

# Guide to Understanding the Forecast

The Antigua and Barbuda Meteorological Service (ABMS) issues forecasts for sky condition, precipitation probability, precipitation accumulation, wind, seas and temperature. Because the weather is always changing, the terminology used in these forecasts are also quite variable. Listed below are descriptions of regularly used weather terms that should give you a better understanding of each forecast.

## Sky Condition

Sky condition	Opaque cloud coverage
Overcast	8/8
Cloudy	7/8 to 8/8
Mostly Cloudy	5/8 to 7/8
Partly Cloudy / Partly Sunny	3/8 to 5/8
Mostly Clear / Mostly Sunny	1/8 to 2/8
Clear / Sunny	Less than 1/8

Forecast of cloud cover normally give the predominant or average sky conditions, if no significant variations are expected and is based on eighths of the sky covered by opaque (not transparent) clouds. A partly sunny day, for example, may at times be cloudy.

If a high probability of precipitation (70 percent or greater) is expected, then the sky condition may be omitted since it is inferred from the precipitation forecast.

Forecasters expecting significant variations in cloud amount may use such terms as sunny periods, sunny breaks, cloudy periods, cloudy at times, mostly/mainly sunny, mostly/mainly cloudy.

If expecting a major change in cloud cover, they usually indicate a distinct trend, e.g. becoming sunny or cloud increasing.

Fair means less than 3/8 opaque clouds, no precipitation, and no extreme conditions of visibility, wind, or temperature (generally pleasant weather conditions). It is recommended using above terms rather than “Fair” – especially during the day.

Terms other than those listed above may be used if they convey a better picture of what is expected. The terms listed below are viewed as hedge terms and will be used sparingly and with great discretion.

- Clear to partly cloudy
- Partly cloudy to cloudy
- Fair to partly cloudy
- Variable cloudiness

## Probability of precipitation or chance of precipitation

The probability of precipitation (POP) or chance of precipitation (COP) is defined as the likelihood, in percent (%), that measurable precipitation of at least 0.25 mm (0.01 in) will fall on “any random point of the forecast region” during the forecast time.

A forecast of, for example: “40 percent chance of showers” for Antigua for today, means that there is a 40% likelihood that rainfall of at least 0.25 mm will fall on any random point of Antigua today.

Please note:

- This does not mean that there is a 40% probability of it showering for the whole of today (the forecast period), only the probability that at least 0.25 mm will fall on any random point of Antigua (the forecast area) today (during the forecast period).
- This does not mean that it will be showering for 40% of the time, only the probability that at least 0.25 mm will fall on any random point of Antigua (the forecast area) today (during the forecast period).
- This does not mean it will be showering over 40 percent of Antigua (the forecast area) today (during the forecast period), only the probability that at least 0.25 mm will fall on any random point of Antigua (the forecast area) today (during the forecast period).
- If there is a 40% chance of showers, there is a 60% chance of none.

Whenever the POP/COP is expected to be between 10 and 90% inclusive, it is indicated in the forecast, 0 and 100% will not be included in the forecast. The POP/COP values are stated in increments of 10 per cent, as indicated in the following table.

The 24-hour forecast will include both quantitative and qualitative probabilities or chances of showers. For example:

**Weather today:** Partly sunny with a 20 percent or a slight chance of showers.

**Weather tonight:** Mostly cloudy with a 70 percent or a high chance of showers.

Chance of precipitation (COP) or thunderstorms	Terminology
0%	Not mention in the forecast
10%, 20%	10 percent or a slight chance of... 20 percent or a slight chance of...
30%	30 percent or a low chance of...
40%, 50%, 60%	40 percent or a moderate chance of... 50 percent or a moderate chance of... 60 percent or a moderate chance of...
70%	70 percent or a high chance of...
80%, 90%	80 percent or a very high chance of... 90 percent or a very high chance of...
100%	Not mention in the forecast

If the forecast for showers is 0 or 100 percent, the forecast will be stated deterministically i.e. without probabilities. For example:

**Weather today:** Partly sunny.

**Weather tonight:** Mostly cloudy with showers.

## Quantitative precipitation forecasting (possible rainfall total)

Rainfall amounts will be reported in the following products when the given thresholds totals are possible:

- For the 24-hour issued twice daily: more than 5 mm (0.20 in) and a probability (chance) of precipitation greater than 20%
- For the forecast discussion: more than 5 mm (0.20 in)
- For the four-day forecast discussion: 25 mm (1 in) or more

The language that will be used to state this information, as the last line of the synopsis, is: **“Possible rainfall total for the forecast period is xx mm or xx in”** For example:

**Synopsis:** A trough system will cause unsettled weather across the area. Possible rainfall total for the forecast period is 5 to 10 mm or 0.20 to 0.40 in.

What does the possible rainfall total mean? The first value means the location has a 50% chance of receiving at least that amount of rain. The second represents a 25% chance of receiving at least that amount. So, for the forecast above of **“5 to 10 mm”**, the location has a 50% chance of receiving 5 mm or more, and a 25% chance of receiving 10 mm or more.

Days where the rainfall range is larger generally suggest a very rainy day where anyone under the path of the impacting weather system will receive a lot of rain but others may stay completely dry or get just a few drops. On the other hand when the rainfall range shows reasonably large totals but a relatively small range like 15 to 20 mm, there's usually widespread rain falling from a broad-scale cloud system, not just showers or thunderstorms popping up here or there.

Even when there's very little likelihood of rain, you'll still see a 'Chance of rain' value, once there is a 50% of 5 mm or more; so, you can make decisions based on your own threshold for this likelihood.

If the “possible rainfall” amount is not shown, it is because there is a less than 25% chance of 5 mm or more, in the case of the 24-hour forecasts and the Forecast Discussion and 25 mm or more, in the case of the Four-day Forecast Discussion. It may also be absent if the chance of showers is less than 30%.

