briefing note 409 March 2020

# NSW/ACT Large Scale Hail Event, January 2020: An Overview of Risk Frontiers' Post-Event Loss Estimate Capabilities

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Risk Frontiers' rapid post-event analysis of radar footprint and damage gives an aggregated loss estimate of $1.2 billion for the January 2020 hail storms that hit Melbourne, Canberra and Sydney simultaneously - see Table 1.

| Name | Date | RF Post Event Estimate, millions | Actual loss (from ICA), millions | Risk Frontiers Reporting Date | ICA Reporting Date |
|---|---|---|---|---|---|
| (CAT185) Sydney 2018 Catastrophe | December 20, 2018 | 1600 | 1357 | 01/03/2019 | 18/12/2019 |
| (CAT196) SEQ, Sunshine Coast Hailstorm | November 17, 2019 | 150 +/- 40 | 166 | 20/12/2019 | Processing |
| (CAT201) Melbourne 2020 Storm | January 19, 2020 | 380 +/- 35 | 670 | 22/02/2020 | Processing |
| (CAT201) Canberra 2020 Storm | January 20, 2020 | 410 +/- 80 | | 22/02/202 | Processing |
| (CAT201) Sydney 2020 Storm | January 20, 2020 | 390 +/- 60 | | 22/02/202 | Processing |

**Table 1.** Risk Frontiers' post-event loss estimates compared to ICA current estimates for recent hail events. Other events not declared by the ICA have also been analysed by Risk Frontiers but are not shown here.

On January 19, 2020, the Bureau of Meteorology (BoM) issued warnings that a severe convective storm would impact Melbourne. The next day, more hail hammered Canberra and Queanbeyan, then in southwest Sydney shortly after. NSW State Emergency Services (SES) answered 800 calls for assistance in Sutherland, Miranda and Caringbah. The ACT SES received

2200 calls following the event. Images and videos of golf-ball sized (4-5cm) hail and strong wind gusts proliferated through social and general media.

The Insurance Council of Australia declared three days of storms as a single catastrophe (CAT201) with impacts in Melbourne, Canberra, Queanbeyan, Sydney, and Goulburn (also extreme rain and wind in Queensland). Their current estimated loss is $670 million (from 69,850 claims-- 53% ACT, 17% NSW, and 30% Vic).

Images of damage include the usual dented cars, shattered windscreens, and holes in roofs. CSIRO crop research glasshouses in Canberra fared particularly poorly (some example photos taken by staff are shown in Figure 1.) Reported wind gusts of 116km/h in ACT (https://www.canberratimes.com.au/story/6588613/heavy-storms-and-huge-hailstones-lash-canberra/) will have contributed to the damage, both by breaking drought weakened vegetation, and affecting the impact of the hail itself.

Risk Frontiers performs rapid post-event analysis when storms are declared catastrophic, or before, when alerted to excessive or large hail through other information channels (e.g. SES volunteers, social media). The methodology derives hail footprints from radar data for use in Risk Frontiers' HailAUS loss model and has been more fully described in prior Newsletters (https://riskfrontiers.com/rf2018/wp-content/uploads/2019/03/RF_Newsletter_Volume18_Issue2_March_2019.pdf). The results are actively compared against evolving ICA estimates.

CAT201 is the second of two ICA hail events to impact Australia in the 2019/20 season and followedCAT196, a smaller storm that occurred in Southeast Queensland in November 2019. Both occurred only a year after the storm that hit Sydney on December 20, 2018, which accrued an estimated $1.357 billion in insurance claims by December last year. As shown in Table 2, the 2018 storm now ranks as the 7th costliest in normalised terms, barely inching ahead of the March 2010 Perth Hail Catastrophe. Thus far Risk Frontiers' post-event loss estimates compare well to those from the ICA for the December 2018 storm and now the SEQ 2019 storm (Table 1).

The January 2020 post-event analysis proved a more unique challenge. The hours clause of most insurance policies meant that storms (even ones where damage was primarily attributed to rain and wind in Queensland) across 3 days and 3 states were aggregated into one catastrophe. Nonetheless, Risk Frontiers extracted multiple storm footprints from the primary radar in each affected urban centre to yield a current estimate in Table 1. The combined figure of $1.2 billion includes residential loss, commercial and industrial loss including business interruption as well as motor losses. This is in excess of the current ICA estimate, but their reported number is expected to increase substantially given only a fraction of claims have been processed.

