



Product guide

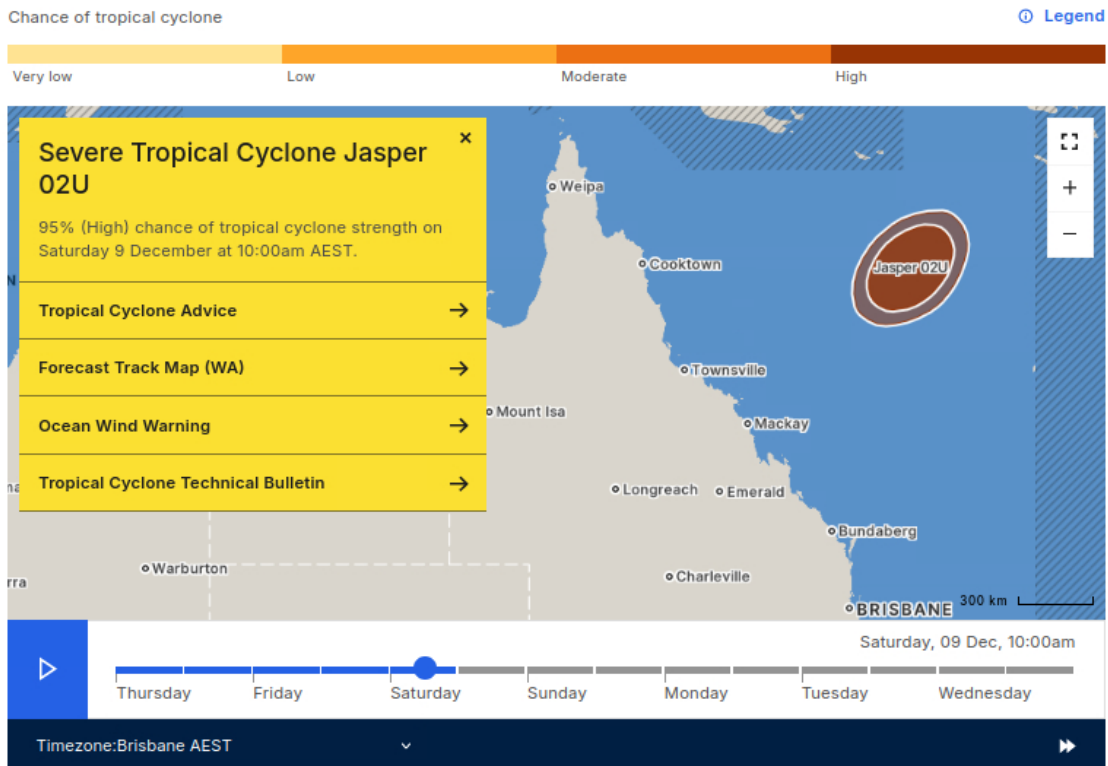
Tropical Cyclone 7 Day Forecast

22 October 2024



Tropical cyclone 7 day forecast

7 day forecast map





Document and release history

Date	Version	Author	Description
10 August 2023	1.0	Lauren Pattie, Vikash Prasad, Andrew Burton, Tony Wedd	First release.
22 October 2024	2.0	Rabi Rivett, Vikash Prasad, Joe Courtney, Andrew Burton	Change to show likely centre position areas for 7 days and possible centre position areas for the first 3 days.



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Cover image: Tropical Cyclone 7 Day Forecast. Systems displayed in the interactive map is Severe Tropical Cyclone Jasper in December 2023.

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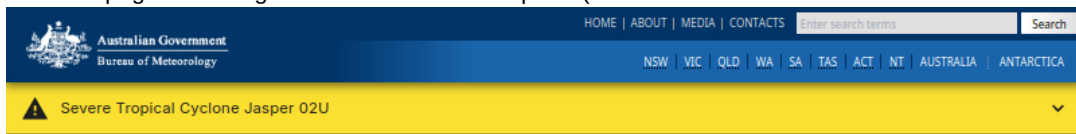


1. Product description

1.1. What is the Tropical Cyclone 7 Day Forecast?

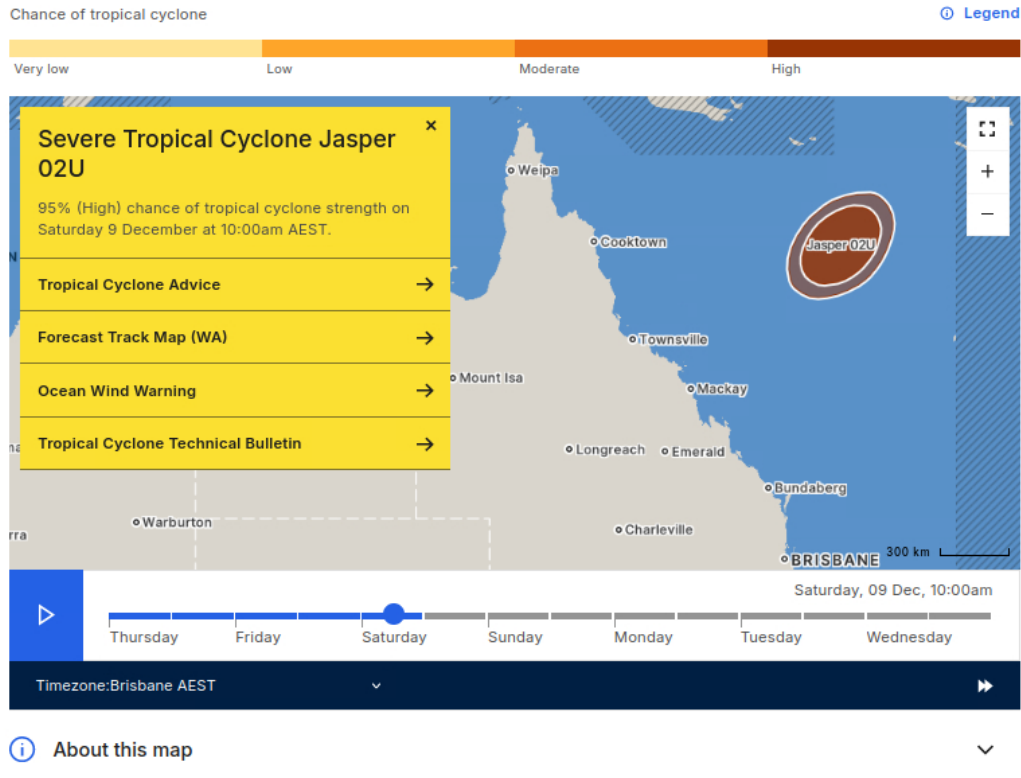
The Tropical Cyclone 7 Day Forecast is a web-based graphical forecast product providing customers with information about tropical cyclones impacting the Australian region, and Australian communities, over the next 7 days. This product provides forecast information on the location of significant tropical weather systems and the likelihood that they will be at tropical cyclone intensity, at twice daily timesteps.