## Other probabilistic precipitation terminologies

For the purposes of the synopses, discussions and general forecasts, the following terms and probabilities are associated:

- (Showers) not or unexpected: 0 to 20%
- (Showers) possible (chance of...): 30 to 50%

- (Showers) likely: 60 to 70%
- (Showers) expected: 80 to 100%

E.g. of use: A tropical wave will possibly cause showers or will likely cause showers or is expected to cause showers; however, thunderstorms are not expected.

These terms can be quite useful in communicating (presenting) the weather situation when there are significant uncertainties.

## Precipitation duration terms

- Brief (periods of): Of short duration - lasting for no longer than 10 minutes at a time
- Occasional: while not frequent, is occurring - for around 20% of the time
- Intermittent: ceases at times - occurring with 10-minute breaks
- Frequent (periods of): occurring regularly and often - occurring for around 80% of the time
- Continuous: does not cease or ceases only briefly.
- Periods of: fall for most of the time, but there will be breaks.

Duration terms imply categorical occurrence of precipitation at any given point and, therefore, require very high (80 to 100%) COPs.

## Precipitation intensity terms

- Light: rain rate of less than 2.5 mm per hour (less than 0.125 mm per 3 minutes)
- Moderate: rain rate of 2.5 mm per hour to less than 10 mm per hour (0.125 to less than 0.5 mm per 3 minutes)
- Heavy: rain rate of 10 mm per hour to less than 50 mm per hour (0.5 to less than 2.5 mm per 3 minutes)
- Violent (very heavy, intense or extreme): rain rate of 50 mm per hour or greater ( $\geq 2.5$  mm per 3 minutes).

## Wind direction

The wind direction is based on true north orientation and is the direction the wind is blowing from. For example, a northerly wind is blowing from the north towards the south.

The wind direction describes the prevailing direction or the direction from which the wind blows most of the time.

Name of the wind direction	Abbreviation	Degrees blowing from	Degrees range blowing from
North	N	360	350 to 20
North-northeast	NNE	20	0 to 40
Northeast	NE	45	30 to 60
East-northeast	ENE	70	50 to 90
East	E	90	70 to 110
East-southeast	ESE	110	90 to 130
Southeast	SE	135	120 to 150
South-southeast	SSE	160	140 to 180
South	S	180	160 to 200
South-southwest	SSW	190	180 to 220
Southwest	SW	225	210 to 240
West-southwest	WSW	250	230 to 270
West	W	270	250 to 290
West-northwest	WNW	290	270 to 310
Northwest	NW	320	300 to 330
North-northwest	NNW	340	320 to 360

Forecast of wind direction normally gives the predominant or prevailing wind direction, if no significant variations (more than 20 degrees) are expected. For example, a day when east-northeast winds are forecast, there may at times when the winds blow from the northeast or east but for most of the time (80 percent) is expected to be within 20 degrees of east-northeast (70 degrees).

Direction, in plain language, will be given to 16 points of the compass. Except for very large forecast areas (example – Eastern Caribbean), only one direction will normally be given for a (12 hour) period. However, when the wind is expected to shift, two directions may be given; example, "Wind: East at 10 knots becoming (or shifting to) the northeast at 14 to 20 knots" or, depending on the emphasis given, "Wind: Shifting to the northwest at 14 to 20 knots," etc.

## Wind speed

Wind is made up of gusts and lulls. The ABMS's forecasts of wind speed and direction are the **average** of these gusts and lulls, measured over a 10-minute period at a height of 10 metres above sea level. The gusts during any 10-minute period are typically 40% higher than the average wind speed.

For example, when the average wind speed is 25 knots, it is normal to experience gusts of 35 knots and lulls of lighter winds. The wind describes the prevailing direction from which the wind is blowing, with speeds in km/h and knots.

Wind speed usually increases with height above the land or sea-surface, so winds at the surface are not typically as strong as they are at 10 metres, where wind is measured and forecast by the ABMS.

A wind forecast range (for example, 10 to 15 knots) may be given when the wind speed is expected to vary significantly.

Wind speed and direction can be influenced significantly by the local environment. Cliffs and other landscape features will affect winds.

Checking wind conditions is one of the five vital weather safety checks everyone should complete before heading out on the water. The others being: marine warnings, changing weather, wave conditions and tides.

Wind descriptive term	Mean 10-minute wind speed and limits (km/h)	Mean 10-minute wind speed and limits (knots)
Calm	0 km/h	0
Light wind	7 (2 to 13)	4 (1 to 6)
Gentle wind	17 (13 to 19)	9 (7 to 10)
Moderate wind	24 (20 to 30)	13 (11 to 16)
Fresh wind	35 (31 to 39)	19 (17 to 21)
Strong wind (Windy)	44 (41 to 50)	24 (22 to 27)
Near gale wind	56 (52 to 61)	30 (28 to 33)
Gale force wind	69 (63 to 74)	37 (34 to 40)
Strong gale force wind	81 (76 to 87)	44 (41 to 47)
Storm winds	96 (89 to 102)	52 (48 to 55)
Violent storm winds	111 (104 to 117)	60 (56 to 63)
Hurricane winds	119+	64+

Forecast of wind speed normally give the predominant range of the wind speed. The forecast range should seldom exceed 15 km/h or 8 knots and never exceed a range of 19 km/h or 10 knots.

For example, the forecast for a day may indicate wind speed of 11 to 22 km/h (mean of 17 km/h). This means that there may at times when the wind speed is 8 km/h or 24 km/h but the mean or predominant speed should be within 9 km/h or 5 knots of the forecast mean speed (17 km/h) 80 percent of the time.