Figures 2 through 4 are the sum of the Maximum Estimated Size of Hail (MESH[1]) analysis over the course of the storm for the indicated regions. Animations of the storms development are available on Risk Frontiers' website. The storm cells in Sydney and Canberra behaved similarly, while the storm in Melbourne exhibited slower movement, an unusual split, and change in travel direction as it passed Northwest of Lancefield. Inspection of the synoptic setup (the plot of Mean Sea Level Pressure in Figure 5) from the BoM shows a steep trough directly over Port Phillip Bay when this phenomena occurred which may offer some explanation. Analysis for this storm required separating the radar volumes in time and allocating a separate footprint to each of the cells that developed after that split.

Risk Frontiers' latest research shows some exciting possibilities in post-event analysis of hail storms. Our current capability, applied to several recent events, has already demonstrated that. Our current capability, applied to several recent events, has already demonstrated that:

- Image analysis can be used to rapidly determine a hail storm footprint from widely available radar data,
- This footprint can be fed into Risk Frontiers' HailAUS damage module to create a fast loss estimation pipeline,
- The loss estimate is robust and could be considered for post-event capital allocation considerations or as part of a parametric hail product .

[1] An algorithm that adds up the radar reflectivity over the heights where hail forms.

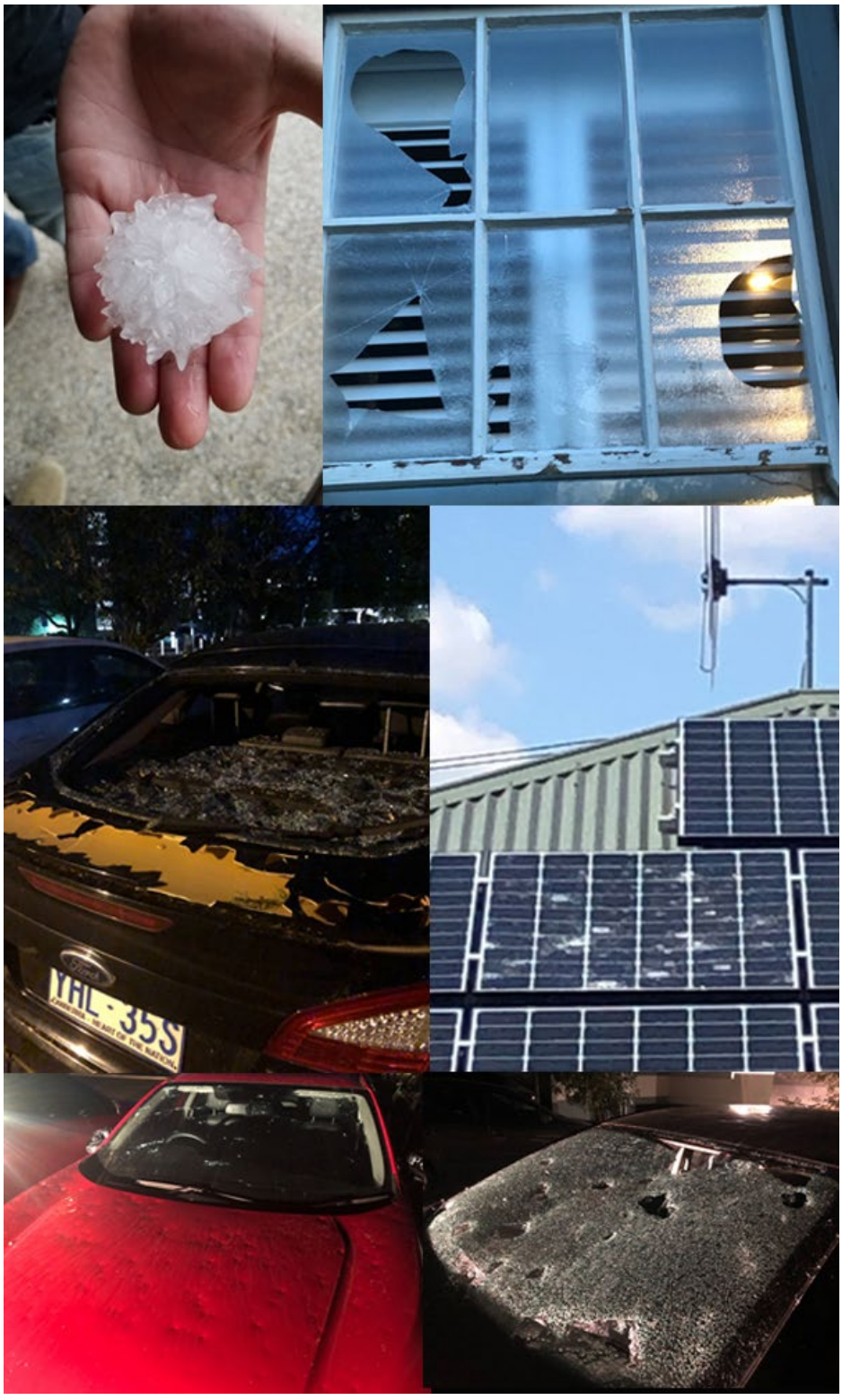


**Figure 1.** Photographs of damaged cars, windows, and solar panels from Barton and Civic Square in Canberra.

| Name/Region | Date | Normalised Cost (2017/18, $million) |
|---|---|---|
| Eastern Sydney Hailstorm | April 14, 1999 | $5,575 |
| Brisbane | January 18, 1985 | $2,274 |
| Northern Sydney Hailstorm | March 18, 1990 | $1,682 |
| Melbourne Storm | March 6, 2010 | $1,626 |
| Brisbane | December 19, 1967 | $1,596 |
| Brisbane Hailstorm | November 27, 2014 | $1,535 |
| Perth Storm | March 22, 2010 | $1,345 |
| Sydney Storm | December 20, 2018 | $1,357 |
| Melbourne Christmas Storm | December 25, 2010 | $988 |
| Western Sydney | October 03, 1986 | $796 |

Table 2. The top 10 most costly hail events in Australia with Risk Frontiers' normalised estimates from the ICA Catastrophe Database.

