



Changes to Aviation Significant Weather Charts

Effective from 7 October 2021

Changes to Aviation Significant Weather charts

From the 7th of October MetService is changing the display and make-up of the medium level Aviation Significant Weather charts (or Medium SIGWX).

The Medium SIGWX charts form part of the meteorological services agreed to with the Civil Aviation Authority, who is the ICAO Meteorological Authority in New Zealand and apply to the airspace between FL100 and FL250.

The specifications of what is required on these charts is outlined in Appendix 2 section 1.3 of the ICAO's regulatory guide Annex 3 Meteorological Service for International Air Navigation.

Phenomena included on the Medium SIGWX:

- moderate or severe turbulence, including clear air turbulence (CAT) presented as “worst in layer”
- moderate or severe icing presented as “worst in layer”
- cumulonimbus (CB) cloud associated with thunderstorms
- tropical cyclones
- active volcanic eruptions
- radioactive material



Changes to Aviation Significant Weather charts

The cloud amount for CB is indicated using the following terms:

- ISOL EMBD,
- OCNL, OCNL EMBD,
- FRQ and FRQ EMBD

The numerals following the cloud type abbreviation are the forecast height of the top and base, respectively, of the cloud.

If the top or base is above/below the level of the chart's coverage (in this case FL100 to FL250), XXX is used, for example

| | |
|------|------|
| ISOL | EMBD |
| CB | XXX |
| | 100 |

Or

| | |
|------|------|
| OCNL | EMBD |
| CB | XXX |
| | XXX |

Or

| | |
|-----|-----|
| FRQ | |
| CB | XXX |
| | XXX |



What's changing

Following user feedback, MetService has agreed to routinely produce three charts forecasting Medium Level SIGWX across the globe.

Charts include:

Medium SIGWX - Displays all phenomena listed on page 2

Medium SIGWX – CB + Icing – Displays phenomena listed on page 2 excluding moderate or severe turbulence

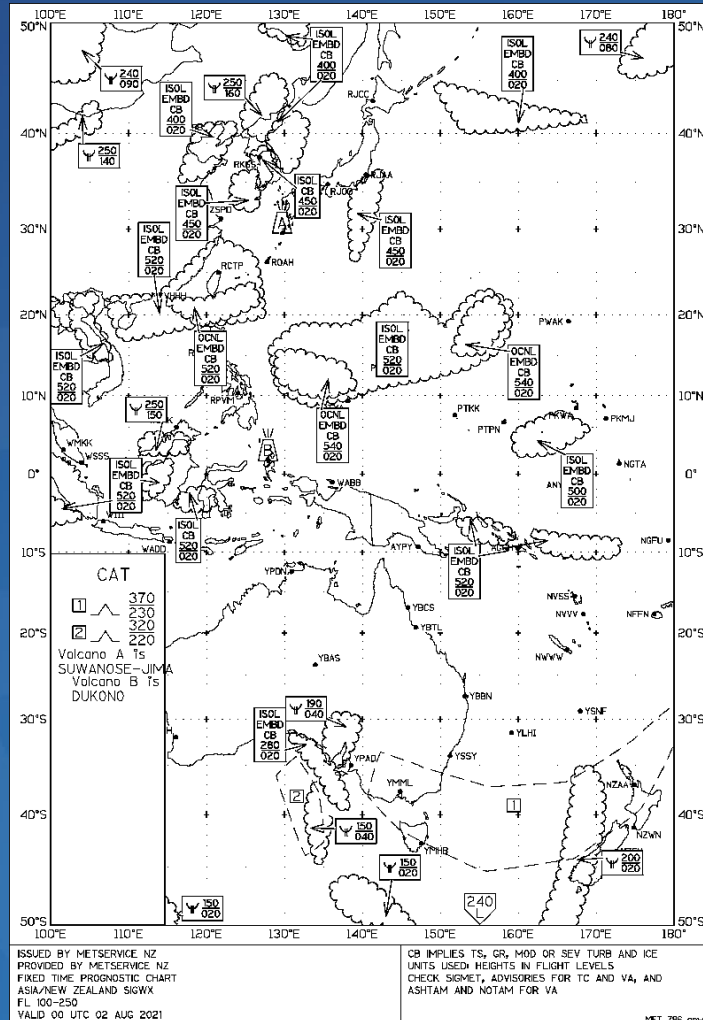
Medium Level Turbulence – Only displays moderate or severe turbulence, as described on page 2.