The web page delivering the service has 3 main parts (



Tropical cyclone 7 day forecast

7 day forecast map



7 day forecast table

[Legend](#)

Tropical lows	Thu 7 Dec 10:00 am	Thu 7 Dec 10:00 pm	Fri 8 Dec 10:00 am	Fri 8 Dec 10:00 pm	Sat 9 Dec 10:00 am	Sat 9 Dec 10:00 pm
Severe Tropical Cyclone Jasper 02U	100% High	100% High	100% High	100% High	95% High	95% High

[Download 7 day forecast table \(CSV 0.72 KB\)](#)

Figure 1 and

Forecast description

Severe Tropical Cyclone Jasper 02U

Tropical Cyclone Jasper forecast to gradually move towards the Queensland coast.

- Jasper is now at category 3 intensity and is expected to continue to strengthen overnight tonight, while tracking south-southwest into the Coral Sea. Jasper is forecast to reach category 4 intensity by Friday, thereafter some weakening may occur over the weekend.
- Jasper is forecast to gradually move on a general southwesterly track towards the Queensland coast early next week. At this stage the highest risk of a cyclone impact is the region north of Mackay.
- Please refer to the latest track map and information for more details.

Figure 2):

1. An interactive map, which gives a visual summary of the potential for tropical cyclone development.
2. A table, providing a quick way to assess the likelihood that a tropical weather system will be at tropical cyclone intensity over the next 7 days.
3. Text summarising the movement and development of each tropical weather system.

In addition to the components of the Tropical Cyclone 7 Day Forecast, the web page links to tropical cyclone warning products when current. Refer to these warnings for more specific details on tropical weather systems and hazard information. Warnings are accessible via a yellow banner across the top of the page and via the interactive map as a yellow pop-up when you click on a

tropical weather system (

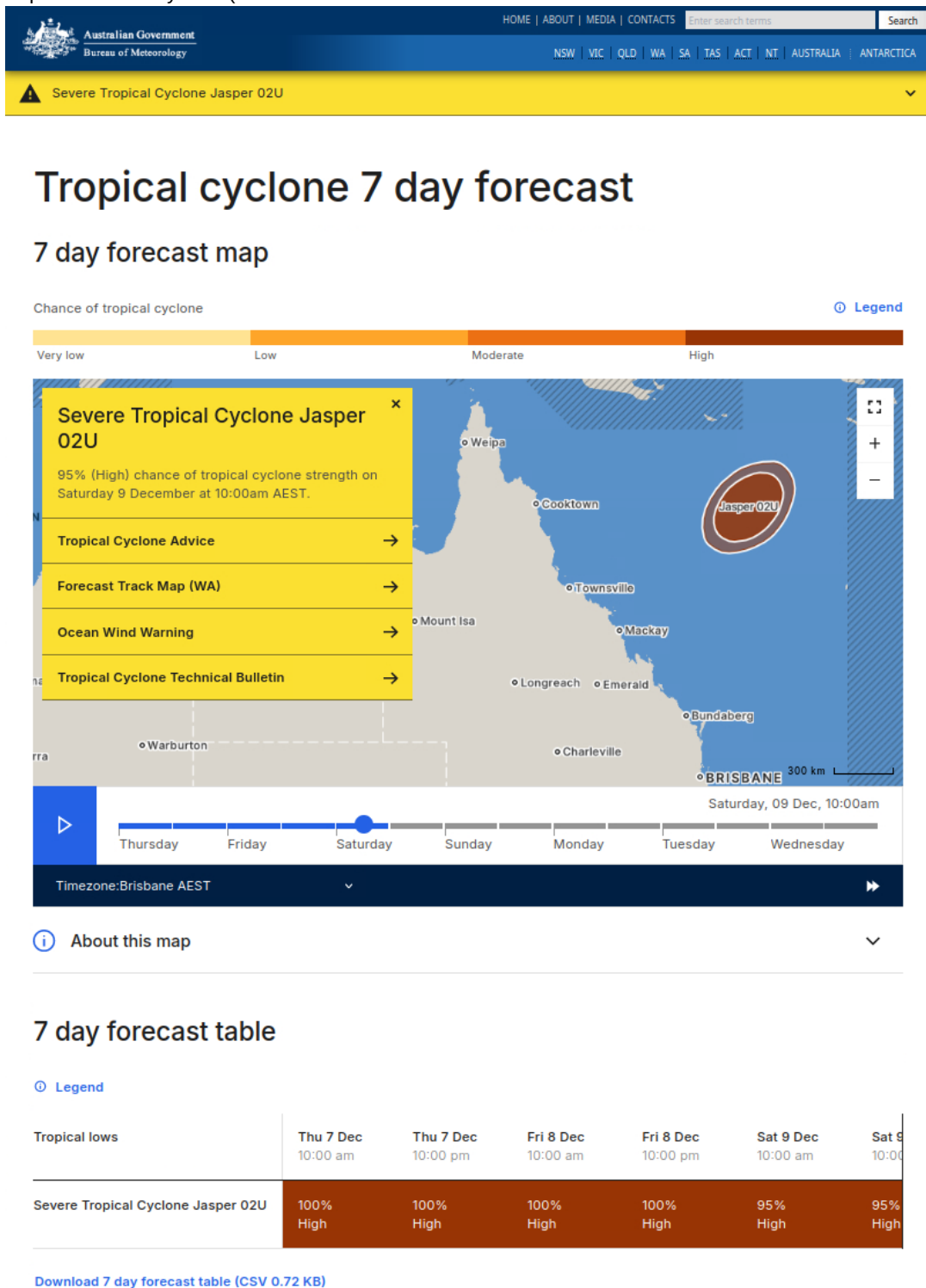


Figure 1).