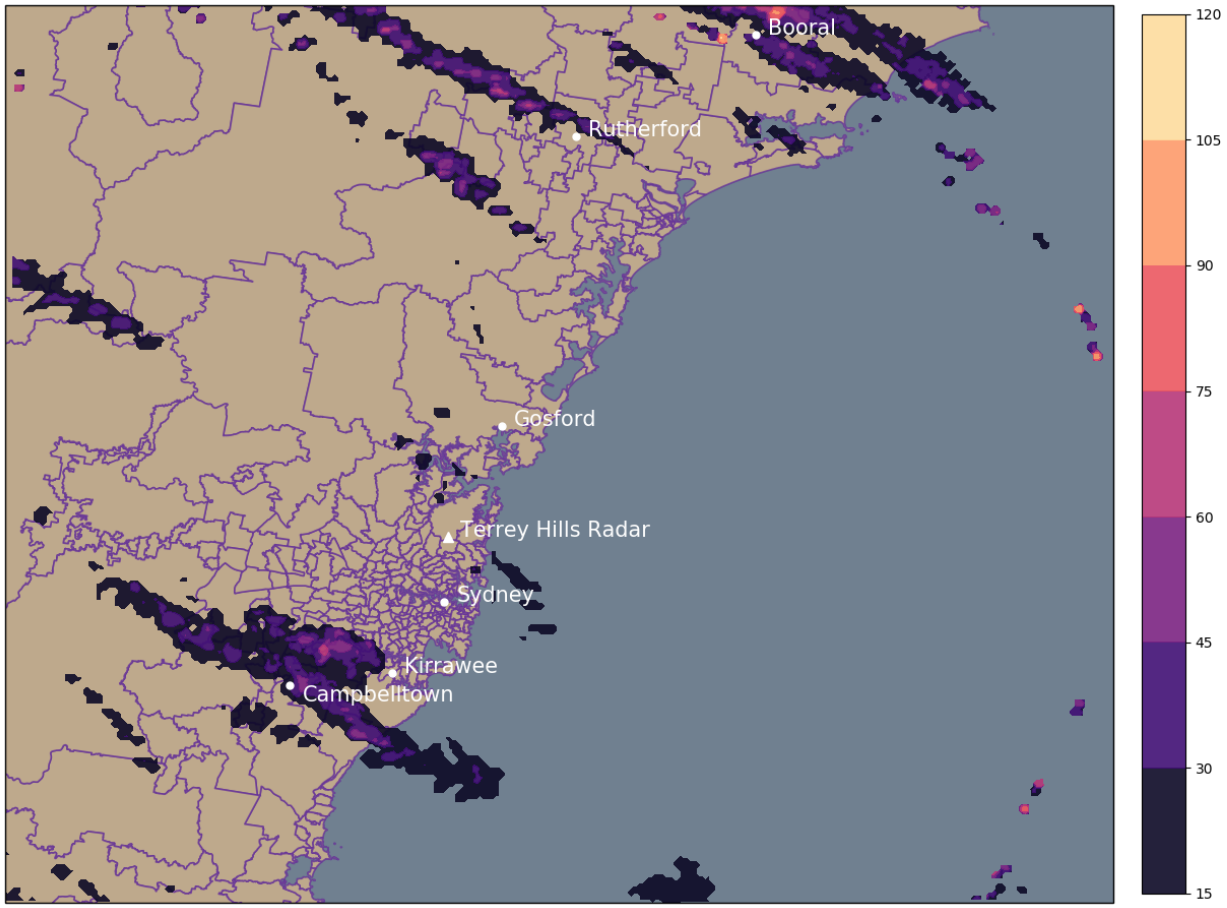


**Figure 2.** Cumulative MESH over the storm event in Sydney. The primary suburbs impacted were the Sutherland Shire and Campbelltown, with another hotspot in the far Northeast near Booral.

