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AutoFcst: A coherent set of forecast grids

Deryn Griffiths and Ashoka Jayawardena

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1. Introduction

This report describes **AutoFcst**, a set of forecast grids available within the Graphical Forecast Editor (GFE). Each grid represents a forecast of a particular forecast parameter for a particular time. There are plans to make **AutoFcst** available outside the GFE. This report describes the extent of the grids and how they are created and used.

The Graphical Forecast Editor (GFE) provides tools for operational meteorologists to create and edit forecast parameters. The GFE ingests various Numerical Weather Prediction (NWP) grids and other objective guidance including statistically processed guidance. There are tools within the GFE to load the guidance desired by operational meteorologists, and to edit that guidance based on their professional judgement [Just and Foley 2020].

AutoFcst is a set of grids based on the best available guidance, with systematic modifications to adjust for known short-comings of the guidance and to ensure consistency between parameters. Known short-comings are largely based on verification at automatic weather stations. Some short-comings (away from observation sites) are based on meteorological understanding of the guidance and the atmosphere.

At the time of writing, **AutoFcst** is only available within the GFE. Operational meteorologists can use **AutoFcst** as guidance in addition to, or instead of, direct NWP. They can (optionally) apply manual edits to **AutoFcst** prior to publishing to the Australian Digital Forecast Database (ADFD). Another way that **AutoFcst** is used is that the skill of **AutoFcst** is used as a benchmark when interpreting verification results of the ADFD.

The Australian Fire Danger Rating System (AFDRS) plans to use **AutoFcst** in addition to the ADFD for calculation of the forecast Fire Behaviour Index (FBI). Other internal systems may use **AutoFcst** in the future. The extended use has prompted this report, describing **AutoFcst**.

AutoFcst is created by a script running various GFE tools. The script and tools may evolve. The detail described here is a snapshot as of 3 November 2022. **AutoFcst** is issued with base times of 00 UTC, 06 UTC, 12 UTC and 18 UTC, and is typically available about 6 hours after each base time. It may be delayed if the main guidance on which it is based is delayed.

The National **AutoFcst** is on a 6km grid. There are regional versions for Victoria and Tasmania, on 3km grids.

The description of **AutoFcst** will make most sense to those familiar with the GFE. However, we hope this report will also be of use to those unfamiliar with the GFE.

2. Underlying Guidance used by AutoFcst

Guidance ingested into the GFE and used to create **AutoFcst** is listed in this section. On ingestion the underlying guidance is interpolated to the GFE grid, with some matching

of land-to-land and water-to-water information. Temperature guidance is adjusted based on elevation using a standard lapse rate.

The short names of fields described in this section, shown in bold, are the names used in the GFE.

2.1. Gridded Operational Consensus Forecast (OCF)

The following **OCF** guidance [Canvin et. al. 2021] is ingested into the GFE and used by **AutoFcst**.

> Hourly: **Wind**; Temperature (**T**); Dewpoint temperature (**Td**)
>
> 3-hourly: Probability of Precipitation (**PoP**); expected precipitation (**Precip**); percentile forecasts of Precipitation (**PrecipYPct**); percentage cloud cover at various levels (**SkyHigh**, **SkyMid**, **SkyLow**)
>
> Daily (15 UTC aligned): Probability of Precipitation (**DailyPoP**); Probability of Precipitation exceeding X mm (**DailyPoPX**); Expected precipitation (**Daily-Precip**); percentile forecasts of Precipitation (**DailyPrecipYPct**)
>
> Daily (other): Correction grids (**TMaxDelta** and **TMinDelta**) used to adjust max(hourly **T**) and min(hourly **T**) to obtain maximum and minimum Temperature over a period (**MaxT** and **MinT**); Upper-level grids of **Wind** and Temperature

PrecipYPct and **DailyPrecipYPct** are forecast (100 – Y)th percentiles. The period over which **MaxT** is forecast is 19 UTC to 12 UTC inclusive. The period for **MinT** is 07 UTC to 00 UTC inclusive.

2.2. Site-based Operational Consensus Forecast

Site-based daily maximum and minimum Temperature, based on a bias-corrected consensus of NWP output, is ingested into the GFE and used by **AutoFcst**. The sites are locations with daily observations.

