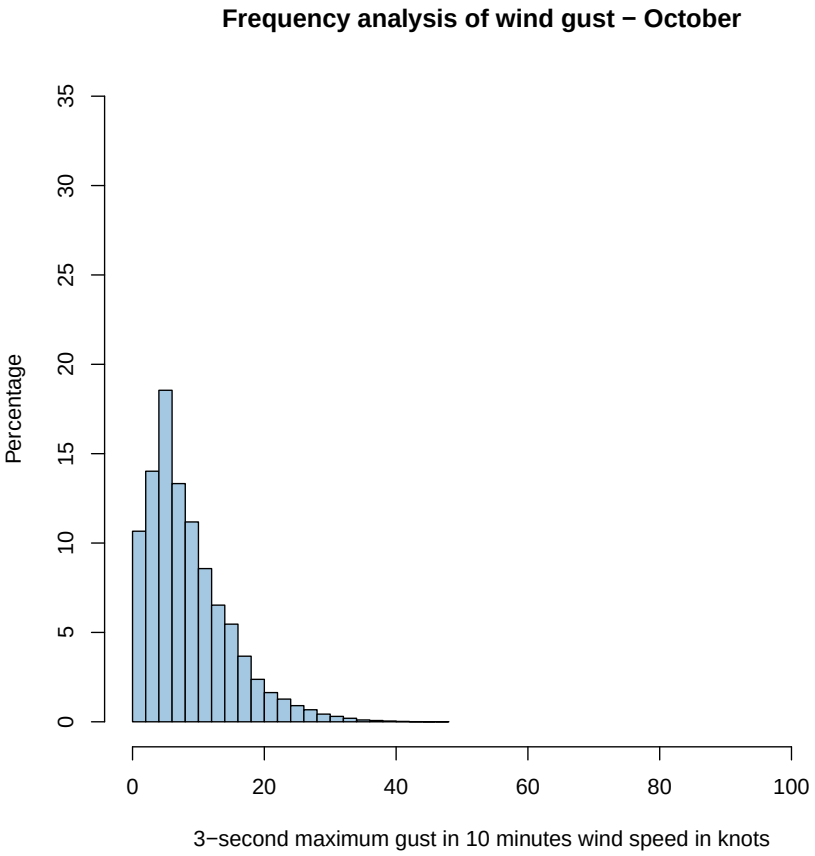

Frequency analysis of wind gust − May
Percentage
0
5
10
15
20
25
30
35
0
20
40
60
80
100
3−second maximum gust in 10 minutes wind speed in knots

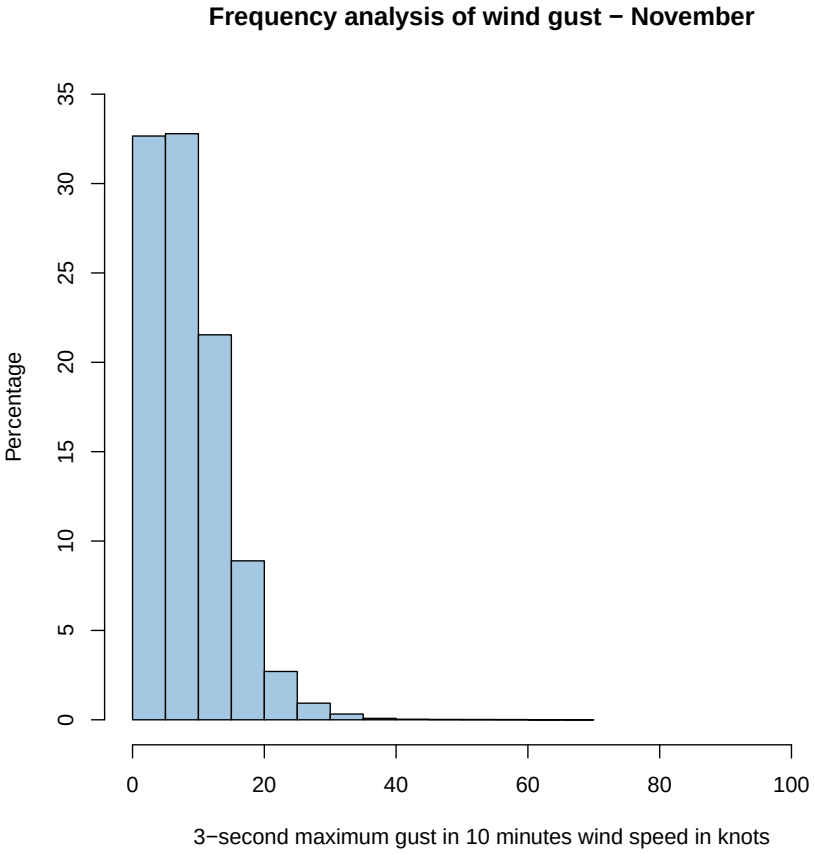

Frequency analysis of wind gust − June
Percentage
0
5
10
15
20
25
30
35
0
20
40
60
80
100
3−second maximum gust in 10 minutes wind speed in knots

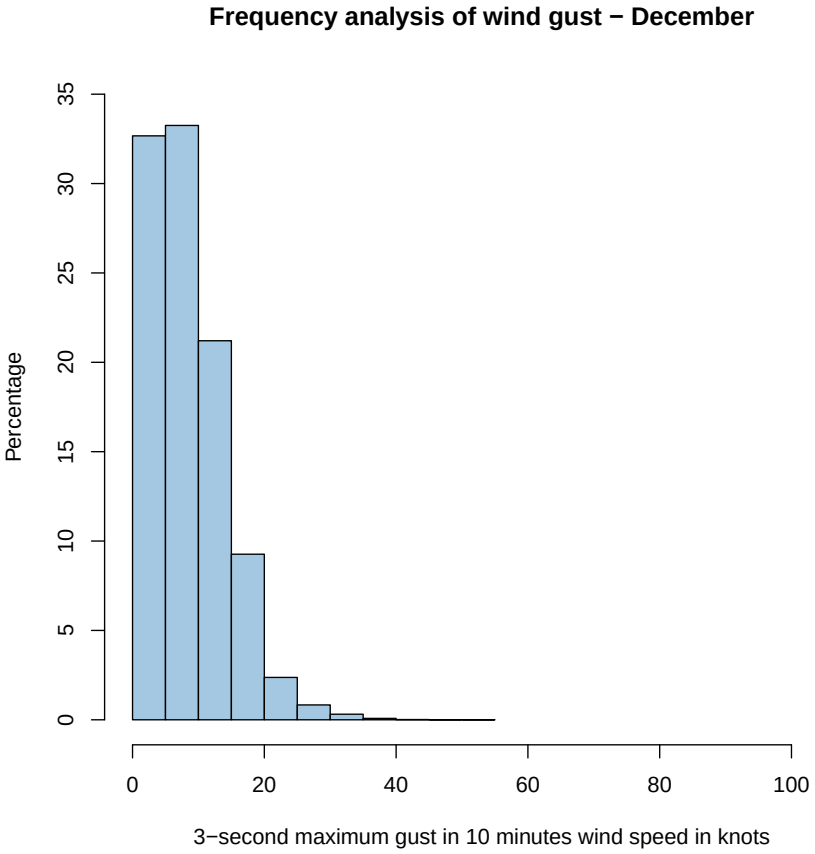

Frequency analysis of wind gust − July
Percentage
0
5
10
15
20
25
30
35
0
20
40
60
80
100
3−second maximum gust in 10 minutes wind speed in knots