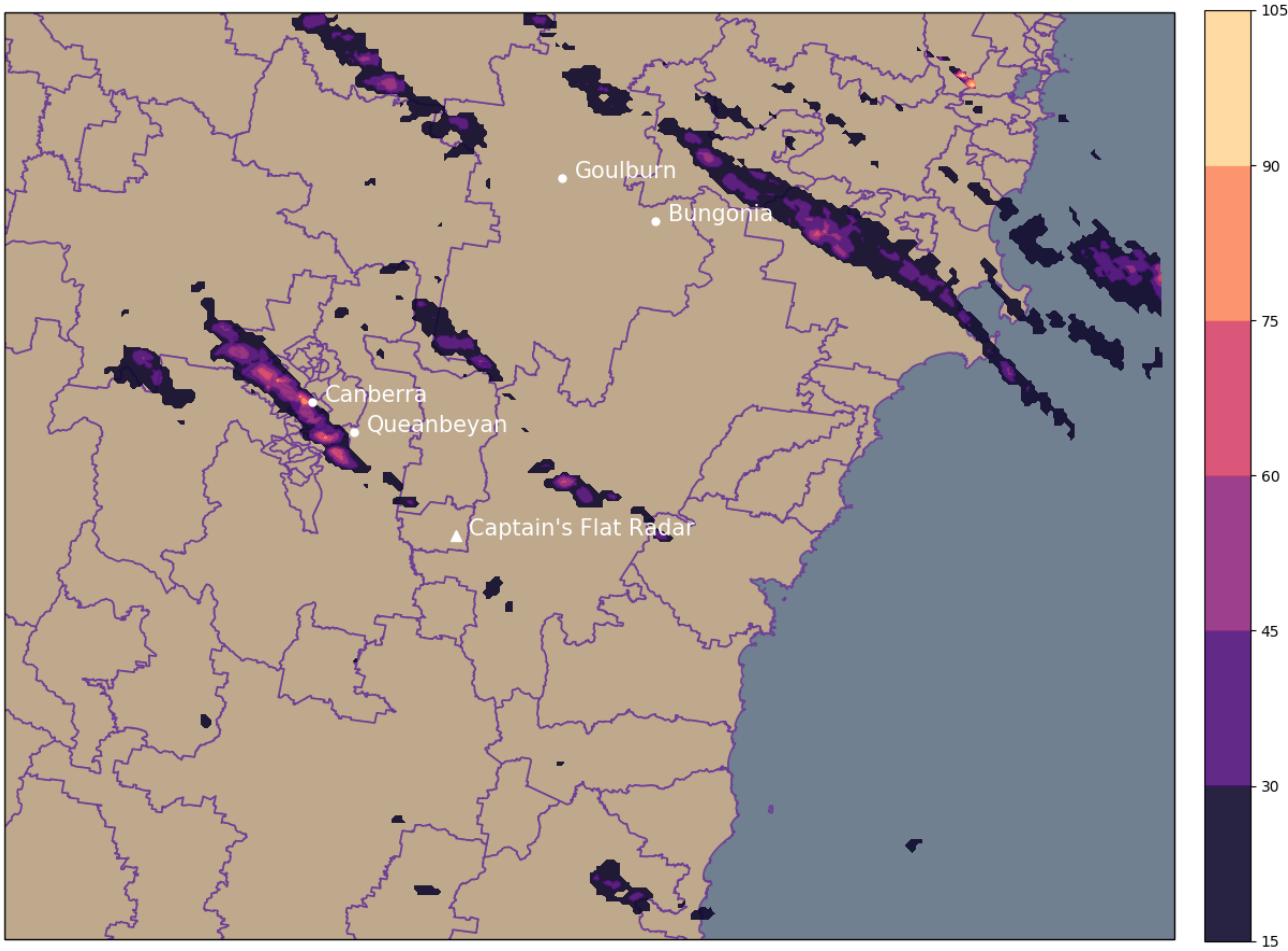


**Figure 3.** Cumulative MESH for the Canberra hail-storm. Hailstone sizes estimated up to 8cm landed in the CBD, with another hotspot occuring Northeast of Bungonia and Goulburn.