The site-based information is blended with gridded **OCF** to form guidance called **PtOCF** as follows: **OCF MinT**, **MaxT** are formed by the minimum or maximum of the **OCF** hourly **T** grids adjusted by the **OCF** correction grids **TMinDelta** or **TMaxDelta**. The GFE Procedure **MatchGuidance** adjusts **OCF MinT** and **MaxT** by up to 1°C near site locations, and by up to 2°C at site locations, to better match the site-based guidance.

2.3. Calibrated Thunder (CalTS)

Three-hourly and daily (15 UTC aligned) Calibrated Thunder guidance [Warren et. al. 2021] is ingested into the GFE and used by **AutoFcst**. The guidance is defined as the probability of lightning within a 10 km radius for the relevant time period. The GFE grids are **PoTS** (3-hourly) and **DailyPoTS** (24-hourly).

2.4. Other numerical guidance

The physical model fields available in the GFE and used in **AutoFcst** are from ACCESS-G3 [Bureau of Meteorology 2019], ECMWF[1], GFS[2] and Auswave-G3 [Zieger and Greenslade 2021]. The parameters are valid at an instant in time, and are as follows:

Wind, **T**, **Td** (including some upper levels); Significant Wave Height (**SigWaveHgt**); Wind Wave (**WindWave** and **WindWaveHgt**); various components of Swell (**Swell**, **Swell2**, **Swell3**), with the matching swell period (**WindWavePd**, **SwellPd**, **Swell2Pd**, **Swell3Pd**); Thickness (**Thick_1000to500**); and Geopotential height (**Z**).

2.5. Reference grids (not changing with time)

The GFE has grids of **Topo** (topography or elevation) and Swell reference grids. The Swell reference grids indicate how the swell (of a given height, direction and period in the open ocean) refracts as it moves around the detailed coast lines and bays. These grids are used by the tools that create **AutoFcst**.

3. AutoFcst Time Range

The **AutoFcst** base time matches the base time of the main **OCF** guidance used to create it. It is analogous to the analysis time for NWP. Any **AutoFcst** grids with a validity before the **AutoFcst** base time, or that overlap the **AutoFcst** base time, necessarily come from underlying guidance with an earlier base time. Guidance used in creating **AutoFcst** may have an earlier base time if that was the most recent available at the time **AutoFcst** was created. This is likely to be the case for ECMWF and Auswave guidance which arrives later than **OCF** and ACCESS-G3.

3.1. Time Ranges with valid data

Generally, **AutoFcst** has grids available for at least 7 days from the base time. Exceptions are sea-state grids which extend only at least 4 days from the base time, and rest-of-day grids which are valid for the first part day and at least one more day from the base time. This section describes the time range over which **AutoFcst** (for each base hour) has a coherent set of grids. The hours described are in relation to the base time. That is, -3 hours is 3 hours prior to the base time, +3 hours is 3 hours after the base time etc. The information is provided graphically in Figures 1 to 4.

The consistency between grids is between parameters at a point in time and space, and is simple logical consistency such as **Td** ≤ **T**. By a coherent set of grids we mean there

[1] For information about ECMWF see https://confluence.ecmwf.int/display/FUG/Forecast+User+Guide

[2] For information about GFS see https://www.emc.ncep.noaa.gov/emc/pages/numerical_forecast_systems/gfs/documentation.php

is a degree of spatial and temporal consistency in addition to the point-based consistency. In practical terms, consistent, coherent grids have had the tools described in Section 4 applied to treat known short-comings in the guidance.

AutoFcst with 00 UTC Base Time

Daily PoP/Precip suite grids from 15 hours after the base time (+15 hours) are part of the coherent set of grids. Any daily PoP/Precip grids prior to +15 hours should be ignored.

Other than the daily PoP/Precip suite of grids, grids from, or overlapping, the base time (+0 hours), are part of a coherent set of grids. Any grids prior to +0 hours should be ignored.

Grids are coherent up until any overlapping with +183 hours.

AutoFcst with 06 UTC Base Time

Daily PoP/Precip suite grids from 9 hours after the base time (+9 hours) are part of the coherent set of grids. Any daily PoP/Precip grids prior to +9 hours should be ignored.

Other than the daily PoP/Precip suite of grids, grids from, or overlapping, the base time (+0 hours), are part of a coherent set of grids. Any grids prior to +0 hours should be ignored.

Grids are coherent up until any overlapping with +177 hours.

AutoFcst with 12 UTC Base Time

Grids from 3 hours after the base time (+3 hours), including the MinT grid overlapping that time, will be coherent. Any grids prior to +3 hours should be ignored.

