Australian Aid

Climate and Oceans Support Program in the Pacific

25 SPREP
Secretariat of the Pacific Regional Environment Programme

Monthly Climate Bulletin

September 2018

Summary

Issued 25 September 2018

Issue Contents:

- The El Niño Southern Oscillation (ENSO) remains neutral. While climate models suggest some easing in the chance of El Niño in 2018, half of the surveyed models still indicate an event is possible. When assessed with current observations, the Bureau's ENSO Outlook therefore remains at El Niño WATCH, meaning the chance of El Niño in 2018 remains around 50% double the normal chance.

- A pulse of the Madden Julian Oscillation (MJO) over the western hemisphere strengthened in recent days. Most international models forecast the MJO to remain close to its current strength for the coming week and track eastwards over American and African longitudes.

- The ITCZ was is over its long term September position with some enhanced activities over the western and central Pacific. This resulted in enhanced convection over the islands of Federated States of Micronesia and Marshall Islands. In the south Pacific, the SPCZ was largely enhanced around the Solomon Islands, mainland PNG and Vanuatu. Rainfall was suppressed over Tonga, parts of Kiribati and the southern Cook Islands.

- Below normal rainfall for Palau, FSM, New Guinea Islands, Solomon Islands, Vanuatu, Fiji, Tonga, Samoa and Niue. Above normal rainfall is favoured for Kiribati and Tuvalu. Models are less emphatic elsewhere.

Climate Bulletin

ISSN: **2617-2557**

Published by the Secretariat of the Pacific Regional Environment Programme (SPREP)

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Our vision: A resilient Pacific environment sustaining our livelihoods and natural heritage in harmony with our cultures.

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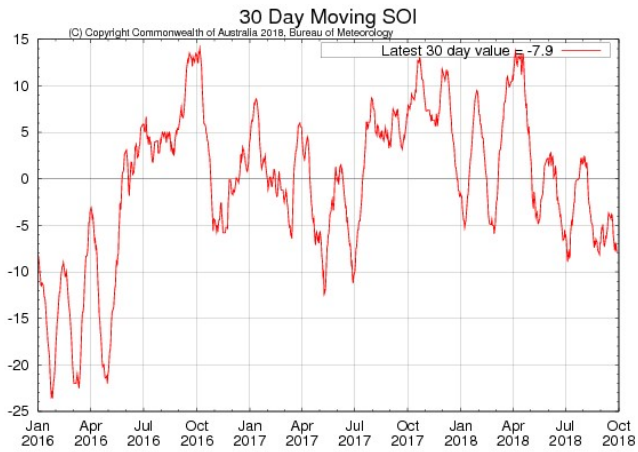
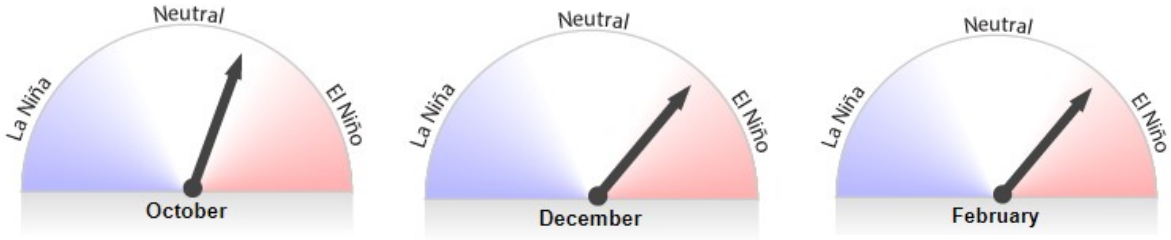
El Niño–Southern Oscillation

El Niño WATCH continues- *ENSO Wrap-Up issued on 25 September 2018*

The El Niño Southern Oscillation (ENSO) remains neutral. While climate models suggest some easing in the chance of El Niño in 2018, half of the surveyed models still indicate an event is possible. When assessed with current observations, the Bureau's ENSO Outlook therefore remains at El Niño WATCH, meaning the chance of El Niño in 2018 remains around 50% double the normal chance. Oceanic and atmospheric indicators of ENSO are generally neutral. While sub-surface waters have recently warmed, sea surface temperatures in the tropical Pacific Ocean are only slightly above average. Likewise, the Southern Oscillation Index remains weakly negative, and short of El Niño levels. Trade winds have recently been weaker than usual in the western Pacific, and may remain weak in the coming weeks. Weakened trade winds can be a precursor to El Niño development. Climate models now indicate less warming of the tropical Pacific is likely compared with last month. As a result, fewer models now predict an El Niño in 2018; only three of eight models exceed El Niño thresholds in 2018, and a fourth does so in early 2019. The rest remain neutral. The Indian Ocean Dipole (IOD) index has exceeded the positive IOD threshold (+0.4 °C) in the last fortnight. However, it would take several more weeks of similar values before a positive IOD event is considered established. Model outlooks currently suggest positive IOD values are likely to continue through the austral spring, before returning to neutral values in late November to December. The approximate 30-day and 90-day Southern-Oscillation Index (SOI) values to 23 September are −7 and −4 respectively