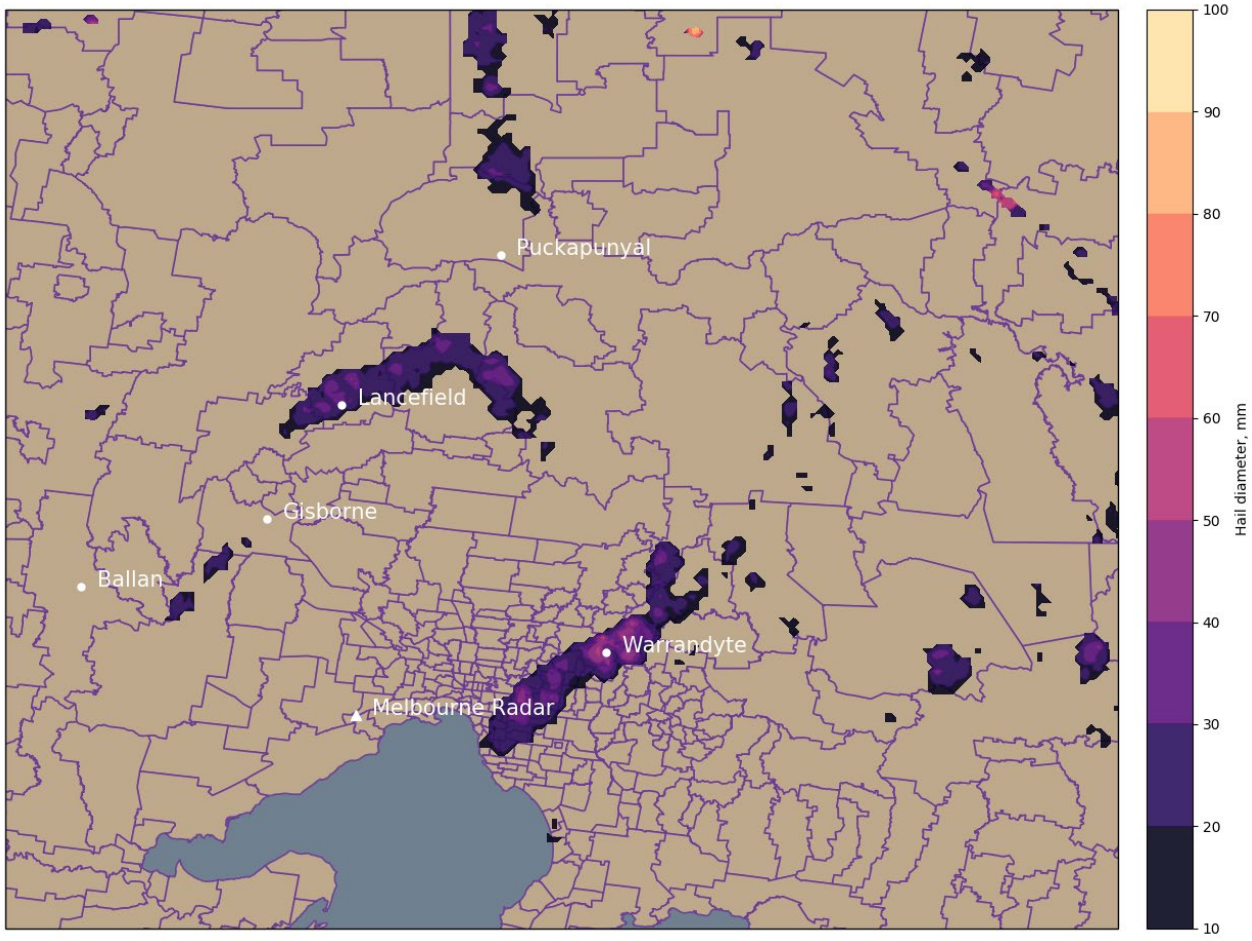


**Figure 4.** Cumulative MESH footprints for the Melbourne hail-storm, showing the peak damage areas around Lancefield, Kilmore, Malvern, and Warrandyte. The storm cells split and travelled opposite