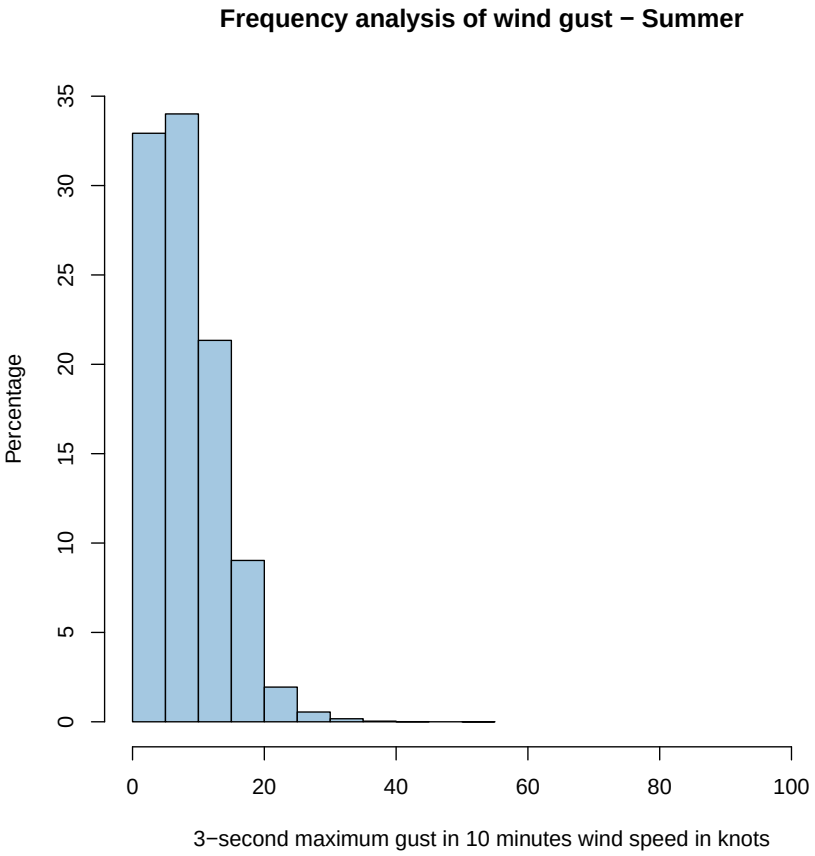

Frequency analysis of wind gust − August
Percentage
0
5
10
15
20
25
30
35
0
20
40
60
80
100
3−second maximum gust in 10 minutes wind speed in knots

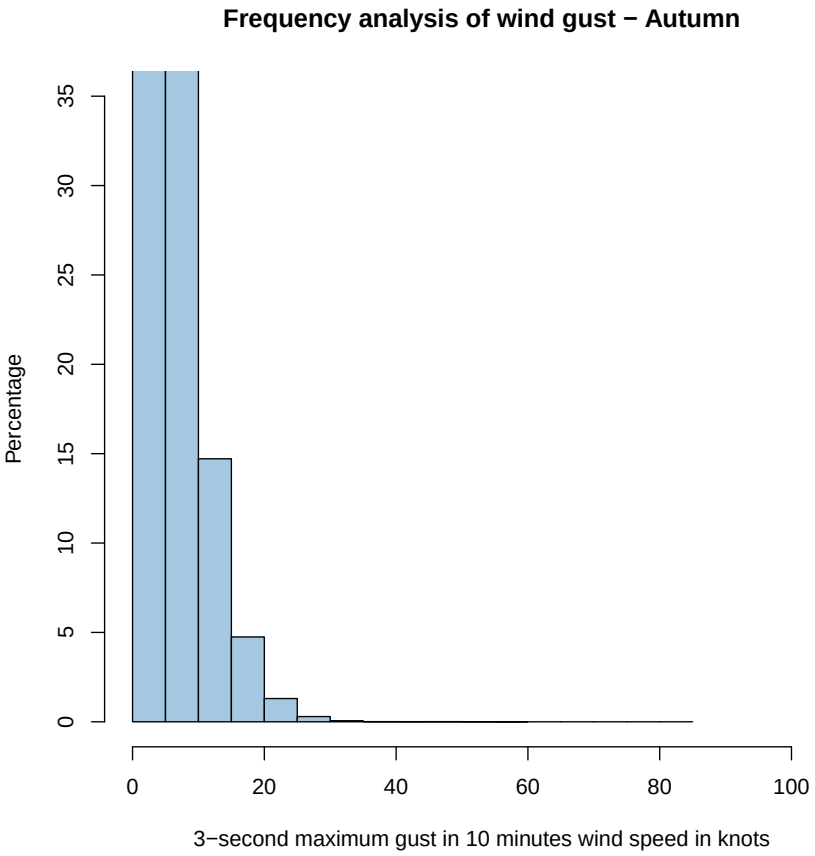

Frequency analysis of wind gust − September
Percentage
0
5
10
15
20
25
30
35
0
20
40
60
80
100
3−second maximum gust in 10 minutes wind speed in knots

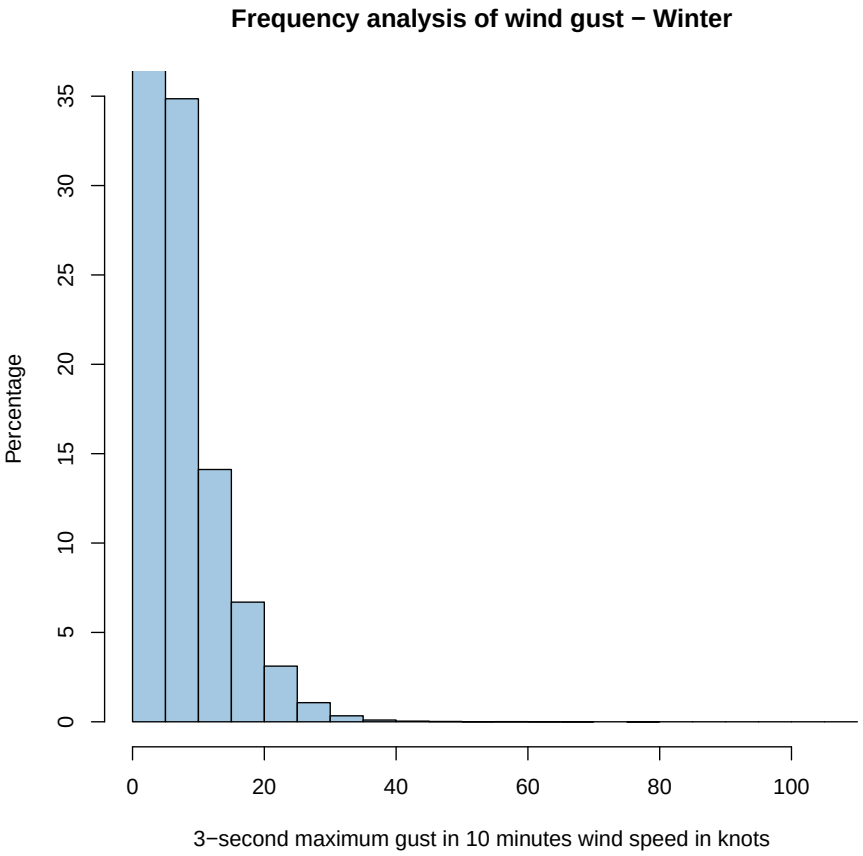

Frequency analysis of wind gust − October
Percentage
0
5
10
15
20
25
30
35
0
20
40
60
80
100
3−second maximum gust in 10 minutes wind speed in knots