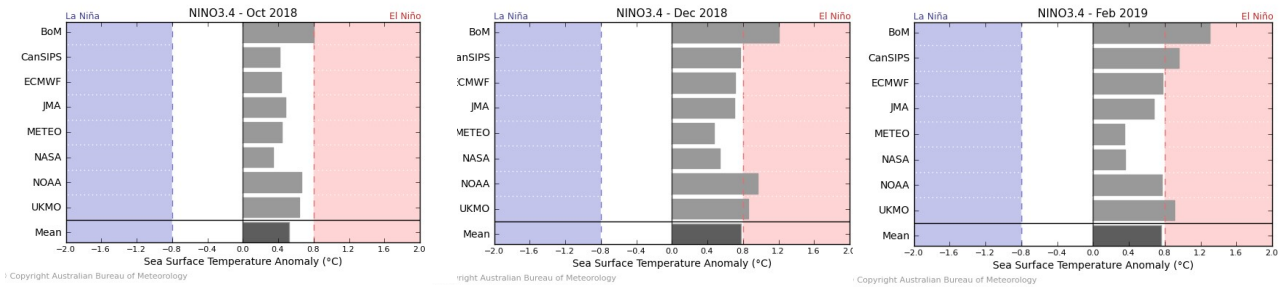


Bureau of Meteorology NINO3.4 ENSO Model Outlooks for October, December and February



Average of international model outlooks for NINO3.4 for the months r, March, May and July http://www.bom.gov.au/climate/model-

Bureau of Meteorology NINO3.4 International Model Outlooks



Bureau of Meteorology summary of international model outlooks for NINO3.4: http://www.bom.gov.au/climate/model-summary/

#tabs=Pacific-Ocean

Madden–Julian Oscillation

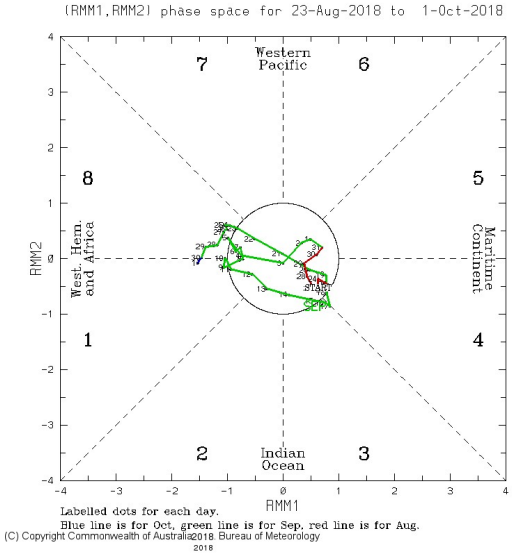
Weekly Tropical Note
[Issued on Tuesday 02 October 2018]

A pulse of the Madden Julian Oscillation (MJO) over the western hemisphere strengthened in recent days. Most international models forecast the MJO to remain close to its current strength for the coming week and track eastwards over American and African longitudes. This MJO pulse has coincided with reduced cloudiness and rainfall over a large area of the northern hemisphere, extending from India to the western North Pacific Ocean, and further weakening of the monsoon over the Indian subcontinent. Stronger than usual westerly winds have also developed over the tropical Pacific Ocean, something that could potentially assist El Niño development.

This is an abbreviated version of the Weekly Tropical Note. Click on the link below for the full version.