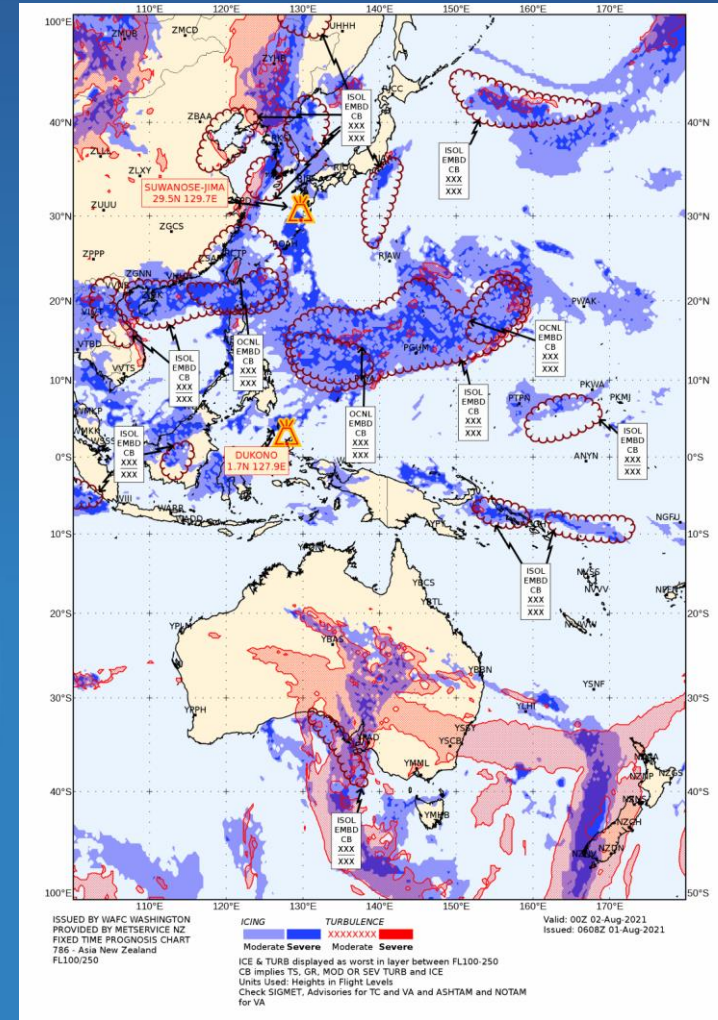
What's changing

Below is an example of how the Medium SIGWX are currently displayed (image to the left), compared to the new Medium SIGWX chart available from 7 October 2021 (image to the right).

Before:

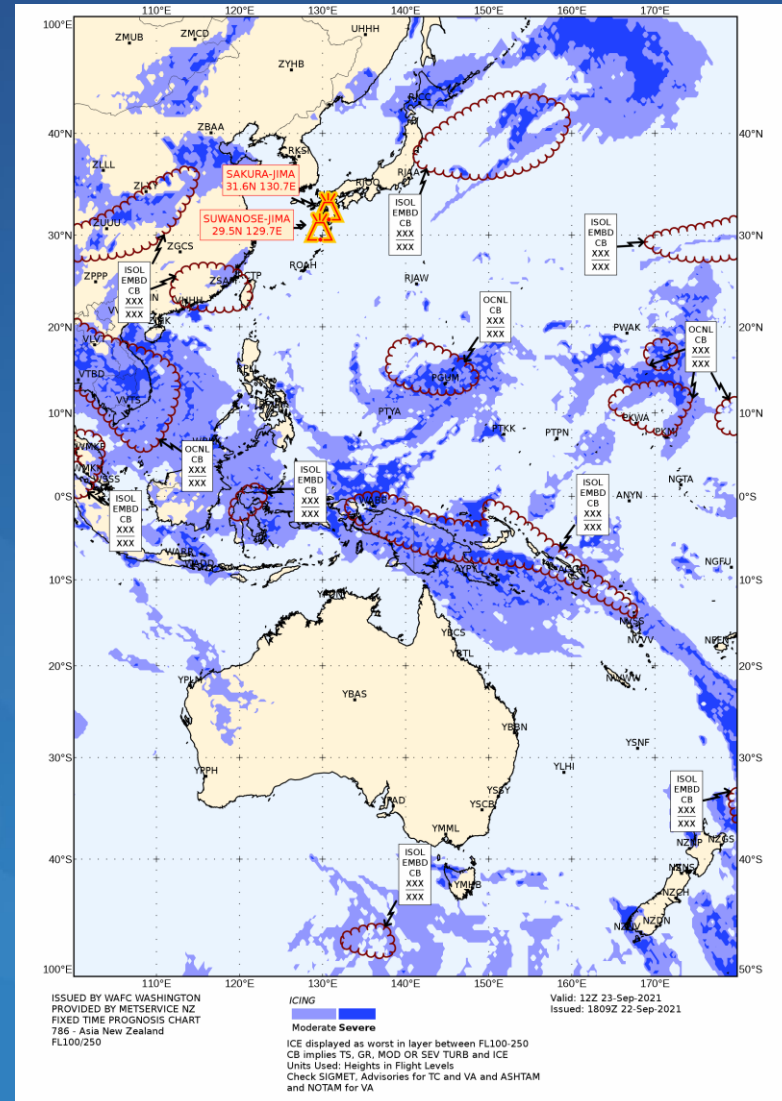


After:



What's changing

Below is an example of the new Medium SIGWX – CB + Icing chart available from 7 October 2021



What's changing - Icing

Current charts

- The current charts show areas of moderate icing only at specific bases and tops.
- For example, an area of icing may exist for an area with a base of FL140 and top of FL250. Another area may have a base of FL100 and a top of FL200.

New charts

- The new charts will instead show areas of moderate or severe icing, based on the ICAO World Area Forecast Centres (or WAFC) gridded model data between FL100 and FL250.
- The areas shown adopt a worst in layer approach. This refers to the worst conditions at each model grid point throughout the FL100 to FL250 layer. At each model grid point, the model fields are examined at each model level and the worst from each layer is chosen. In this case, the worst is the highest value (i.e. most severe). This process is repeated at each grid point, therefore providing a “worst case scenario”, spatially.
- The new icing forecasts developed by the ICAO WAFC's brings improved algorithms which includes temperature, cloud fraction, vertical velocity and cloud liquid, and cloud frozen water content. These forecasts are then output into various categories of icing intensities of which the new charts display areas of moderate and severe.



What's changing - Turbulence

Current charts

- The current charts display areas of turbulence with specific bases and tops. For example, an area of turbulence may have a base down to FL230 and a top up to FL370.
- At the moment, this is shown as turbulence existing between 370/230.

New charts