1 km/h = 0.54 knot = 0.62 mph

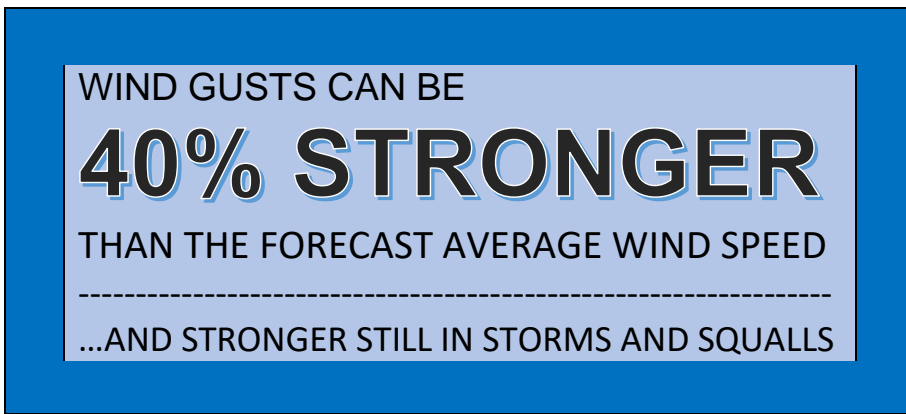
## Wind gusts

A gust is any sudden increase of wind of short duration, usually a few seconds.

The gusts are generally calculated as the 10-minute mean wind speed times a factor of 1.4 i.e. 40% stronger than the forecast average wind speed.

So, on a day with forecast wind speed of 11 to 22 km/h, the gusts will be around 15 to 31 km/h

The gust will usually be forecast once it exceeds 40 km/h



See link for more [https://www.wmo.int/pages/prog/www/tcp/documents/WMO\\_TD\\_1555\\_en.pdf](https://www.wmo.int/pages/prog/www/tcp/documents/WMO_TD_1555_en.pdf)

## Wind Advisories

**Gale warning:** A gale warning means winds of 34 to 47 knots with or without higher gusts are imminent or occurring. This may not or may be associated with a tropical cyclone; however, a tropical cyclone watch or warning is not applicable.

**High wind advisory:** A high wind advisory means winds of 22 to 27 knots with or without higher gusts are imminent or occurring but are not strong enough to warrant a high wind warning. Wind of this strength could make some outdoor activities uncomfortable, if not outright dangerous. High winds can create dangerous fallen or blowing objects. Residents should secure loose outdoor items, which can be blown away, and caution should be taken if driving.

**High wind warning:** A high wind advisory means winds of 28 to 33 knots with or without higher gusts are imminent or occurring. Wind of this strength will make outdoor activities dangerous. High winds can create dangerous fallen or blowing objects. Residents should secure loose outdoor items, which can be blown away, and stay indoors.

**Hurricane warning:** An announcement that sustained winds of 64 knots (74 mph or 119 km/h) or higher are expected somewhere within the specified area in association with a [tropical](#), [subtropical](#) or [post-tropical](#) cyclone. Because hurricane preparedness activities become difficult once winds reach [tropical storm](#) force, the warning is issued 36 hours in advance of the anticipated onset of tropical-storm-force winds. The warning can remain in effect when dangerously high water or a combination of dangerously high water and waves continue, even though winds may be less than [hurricane](#) force.

**Monitored area:** An area designated by the ABMS for which most tropical cyclones that impact Antigua and Barbuda have their genesis. Warning issued on time the following points: 10N 40W, 16N 68W, 20N 66W, 15N 40W.

**Tropical cyclone alert:** The tropical cyclone alert means that a tropical cyclone has developed in our monitored area but not close enough for a watch or warning to be issued, or a disturbance within our monitored area with at least a >50% chance of becoming a tropical cyclone (depression, tropical storm or hurricane).

## Waves

Forecast of the seas gives the **total or significant wave height** i.e. the average height of the top one-third of all wave heights. Normally, the predominant range is forecast with that range normally being less than 1 metre or less than 3 feet. Thus, wave height values describe the average height of the highest one-third of the waves.

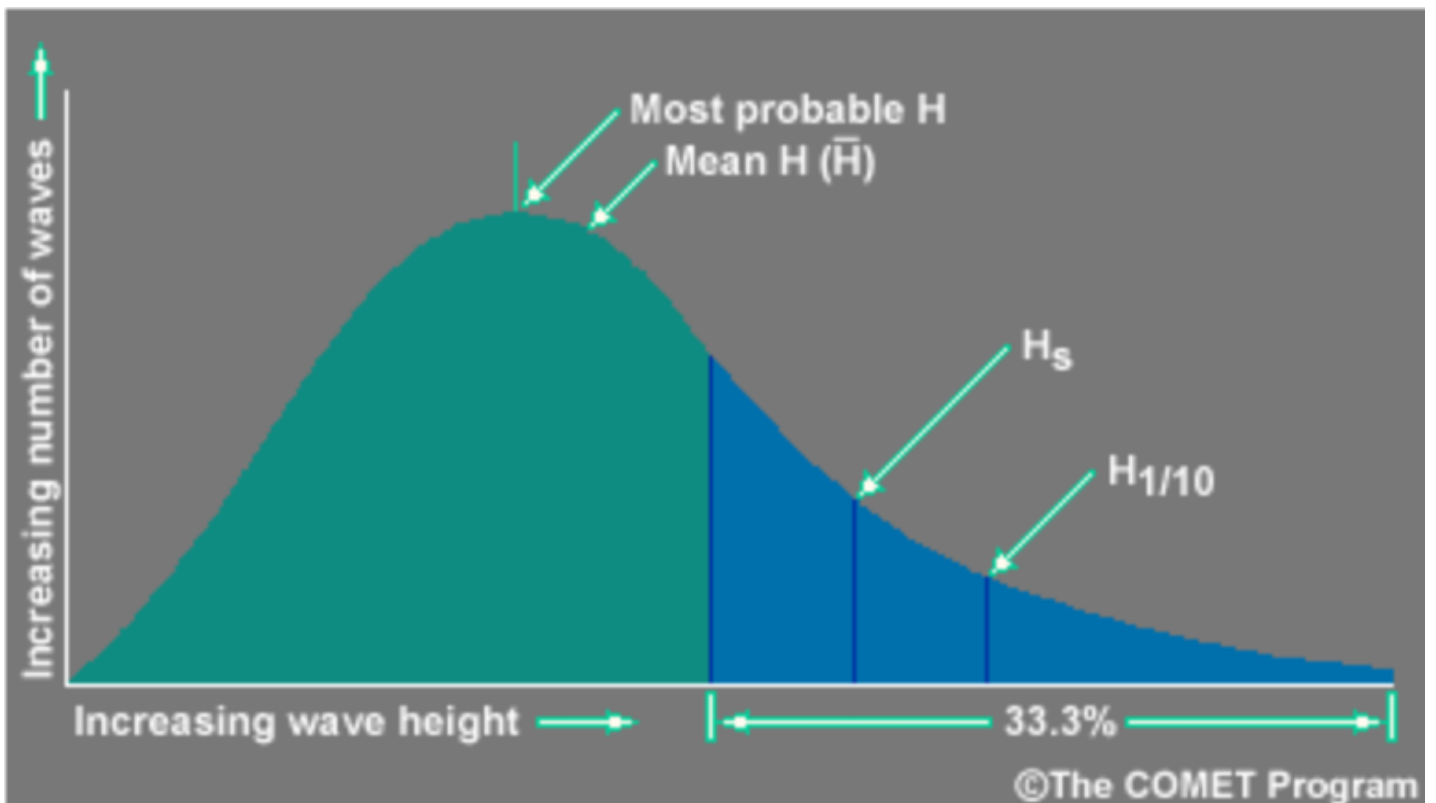
The ABMS does not forecast maximum wave heights in routine forecasts. Statistically it is estimated that about one in every 2000 to 3000 waves (three to four times a day) will be approximately twice the height of the significant wave.

