Weather Forecasting for Amateur Astronomers

Making sense of conflicting weather predictions

By Roger Powell (updated Feb 2025)

Will It Be Clear Tonight?

Like all amateur astronomers I want to know if the atmospheric conditions over the next few days will provide opportunities for an observing session. When setting up at home, it's handy to know when the clouds will clear. When packing the car to travel to a remote site, it's vital.

Weather Data Origins

Where weather data comes from. Image source: Australian Bureau of Meteorology

Data from world wide sources is input into super computers managed by the weather bureau of major countries. So, what information is at our disposal here in Australia?

The Bureau of Meteorology

BOM has access to extensive data and advanced modelling, making it highly accurate for predicting imminent and severe weather conditions. However, its day-to-day forecasts are often brief and lacking in detail specific to astronomers.

While BOM produces its own globalised weather model with a dedicated super computer, it also compares predictions from other international models.

Do I use BOM?

> *Partly, yes. BOM is the principal authority on Australian weather. Their forecasts may lack detail, but for an overview of current-day localised conditions, BOM should always be checked —but not exclusively.*

General Weather Websites and Phone Apps

Many popular sources provide detailed graphics and hourly predictions, but they usually rely on a single computer model without revealing its identity. Relying on only one model means missing the full picture.

Do I use these apps and websites?

> *Not any more. These single-source solutions are unsatisfactory for astronomy purposes.*

Astronomy Weather Apps

Astronomy-specific weather apps function similarly to general weather apps but are marketed towards astronomers.

Do I use these astronomy apps and websites?

> *No, for exactly the same reason as above - most rely on a single-source weather model.*

Global Computer Models

Global computer models, also known as numerical weather prediction (NWP) models, are the primary tools for forecasting. Governments worldwide use dedicated super-computers to calculate atmospheric conditions based on past and current observations.

Available Models

COUNTRY	MODEL	DETAILS
Australia	ACCESS-G	BOM global model
Australia	ACCESS-C	BOM higher resolution model for capital cities
European Community	ECMWF	Collaboration of European nations
United States	GFS	Global Forecast System, from US National Weather Service
Canada	GEM	Global Environmental Multi-scale model
Germany	ICON	German global model
United Kingdom	UKMO	UK Meteorological Office model
Norway	Norway ECMWF	Norwegian model

These models provide full global weather predictions, except for ACCESS-C, which focuses on capital cities. There is no reason to favour any single model over others.

Other models can be found here: https://en.wikipedia.org/wiki/Atmospheric_model#Domains

Why Consider Overseas Models?

A local model is sometimes wrong, whilst other models might get it right….and vice versa!

Comparing Models

Previously, I recommended *Cloud Free Night*, a useful Australian site for comparing models. While still a great resource, it now posts data from only two models, which is insufficient. I now recommend Meteologix.

Meteologix

This website provides meteograms from eight global models, allowing for meaningful comparisons.

Though not designed specifically for astronomers, it offers cloud coverage predictions across multiple models, a key advantage.

Where to Find Meteologix Forecasts:

- Meteologix - Campbelltown
- Meteologix - The Oaks
- Meteologix - Belanglo

Conclusion

Astronomers need to compare multiple global weather prediction models to get a more complete picture. The output results may differ and the key is to analyse discrepancies to make the best decision.

Your favourite weather app only provides a fraction of the available data. It likely uses only one model, such as the American GFS model.

Over the years, I have observed that no single model is consistently more accurate than the others.

The weather remains unpredictable and sometimes nature defies even the world's most powerful computers. By comparing multiple models, you maximise your chances of making an informed decision about when to set up your gear.

Recommendation

So, my recommendation is:

- Avoid relying on single-source general weather prediction apps or websites.
- Compare multiple global models.
- Meteologix is the best multi-model site that I know of.
- Supplement your research by checking current weather conditions on the local BOM.