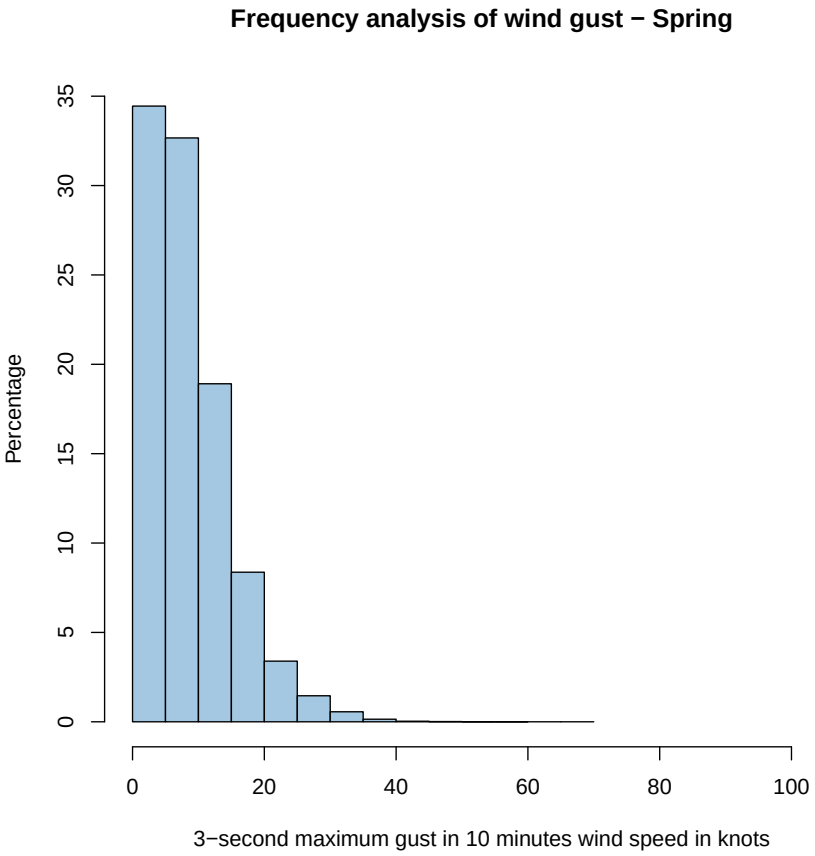

Frequency analysis of wind gust − November
Percentage
0
5
10
15
20
25
30
35
0
20
40
60
80
100
3−second maximum gust in 10 minutes wind speed in knots


Frequency analysis of wind gust − December
Percentage
0
5
10
15
20
25
30
35
0
20
40
60
80
100
3−second maximum gust in 10 minutes wind speed in knots


Frequency analysis of wind gust − Summer
Percentage
0
5
10
15
20
25
30
35
0
20
40
60
80
100
3−second maximum gust in 10 minutes wind speed in knots


Frequency analysis of wind gust − Autumn
Percentage
0
5
10
15
20
25
30
35
0
20
40
60
80
100
3−second maximum gust in 10 minutes wind speed in knots


Frequency analysis of wind gust − Winter
Percentage
0
5
10
15
20
25
30
35
0
20
40
60
80
100
3−second maximum gust in 10 minutes wind speed in knots


Frequency analysis of wind gust − Spring
Percentage
0
5
10
15
20
25
30
35
0
20
40
60
80
100
3−second maximum gust in 10 minutes wind speed in knots

Frequency analysis of wind gust

	count	percent
<= 5 knots	22454	0.32
<= 10 knots	22862	0.33
<= 15 knots	15600	0.22
<= 20 knots	7080	0.10
<= 25 knots	1360	0.02
<= 30 knots	413	0.01
<= 35 knots	109	0.00
<= 40 knots	17	0.00
<= 45 knots	3	0.00
<= 50 knots	0	0.00
<= 55 knots	1	0.00

Table 1: January gust frequency

	count	percent
<= 2 knots	6139	0.10
<= 4 knots	7956	0.13
<= 6 knots	12930	0.21
<= 8 knots	9672	0.15
<= 10 knots	7668	0.12
<= 12 knots	6098	0.10
<= 14 knots	4589	0.07
<= 16 knots	3586	0.06
<= 18 knots	2143	0.03
<= 20 knots	1200	0.02
<= 22 knots	571	0.01
<= 24 knots	281	0.00
<= 26 knots	113	0.00
<= 28 knots	59	0.00
<= 30 knots	17	0.00
<= 32 knots	11	0.00
<= 34 knots	6	0.00
<= 36 knots	1	0.00
<= 38 knots	0	0.00
<= 40 knots	0	0.00
<= 42 knots	0	0.00
<= 44 knots	1	0.00

Table 2: February gust frequency

	count	percent
<= 2 knots	8741	0.12
<= 4 knots	10107	0.14
<= 6 knots	14987	0.21
<= 8 knots	11118	0.16
<= 10 knots	8711	0.12
<= 12 knots	6182	0.09
<= 14 knots	4575	0.06
<= 16 knots	3122	0.04
<= 18 knots	1615	0.02
<= 20 knots	742	0.01
<= 22 knots	354	0.01
<= 24 knots	152	0.00
<= 26 knots	79	0.00
<= 28 knots	57	0.00
<= 30 knots	25	0.00
<= 32 knots	12	0.00
<= 34 knots	5	0.00
<= 36 knots	1	0.00
<= 38 knots	2	0.00
<= 40 knots	0	0.00
<= 42 knots	2	0.00
<= 44 knots	2	0.00

Table 3: March gust frequency

	count	percent
<= 5 knots	27969	0.41
<= 10 knots	25795	0.38
<= 15 knots	9531	0.14
<= 20 knots	3041	0.05
<= 25 knots	913	0.01
<= 30 knots	199	0.00
<= 35 knots	50	0.00
<= 40 knots	7	0.00
<= 45 knots	4	0.00
<= 50 knots	9	0.00
<= 55 knots	1	0.00
<= 60 knots	3	0.00
<= 65 knots	0	0.00
<= 70 knots	0	0.00
<= 75 knots	1	0.00

Table 4: April gust frequency

	count	percent
<= 5 knots	30283	0.44
<= 10 knots	25524	0.37
<= 15 knots	8293	0.12
<= 20 knots	3188	0.05
<= 25 knots	1225	0.02
<= 30 knots	295	0.00
<= 35 knots	57	0.00
<= 40 knots	9	0.00
<= 45 knots	9	0.00
<= 50 knots	9	0.00
<= 55 knots	11	0.00
<= 60 knots	2	0.00
<= 65 knots	1	0.00
<= 70 knots	0	0.00
<= 75 knots	0	0.00
<= 80 knots	0	0.00
<= 85 knots	1	0.00

Table 5: May gust frequency

	count	percent
<= 5 knots	26979	0.41
<= 10 knots	24157	0.37
<= 15 knots	8494	0.13
<= 20 knots	3731	0.06
<= 25 knots	1568	0.02
<= 30 knots	525	0.01
<= 35 knots	128	0.00
<= 40 knots	26	0.00
<= 45 knots	18	0.00
<= 50 knots	20	0.00
<= 55 knots	5	0.00
<= 60 knots	8	0.00
<= 65 knots	4	0.00
<= 70 knots	2	0.00
<= 75 knots	0	0.00
<= 80 knots	2	0.00

Table 6: June gust frequency

	count	percent
<= 5 knots	28160	0.41
<= 10 knots	23588	0.34
<= 15 knots	9547	0.14
<= 20 knots	4375	0.06
<= 25 knots	1844	0.03
<= 30 knots	677	0.01
<= 35 knots	228	0.00
<= 40 knots	54	0.00
<= 45 knots	10	0.00
<= 50 knots	4	0.00
<= 55 knots	4	0.00
<= 60 knots	7	0.00
<= 65 knots	1	0.00
<= 70 knots	2	0.00
<= 75 knots	1	0.00
<= 80 knots	1	0.00
<= 85 knots	0	0.00
<= 90 knots	0	0.00
<= 95 knots	0	0.00
<= 100 knots	0	0.00
<= 105 knots	0	0.00
<= 110 knots	1	0.00