Grids are coherent up until any overlapping with +195 hours.

AutoFcst with 18 UTC Base Time

Daily PoP/Precip suite grids from 21 hours after the base time (+21 hours) are part of the coherent set of grids. Any daily PoP/Precip grids prior to +21 hours should be ignored.

Other than the daily PoP/Precip suite of grids, grids from, or overlapping, the base time (+0 hours), are part of a coherent set of grids. Any grids prior to +0 hours should be ignored.

Grids are coherent up until any overlapping with +189 hours.

3.2. Historical Time Ranges

For those accessing versions of **AutoFcst** prior to 3 November 2022, the following start times apply.

00 UTC Base Time

Sub-daily grids from, and daily grids overlapping, +15 hours may be used. Any grids prior to that time should be ignored.

06 UTC Base Time

Sub-daily grids from, and daily grids overlapping, +9 hours may be used. Any grids prior to that time should be ignored.

12 UTC Base Time

Sub-daily grids from, and daily grids overlapping, +27 hours may be used. Any grids prior to that time should be ignored.

18 UTC Base Time

Sub-daily grids from, and daily grids overlapping, +21 hours may be used. Any grids prior to that time should be ignored.

4. AutoFcst Calculation by Parameter

The algorithm to convert the underlying guidance to **AutoFcst** is described in general terms in this section. We describe which underlying guidance is used for each **AutoFcst** parameter, and the degree to which modifications are made to that guidance. A list of GFE tools is provided in Section 5.

4.1. MinT, MaxT (Land grid cells)

At land grid cells **MinT** and **MaxT** are based on **PtOCF**. The main adjustments are in an area of Victoria (called "FixWarmValleys" within the GFE) where the **OCF MinT** guidance (and the analysis on which its bias correction is based) is routinely unreasonably warm.

Additionally, some point locations of interest are given values based on other points of interest. For example, some towns are given a forecast that matches the forecast for the local airport at which the Bureau has observations.

A minor adjustment is a consistency check to ensure that overlapping (in time validity) **MinT** and **MaxT** satisfy **MinT** ≤ **MaxT** (by replacing the values with the average if necessary). Modifications due to the consistency check are usually confined to days and locations with a small diurnal temperature range.

4.2. T (Land grid cells)

Hourly temperature (**T**) is based on **OCF T**. The main adjustment over land is stretching and shrinking the hourly **T** cycle to ensure that max(**T**) and min(**T**) match **MaxT** and **MinT**. However, prior to that there is an adjustment in the area FixWarmValleys and near the coast with spatial smoothing applied. The spatial smoothing improves the diurnal cycle, especially for situations with a small diurnal range in **OCF T** but a large diurnal range in **AutoFcst MinT** and **MaxT**.

4.3. T (Water grid cells)

Over water, hourly temperature (**T**) is based on **OCF T**.

4.4. MinT, MaxT (Water grid cells)

Over water, **MinT** and **MaxT** are based on min(**T**) or max(**T**).

4.5. Td

The dewpoint temperature (**Td**) is based on **OCF Td**. The only adjustment is to reduce **Td** if necessary, so as not to exceed **T**.

4.6. Wind, WindMaxInHour, WindGust

Wind is based on **OCF Wind** (surface), but blended with a proportion of the upper level **OCF Wind** for land grid cells above 700m in Tasmania and above 900m over the Great Dividing Range. The blending typically increases the **Wind** magnitude over elevated terrain compared to the **OCF Wind**. Near the coast, there is some filling over water in onshore flow to (usually) sharpen the gradient at the coast.

WindMaxInHour predicts the maximum 10-minute mean wind speed in an hour. **WindMaxInHour** is calculated based on **Wind**, with the speed increased by a linear function which adds 5% and then 1.25 kt over land, and adds 3% and then 1 kt over water.

WindGust predicts the maximum wind gust. **WindGust** is calculated based on **Wind**, with the speed increased by a linear function which adds 44% and then 2.15 kt over land, and adds 26% and then 2.1 kt over water.

There is no attempt to remove oscillations which have been observed in the **OCF Wind** guidance over water.

4.7. DailyPoP, DailyPrecip, DailyPrecipYPct, DailyPoPX

The daily PoP/Precip suite of grids are based on the **OCF** grids of the same name, modifying only to ensure consistency between them. This addresses inconsistencies which may have been introduced by the GFE via the remapping, or that may have existed in the **OCF** guidance.