1.2. What are the benefits of the Tropical Cyclone 7 Day Forecast?

The Tropical Cyclone 7 Day Forecast makes it easier for customers to determine the likelihood of a tropical cyclone affecting locations of interest during the next 7 days.

Benefits include:

- Easy visualisation, via an interactive map, with shaded areas indicating the likely location of the tropical weather system. The colour indicates the potential for a tropical cyclone. Each tropical weather system is also allocated a unique Disturbance ID, for example 22U.
- Additional information will display once a tropical weather system is significant, in a yellow pop-up box.
- When a tropical low becomes a tropical cyclone, it is given a unique name, for example Jasper, which appears on the interactive map.
- A 7 day timeline of the probability of tropical cyclone development is displayed in a table. This facilitates assessing the potential risk from any tropical cyclone.
- A summary of the 7 day forecast table is downloadable in a comma separated value (csv) file.
- The Forecast Description provides expert commentary describing the behaviour of each tropical weather system. These important characteristics and key changes are prepared by specialist tropical cyclone meteorologists.
- The collection of information supports informed, risk-based decision making and aids hazard preparedness.

1.3. Product example

The [Tropical Cyclone 7 Day Forecast](#) is available through the Bureau of Meteorology website.

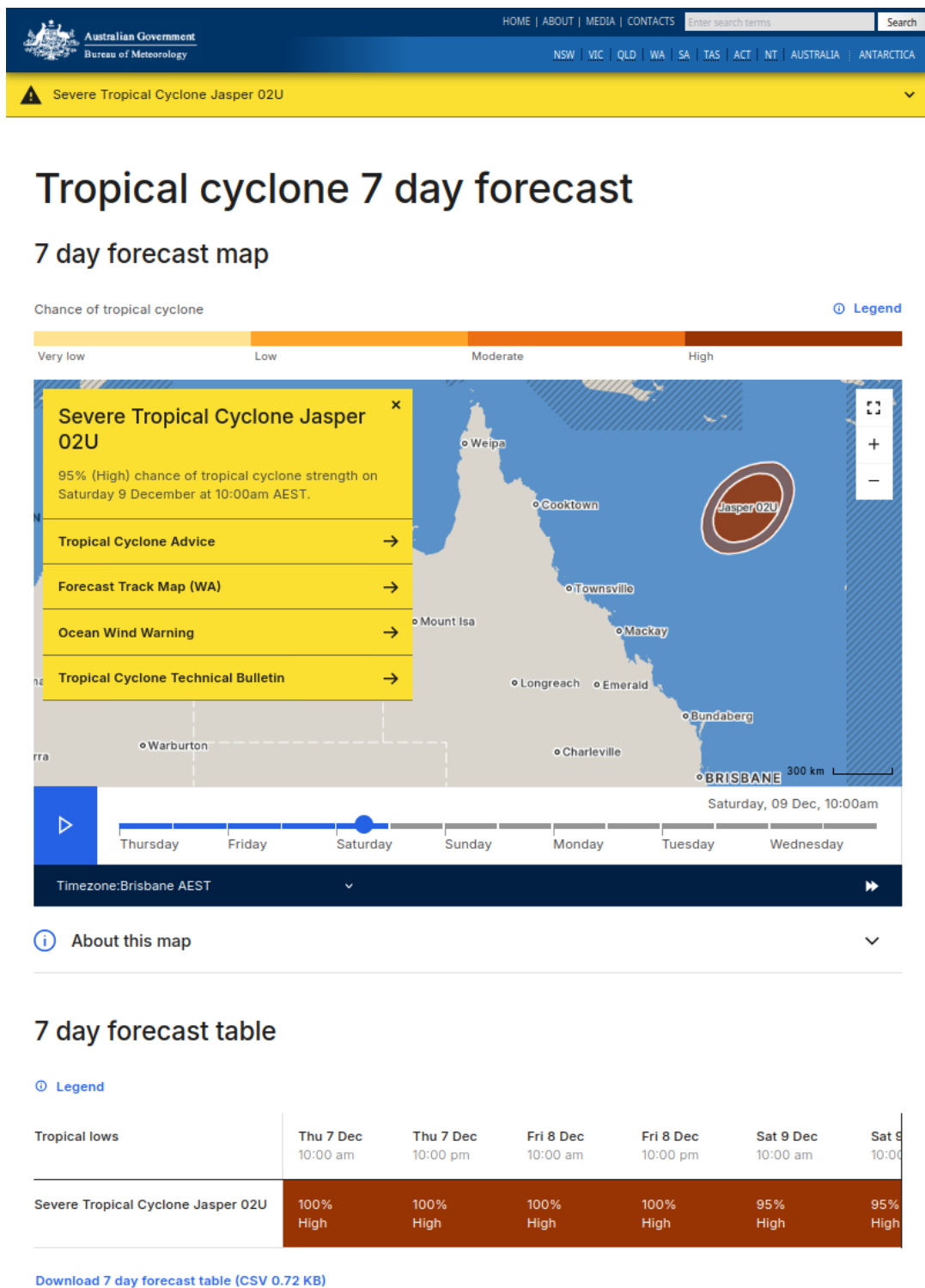


Figure 1. Tropical Cyclone 7 Day Forecast example part 1.

Forecast description

Severe Tropical Cyclone Jasper 02U

Tropical Cyclone Jasper forecast to gradually move towards the Queensland coast.

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- Jasper is forecast to gradually move on a general southwesterly track towards the Queensland coast early next week. At this stage the highest risk of a cyclone impact is the region north of Mackay.
- Please refer to the latest track map and information for more details.