- The new charts will show areas of moderate or severe turbulence, based on gridded model data between FL100 and FL250. The areas shown adopt a worst in layer approach. This refers to the worst conditions at each model grid point throughout the FL100 to FL250 layer. At each model grid point, the model fields are examined at each model level and the worst from each layer is chosen. In this case, the worst is the highest value (i.e. most severe). This process is repeated at each grid point, therefore providing a “worst case scenario”, spatially.
- The turbulence forecasts are created through a multi-diagnostic algorithm called the Graphical Turbulence Guidance (or GTG). The GTG has been developed by the National Centre for Atmospheric Research (NCAR) and forecasts of turbulence are provided in terms of Eddy Dissipation Rates (or EDR).
- EDR is a separate measure of aircraft independent turbulence and is output as a number between 0 and 1. The moderate and severe grids which now appear in the Medium SIGWX and the Medium Level Turbulence are based on the following thresholds defined by NCAR:
 - Moderate - when the peak value of EDR is equal to or above 0.20 and below 0.45
 - Severe - when the peak value of the EDR equals or exceeds 0.45



What's changing – CB areas

- The charts will continue to display areas of CB received from the WAFCs by way of scalloped areas.
- Instead of showing specific bases and tops as is done with the current charts, they will be depicted as XXX/XXX.
- CBs typically have bases below FL100 and tops higher than FL250, meaning that for the majority of the time they will sit below and above the extremities of the Medium SIGWX and Medium SIGWX – CB + Icing charts.
- The Medium Level Turbulence charts will not show any CB areas.