The consistency checks applied are done in the following order:

1. **DailyPoPX** are made consistent with **DailyPoP**. E.g. **DailyPoP1** < **DailyPoP**
2. **DailyPrecipYPct** are modified to be consistent with **DailyPoP**
3. **DailyPrecipYPct** are modified to be consistent with **DailyPoPX**
4. **DailyPrecip** is modified to be consistent with **DailyPoPX** and **DailyPrecipYPct**.

4.8. PoP, Precip, PrecipYPct

These grids are based on the **OCF** grids of the same name, modifying only to ensure consistency between these parameters, and between them and the daily grids. The checking does not cover all possible inconsistencies.

There is no attempt to remove biases which have been observed in the **OCF** PoP/Precip guidance.

For base times of 18 UTC, 00 UTC, 06 UTC and 12 UTC, the first 21, 15, 9 and 3 hours respectively, following the base time, have 3-hourly PoP/Precip grids which are not made consistent with daily PoP/Precip grids.

The consistency checks applied are done in the following order:

1. **PoP** are modified to be consistent with **DailyPoP** (for days with daily grids as part of the coherent set of grids)
2. **PrecipYPct** grids are modified to be consistent with **PoP**
3. **Precip** grids are modified to be consistent with **PoP** (E.g. **Precip** ≥ 0.2mm when **PoP** = 100%)
4. **Precip** is rescaled to be consistent with **DailyPrecip** (for days with daily grids as part of the coherent set of grids)

4.9. RestOfDayPoP, RestOfDayPrecipYPct

The RestOfDay grids start every three hours and represent the time period to the next 15 UTC.

For days for which the daily PoP/Precip grids are part of the coherent set of grids (see Section 3 and Figures 1 - 4) these grids are based on the initial **DailyPoP** and **Daily-PrecipYPct** with the values decaying at a rate following the pattern of the **Precip** grids. The final values match the final **PoP** and **PrecipYPct** grids for that day.

For days for which the daily PoP/Precip grids are not part of the coherent set of grids (essentially, the day overlapping with the base time), the first time step has **RestOfDayPoP** and **RestOfDayPrecip** grids based on the **PoP** and **Precip** grids from the base time to the next 15 UTC time. An assumed degree of statistical dependence is used to convert the 3-hourly probabilities to a probability for the rest of the day. The **Precip** grids are summed to give **RestOfDayPrecip**. The **RestOfDayPrecipYPct** grids at the first time step are a function of the **RestOfDayPoP** and **RestOfDayPrecip** at the same time step. From the first time step to the final step for that part day the decay follows the pattern of the **Precip** grids.

4.10. SnowLevel, DailyProbSnow

The median forecast height above which precipitation will fall as Snow is captured in a 3-hourly grid named **SnowLevel**. The **SnowLevel** is calculated using a formula based on NWP fields of **Thickness**, 850hPa **T** and 850hPa **Z**. The formula is based on unpublished work of Dave Williams, Bureau of Meteorology, who analysed observations

from 1971 to 1999, a formula used widely as the basis for forecasts issued by operational meteorologists.

The **DailyProbSnow** (15 UTC aligned) is calculated based on **PoP** and **SnowLevel** and an assumed degree of statistical dependence to convert the 3-hourly probabilities to a daily probability.

4.11. PoTS, DailyPoTS

These grids are based on the **CalTS** grids of the same name, with **PoTS** modified to ensure consistency with **DailyPoTS**.

4.12. TIPO

The Type of precipitation, If Precipitation Occurs, or **TIPO**, is designated as Showers, or Showers + Storms. Storms are a function of **PoTS** and **DailyPoTS**, and included in the 3-hourly **TIPO** grid if the corresponding **PoTS** is at least 5% and the overlapping **Daily-PoTS** is at least 10%.

4.13. Sky

Sky is based on **OCF SkyHigh**, **SkyMid**, **SkyLow**, and **PoP**.

4.14. Wx

The weather grid, **Wx**, will show isolated showers (**Isol SH**), scattered showers (**Sct SH**) or widespread showers (**Wide SH**) based on **PoP**. These may be modified to include chance of storms (**Chc TS**), isolated storms (**Isol TS**), scattered storms (**Sct TS**), or widespread storms (**Wide TS**) based on **TIPO** and **DailyPoTS**. The showers may be changed to snow (**SN**) based on the **SnowLevel** grids.