Figure 2. Tropical Cyclone 7 Day Forecast example part 2

1.4. How does it relate to other Bureau products?

The Tropical Cyclone 7 Day Forecast provides information to customers and the community during the critical planning and decision-making window, which typically occurs 3 to 7 days prior to potential impacts.

Other related products:

- The Tropical Cyclone 7 Day Forecast sits between the longer-term Tropical Cyclone Seasonal Outlook and the shorter-term tropical cyclone warning products.
- The Tropical Cyclone Seasonal Outlook is a longer-term product providing a summary of the season ahead.
- When marine or land impacts from a tropical cyclone are forecast within 48 hours, additional warning products, including the Tropical Cyclone Advice and Forecast Track Map, will also be issued. These warnings will be consistent with the Tropical Cyclone 7 Day Forecast. Refer to warnings for hazard information.
- The Bureau also produces general forecasts for locations around Australia, such as Town and Precip Forecasts. There will be times where the Tropical Cyclone 7 Day Forecast is indicating the risk of a tropical cyclone at a location but the general forecasts do not. This occurs when there is large uncertainty in the location of a tropical system and therefore a low likelihood of an impact at that location.
- The Real Time Event Data (RED) product contains all the information in the Tropical Cyclone 7 Day Forecast, as well Watch/Warning information, in a machine-readable JSON/GeoJSON format. It is available through Bureau's [subscription](#) service.

2. Technical information

2.1. System description

The information presented in the Tropical Cyclone 7 Day Forecast is the result of synthesising many different data sources. This includes a wide range of meteorological observations from surface instruments and satellites and a range of numerical weather prediction models.

The map shows the likely and possible centre position areas for each tropical weather system. The likely centre position or 50% Forecast Confidence Area (FCA), is the area in which the centre of the tropical weather system is expected to be for 50% of forecasts. The combination of the possible and likely centre position areas is the 70% FCA.

The Forecast Confidence Areas (FCAs) typically use multiple runs of multiple ensemble numerical weather prediction models as inputs. This provides a large number (typically 100-200) of model scenarios that more accurately portray the likely and possible location of the tropical weather system. This data is quality controlled by the Bureau's specialist tropical cyclone meteorologists, and machine learning is applied to generate the FCAs. The FCAs are calibrated using a global data set of forecast and analysis data.

The percentage likelihood (and associated categorical rating) that a weather system will be a tropical cyclone at a point in time is subjectively assigned by the Bureau's team of specialist tropical cyclone meteorologists, based on available data, and following a standard process.

The forecast description for each tropical weather system is also produced by these specialised meteorologists.

2.2. Outputs

Outputs overview

The outputs of the [Tropical Cyclone 7 Day Forecast](#) can be viewed via a webpage available on the Bureau's website. The Tropical Cyclone 7 Day Forecast has three components:

- the interactive map display of likely and possible centre position areas
- 7 Day Forecast Table; and
- Forecast Descriptions.

Output details

Each tropical weather system will have a unique Disturbance ID of the form xxU. The letter U is the code used internationally for the Australian region by the World Meteorological Organisation. The number xx is assigned to the tropical weather system by the Bureau when it is first forecast. This xxU identifier will be used to refer to that tropical weather system across the 3 components of the Tropical Cyclone 7 Day Forecast.

At the point that a tropical low becomes a tropical cyclone, it is given a unique name, in addition to the disturbance ID.

Note: If a tropical cyclone is expected to impact the Australian mainland or Island communities within 48 hours, or Australian waters within 24 hours, additional tropical cyclone advice information (including forecast track maps and warnings) can be found by clicking on the tropical weather system via the interactive map. The Tropical Cyclone Advice will tell you what impacts are expected and includes Emergency Services recommended actions. Visit bom.gov.au or the BoM Weather App to see all current warnings and the Forecast for your location.

Interactive map details

The interactive map shows the likely centre position areas for each tropical weather system at twice daily timesteps (0000 and 1200 UTC) out to 7 days and the possible centre position areas for

the first 3 days. Areas are only shown for times when the tropical weather system has a chance of being at tropical cyclone strength.

Note: The Forecast Track Map displays the Forecast Confidence Cone (FCC), which is the swathe of 70% FCAs in the period of the cone. These periods are +72h (on the Forecast Track Map) and +120h (on MetEye), from analysis time. The FCC and the FCA in the Tropical Cyclone 7 Day Forecast will always be consistent as they are generated using the same data.

The shading colour of the centre position areas represents the probability of the system being a tropical cyclone (chance of tropical cyclone) at the specified time. The opacity representing whether the area is for the likely or possible centre position.

The chance of tropical cyclone is given in four ratings: Very Low (<5%), Low (5-20%), Moderate (20-50%) and High (>50%) (Figure 3). The ratings indicate the probability of a tropical cyclone with category 1 or higher intensity.

Chance of tropical cyclone

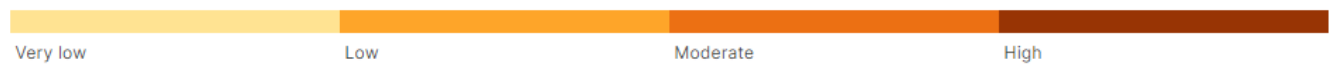


Figure 3. Chance of tropical cyclone categorical scale

Use the FCA to tell you where the centre of any potential tropical cyclone is likely to be located.

A map legend is contained in an information pop-up box to the top right of the map. This details the chance of tropical cyclone with shading as described above.