Wave Height			
It is normal for waves to vary in height from one to the next. To give you an idea of the range of wave to expect at a given time, the ABMS provides the <b>total or significant wave height</b> , in its marine forecast.			
Most frequent waves	Significant Waves	Occasional waves	Maximum waves
The most frequent wave height is 0.64 or a little more than half of the <b>significant wave height</b> .	The significant wave height is the average height of the top one-third of all wave heights. About 14% of waves will be higher than the <b>significant wave height</b> (about 1 in every 7 waves). This is equivalent to a probability of around 14%.	Occasional wave height is the average height of the top one-tenth of all wave heights. It is 1.27 of the <b>significant wave height</b> . About 4% of all waves will be higher than the occasional wave height (about 1 in every 25).	The maximum wave height is twice the <b>significant wave height</b> . It is normal to expect a wave of twice the height of the significant wave about 3 times in 24 hours. <b>This means that you need to be prepared for a wave of this height before heading out to sea.</b>

For example, on a day when the forecast is for significant wave heights of 2 m or 7 feet. The most frequent (average) wave height a mariner will encounter is  $(2 \times 0.64)$  1.3 m or 4.3 feet. Occasionally, he will encounter wave heights of  $(2 \times 1.27)$  2.5 m or 8 feet (2 to 7 per hour). Rarely he will encounter heights of  $(2 \times 1.67)$  3.3 m or 11 feet (0 to 1 per hour). And more rarely, 4 m or 13 feet, 3 to 4 times per day.

By theory, several symbolic conventions are used in marine meteorology to classify wave heights within the wave spectrum (below).





Where (above):

Mean H = Average wave height ( $0.64H_s$ )

$H_s$  or  $H_{1/3}$  = Significant wave height (the highest of the highest 33% or the mean height of the top 1/3 of waves)

$H_{1/10}$  = The highest of the highest 10% of waves

$H_{max}$  = Maximum probable wave height for a large sample of waves

$H_s$  is the mean height of the highest one third of the waves passing a point.  $H_{1/3}$  is of particular interest, since its wave height correlates best with the wave height a trained observer reports after examining a group of wave heights from a ship or platform ( $H_{1/3}$  has a probability of about 14% or 1 in 7 waves). The averaged periods of the waves used to compute significant wave height is known as the significant wave period.

Other wave height statistics can be computed from  $H_s$ , the standard used because nearly all subjective wave heights are estimated in terms of  $H_s$ :

H mean (mean wave heights) =  $0.64H_s$

$H_{1/10}$  (highest of the highest 10% of waves) =  $1.27H_s$

$H_{1/100}$  (highest of the highest 1% of waves) =  $1.67H_s$

$H_{max}$  (Highest waves you should be on the alert for) =  $2.0H_s$ , for a reasonably large sample of waves (> 2000)

## Wave definitions

**Sea (or wind) waves** are generated by the local prevailing wind and vary in size according to the length of time a particular wind has been blowing, the fetch (distance the wind has blown over the sea) and the water depth.

**Swell waves** are the regular longer period waves generated by distant weather systems. There may be several sets of swell waves travelling in different directions, causing a confused sea state.

**Combined sea and swell** is also known as **total wave height**, or **significant wave height**. Combined sea and swell describes the combined height of the sea and the swell that mariners experience on open waters. The height of the combined sea and swell refers to the average wave height of the highest one third of the waves.