Table 7: July gust frequency

	count	percent
<= 5 knots	25705	0.37
<= 10 knots	23343	0.33
<= 15 knots	10745	0.15
<= 20 knots	5546	0.08
<= 25 knots	2939	0.04
<= 30 knots	981	0.01
<= 35 knots	326	0.00
<= 40 knots	122	0.00
<= 45 knots	46	0.00
<= 50 knots	14	0.00
<= 55 knots	2	0.00
<= 60 knots	2	0.00
<= 65 knots	3	0.00

Table 8: August gust frequency

	count	percent
<= 5 knots	24002	0.35
<= 10 knots	22731	0.33
<= 15 knots	11740	0.17
<= 20 knots	5366	0.08
<= 25 knots	2780	0.04
<= 30 knots	1312	0.02
<= 35 knots	551	0.01
<= 40 knots	126	0.00
<= 45 knots	22	0.00
<= 50 knots	11	0.00
<= 55 knots	0	0.00
<= 60 knots	1	0.00

Table 9: September gust frequency

	count	percent
<= 2 knots	7445	0.11
<= 4 knots	9789	0.14
<= 6 knots	12952	0.19
<= 8 knots	9306	0.13
<= 10 knots	7808	0.11
<= 12 knots	5985	0.09
<= 14 knots	4558	0.07
<= 16 knots	3815	0.05
<= 18 knots	2563	0.04
<= 20 knots	1658	0.02
<= 22 knots	1141	0.02
<= 24 knots	887	0.01
<= 26 knots	631	0.01
<= 28 knots	470	0.01
<= 30 knots	300	0.00
<= 32 knots	211	0.00
<= 34 knots	137	0.00
<= 36 knots	72	0.00
<= 38 knots	50	0.00
<= 40 knots	30	0.00
<= 42 knots	14	0.00
<= 44 knots	5	0.00
<= 46 knots	2	0.00
<= 48 knots	3	0.00

Table 10: October gust frequency

	count	percent
<= 5 knots	21670	0.33
<= 10 knots	21756	0.33
<= 15 knots	14290	0.22
<= 20 knots	5900	0.09
<= 25 knots	1794	0.03
<= 30 knots	617	0.01
<= 35 knots	214	0.00
<= 40 knots	53	0.00
<= 45 knots	21	0.00
<= 50 knots	13	0.00
<= 55 knots	11	0.00
<= 60 knots	9	0.00
<= 65 knots	1	0.00
<= 70 knots	1	0.00

Table 11: November gust frequency

	count	percent
<= 5 knots	22605	0.33
<= 10 knots	23008	0.33
<= 15 knots	14674	0.21
<= 20 knots	6410	0.09
<= 25 knots	1640	0.02
<= 30 knots	575	0.01
<= 35 knots	216	0.00
<= 40 knots	54	0.00
<= 45 knots	10	0.00
<= 50 knots	1	0.00
<= 55 knots	1	0.00

Table 12: December gust frequency

	count	percent
<= 5 knots	66553	0.33
<= 10 knots	68741	0.34
<= 15 knots	43134	0.21
<= 20 knots	18246	0.09
<= 25 knots	3923	0.02
<= 30 knots	1106	0.01
<= 35 knots	343	0.00
<= 40 knots	71	0.00
<= 45 knots	14	0.00
<= 50 knots	1	0.00
<= 55 knots	2	0.00

Table 13: Summer gust frequency

	count	percent
<= 5 knots	85775	0.41
<= 10 knots	77460	0.37
<= 15 knots	30462	0.15
<= 20 knots	9827	0.05
<= 25 knots	2695	0.01
<= 30 knots	604	0.00
<= 35 knots	125	0.00
<= 40 knots	18	0.00
<= 45 knots	17	0.00
<= 50 knots	18	0.00
<= 55 knots	12	0.00
<= 60 knots	5	0.00
<= 65 knots	1	0.00
<= 70 knots	0	0.00
<= 75 knots	1	0.00
<= 80 knots	0	0.00
<= 85 knots	1	0.00

Table 14: Autumn gust frequency

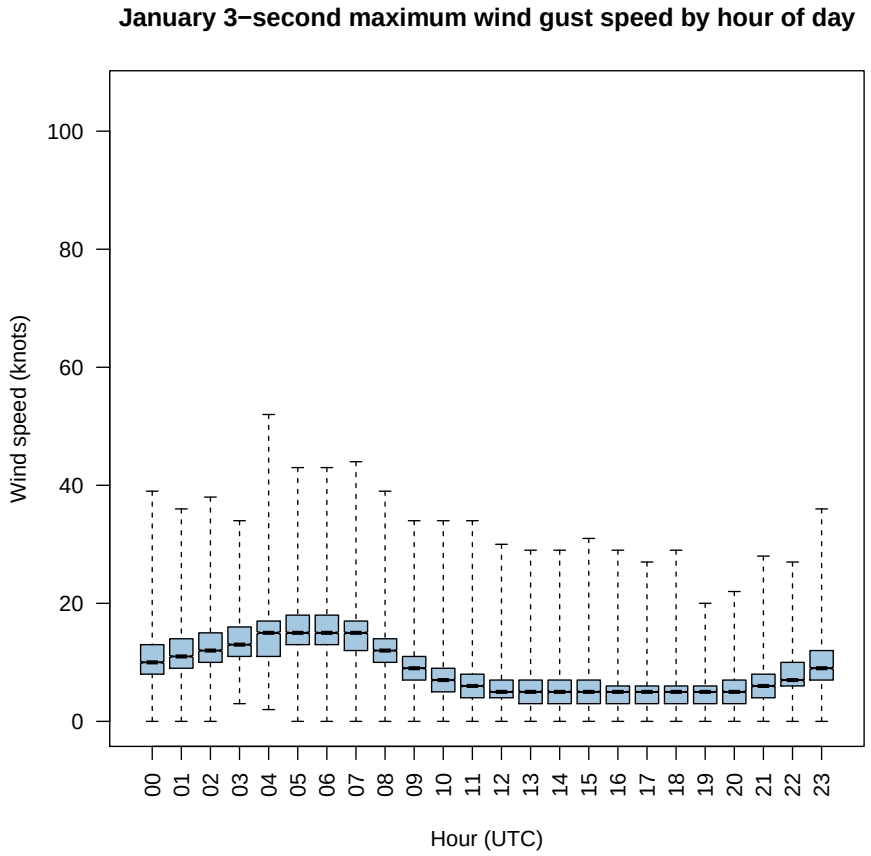
	count	percent
<= 5 knots	80844	0.40
<= 10 knots	71088	0.35
<= 15 knots	28786	0.14
<= 20 knots	13652	0.07
<= 25 knots	6351	0.03
<= 30 knots	2183	0.01
<= 35 knots	682	0.00
<= 40 knots	202	0.00
<= 45 knots	74	0.00
<= 50 knots	38	0.00
<= 55 knots	11	0.00
<= 60 knots	17	0.00
<= 65 knots	8	0.00
<= 70 knots	4	0.00
<= 75 knots	1	0.00
<= 80 knots	3	0.00
<= 85 knots	0	0.00
<= 90 knots	0	0.00
<= 95 knots	0	0.00
<= 100 knots	0	0.00
<= 105 knots	0	0.00
<= 110 knots	1	0.00