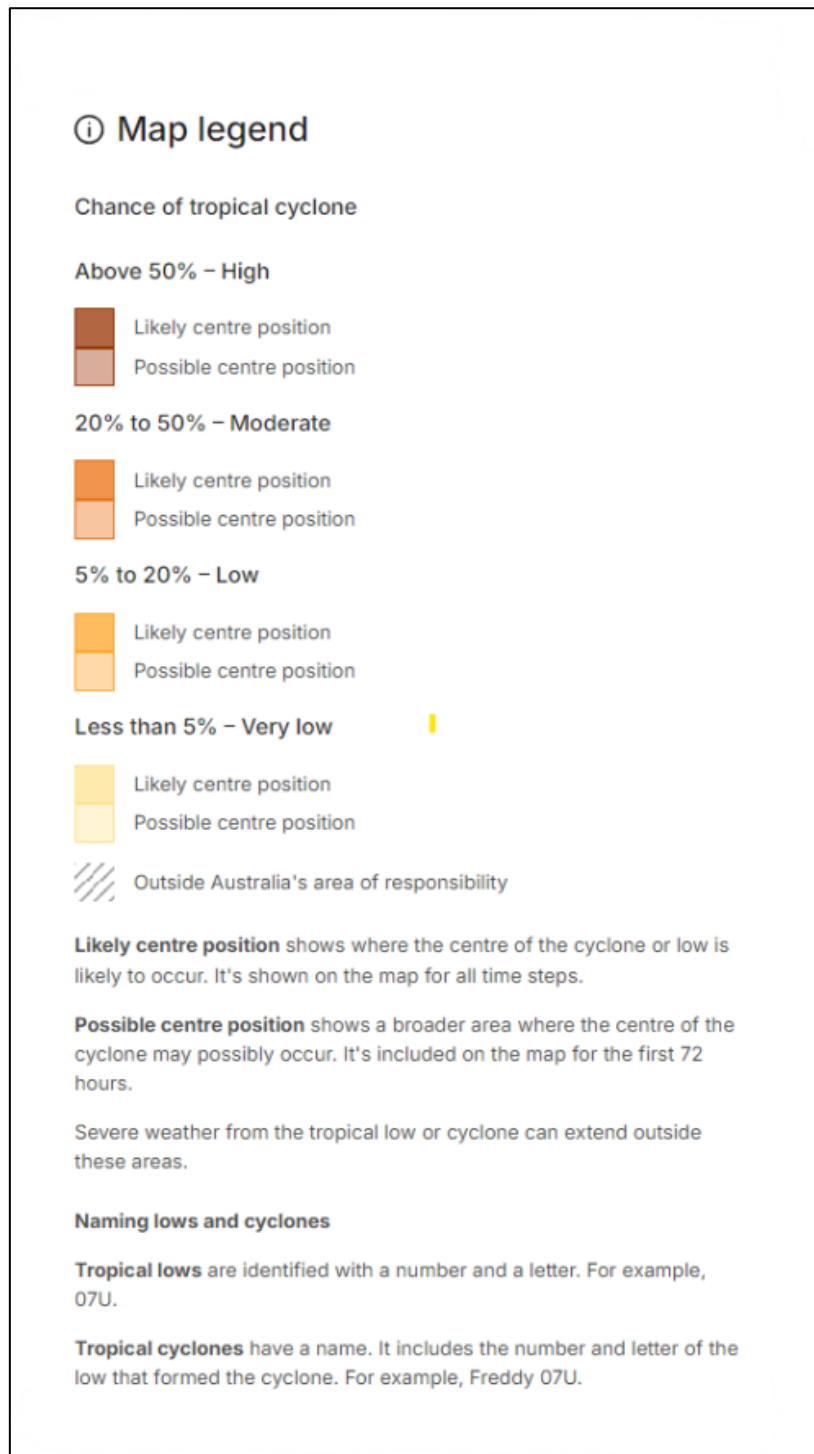


Figure 4. 7 Day Forecast Map Legend

The time zone of the webpage will default to match the user's browser. Along the bottom of the graphical display there is a dropdown which allows for manual selection of any Australian time zone or Coordinated Universal Time (UTC).

Areas outside of the Bureau's official international area of responsibility (Australian region) are shaded in grey on the interactive map. Areas well outside (as determined by the Bureau) the Australian region are not shown on the map.

Directly below the graphical map there is a dropdown 'About this map' which contains further information on how to use the Tropical Cyclone 7 Day Forecast.

7 Day Forecast Table

The 7 Day Forecast Table is located under the interactive map. This table displays both a percentage likelihood and categorical rating for the chance of each tropical weather system being a tropical cyclone at 0000 and 1200 UTC for each of the next 7 days. The table uses the same shading system as that used for the map, which allows for visualisation of how the risk changes over the relevant period. Percentage chance values are given to the nearest 5%. However, for Very Low (<5%), 'Less than 5%' will be used in the table while 1% will be used in the downloadable csv file.

Use the 7 Day Forecast Table to tell you the probability of a tropical cyclone developing.

Use the 7 Day Forecast Map and the 7 Day Forecast Table in combination to understand where and when a tropical cyclone may develop, as well as the likelihood of this occurring.

The table may show the additional rating of 'None', which occurs when there is no risk of the corresponding tropical low being a tropical cyclone at the specified time. 'None' is also displayed when a tropical weather system has moved well outside of the Australian region (as determined by the Bureau). When the risk is 'None' there will not be a corresponding FCA on the interactive map. 'No data yet' is displayed if a forecast rating has not been issued for a current tropical weather system. It is only displayed at the last timestep in the 7 Day Forecast Table when data is yet to be issued for that tropical weather system, while another system does have this data. A table legend is contained in an information pop-up box to the top left of the 7 Day Forecast Table.