Frost (**FR**) is added based on the **T**, **Wind** and **Sky** grids.

There is no addition of Fog, Dust or Smoke, and no use of the terms Drizzle or Rain, in the **AutoFcst Wx** grids. There are no convective descriptors such as hail or "gusty" in the **AutoFcst Wx** grids.

4.15. WindWaveHgt, WindWave, Swell, Swell2, SwellPd, Swell2Pd, SigWaveHgt

These are based on ACCESS-G3 Winds and Auswave-G3 sea state. The modifications done are to derive **WindWaveHgt** based on the **Wind**, and to reorganise the remaining wave energy into two grids (**Swell** and **Swell2**) based on their direction to ensure that each swell grid has some spatial coherence.

The **Swell** and **Swell2** grids are further modified to make use of reference grids to capture the refraction of swell around inshore areas.

The **SwellPd** and **Swell2Pd** grids are based on Auswave-G3 with a reorganisation to match that of the swell reorganisation.

The **SigWaveHgt** is calculated based on the **WindWaveHgt**, **Swell** and **Swell2** grids.

4.16. Fire Weather grids

Wind (upper levels) is based on **OCF Wind** (upper levels)

Mixing height (**MixHgt**) is based on **T** (surface) and various NWP for upper level temperature.

Continuous Haines (**CHaines**) is based on NWP upper level temperature and dewpoint.

5. GFE Tools and Procedures Used in Creating AutoFcst

As of 3 November 2022, **FirstCutForecast** runs the procedures **LoadStandard-Guidance**, **WindProcess**, **PoPFactory**, **SnowLevel50Percent**, **DeriveProbSnow**, **TSProcess**, **WxFromComponents**, **SkyFromLowMiddleHigh**, **SkyMatchWxAnd-PoP**, **TemperatureProcess**, **Frost** and **FireTools_1_Uppers**.

In creating **AutoFcst**, **FirstCutForecast** is run with defaults (that operational meteorologists see when run manually) other than

- extending the time range and allowing older guidance to be used where necessary, and
- running **PoPFactory** in part-day mode for Day +0
- running **MarineElements**

Additionally, initial **KBDI** and **SDI** are copied from Official grids, to be available for use by **SimpleSoilMoistureDeficit** when needed. The Official grids are a record of grids sent to the ADFD.

6. Imminent Changes

FirstCutForecast and other tools are updated frequently and these changes flow through to **AutoFcst**.

We plan to change the PoP/Precip suite for Day + 0 in the 18 UTC and 00 UTC base times of **AutoFcst**, to provide consistency between the daily and sub-daily PoP/Precip grids for the initial period. For the 18 UTC base time, that is -3 to +21 hours, and for the 00 UTC base time it is -9 to +15 hours.

We plan to include **FireTools_AFDRS** in **FirstCutForecast** (replacing **FireTools_1_-Uppers**). This will add two grids, **TotalPrecip48Hrs** and **HrsSinceLastPrecip**, and make **LAL**, **KBDI**, **SDI** and **DF** available again within **AutoFcst** (as they were prior to September 2022).

When available, the Lightning Activity Level (**LAL**) is based on the **Wx** grids.

When available as forecast grids the long-term dryness indices (**KBDI** and **SDI**) are based on the copied Official grids, observed rainfall, the expected 3-hourly rainfall (**Precip**) and the forecast 25th percentile of rainfall amount (**DailyPrecip75Pct**).

The Drought Factor (**DF**), a shorter-term dryness index, is based on the **KBDI** or **SDI**, observed rainfall, the expected 3-hourly rainfall (**Precip**) and the forecast 25th percentile of rainfall amount (**DailyPrecip75Pct**).

OCF will be replaced by **IMPROVER** [Gale, 2020] as **IMPROVER** becomes available.

7. Discussion

To date, as an agency, the Bureau has aimed to issue a coherent, consistent set of grids. That consistency has gone further than the consistency provided by **AutoFcst**, in that the ADFD grids also aim to be consistent with any Warnings issued.

As we consider increasing the automation of our services, we should question the degree of consistency required. Increasing automation will enable more frequent updating of forecasts. We can ask whether we are prepared to forego some consistency in exchange for better timeliness in updating some forecast parameters. An important example to consider is a Warning out for Gale force winds. In this case, should we modify our grids (in an automated or manual manner) to ensure they reflect the Warning conditions? A lesser example is the AutoFcst running of a tool to ensure Td ≤ T and to ensure MinT ≤ T ≤ MaxT.