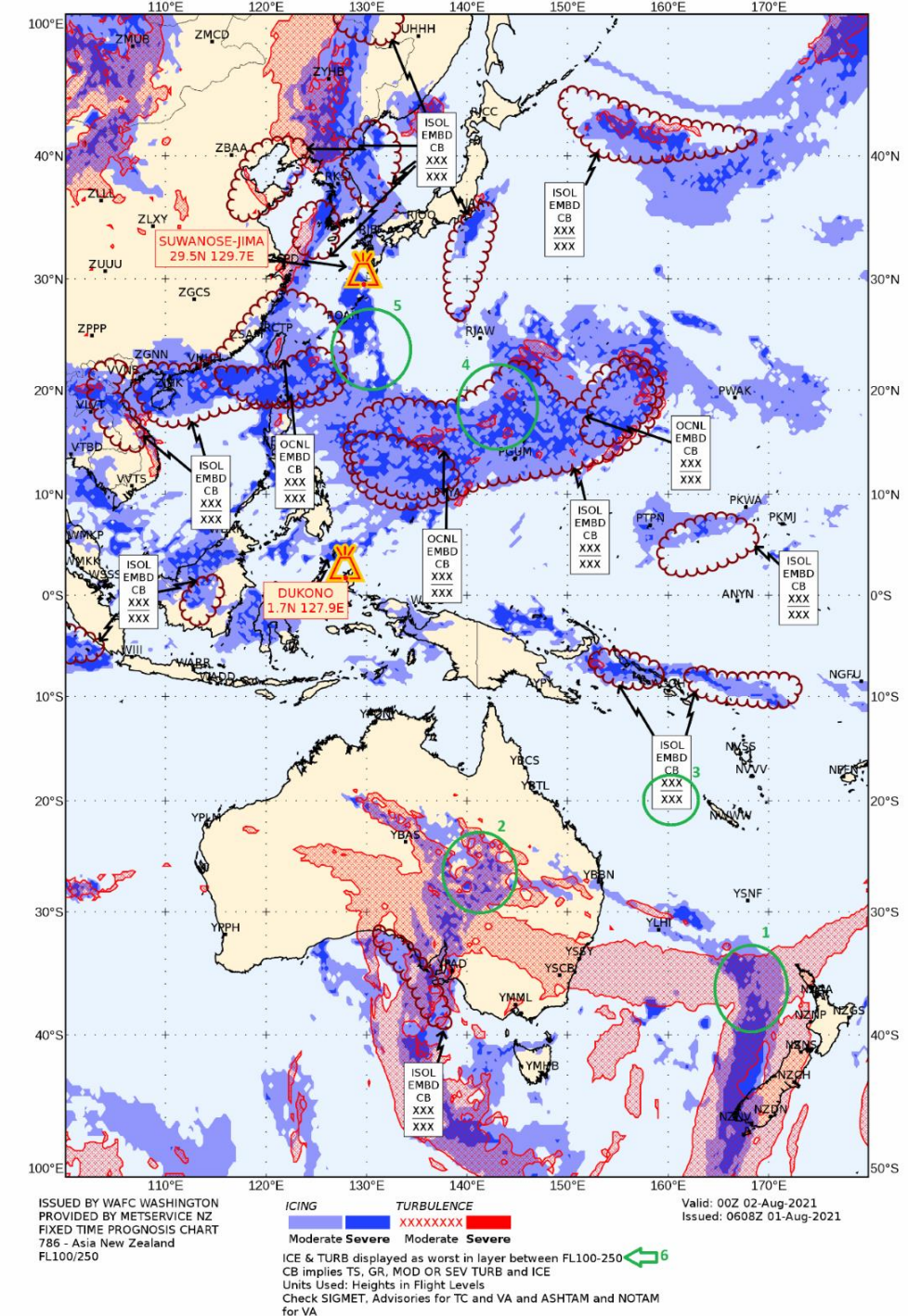


Understanding the charts – Medium SIGWX Chart

There are six items from the Medium SIGWX charts that are discussed in further detail. These are circled and numbered in green on the chart to the right.