A forecast of sea waves of 1.5 metres, and a forecast of swell waves of 1.5 metres, could result in a total wave height of 2.1 metres. See lookup table below: which is based on the equation: Combined sea and swell height =  $\sqrt{\{(Wind\ Wave\ Height)^2 + (Swell\ Wave\ Height)^2 + (Secondary\ Swell\ Wave\ Height)^2\}}$

		SWELL HEIGHT (metres)									
		0	0.5	1.0	1.5	2.0	2.5	3.0	4.0	5.0	6.0
SEAS or WIND WAVE HEIGHT (metres)	0.5	0.5	0.7	1.1	1.6	2.1	2.6	3.0	4.0	5.0	6.0
	1.0	1.0	1.2	1.4	1.8	2.2	2.7	3.2	4.1	5.1	6.1
	1.5	1.5	1.6	1.8	2.1	2.5	2.9	3.4	4.3	5.2	6.2
	2.0	2.0	2.1	2.2	2.5	2.8	3.2	3.6	4.5	5.4	6.3
	2.5	2.5	2.6	2.7	2.9	3.2	3.5	3.9	4.7	5.6	6.5
	3.0	3.0	3.0	3.2	3.4	3.6	3.9	4.2	5.0	5.8	6.7
	4.0	4.0	4.0	4.1	4.3	4.5	4.7	5.0	5.7	6.4	7.2
	5.0	5.0	5.0	5.1	5.2	5.4	5.6	5.8	6.4	7.1	7.8
	6.0	6.0	6.0	6.1	6.2	6.3	6.5	6.7	7.2	7.8	8.5

The ABMS provides forecasts of swell and sea to the nearest 0.5 metres, as much as possible. To be consistent with this precision, the total or significant wave height values in the above table should be "rounded" to the nearest 0.5 metres, as much as practicable.

**Sea state** describes the combination of sea (wind) waves and swell.

**Wave height** (trough to crest) for both sea and swell refers to 'significant wave height' which represents the average height of the highest one-third of the waves. Some waves will be higher and some lower than the significant wave height. **The probable maximum wave height can be up to twice the significant wave height.**

**King or rogue waves** are waves typically greater than twice the significant wave height. These very large waves are known to occur in areas where ocean currents run opposite to the prevailing sea and swell and where waves overrun each other, generating steep and dangerous seas. Mariners should be prepared for a rogue wave encounter.

## Sea and swell terms

**Sea waves:** waves generated by the wind blowing at the time, and in the recent past, in the area of observation.

**Peak wave period:** Period in seconds between the swells of the primary swell component. The larger the time difference, the greater the amount of energy associated with the swells.

**Primary swell:** Height and direction of the swell with the highest energy component. This is sometimes referred to as the dominant swell.

**Secondary swell:** Height and direction of the swell with the second highest energy component.

**Swell period:** See Peak Wave Period.

**Swell waves:** waves which have travelled into the area of observation after having been generated by previous winds in other areas. These waves may travel thousands of kilometres from their origin before dying away. There may be swell present even if the wind is calm and there are no 'sea' waves.

**Wave period:** the average time interval between passages of successive crests (or troughs) of waves.

**Wave height:** Generally taken as the height difference between the wave crest and the preceding trough.

**Wave length:** The mean horizontal distance between successive crests (or troughs) of a wave pattern.

## Sea state

**Sea state** describes the combination of sea (wind) waves and swells. The sea state can be described with respect to wind waves or with respect to swells.

## Wave explanations

Description*	Height (metres)	Effect	WMO sea state code
Calm (glassy)	0	No waves breaking on beach	0
Calm (rippled)	0 to 0.1	No waves breaking on beach	1
Smooth (wavelets)	0.1 to 0.5	Slight waves breaking on beach	2
Slight	0.5 to 1.25	Waves rock buoys and small craft	3
Moderate	1.25 to 2.5	Sea becoming furrowed (corrugated)	4
Rough	2.5 to 4	Sea deeply furrowed	5
Very rough	4 to 6	Sea much disturbed with rollers having steep fronts	6
High	6 to 9	Sea much disturbed with rollers having steep fronts (damage to foreshore)	7
Very high	9 to 14	Towering seas	8
Phenomenal	Over 14	Precipitous seas (experienced only in cyclones)	9

\*Based on sea (or wind) waves only.

Resource: <https://www.metoffice.gov.uk/guide/weather/marine/beaufort-scale>

## Swell explanations

Description*	Wave length (m)	Period	Wave height (m)
Low swell of short or average length	0 to 200	Less than 11 sec.	0 to 2
Long, low swell	Over 200	Greater than 11 sec.	0 to 2
Short swell of moderate height	0 to 100	Less than 8 sec.	2 to 4
Average swell of moderate height	100 to 200	9 to 10 sec.	2 to 4
Long swell of moderate height	Over 200	Greater than 11 sec.	2 to 4
Short heavy swell	0 to 100	Less than 8 sec.	Over 4
Average length heavy swell	100 to 200	9 to 10 sec.	Over 4
Long heavy swell	Over 200	Greater than 11 sec.	Over 4

\*Based on sea swells only.

Resource: <http://www.bom.gov.au/marine/knowledge-centre/reference/waves.shtml>

In the forecast, the qualitative sea state descriptions are not generally use. We simply indicate the significant wave heights without using the term “significant wave heights”. Once (primary) swells are 4 feet or more, they are also indicated, separate from the significant wave height, along with the direction they are expected to come from. For example:

With wind waves 2 feet and swells 3 feet, significant wave height =  $\sqrt{(2^2 + 3^2)} = 3.6$  feet

**Seas:** Less than 1.5 metres or less than 5 feet.

With wind waves 2 feet and swells 4 feet, significant wave height =  $\sqrt{(2^2 + 4^2)} = 4.5$  feet

**Seas:** 1.5 metres or 5 feet. Swells northeast at less than 1.5 metres or 4 feet.

*See page 9 and Appendix V for more*

Swells, especially the long period ones – greater than 11 seconds, in deep, open water, present less of a hazard to most mariners than wind waves, which are often relatively steep.

Swells become dangerous when they move into shallow waters. When a wave approaches shallowing waters, it tends to become steeper and taller through a process called shoaling. **Wave heights can double** when shoaling and become so steep that they break in open water. Shoaling typically occurs near shore from the gradual shallowing of the sea floor.

## Marine warnings

**Small craft caution:** A small craft caution means that wind speeds of 15 to 19 knots and or seas (wind waves) of at least 6 feet are expected to produce somewhat hazardous wave conditions to small crafts. Inexperienced mariners, especially those operating smaller vessels should exercise caution when navigating these conditions.