The concept of consistency between parameters and text forecasts will be further challenged, while also being made easier in some ways, as we increase our explicitly probabilistic forecasts.

Discussion of **AutoFcst** and ADFD also raises questions about issuing forecasts of parameters not (yet) well captured by guidance. Historically the Bureau of Meteorology has used the GFE for parameters with good quality guidance, for parameters with less good quality guidance, and for parameters with no guidance. We should ask whether there is an ongoing reason for all these forecasts to be crafted using the same software. Would we be better served by creating these (gridded) forecasts in different systems before combining them in gridded, graphical and text-based products available to the public?

Any mention of automation needs to acknowledge the importance of being aware of any trade-off in skill required to achieve forecasts updated more frequently and produced in a more automated manner. The skill, though not described in any detail here, is monitored by the organisation.

8. Summary

AutoFcst provides a coherent forecast data set created in a systematic manner, available four times a day. It never includes Fog, Dust, Smoke, Drizzle or Rain. It does not include hail, or convective descriptors such as "gusty" or "severe". Generally, the skill

of the forecasts is similar to, or slightly better than, the guidance on which it is based. As the guidance improves, the modifications to the guidance will be reviewed and removed where appropriate.

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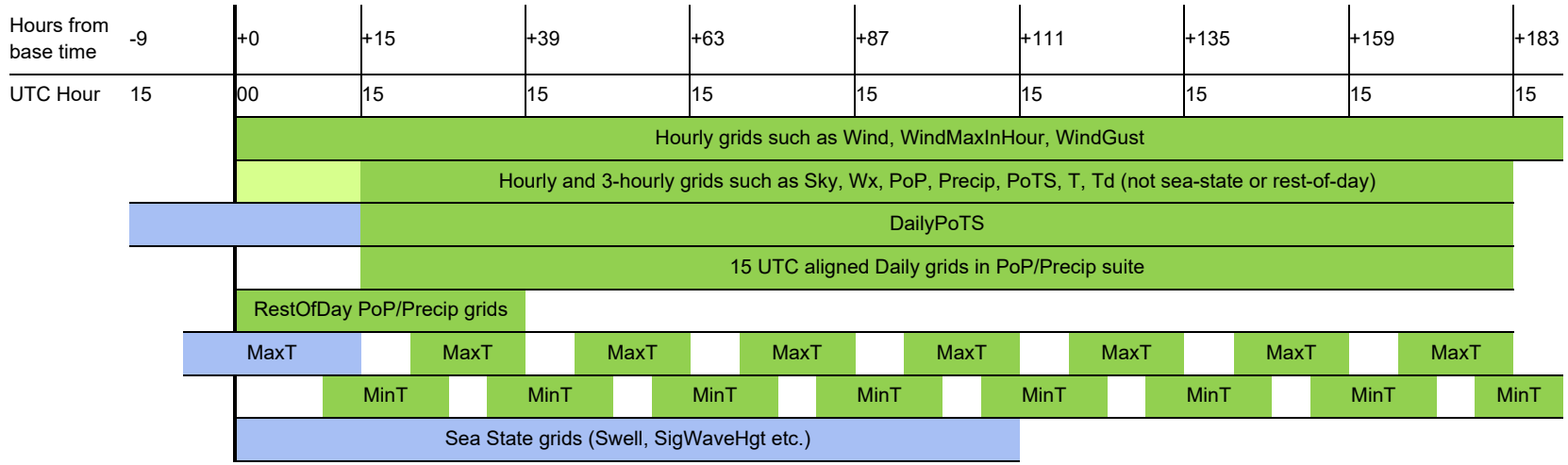

Figure 1. AutoFcst Base Hour 00 UTC

Schematic showing coherent grids (blue and green) for a 00 UTC base time.
Top row shows lead hours compared to the base time.
Second row shows UTC hour, with base time indicated by a double line. Single vertical lines represent the end of a 15 UTC aligned period.
Blue shading indicates grids based on guidance with base time prior to the 00 UTC base hour of AutoFcst.
Green shading indicates grids based on guidance with the 00 UTC base hour of AutoFcst.
Light green shading indicates grids modified based on guidance with base time prior to the 00 UTC base hour of AutoFcst.