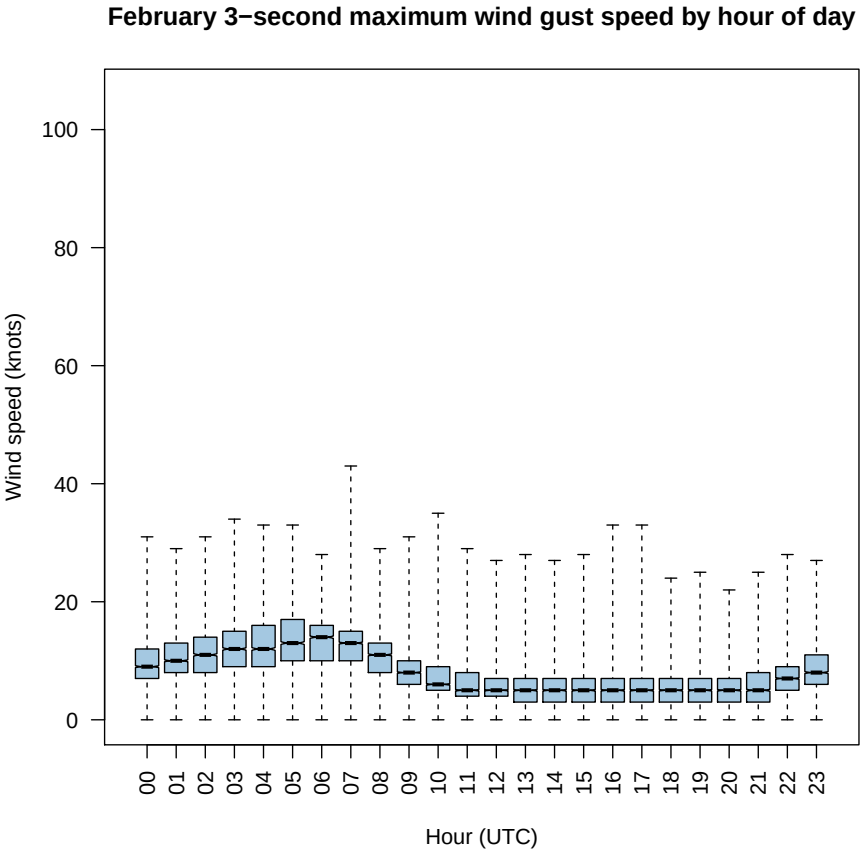
Table 15: Winter gust frequency

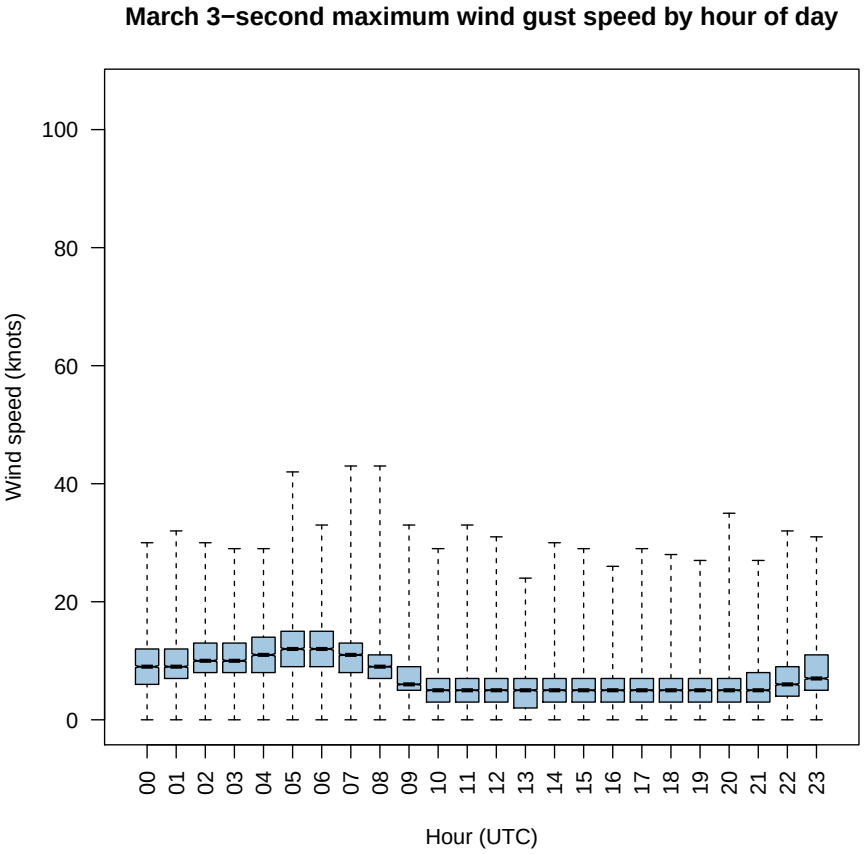
	count	percent
<= 5 knots	70554	0.34
<= 10 knots	66905	0.33
<= 15 knots	38734	0.19
<= 20 knots	17141	0.08
<= 25 knots	6950	0.03
<= 30 knots	2982	0.01
<= 35 knots	1149	0.01
<= 40 knots	295	0.00
<= 45 knots	64	0.00
<= 50 knots	27	0.00
<= 55 knots	11	0.00
<= 60 knots	10	0.00
<= 65 knots	1	0.00
<= 70 knots	1	0.00