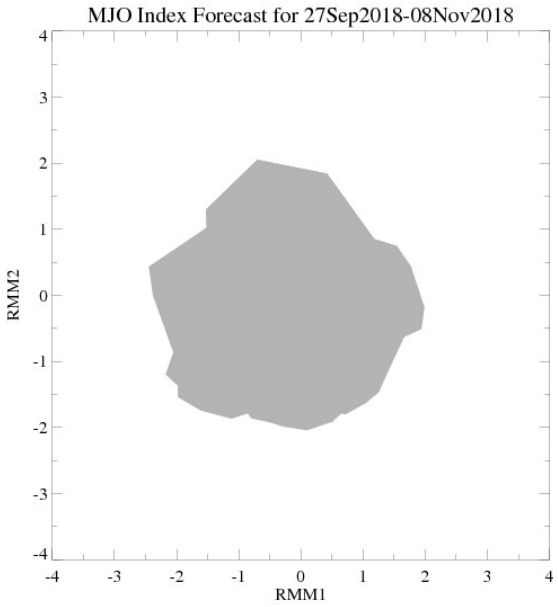
Bureau of Meteorology Weekly Tropical Climate Note Page:
http://www.bom.gov.au/climate/tropical-note/

40-Day MJO Phase Plot

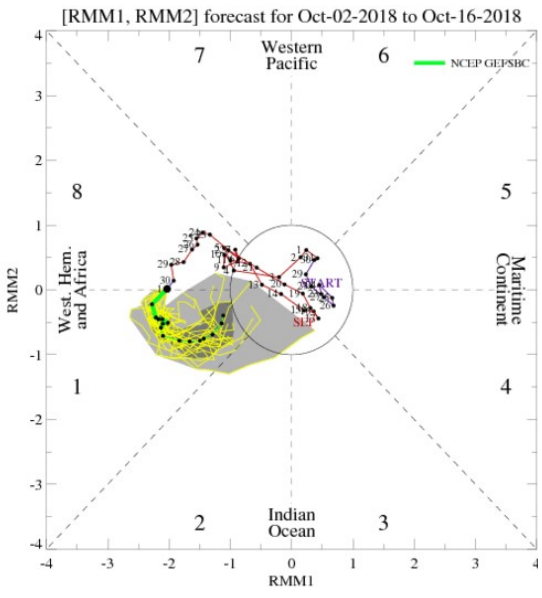


Bureau of Meteorology MJO Page:
http://www.bom.gov.au/climate/mjo/

MJO Phase Forecasts



Bureau of Meteorology MJO Forecast: http://www.cpc.ncep.noaa.gov/products/precip/CWlink/MJO/CLIVAR/bomm.shtml



NOAA MJO Model Forecasts: http://www.cpc.ncep.noaa.gov/products/precip/CWlink/MJO/CLIVAR/clivar_wh.shtml

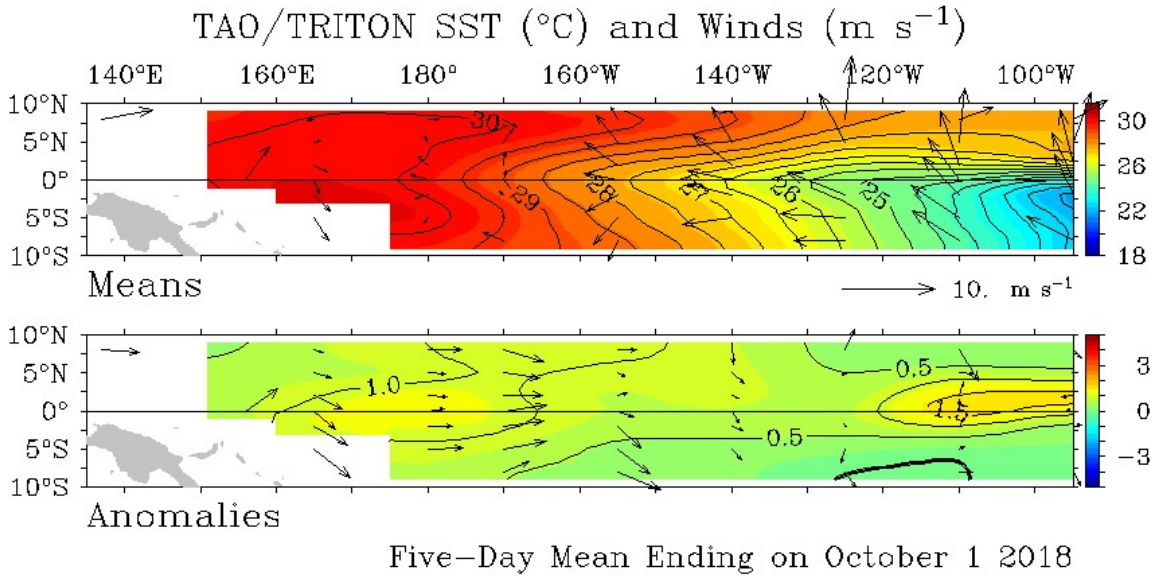
NOAA MJO Page: http://www.cpc.ncep.noaa.gov/products/precip/CWlink/MJO/mjo.shtml