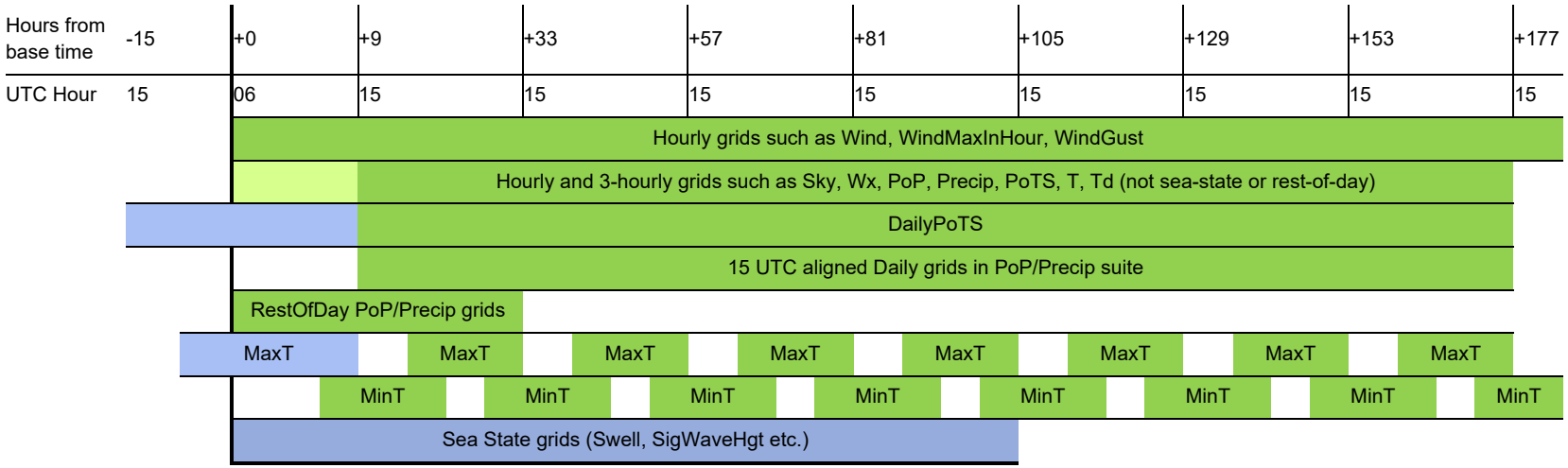

Figure 2. AutoFcst Base Hour 06 UTC

Schematic showing coherent grids (blue and green) for an 06 UTC base time.
Top row shows lead hours compared to the base time.
Second row shows UTC hour, with base time indicated by a double line. Single vertical lines represent the end of a 15 UTC aligned period.
Blue shading indicates grids based on guidance with base time prior to the 06 UTC base hour of AutoFcst.
Green shading indicates grids based on guidance with the 06 UTC base hour of AutoFcst.
Light green shading indicates grids modified based on guidance with base time prior to the 06 UTC base hour of AutoFcst.