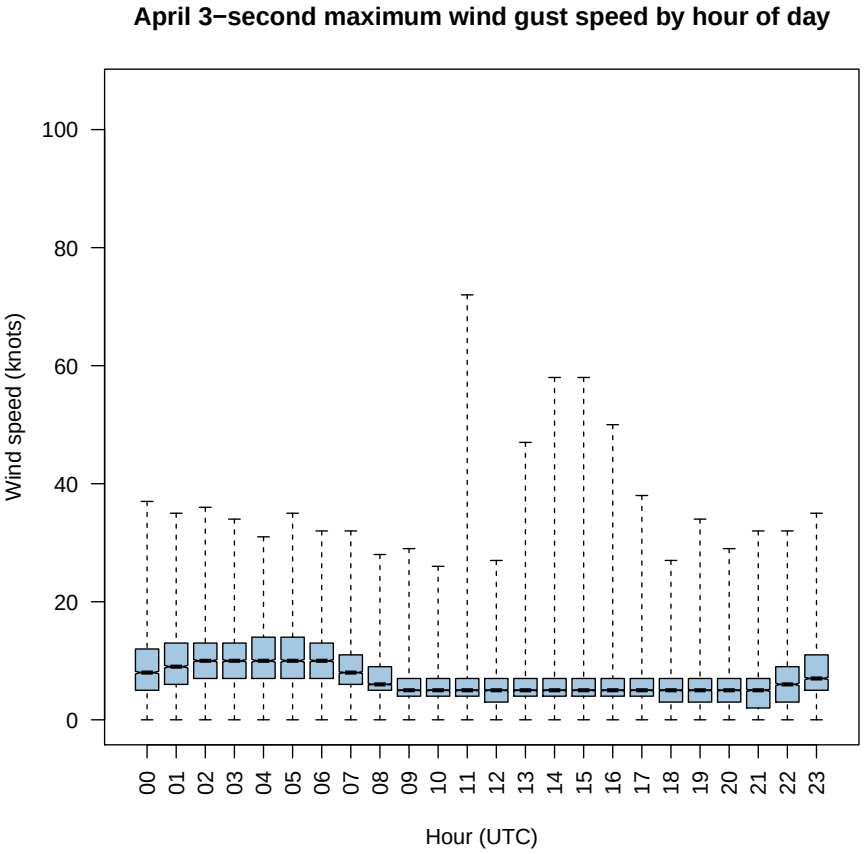
Table 16: Spring gust frequency

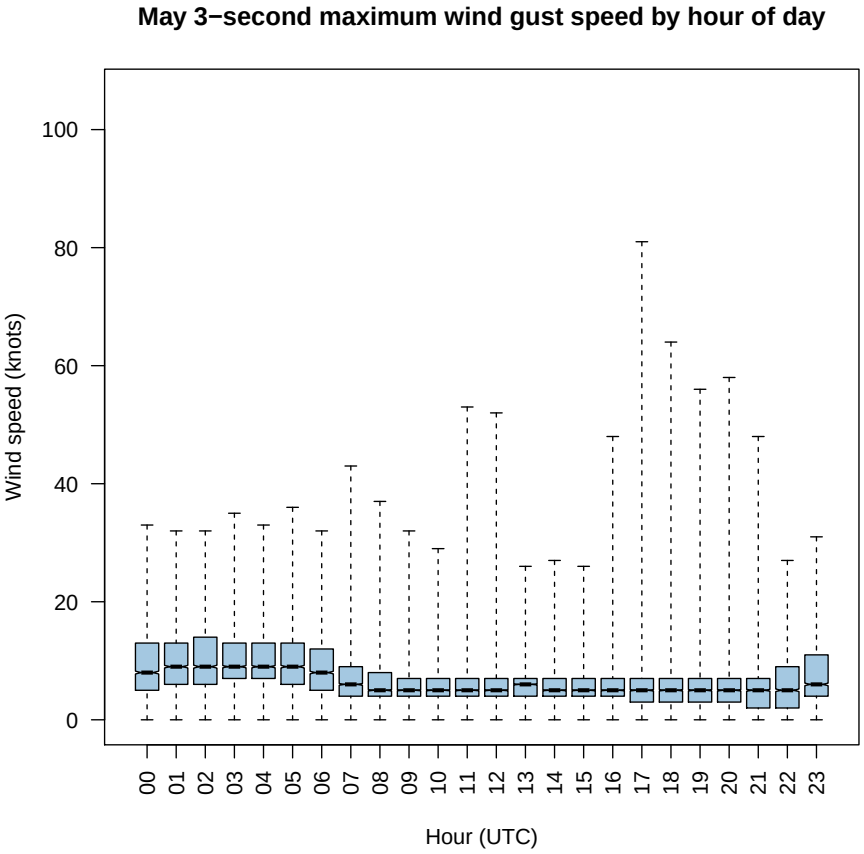
3-second maximum wind gust speed by hour of day

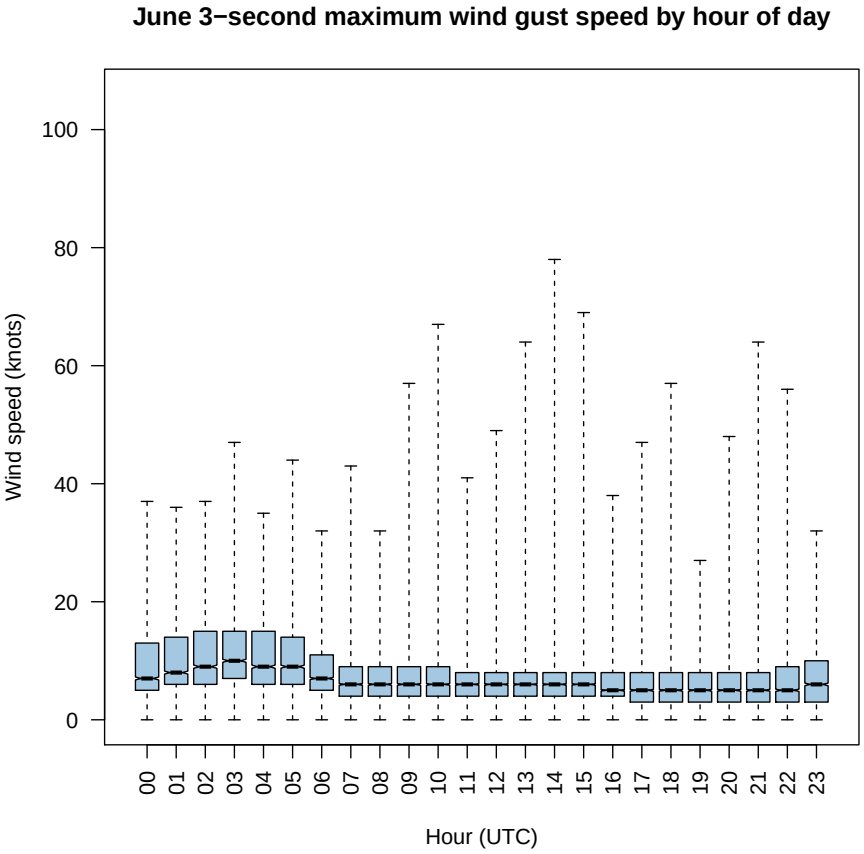


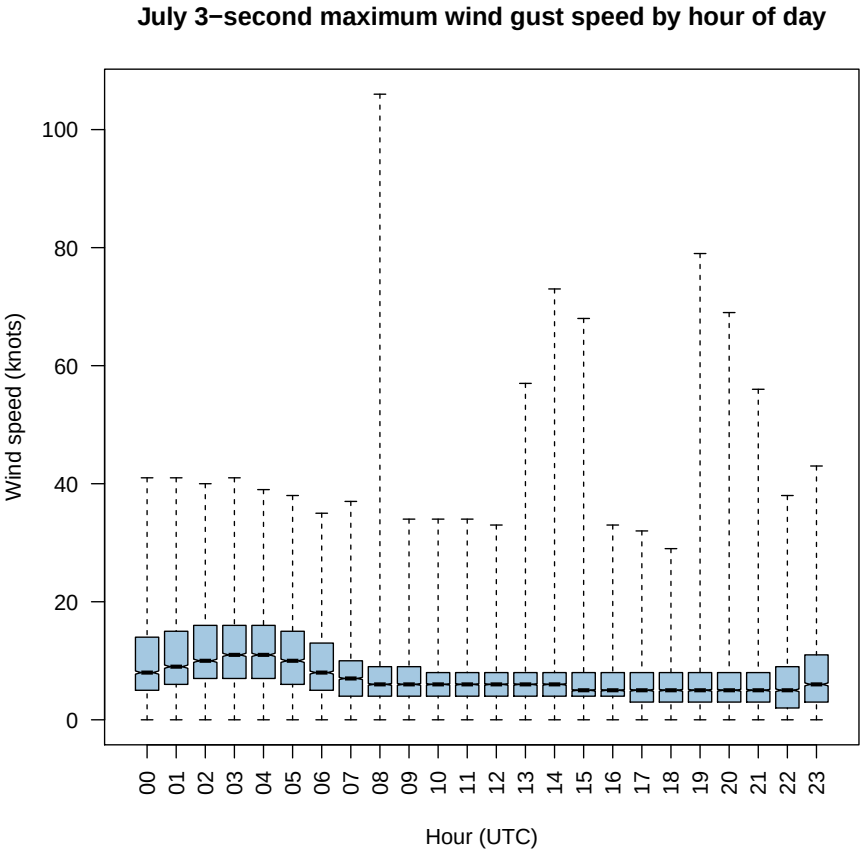

February 3−second maximum wind gust speed by hour of day
Wind speed (knots)
0
20
40
60
80
100
00
01
02
03
04
05
06
07
08
09
10
11
12
13
14
15
16
17
18
19
20
21
22
23
Hour (UTC)