directions Northeast of Lancefield.

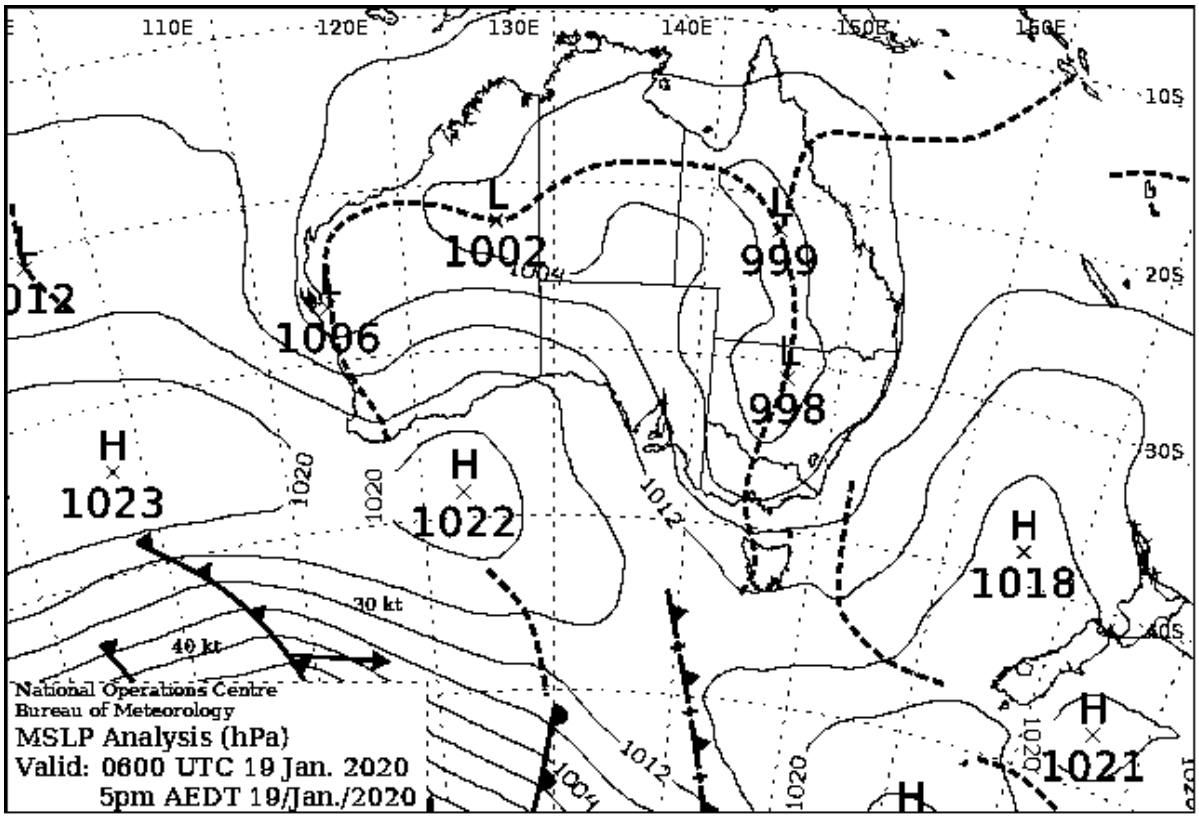


**Figure 5.** Mean Sea Level Pressure at 5pm AEDT. The low pressure trough occurred over Port Phillips Bay, causing the unusual U-shaped damage swath in Figure 4.