The intention here is to give the user more insight into how best to use the new Medium SIGWX charts for flight planning operations.

1. The area west of New Zealand is showing a continuous area of icing and turbulence. There is a high level of confidence that should an aircraft fly through the area between FL100 and FL250 icing and turbulence will be encountered. The area of icing is almost equally split between being moderate and severe in intensity. This can also be used as an indicator of the likelihood of an icing SIGMET closer to 00UTC on the 2 August (valid time of the chart).
2. The area of icing and turbulence displayed over Australia is more patchy in nature when compared to the item described in area 1. Also, there are holes within the data which may lead to thinking no turbulence or icing is present. A user should treat this area holistically and keep in mind that the model data is showing the state of icing and turbulence over the area for a particular time. In this case that would be for 00UTC on 2 August. As the weather system responsible for creating the icing and turbulence moves eastwards with time, the clear areas or holes that we see in the turbulence and icing could fill. If planning a flight through this type of area the user should account for turbulence and icing between FL100 and FL250.



Understanding the charts – Medium SIGWX Chart

There are six items from the Medium SIGWX charts that are discussed in further detail. These are circled and numbered in green on the chart to the right.

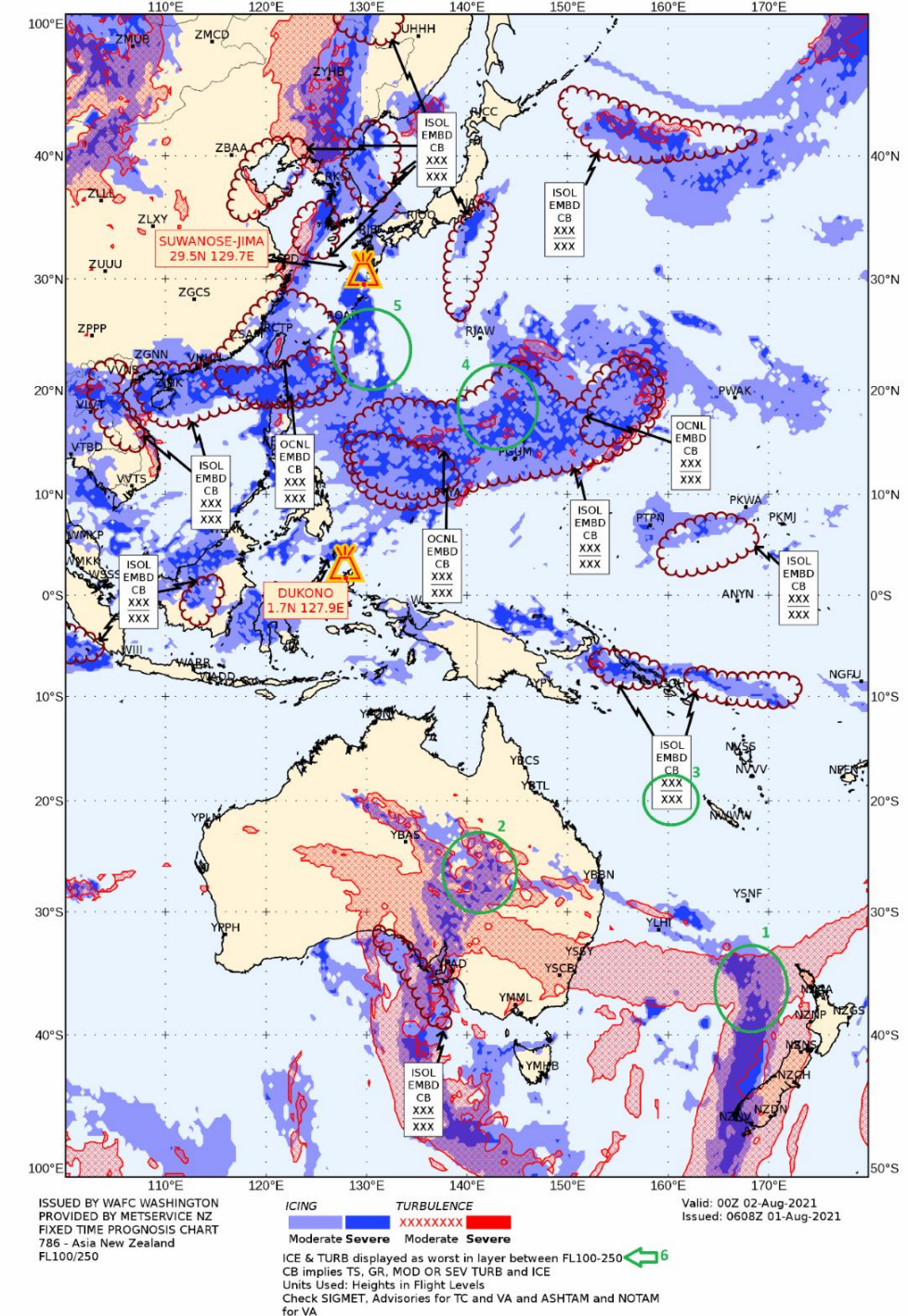
The intention here is to give the user more insight into how best to use the new Medium SIGWX charts for flight planning operations.