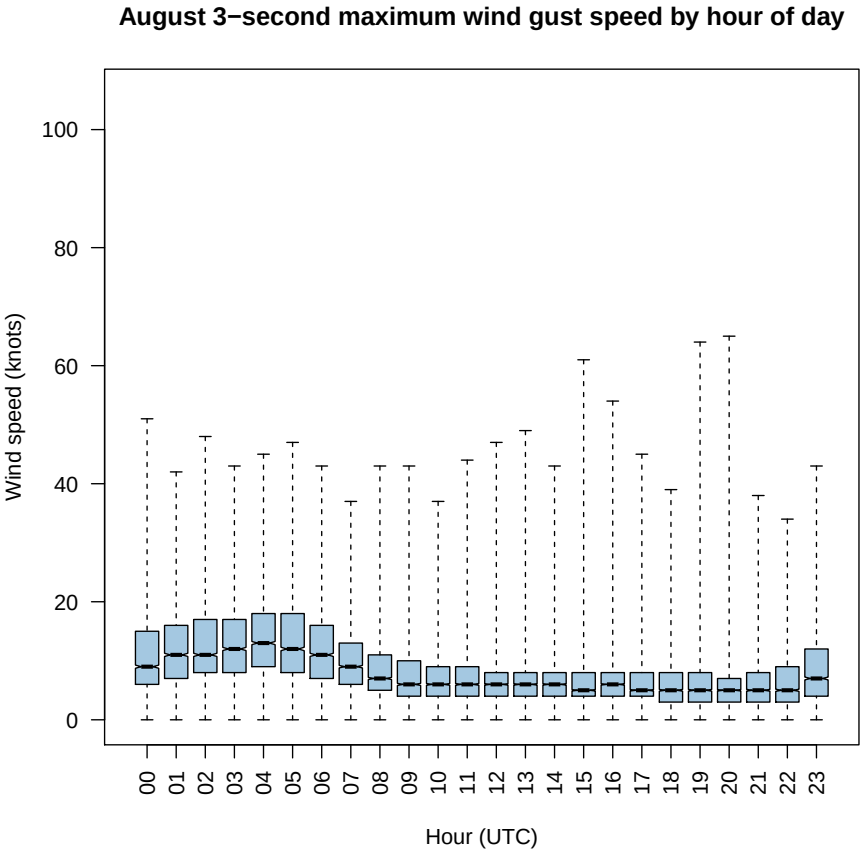

March 3−second maximum wind gust speed by hour of day
Wind speed (knots)
0
20
40
60
80
100
00
01
02
03
04
05
06
07
08
09
10
11
12
13
14
15
16
17
18
19
20
21
22
23
Hour (UTC)

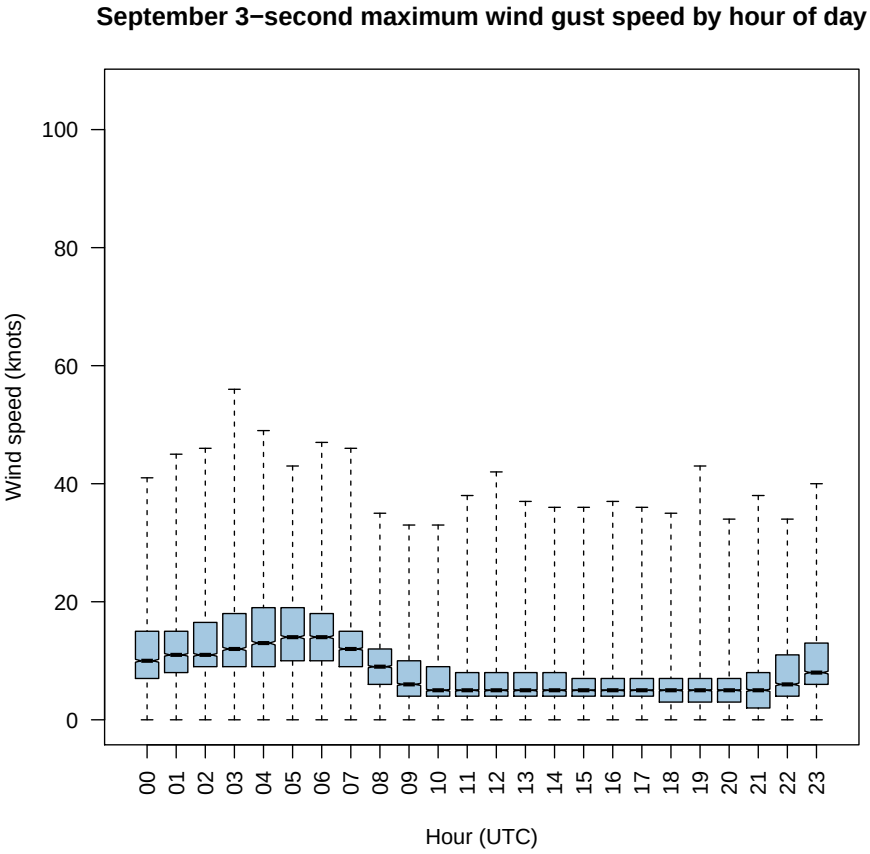

April 3−second maximum wind gust speed by hour of day
Wind speed (knots)
0
20
40
60
80
100
00
01
02
03
04
05
06
07
08
09
10
11
12
13
14
15
16
17
18
19
20
21
22
23
Hour (UTC)

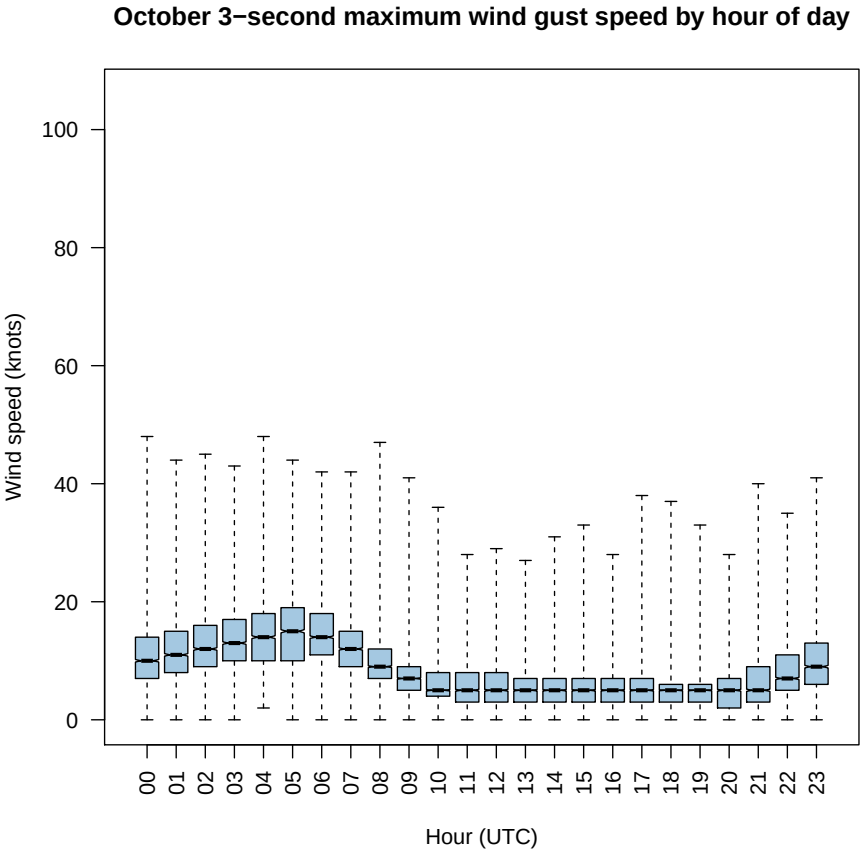

May 3−second maximum wind gust speed by hour of day
Wind speed (knots)
0
20
40
60
80
100
00
01
02
03
04
05
06
07
08
09
10
11
12
13
14
15
16
17
18
19
20
21
22
23
Hour (UTC)