Wind

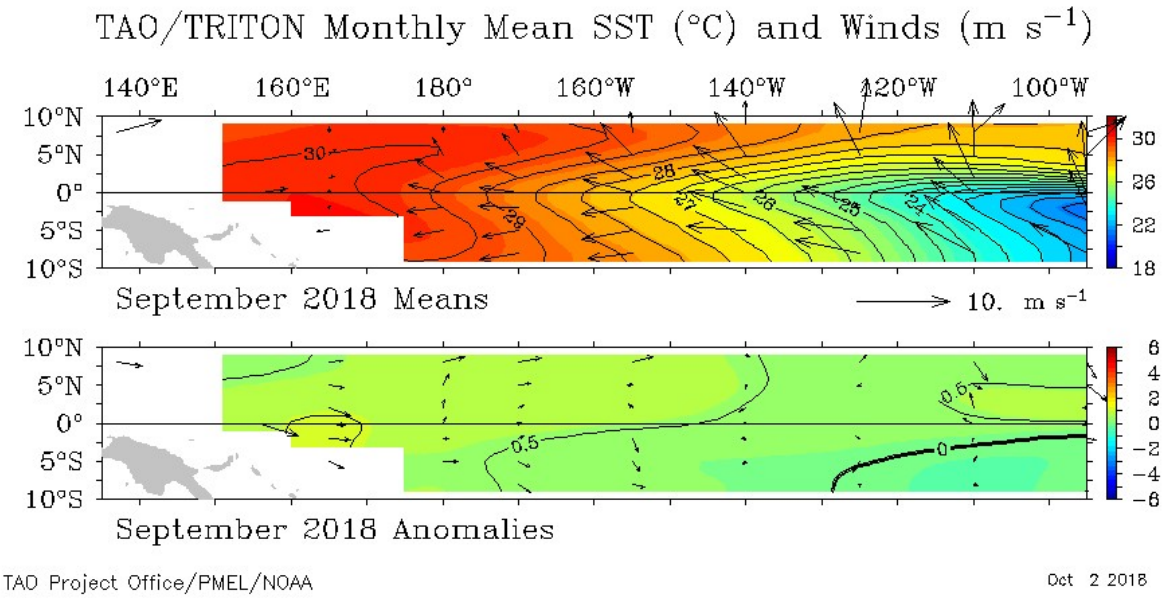
The equatorial trade winds were somewhat weaker than average across the tropical Pacific west of the 160°W in September, and close to average further to the east. Current outlook for Madden Julian Oscillation (MJO) suggest that trade winds in the western Pacific are likely to remain much weaker than than normal west of about 140°W, consistent with a possible development of El Niño.

During La Niña events there is a sustained strengthening of the trade winds across much of the tropical Pacific, while during El Niño events there is a sustained weakening of the trade winds across much of the tropical Pacific, or even a reversal of the trade winds.