5. In keeping with the theme described for areas 2 and 4, an area of predominantly severe icing is displayed east of China.

There are also large areas of no icing threat depicted on the charts. The user should apply a holistic approach and plan for an icing threat across these areas.

An hour either side of 00UTC on 2 August could result in the areas being filled and moderate or severe icing being present as the convective weather about the area evolves. Given this region lies just east of an ISOL EMBD and OCNL EMBD CB area an hour or two either side of the chart validity time could mean severe icing being present across these areas.

6. There is a new label titled “ICE & TURB displayed as worst in layer between FL100-250” as a reminder to users on how icing and turbulence is displayed on the charts.

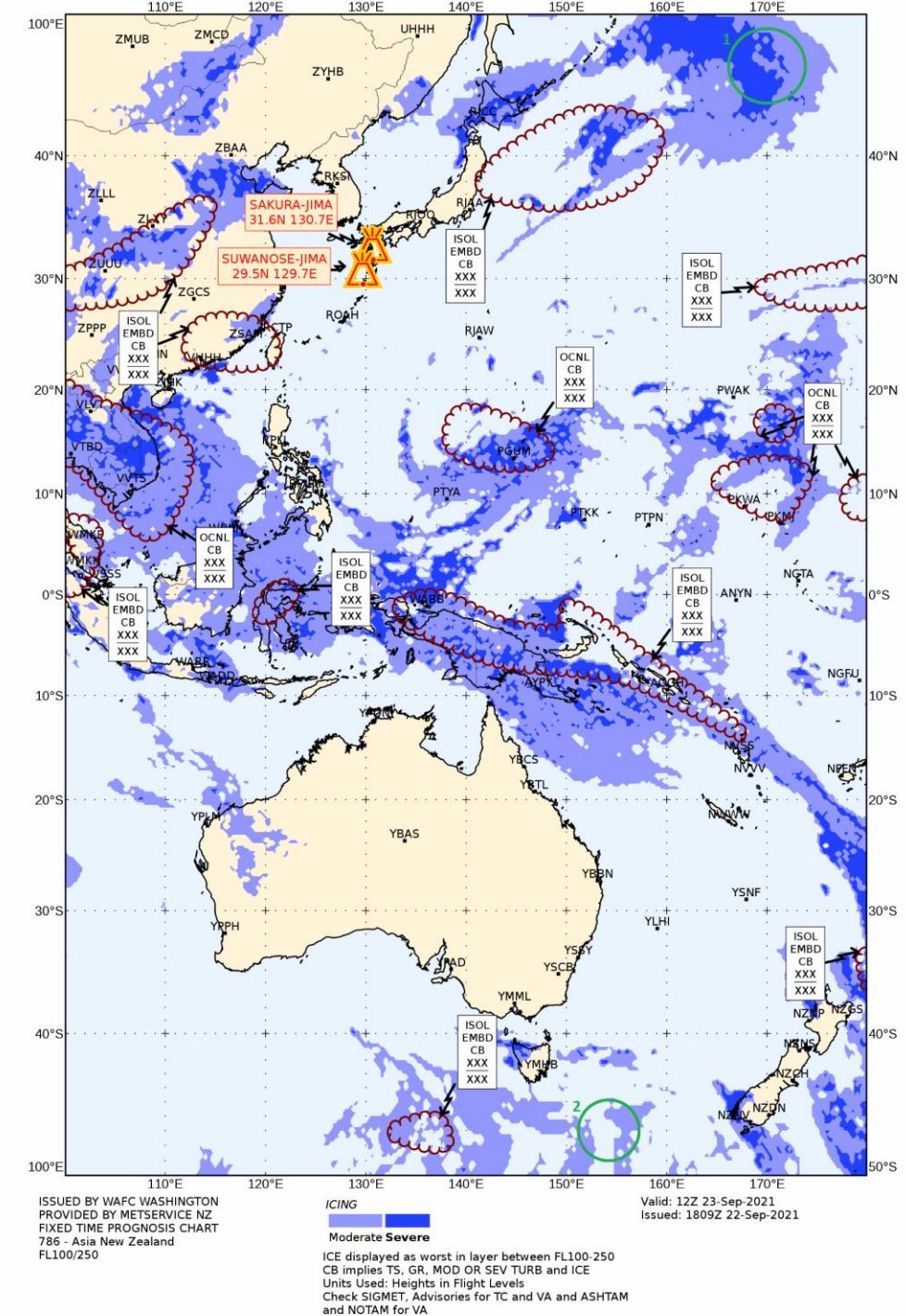


Understanding the charts – Medium SIGWX – CB + Icing

There are two items from the Medium SIGWX – CB + Icing charts that are discussed in further detail. These are circled and numbered in green on the chart to the right.

The intention here is to give the user more insight into how best to use the new Medium SIGWX – CB + Icing charts for flight planning operations.

1. The area north east of Japan shows a consistent area of moderate and severe icing. There is a high level of confidence that should an aircraft fly through the area between FL100 and FL250 icing will be encountered. This can also be used as an indicator of the likelihood of an icing SIGMET closer to 12UTC on 23 September (valid time of the chart).
2. This area south west of New Zealand is indicating patchy areas of moderate icing and a large area of no icing threat. The user should apply a holistic approach and plan for a moderate icing threat across these areas. An hour either side of 12UTC on 23 September could result in some areas being filled with moderate icing. Given there is weak frontal activity to the west (including approaching ISOL EMBD CB).