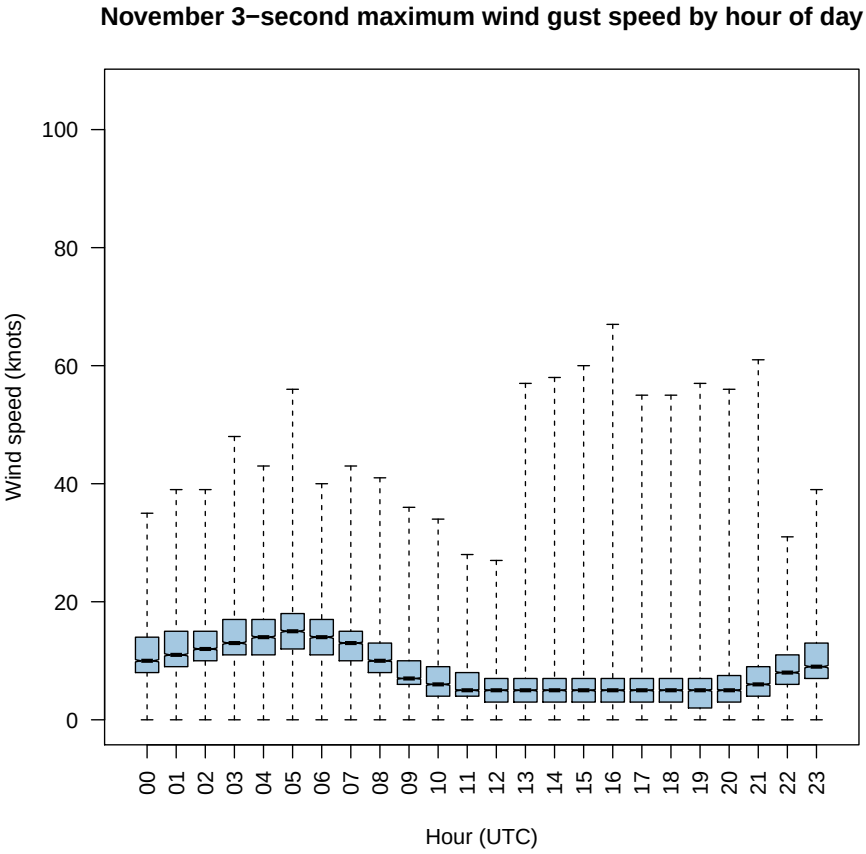

June 3−second maximum wind gust speed by hour of day
Wind speed (knots)
0
20
40
60
80
100
00
01
02
03
04
05
06
07
08
09
10
11
12
13
14
15
16
17
18
19
20
21
22
23
Hour (UTC)

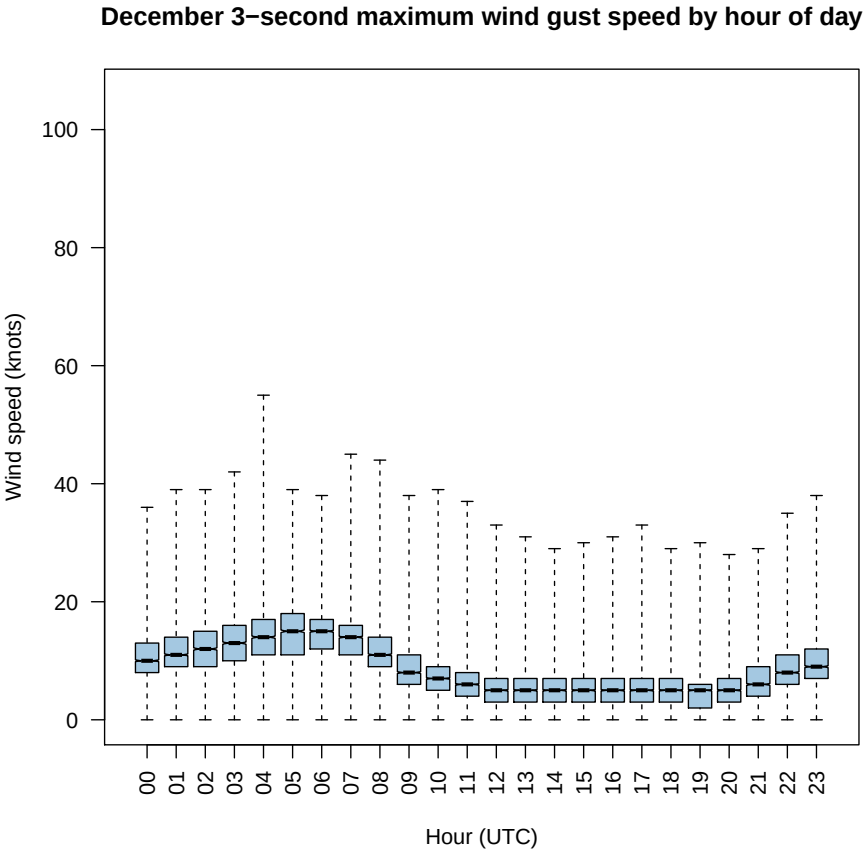

July 3−second maximum wind gust speed by hour of day
Wind speed (knots)
0
20
40
60
80
100
00
01
02
03
04
05
06
07
08
09
10
11
12
13
14
15
16
17
18
19
20
21
22
23
Hour (UTC)


August 3−second maximum wind gust speed by hour of day
Wind speed (knots)
0
20
40
60
80
100
00
01
02
03
04
05
06
07
08
09
10
11
12
13
14
15
16
17
18
19
20
21
22
23
Hour (UTC)


September 3−second maximum wind gust speed by hour of day
Wind speed (knots)
0
20
40
60
80
100
00
01
02
03
04
05
06
07
08
09
10
11
12
13
14
15
16
17
18
19
20
21
22
23
Hour (UTC)


October 3−second maximum wind gust speed by hour of day
Wind speed (knots)
0
20
40
60
80
100
00
01
02
03
04
05
06
07
08
09
10
11
12
13
14
15
16
17
18
19
20
21
22
23
Hour (UTC)


November 3−second maximum wind gust speed by hour of day
Wind speed (knots)
0
20
40
60
80
100
00
01
02
03
04
05
06
07
08
09
10
11
12
13
14
15
16
17
18
19
20
21
22
23
Hour (UTC)


December 3−second maximum wind gust speed by hour of day
Wind speed (knots)
0
20
40
60
80
100
00
01
02
03
04
05
06
07
08
09
10
11
12
13
14
15
16
17
18
19
20
21
22
23
Hour (UTC)

Attribution

The wind roses provided here use the R package openair http://openair-project.org

Carslaw, D.C. and K. Ropkins, (2012). openair - an R package for air quality data analysis. Environmental Modelling & Software. Volume 27-28, 52-61.

Carslaw, D.C. (2014). The openair manual - open-source tools for analysing air pollution data. Manual for version 1.0, King's College London.

Appendix C: Using an IFD to assess the significance of rainfall events

To assess the significance of past rainfall events requires the following steps:

1) Obtain the rainfall data.
    a. Daily rainfall data from Bureau gauges can be obtained at: http://www.bom.gov.au/climate/data/.
    b. Subdaily data requests from Bureau gauges can be made from http://www.bom.gov.au/climate/data/stations/. In order to obtain an accurate assessment of significance for very short duration events, it will be necessary to request the data at one-minute time intervals.
2) Extract the highest rainfall depth for each standard duration from the data. AWS data at the Badgerys Creek site is available to a time resolution of one minute. Assuming we want the highest rainfall depths for standard durations of say, *n* minutes, where *n* could be 5, 10, 15, … 1440 ..4320 minutes, we form overlapping *n* minute rainfall depths and take the highest value for each duration. By taking the highest value in this manner we are not restricted to a specific clock time. The IFDs are not constrained to a clock hour therefore when comparing the data with the IFDs we can be confident we are getting the most accurate estimate of the significance of the rainfall event.
3) Plot the data on the IFD curve or compare with the IFD table.

    The maximum rainfalls for each duration can then be plotted on the IFD chart or compared with the IFD table. This will tell us the significance of the event at every duration and the duration at which the event was most significant.