Five-Day Mean SST/Wind Map



Latest Monthly SST/Wind Map



TAO/TRITON Data Display: http://www.pmel.noaa.gov/tao/jsdisplay/

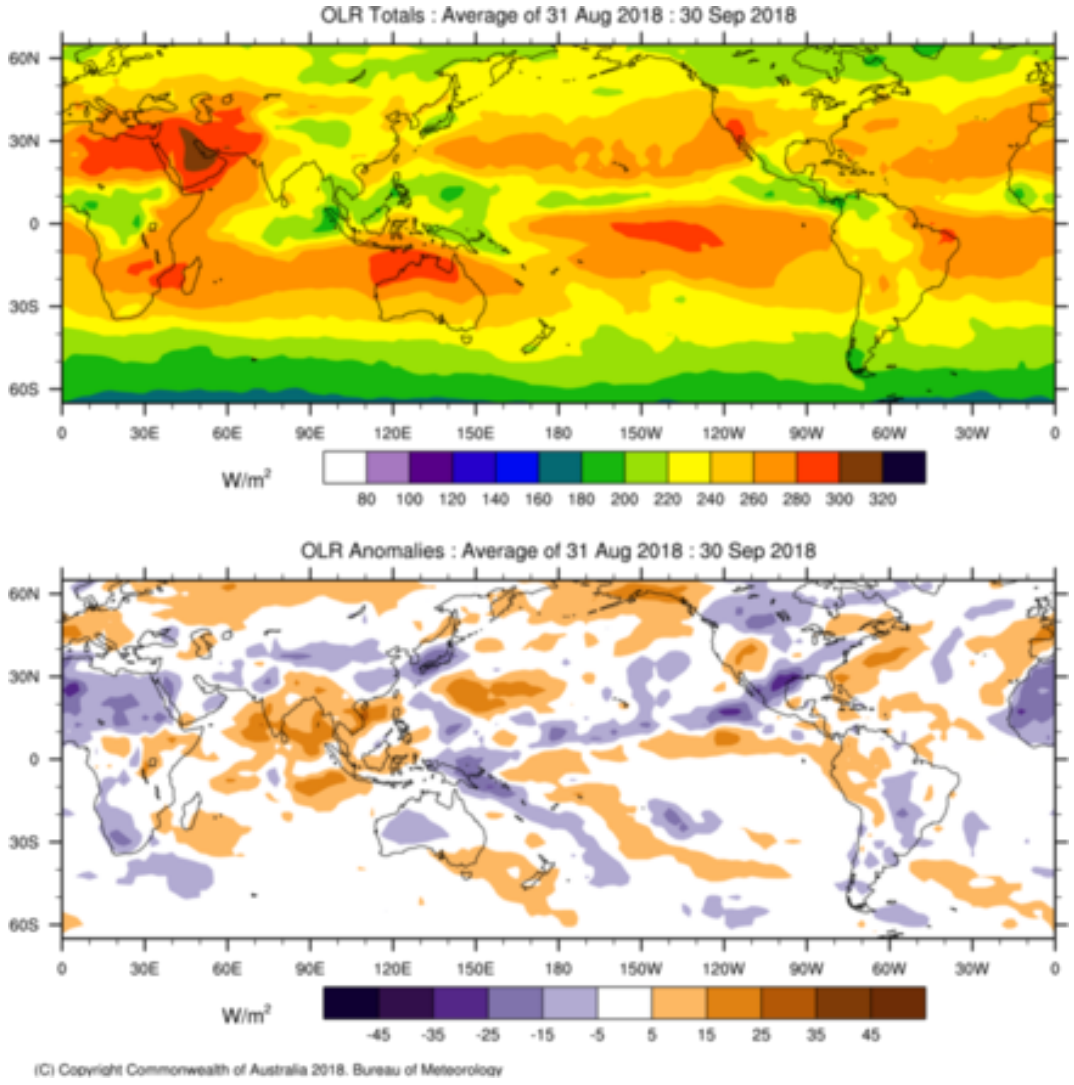
7-Day ACCESS Model South West Pacific Wind Forecasts: http://www.bom.gov.au/australia/charts/viewer/index.shtml?type=windbarb&level=10m&tz=AEDT&area=SWP&model=G&chartSubmit=Refresh+View

Cloud and Rainfall

For the 30-days ending 29 September, the OLR and TRMM anomaly maps suggest the ITCZ was north of its long term average September position with some enhanced activities over the western and central Pacific. This resulted in enhanced convection over the islands of Federated States of Micronesia and Marshall Islands. In the south Pacific, the SPCZ was largely enhanced around the Solomon Islands, mainland PNG and Vanuatu. Rainfall was suppressed over Tonga, parts of Kiribati and the southern Cook Islands.