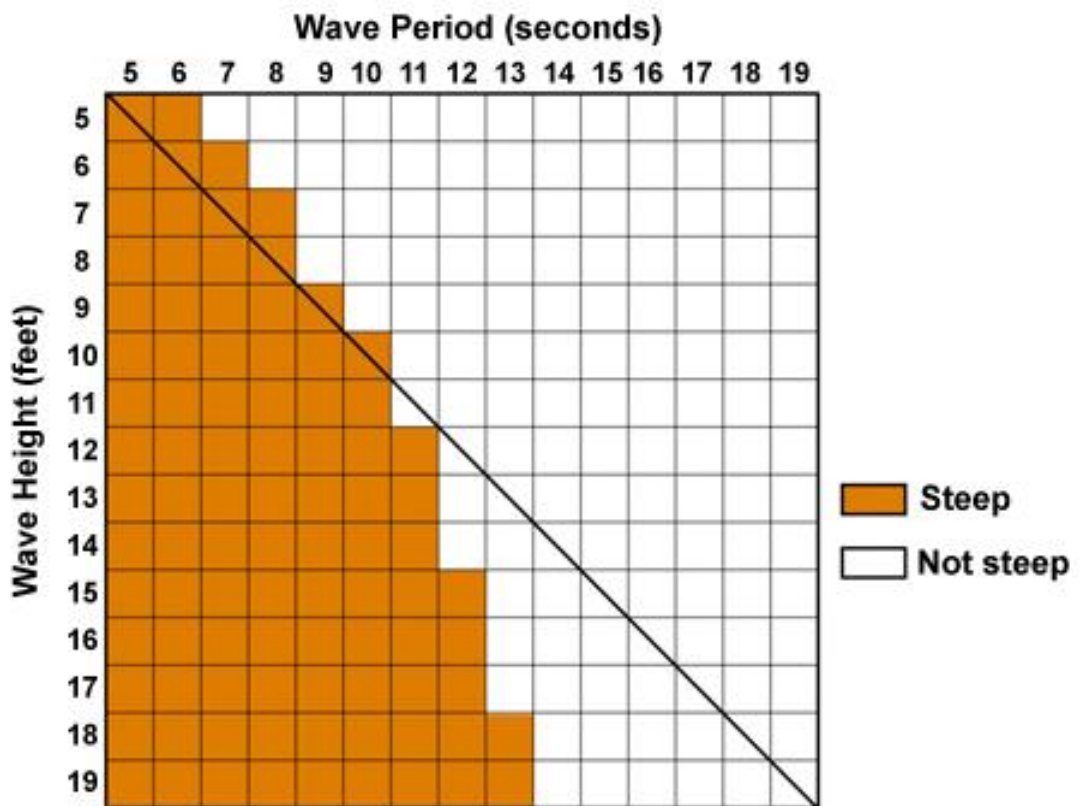
**Small craft advisory:** A small craft advisory means that wind speeds of 17 to 21 knots and or seas (wind waves) of 7 to 8 feet or greater are expected to produce hazardous wave conditions to small crafts. Inexperienced mariners, especially those operating smaller vessels should avoid navigating in these conditions.

**Small craft warning:** A small craft warning means that wind speeds of 21 to 33 knots and or seas (wind waves) of 9 feet or greater are expected to produce hazardous wave conditions to small crafts. Small craft operators should stay in port.

**High surf advisory:** A high surf advisory means that dangerous high surfs of 6 to 10 feet (from swells approximately 4 to 7 feet) will affect beaches in the advisory area, producing localized beach erosion and dangerous swimming conditions. Beachgoers should be extremely cautious; bathe only where lifeguards are present or the sheltered, less affected beaches on the south.

**High Surf warning:** A high surf warning means that dangerous battering surfs, in excess of 10 feet (from swells generally in excess of 7 feet), will pound the shoreline, producing especially life-threatening conditions and a heightened threat to property. No one should enter the surf zone.

Based on our understanding of waves and the danger they pose to small crafts, no advisories for small craft will be for seas that are not deemed steep or squared i.e. the wave height equal wave period. Further, generally none will be given to small craft operators when the local winds do not exceed 30 km/h or do not exceed 16 knots.



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Generally, no small craft advisories will be issued when the local winds do not exceed 30 km/h or do not exceed 16 knots and when the wind wave heights do not exceed 5 feet.

## Temperature

The temperature in a forecast is used to describe the forecast maximum and minimum temperature than could be reached in a given period for some place in the forecast area. In some cases, it could be the maximum or minimum temperature expected at a specific time within a specific area, plus or minus a couple degrees.

Temperature description	Forecast Meaning
Around 30 / Near 30 / About 30	A range of temperatures from 29 to 31
Lower 30s	Temperatures of 30, 31, 32, 33
30 to 35	Temperatures of 30, 31, 32, 33, 34, 35
Upper 20s	Temperatures of 27, 28, or 29
Middle 20s	Temperatures of 24, 25 or 26
20s	A range of temperatures from 20 to 29
Upper teens	Temperature of 17,18 or 19
Mid teens	14, 15, 16

## Forecast time periods

Normally, forecasts are divided into periods (12 hours/day and night). In some instances, the forecast may be divided into subperiods (6 hours).