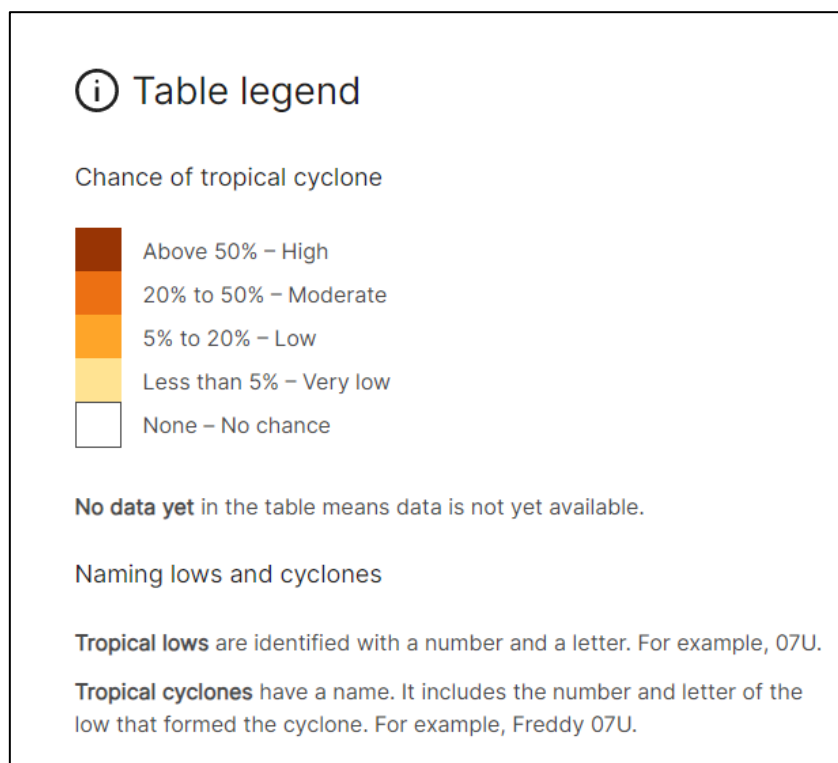


Figure 5. 7 Day Forecast Table Legend

A link to a downloadable csv file is located below the 7 Day Forecast Table. This file summarises the 7 Day Forecast Table in csv format.

Forecast Description

One forecast description for each tropical weather system sits below the 7 Day Forecast Table. It describes the expected behaviour of each tropical weather system. Use the Forecast Description to understand more about the possible development, intensity and impacts of any tropical weather system.

At the bottom of each Forecast Description, the 'last updated' field displays the date and time when the Tropical Cyclone 7 Day Forecast for that tropical weather system was last published. Information for each tropical weather system is sent to the webpage separately. There will be more frequent updates for systems with associated warning products. Hence, the 'last updated' time may vary between different tropical weather systems.

2.3. Update and data frequency

The Tropical Cyclone 7 Day Forecast will be updated at least twice daily, and more frequently when additional tropical cyclone products, such as a Tropical Cyclone Advice are also current.

Normal update times will be around 0100 UTC and 0900 UTC, which correspond to:

- 11:00am AEST/10:30am ACST/9:00am AWST
- 7:00pm AEST/6:30pm ACST/5:00pm AWST

2.4. Quality control

The procedures used in the Bureau to create the Tropical Cyclone 7 Day Forecast are subject to continuous improvement based on verification results, international benchmarking, and the operationalisation of recent scientific research. These procedures are reviewed at least annually.

The primary inputs for the FCAs (and FCCs) are vortex parameter files from ensemble numerical weather prediction models. With every issue of the Tropical Cyclone 7 Day Forecast these inputs are subject to quality control by our tropical cyclone specialists to account for:

- (a) weaknesses in the vortex tracking algorithms used to create the vortex parameter files; and
- (b) weaknesses in the clustering algorithm used to associate vortex parameter files with specific weather systems.

In the unlikely scenario that there is insufficient data from numerical weather prediction models to reliably generate FCAs/FCCs, the Bureau has contingency procedures in place to generate them based on the distribution of errors over the preceding 5 years. In this unlikely situation, the FCAs/FCCs may vary until sufficient data is again available.

2.5. Limitations

- The likely and possible centre position areas are not an assessment of the extent of any associated hazards, and do not provide information about potential impacts. Hazards may extend beyond the centre position areas. The Tropical Cyclone 7 Day Forecast should be used in conjunction with any warning products.
- Forecast information is provided for twice daily instantaneous timesteps (0000 and 1200

UTC), and there is no information at intervening timesteps. The chance of tropical cyclone development may vary between these timesteps. The Forecast Description will indicate any significant variations in potential development.

- There may be times when the centre position areas for 2 separate tropical weather systems overlap. The tropical weather system with the higher probability of development will default to display on top. If the probability of development is the same, whichever is listed first in the 7 Day Forecast Table will display on top. The quality control and cyclogenesis processes include consideration of any potential interaction between tropical weather systems. The probabilities of tropical cyclone strength and centre position areas will incorporate this expertise. When using the Tropical Cyclone 7 Day Forecast, consider all potential tropical cyclones and read the accompanying Forecast Description for information on potential system interactions.
- Areas outside the Australian region (for example, Norfolk Island) will appear with grey shading. While the visualisation is different, all forecast information remains the same and will be provided whenever there is potential for impacts to Australian communities.
- For a time, the likely and possible centre position areas shown on the map have a shading colour which represents the probability that the corresponding tropical weather system will be a tropical cyclone at that time step. However, the probability of tropical cyclone development is often not uniform across these areas. There is often a relationship between the location of any tropical weather system and its potential for development but the centre position areas do not show whether a tropical low may be more likely to develop in one part of area compared with another. The Forecast Description will provide details on expected behaviour.
- The 'chance of tropical cyclone' probabilities represent the probability of the tropical weather system being a category 1 or greater tropical cyclone. There is no other tropical cyclone intensity, size or structure information contained in the interactive map or table. A higher tropical cyclone probability does not necessarily translate to a higher probability of a more intense tropical cyclone. The Forecast Descriptions may contain information on the likely intensity of any forecast tropical cyclone, however, whenever they are available, the Tropical Cyclone Advice and Forecast Track Map products are the best source of forecast intensity and structure information.

3. Product navigation

Where to find information when using the Tropical Cyclone 7 day Forecast:

Interactive map

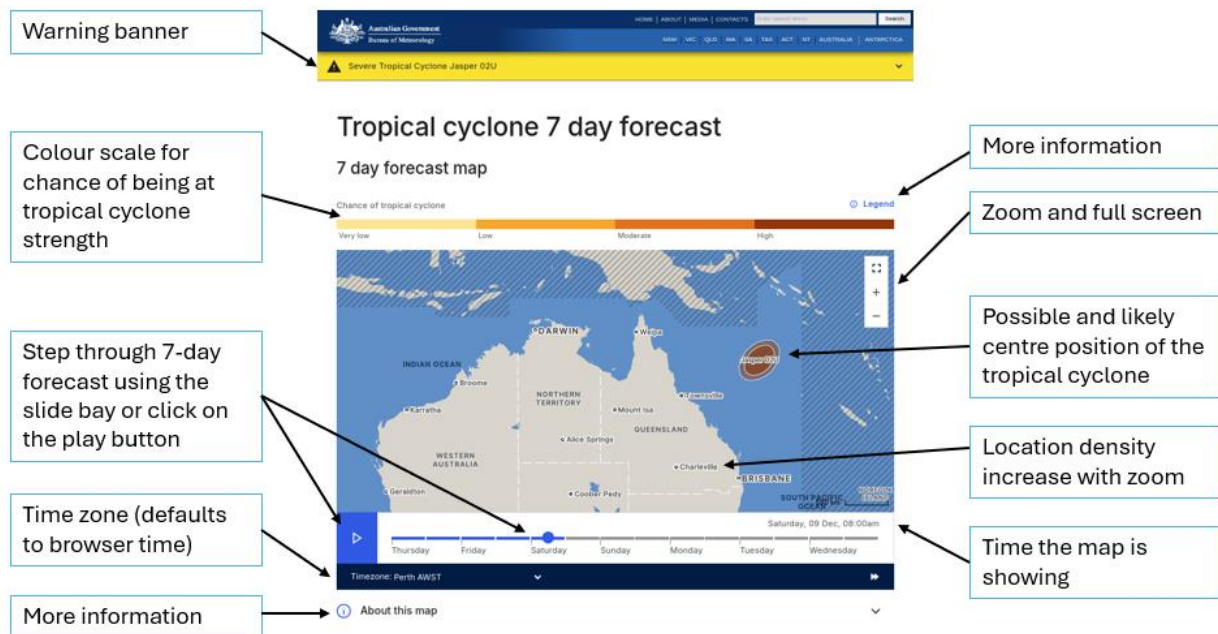


Figure 6. How to navigate the 7 Day Forecast Map

Step through the interactive map time series using the slider bar. The likely and possible centre position areas will change in colour and size, depending on the risk and location of the tropical weather system. The possible centre position areas are shown for the first 3 days. Loop the images using the looping features or step through the forecast by clicking the 'double play' button located at the bottom right corner of the slider bar.

The area covered by diagonal lines is outside of the Australian Area of Responsibility (AOR), which is also referred to as the Australian region.

Zoom and pan the map to display your area of interest using the middle mouse button, or by using the map zoom feature in the top right corner.

Clicking on a centre position area brings up a pop-up box at the top left-hand side of the map.

If the centre position area is for a tropical low with no active warnings, then a white box pops up with the rating (chance of tropical cyclone) for that low at that time. If there are associated tropical cyclone warnings current, then a yellow pop-up box appears with links to active warning products. A yellow banner also appears above the map indicating warnings are current for a particular tropical low or tropical cyclone.

7 Day Forecast Table

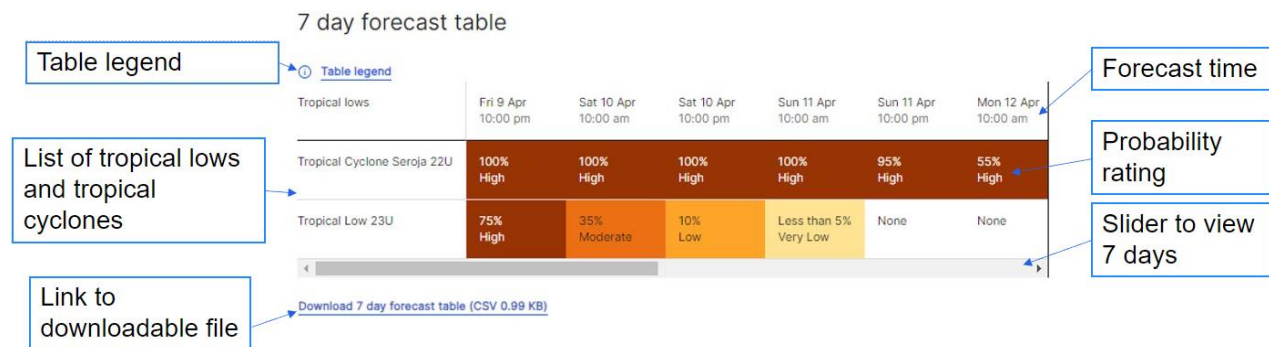


Figure 7. How to navigate the 7 Day Forecast Table.

Use the scrollbar to scroll through the 7 Day Forecast Table and view the specific percentage rating (chance of tropical cyclone) for each timestep. These are given in 5% increments. Ratings are shaded the same as the centre position areas for easy visualisation of how the risk changes over time.

Forecast Description

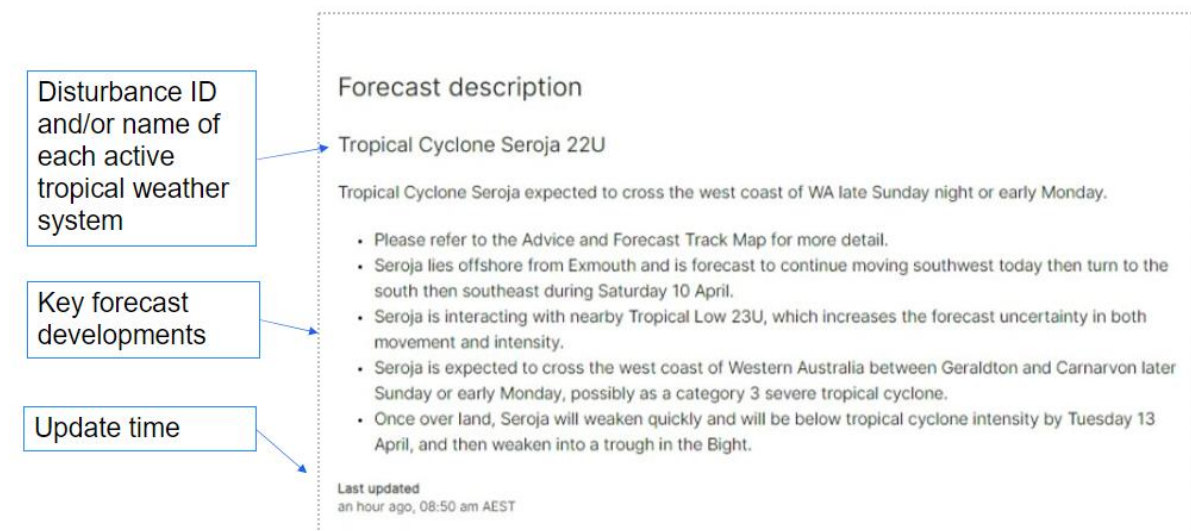


Figure 8. How to navigate the Forecast Description

To find out when the Tropical Cyclone 7 Day Forecast was last updated for a particular tropical weather system, look below the corresponding Forecast Description.