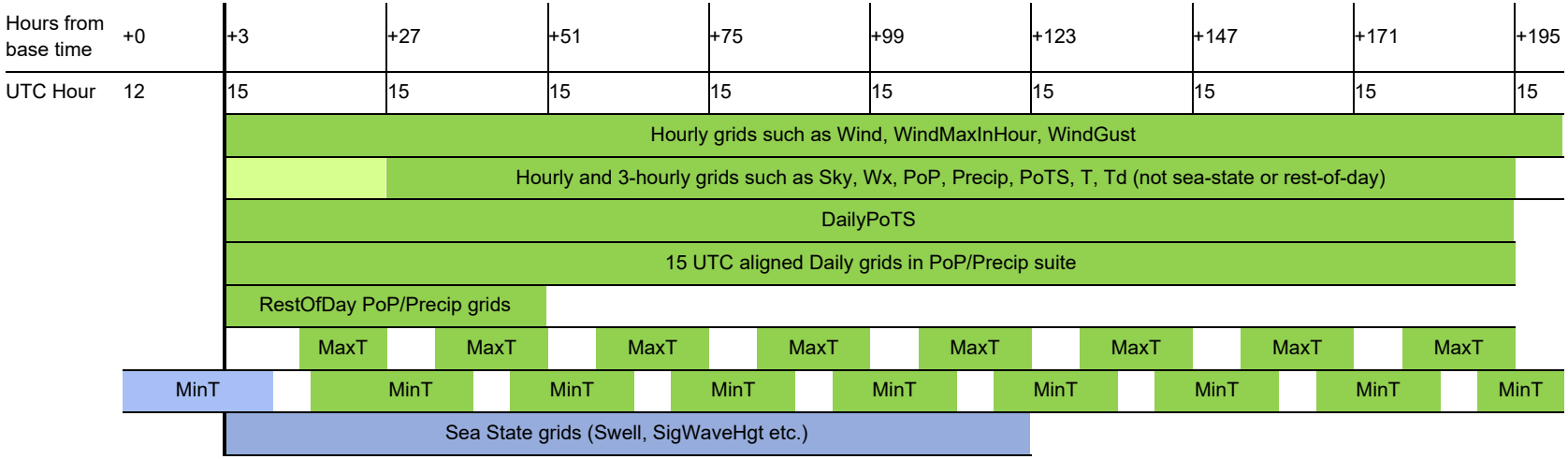

Figure 3. AutoFcst Base Hour 12 UTC

Schematic showing coherent grids (blue and green) for a 12 UTC base time.
Top row shows lead hours compared to the base time.
Second row shows UTC hour, with +3 hours from the base time indicated by a double line. Vertical lines represent the end of a 15 UTC aligned period.
Blue shading indicates grids based on guidance with base time prior to the 12 UTC base hour of AutoFcst.
Green shading indicates grids based on guidance with the 12 UTC base hour of AutoFcst.
Light green shading indicates grids modified based on guidance with base time prior to the 12 UTC base hour of AutoFcst.

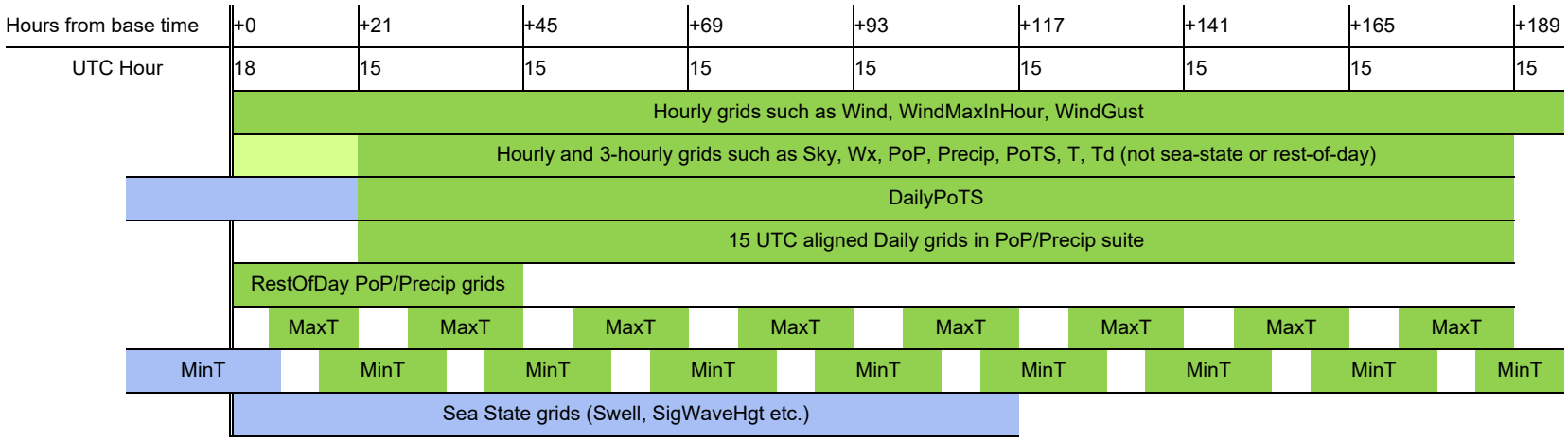

Figure 4. AutoFcst Base Hour 18 UTC

Schematic showing coherent grids (blue and green) for an 18 UTC base time.
Top row shows lead hours compared to the base time.
Second row shows UTC hour, with base time indicated by a double line. Single vertical lines represent the end of a 15 UTC aligned period.
Blue shading indicates grids based on guidance with base time prior to the 18 UTC base hour of AutoFcst.
Green shading indicates grids based on guidance with the 18 UTC base hour of AutoFcst.
Light green shading indicates grids modified based on guidance with base time prior to the 18 UTC base hour of AutoFcst.