Temperature description	Forecast Meaning
Today	8 AM – 8 PM (Sunrise – Sunset)
This Morning	6AM – Midday (Sunrise – Midday)
Early Morning	6AM – 9AM (Sunrise to 9AM)
Late Morning	9AM – Midday
Near/Around Midday	11AM – 1PM
This Afternoon	Midday – 6PM (Midday – Sunset)
Early Afternoon	Midday to 3PM
Late Afternoon	3PM – 6PM (3PM – Sunset)
This Evening	6PM – Midnight (Sunset – Midnight)
Early Evening	Sunset – 9PM (6PM – 9PM)
Late Evening	9PM – Midnight (9PM – Midnight)
Near/Around Midnight	11PM to 1AM
After Midnight	Midnight to 3AM
Fore-day Morning	3AM – 6PM (3PM – Sunrise)
Tonight	8 PM – 8 AM
Tomorrow	8 AM – 8 PM
Day of Week (e.g. Tuesday)	8 AM Tuesday – 8 AM Wednesday

Other more explicit time periods may also be used

## Appendix I: National (24-Hour) Forecast Format and Content

<b>Synopsis:</b>	<The lead of the forecast – consisting of the most notable forecast item(s) along with the system expected to affect the area and the possible rainfall total for the forecast period, if there is a 50% chance of it exceeding 5 mm; the lower range has a 50% chance and the upper has a 25% chance i.e. 5 to 10 mm means 50% chance of 5 mm of rain falling and 25% chance of 10 mm falling>
<b>Weather today:</b>	<The weather forecast for today – cloud coverage and qualitative and quantitative chance/probability of precipitation (rain/showers) and thunderstorms>
<b>Weather tonight:</b>	<The weather forecast for today – cloud coverage and qualitative and quantitative chance/probability of precipitation (rain/showers) and thunderstorms>
<b>Wind:</b>	<The wind direction and speed (in km/h and knots), including gusts when applicable. Wind advisories and warnings when required. A standalone wind statement will be issued to complement advisories and warnings.>
<b>Seas:</b>	<The significant wave heights, in metres and feet, with a separate indication of the swells and their direction, if their height is 4 feet or greater. Cautions, advisories and warnings will be included when required or certain thresholds are met. Standalone marine statements will be issued to complement the advisories and warnings.>
<b>Rainfall (today/last night):</b>	<Coming soon - The max rainfall total for last night across Antigua and Barbuda>
<b>Rainfall (month):</b>	<The rainfall total for the month at the Airport>
<b>Temperature:</b>	<Forecasting and reporting of maximum (high) and minimum (low) temperatures across Antigua and Barbuda. Also, forecasting and reporting of the heat index (feel-like temperature will be added soon with suitable advisories and warnings. In forecasting the max temperature, we will use the following language: “the max/high temperature could reach XX C or XX F. In forecasting the min temperature, we will use the following language: “the min/low temperature could fall to XX C or XX F.”>
<b>Sunrise:</b>	<The sun rise time for tomorrow>
<b>Sunset:</b>	<The sunset time today or tomorrow>



## Appendix II: Eastern Caribbean (24-Hour) Forecast Format and Content

- Synopsis:** <The lead of the forecast – consisting of the most notable forecast item(s) along with the systems expected to affect the area. A general forecast is given for the islands, as a whole, or as sub-groupings. Qualitative probability terms will be used to indicate the chance of precipitation and other weather phenomena. The product will generally answer the questions: what, when, where, why, what and how.>
- Wind:** <The wind direction and speed (in km/h and knots), including gusts when applicable.>
- Seas:** <Significant wave heights in metres and feet. No advisories will be issued in this product, for advisories, please see your national forecasts, including your marine weather forecast.>

Note: This is not designed to be a very detailed forecast but rather to give the general weather situation and forecast for the Eastern Caribbean i.e. Puerto Rico to Trinidad, including Barbados.

## Appendix III: The Leeward Islands and British Virgin Islands Four-Day Forecast Synopsis

This synopsis is a description of weather patterns and systems expected to affect the area over the four-day period, this includes nearshore and offshore waters. It should capture the most significant/impactful/important weather patterns and systems. Sky condition may be omitted if there is no value added or lost to the synopsis or cloud coverage is implied by the weather pattern stated, for example - if there is a least a high probability of precipitation forecast. Significant departures from normal winds, seas and temperatures etc. should be indicated. Also, in addition to saying what the weather will be, also include **what the weather will do**, especially if significant.

The Synopsis Answers the following questions:

- What are the main weather systems or features or conditions that will dominate the weather over the upcoming four days?
  - Tropical wave, tropical cyclones, Saharan Dust? Etc.
- What will the weather be and do, when and where, i.e. which day(s) or part thereof and which island(s)?
  - A tropical wave will cause showers and thunderstorms Monday morning and Thursday, otherwise, mostly dry weather will prevail.
  - Will possible rainfall total reach or exceed an inch.
- Will the wind depart from the norm, if yes, when and perhaps why?
  - What are the potential for advisories i.e. high wind advisories, warnings, alerts, watches, warnings etc.
- Will the seas depart from the norm, if yes, when and perhaps why?
  - What are the potential for marine cautions, advisories, warnings etc.

The Synopsis should generally be no more than 12 lines or no more than 200 words and covers the period of four days starting 8 am the following day until four days later. For example, if today is Wednesday, the synopsis starts 8 am Thursday and ends 8 am Monday morning. Please note that a day begins and ends at 8 am.

### Sample

Winds and seas will subside in the next 24 hours; small craft advisories will be dropped by then. Mostly dry weather will prevail as a result of the continued flow of dry and dusty air from the Saharan Desert, which will also reduce air quality. The chance of showers will increase slightly as the Saharan Dust decreases during the next couple of days. A tropical wave is expected on Friday; notwithstanding, the chance of showers will not rise above moderate levels. Winds and seas will pick back up late Friday; marine cautions and advisories may be required then, for hazardous seas, which could curtail marine activities. The maximum temperature could rise to near 36 C or 97 F on Thursday across some areas, resulting in dangerously warm conditions, leading to health issues for some.