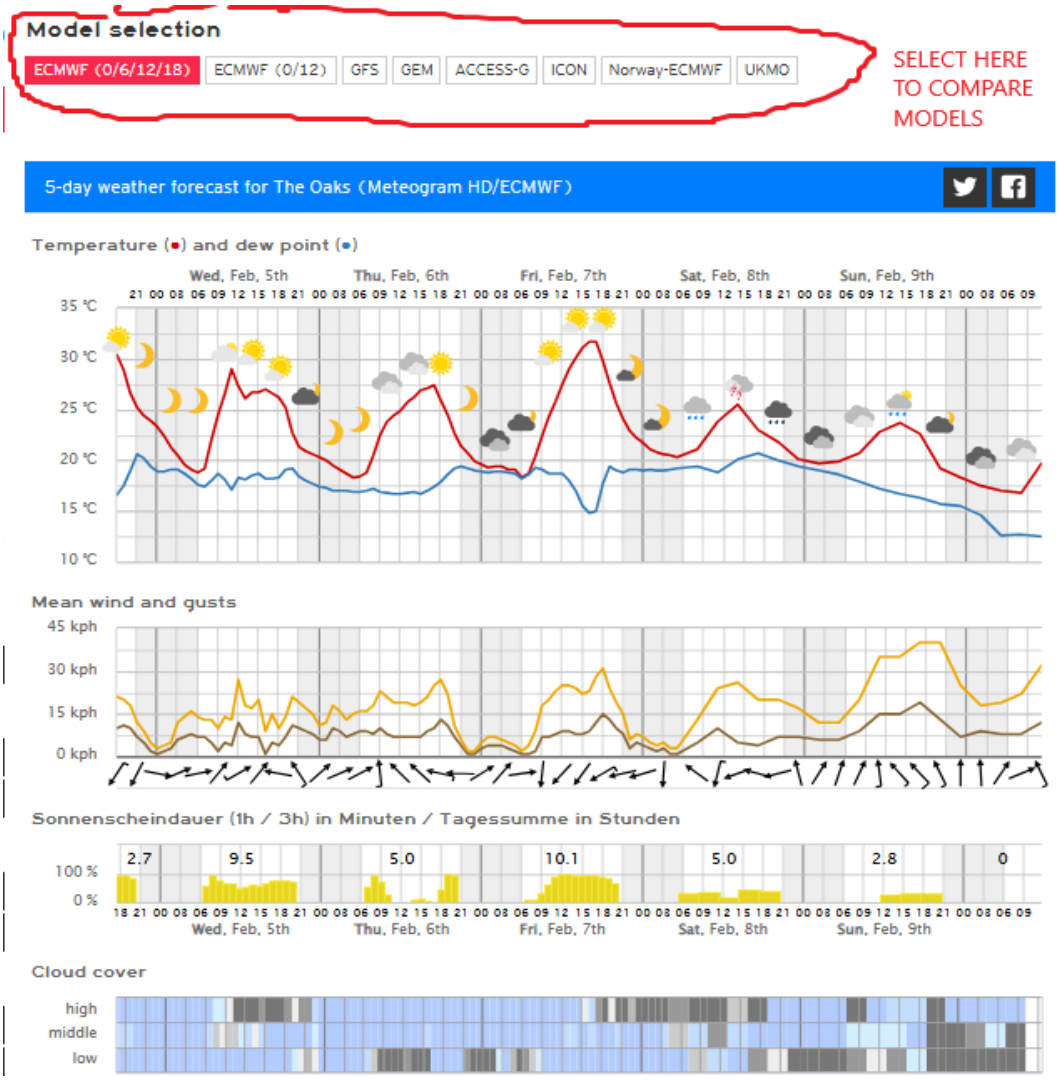
See also the supporting information in the two appendices below:

Appendix 1

The following is a sample Meteologix Page.

Note the model selector at the top of the page and for each model look at the cloud cover meteogram.

The GEM model has no cloud meteogram, so you need to rely on the cloud icons in the temperature meteogram.



Appendix 2

Here is a typical sample tabulation of results from the eight models published by Meteologix for a particular evening.

Weather Prediction Model Analysis

Date: Saturday 3rd February 2024, (a Stargard night)

Tabulation of predictions for that evening

Global Model	Origin	Forecast the Day before	Forecast 3rd Feb Morning	Score
ECMWF 6	European Community	*Mostly clear*	*Clear*	☑
ECMWF 12	European Community	*Mostly clear*	*Clear*	☑
GFS	USA	*Clear*	*Clear*	☑
GEM	Canada	*Clear*	*Clear*	☑
ACCESS-G	Australia	*Cloudy*	*Cloudy*	☒
ICON	Germany	*Partly cloudy*	*na*	☒
Norway ECMWF	Norway	*Mostly clear*	*Clear*	☑
UKMO	United Kingdom	*High cloud*	*Clear*	☑

Six out of eight models predicted *"clear"* conditions, which was enough information to make a positive decision.

The actual conditions that night were clear all evening.

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