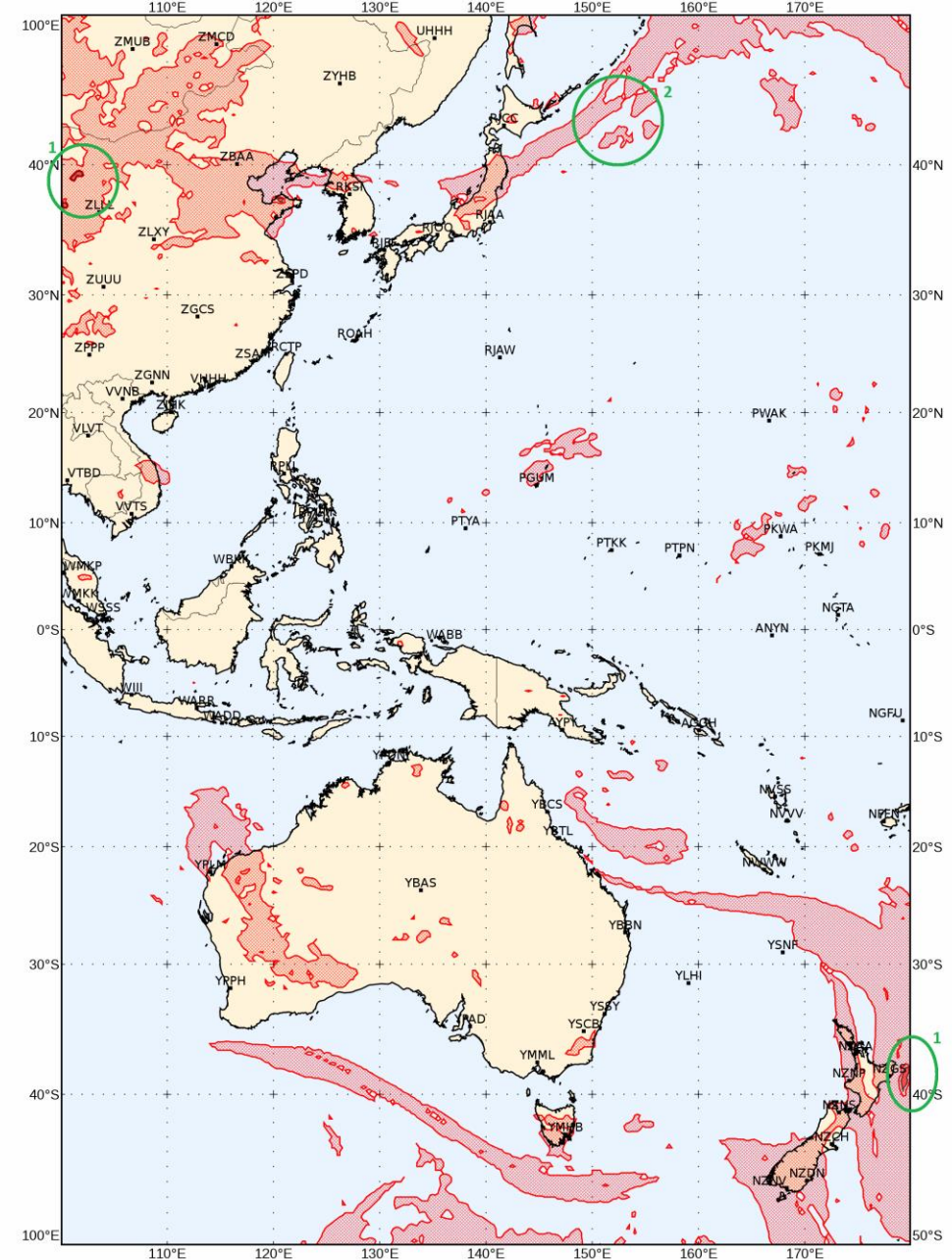


Understanding the charts – Medium Level Turbulence

There are three items from the Medium Level Turbulence charts that are discussed in further detail. These are circled and numbered in green on the chart to the right.

The intention here is to give the user more insight into how best to use the new Medium Level Turbulence chart for flight planning operations.

1. There are two areas labelled as “1” to show the user how Severe turbulence is displayed on the charts. These are indicated by small areas of solid red (present over inland China and off New Zealand’s East Cape). There is a high level of confidence that should an aircraft fly through these areas between FL100 and FL250 severe turbulence could be encountered. Outside the solid red areas and within the red hatched areas, and aircraft can expect to encounter moderate turbulence. The existence of these solid red areas can be used as an indicator of the likelihood of a turbulence SIGMET closer to 12UTC on 23 September (valid time of the chart).
2. This area east of Japan is showing some areas of moderate turbulence and some of no turbulence. The user should apply a holistic approach and plan for a moderate turbulence threat across the entire area. An hour either side of 12UTC on 23 September could result in some areas being filled with moderate turbulence as the weather system causing the turbulence evolves with time.



ISSUED BY WAFIC WASHINGTON
PROVIDED BY METSERVICE NZ
FIXED TIME PROGNOSIS CHART
786 - Asia New Zealand
FL100/250

TURBULENCE
XXXXXXX
Moderate Severe

TURB displayed as worst in layer between FL100-250
Units Used: Heights in Flight Levels

Valid: 12Z 23-Sep-2021
Issued: 1809Z 22-Sep-2021



Thank you 