## Appendix IV: Area Forecast Discussion Content and Format

The Area Forecast Discussion should, among other things, answer the following questions:

- What has happened since the last set of routine forecasts were issued?
- What are the notable weather features?
  - For example: Has it rain? How much (totals based on radar and gauges)? Cloud coverage, moisture levels? Etc.
- What has caused the weather?
- What system(s) are responsible for the weather?
  - Tropical wave? High pressure system? Cold front? Saharan Dust? Advection? Etc.
- Will what has happened continue or change and to what?
- What are the models (GFS, GEFS, NAM, ECMWF etc) indicating?
  - Do models have differing forecasts? Which are you leaning toward and why?
  - Any known biases or shortcomings of the models?
- How do the latest observations, analyses and model data compare with the last issued forecasts?
  - Will 5 or more mm of rain fall? If so, please indicate.
- Are updates required to the last issued forecast based on existing establish thresholds?
  - If updates are required, please so indicate; if not also so indicate.
  - If updates are issued, all relevant communication outlets are to be updated, including but not limited to the website and hotline.

The Area Forecast Discussion should be as brief as possible; however, it should be at least 6 lines or 100 words and generally not exceed 12 lines or 200 words.

The morning discussion should consider all that has happened since the **last set of forecasts** was issued i.e. 8 to 11 am and forecast out to 8 am the following day. On the other hand, the evening discussion should consider all that has happened since the **last set of forecasts** was issued i.e. 8 to 11 pm and forecast out to 8 pm the following day.

As with any forecasting process a good conceptual model (CM) - analysis (what is happening) and diagnosis (why is it happening) of the actual state of the atmosphere is an essential condition for a good weather forecast.

Satellite data, numerical model output and conventional observations (e.g. radiosondes and synops) are the tools for such conceptual models. A combination of these three enables the forecaster to obtain a proper three-dimensional image of the atmosphere. The 3D view can be extended by a fourth dimension – time. CM allow both an interpretation of satellite data and the subsequent use of this data in combination with other data, such as numerical output and conventional observation data.

Sample:

AREA FORECAST DISCUSSION  
FOR THE LEEWARD ISLANDS AND BRITISH VIRGIN ISLANDS  
ISSUED BY ANTIGUA AND BARBUDA METEOROLOGICAL SERVICES

15:15 UTC JUNE 1 2018

**DISCUSSION:** THIS MORNING, FRESH WINDS CONTINUED, RESULTING IN SEAS REMAINING HAZARDOUS. ALSO, RELATIVELY DRY AND DUSTY CONDITIONS PREVAILED ACROSS THE AREA. NO PRECIPITATION WAS REPORTED BY ANY OF THE WEATHER STATIONS IN THE AREA AND NONE WAS SEEN ON RADAR IMAGES. ONLY FEW TO SCATTERED CLOUDS WERE SEEN ACROSS THE SKIES OF THE ISLANDS. THE VERY SETTLED WEATHER WAS DUE LARGELY TO THE DRY AND DUSTY AIR FROM THE SAHARAN DESERT AND THE PROXIMITY OF A HIGH PRESSURE SYSTEM AT THE LOWER LEVELS OF THE ATMOSPHERE. THE DUST CAUSED AIR QUALITY LEVELS TO REMAIN AT MODERATE LEVELS. THE LATEST SURVEY OF MODELS INDICATES THAT THE DUST IS WANING AND THE HIGH IS DRIFTING AWAY; HOWEVER, LOW RELATIVE HUMIDITY LEVELS AND DIVERGING WINDS AT THE LOWER LEVELS WILL PERSIST THROUGH, AT LEAST, EARLY THURSDAY MORNING. FURTHER, THE WINDS ARE FORECAST TO DECLINE; HENCE, SEAS SHOULD START TO SUBSIDE THIS AFTERNOON; THUS, THE CURRENT SMALL CRAFT ADVISORY WILL LIKELY BE DROPPED WITHIN THE NEXT 24 HOURS. THE LATEST OBSERVATIONS, MODEL RUNS AND ANALYSES ARE CONSISTENT WITH THE LAST ISSUED FORECASTS; HENCE, NO UPDATES ARE REQUIRED.

**FORECASTER**

MARY JANE

Last updated June 28, 2018

## Appendix V: Seas

In the forecast, the qualitative sea state descriptions are not generally use. We simply indicate the significant wave heights without using the term “significant wave heights”. Once (primary) swells are 4 feet or more, they are also indicated, separate from the significant wave height, along with the direction they are expected to come from. For example:

With wind waves 2 feet and swells 3 feet, significant wave height =  $\sqrt{(2^2 + 3^2)} = 3.6$  feet

**Seas:** Less than 1.5 metres or less than 5 feet.

With wind waves 2 feet and swells 4 feet, significant wave height =  $\sqrt{(2^2 + 4^2)} = 4.5$  feet

**Seas:** 1.5 metres or 5 feet. Swells northeast at less than 1.5 metres or 4 feet.

With wind waves 4 feet and swells 2 feet, significant wave height =  $\sqrt{(4^2 + 2^2)} = 4.5$  feet

**Seas:** 1.5 metres or 5 feet.

With wind waves 3 feet and swells 5 feet, significant wave height =  $\sqrt{(3^2 + 5^2)} = 5.8$  feet

**Seas:** 2 metres or 6 feet. Swells northeast at 1.5 meters or 5 feet. A high surf advisory is in effect.

With wind waves 6 feet and swells 5 feet, significant wave height =  $\sqrt{(6^2 + 5^2)} = 7.8$  feet

**Seas:** 2.5 metres or 8 feet. Swells northeast at 1.5 meters or 5 feet. A small craft caution and a high surf advisory are in effect.

With wind waves 7 feet and swells 5 feet, significant wave height =  $\sqrt{(7^2 + 5^2)} = 8.6$  feet

**Seas:** Over 2.5 metres or 9 feet. Swells northeast at 1.5 meters or 5 feet. Small craft and high surf advisories are in effect.

With wind waves 9 feet and swells 8 feet, significant wave height =  $\sqrt{(9^2 + 8^2)} = 12$  feet

**Seas:** Over 3.5 metres or 12 feet. Swells northeast at 2.5 meters or 8 feet. Small craft and high surf warnings are in effect.

*See pages 9 and 11 for more*