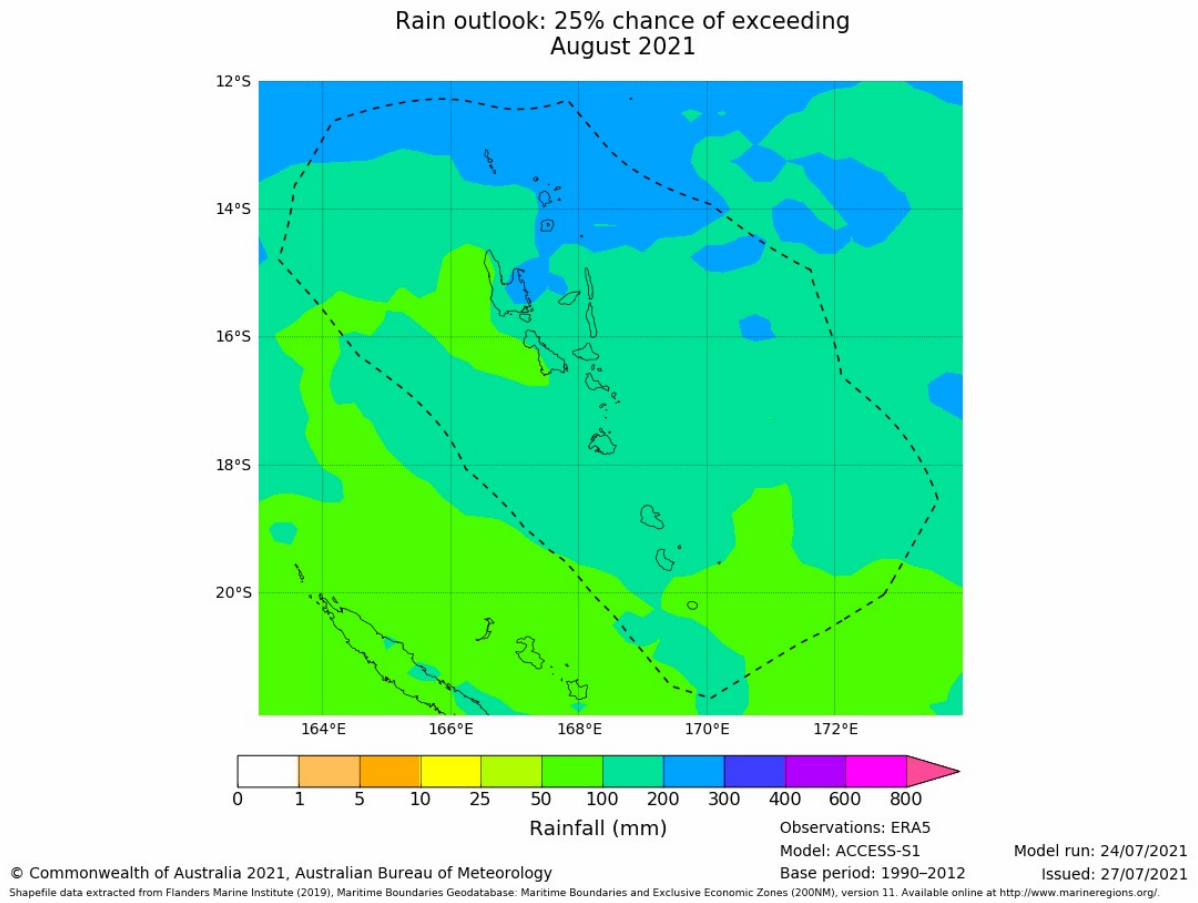
ACCESS-S Outlook Scenario's and Chance of at Least product's

There is now an extended range of monthly and seasonal rainfall forecast products. These include probabilities of exceedance for set rainfall total thresholds (using ERA5 to approximate monthly and seasonal rainfall totals for the Pacific), and rainfall totals for set probabilities of exceedance.

For those interested in specific rainfall amounts (e.g. 200mm for the season), or who make decisions at specific probabilities (e.g if there is a 75% chance it will be drier than normal), the extended range of ACCESS-S products uses a statistical technique to transform the probabilistic forecast from the climate outlook model into rainfall scenarios that can be viewed in two different ways:

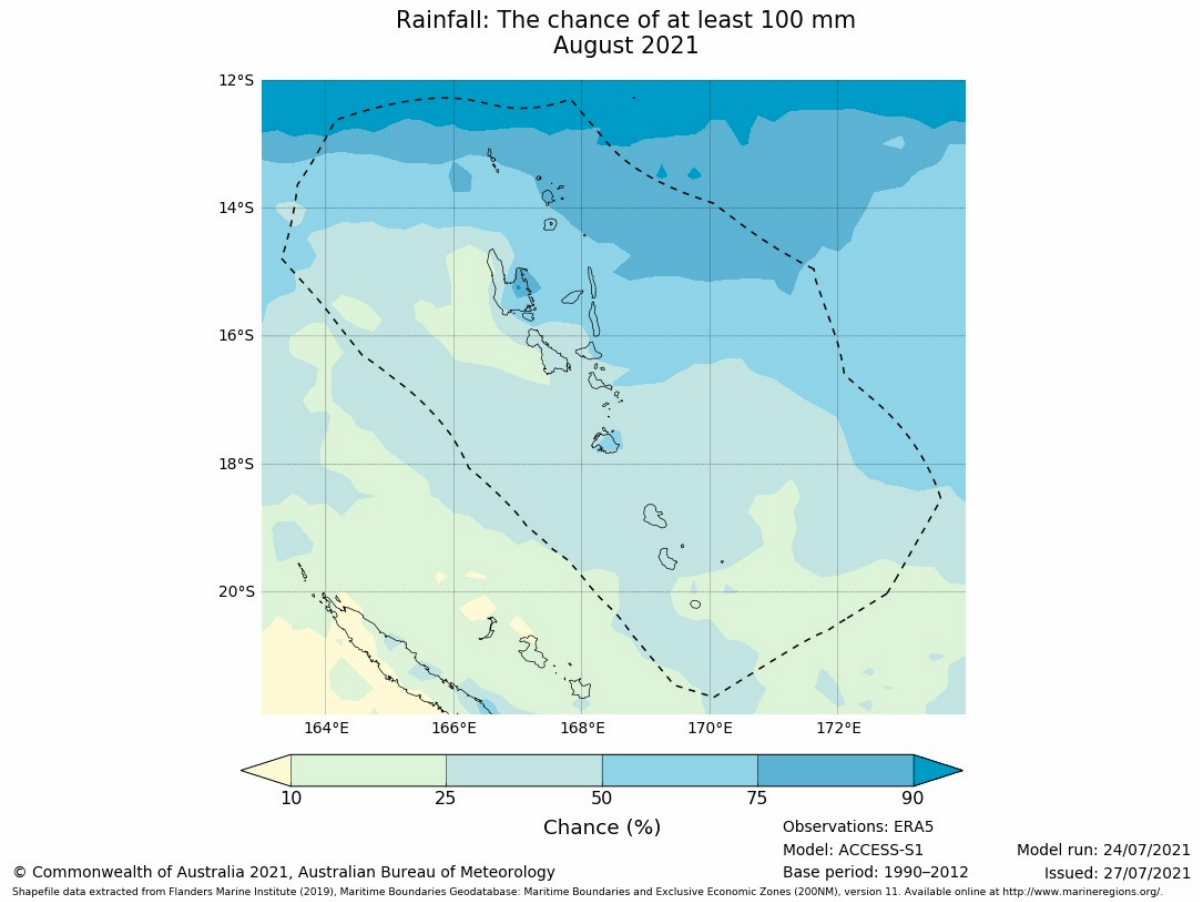
- Chance of at least: the chances that rainfall for the selected outlook period will exceed particular thresholds, e.g. chance of at least 200mm over the coming three months, or 25 mm in the coming month
- Outlook scenarios: rainfall amounts that are likely at a particular percentage chance, e.g., 25% chance of receiving the given rainfall amount for the season.

Outlook scenario maps



Outlook scenario maps present the climate outlook information as rainfall amounts which have a 75%, 505 or 25% chance of occurring. To illustrate, Figure 1 shows the rainfall outlook for Vanuatu for August 2021. The colours on the map show the amount of rainfall (mm) that has a 75% chance of occurring during this period. The location highlighted with the black circle, Erromango in southern Vanuatu, has a 25% chance of receiving at least 100mm and possibly up to 200mm of rain for the month of August.

Chance of at least maps



The chance of at least maps also show the rainfall outlook, by displaying the chance of receiving a specified amount of rainfall. There are many rainfall threshold amounts to choose from for both monthly and seasonal outlooks. To illustrate, figure 2 shows the chance of receiving a total rainfall amount of at least 100mm during August 2021. The colours on the map show the percentage chance of 100mm of rain occurring. The location highlighted by the black circle over Erromango, in southern Vanuatu, has a 25 to 50% chance of receiving 100mm of rain during August.

The chance of at least rainfall outlook maps are consistent with the outlook scenarios. For the same location in the examples above, the chance of at least 100mm of rainfall is 25 to 50%, which is consistent with the outlook scenario which shows a 25% chance of at least 100mm and possibly up to 200mm of rain.

Further Detail:

The products presented here use ERA5 reanalysis to approximate climatological rainfall across the Pacific. Given the rainfall amounts are presented as discrete bins, the ERA5 monthly and seasonal rainfall is a reasonable approximation of a rainfall climatology.

https://www.ecmwf.int/en/forecasts/datasets/reanalysis-datasets/era5

Methodology Notes:

There is an underlying assumption of a normal distribution. This is approximately correct for monthly and seasonal timescales, however at sub-monthly timescales this would no longer be an appropriate assumption and is the primary reason this method cannot be applied to weekly and fortnightly outlooks.

The second assumption in these products is that the climatological rainfall (ERA5) and the forecast rainfall (ACCESS-S) differ only in the mean, that is they have the same variance and are both normally distributed.

For more information about the methodology please see -

Fawcett, R., Beard, G., Jones, D. (2009). *Extending the Bureau of Meteorology's seasonal forecast products.* Bulletin of the Australian Meteorological Society, **22**, 70-76.