4. Support information

4.1. Access arrangements

The Tropical Cyclone 7 Day Forecast is available through the Bureau's

[Tropical Cyclone web page](#).

More information on tropical cyclone forecast and warning services provided by the Bureau can be found on the [Tropical cyclone warnings and other services](#) page on the Bureau website.

4.2. Support arrangements

If you detect errors or have any issues with this product, please email us at weatherquestions@bom.gov.au.

5. Glossary

Term	Definition
Australian Area of Responsibility	Australian Area of Responsibility (AOR), which is also referred to as the Australian region. The World Meteorological Organisation divides the globe into areas of responsibility for the purposes of tropical cyclone warning services. The Bureau's Tropical cyclone warnings and other services page has more information about the Australian AOR.
Australian region	See Australian Area of Responsibility.
Category	A measure of the strength of a tropical cyclone based on its wind speed. On the Australian scale, the category number ranges from 1 to 5, with category 1 being weakest classification of tropical cyclone while category 5 is the strongest. Category 3 and higher tropical cyclones are referred to as severe tropical cyclones. Refer to the Bureau's Tropical Cyclone Knowledge Centre for more information.
Clustering algorithm	An algorithm which assigns points in some dataset into groups (clusters) based on some objective measure of similarity. In the tropical cyclone context, it is an algorithm that splits all the tropical weather system tracks forecast by an ensemble numerical weather prediction model (see 'vortex tracking algorithms', below) into groups (clusters), with each cluster representing a distinct forecast tropical weather system.
Cyclogenesis	The process by which a tropical low develops and strengthens to a tropical cyclone.
Disturbance ID	Each tropical low or tropical cyclone affecting the Australian region will have a unique identifier of the form xxU. The letter U is the code used internationally for the Australian region by the World Meteorological Organisation. The number xx is assigned to the tropical low or tropical cyclone by the Bureau when it is first identified and tracked. Together the number and letter are used to refer to that particular tropical low or tropical cyclone in all tropical cyclone communications and products throughout its lifetime.
Ensemble Numerical Weather	A method of running a Numerical Weather Prediction (NWP) model several times (typically 20+) with slightly varied initial conditions to produce a range of possible forecast scenarios. The spread of

Prediction (NWP)	resulting scenarios can be used qualitatively to assess the reliability of the depicted forecast, or quantitatively to determine probabilistic and/or statistically based output parameters. See also NWP models.
Forecast Confidence Area	The Forecast Confidence Area (FCA) is the area within which the centre of a tropical cyclone or tropical low is expected to be located a certain percentage time. The 50% FCA is shown on the map as the likely centre position. The 70% FCA is the combination of the likely and possible centre position.
Forecast Confidence Cone	An accumulation of Forecast Confidence Areas (swathe) over a time range from analysis time to a given forecast hour (+24, +48, +72, +120 hours).
Forecast	A prediction of how the atmosphere will behave in the future, that is based on observational data and the laws of physics.
GeoJSON	GeoJSON is a geospatial data interchange format based on JSON.
Global Data Set	In the tropical cyclone context, a set of analysis tracks for tropical cyclones that occurred anywhere on Earth. The data set is IBTrACS.
International benchmarking	The comparison of procedures and methodology used by the Bureau (in this case, for tropical cyclone forecasting) to those used by the meteorological agencies of other countries. This is used to validate the procedures and ensure that best scientific practice is being followed.
JSON	JavaScript Object Notation. A machine-readable file format.
Machine learning	The process by which a computer algorithm is refined (trained) by exposing it to historical data in the form of inputs and the correct outputs corresponding to those inputs. Decisions in the algorithm are weighted by this process, making it more likely the algorithm gives the correct outputs in response to new inputs it encounters.
Numerical Weather Prediction (NWP) Models	Numerical weather prediction (NWP) models essentially create a virtual planet Earth, simulating the atmosphere, ocean, land surface and sea ice, and use mathematical equations to predict future weather.
Real Time Event Data (RED)	A machine-readable data product in JSON/GeoJSON format.
Spatial and temporal risk	Risk as it varies by location (spatial) and time (temporal).
Timestep	A particular point in time, usually referring to one of a series of such

	times in (for example) the output of a numerical model or forecast.
Tropical low	A warm-cored low-pressure system located over tropical or subtropical regions. The strongest winds and organised convection surround the central circulation.
Tropical cyclone	A tropical cyclone is defined as a warm-cored, non-frontal low-pressure system of synoptic scale developing over warm waters having organised convection and a maximum mean wind speed of 34 knots or 63 km/h (10-minute mean) or greater extending more than halfway around near the centre and persisting for at least six hours.
Tropical weather system	A generic reference to tropical lows and tropical cyclones. The term 'tropical system' is also used.
UTC	Coordinated Universal Time
Verification	The process, and results of this process, by which forecasts are compared to the actual weather and hazard outcomes of a weather event, enabling objective measures of the forecast's accuracy (skill) to be determined.
Vortex parameter file	A file containing a summary of a tropical weather system as forecast by a particular numerical weather prediction model. The file will typically contain the location, strength, and structure (in terms of radial extent of winds, see above) of the forecast tropical weather system for a series of continuous timesteps.
Vortex tracking algorithm	An algorithm which processes the output of a numerical weather prediction model and based on the wind and pressure values forecast by the model, identifies any forecast tropical weather systems, and determines their tracks in the form of vortex parameter files. See also Vortex parameter file.
World Meteorological Organisation	Agency of the United Nations for meteorology (weather and climate), operational hydrology and related geosciences.