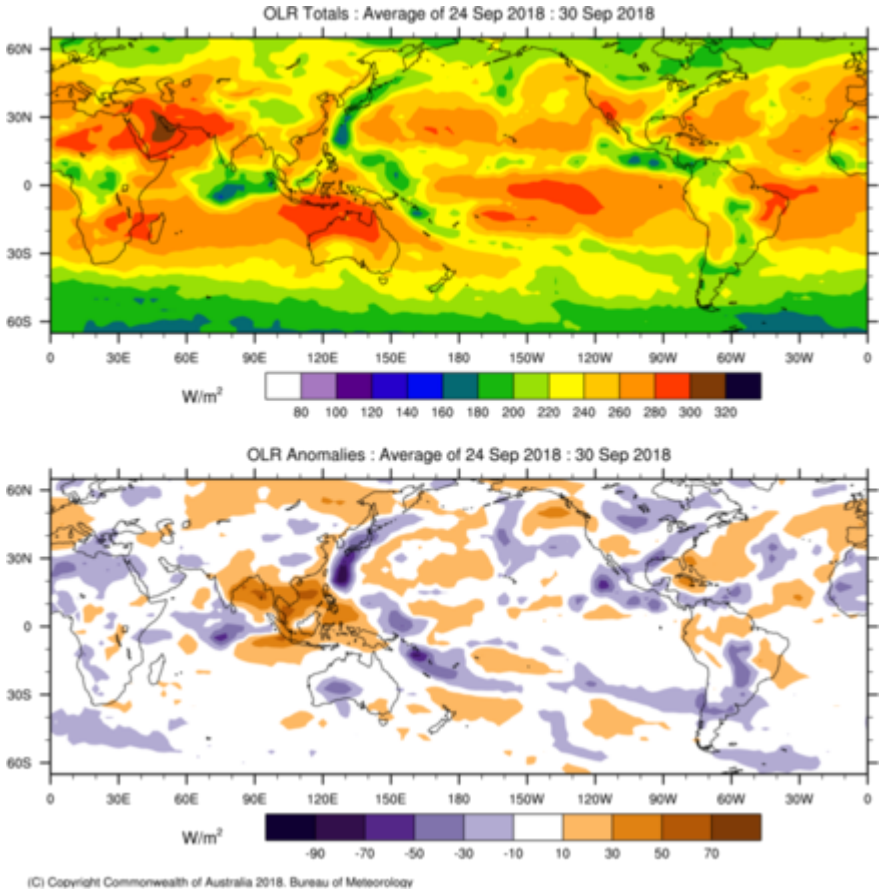
Note:Global maps of outgoing longwave radiation (OLR) highlight regions experiencing enhanced or reduced cloudiness. The top panel is the total OLR in Watts per square metre (W/m²) and the bottom panel is the anomaly (current minus the 1979-1998 climate average), in W/m². In the bottom panel, negative values (blue shading) represent above normal cloudiness while positive values (brown shading) represent below normal cloudiness.

OLR Totals and Anomalies, 30 Day OLR



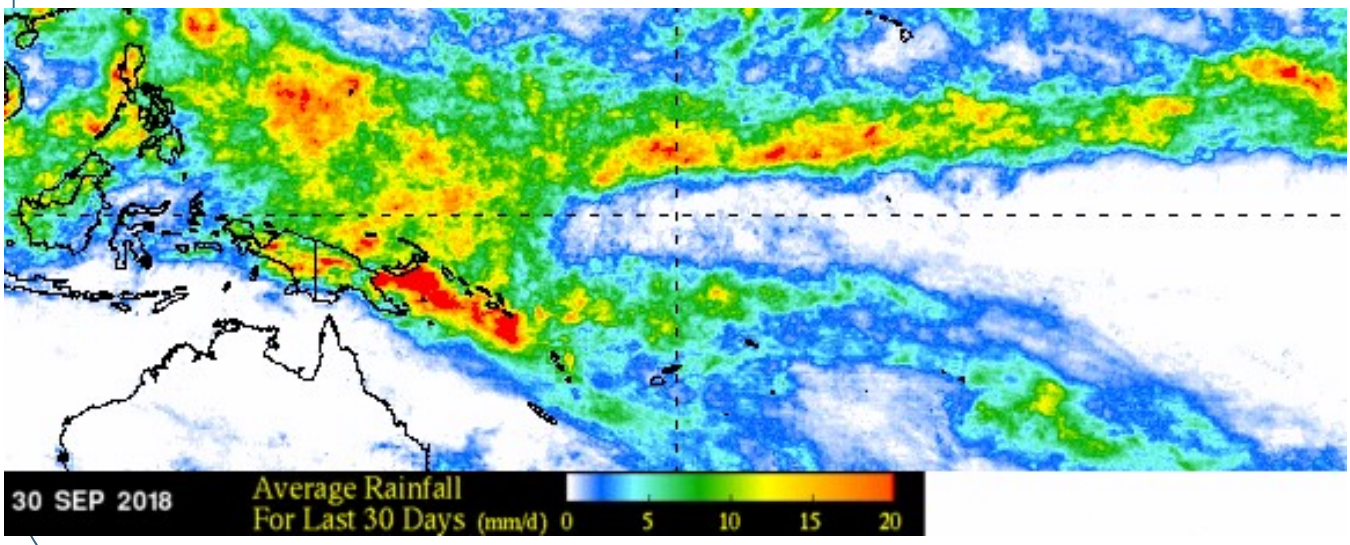
Cloud and Rainfall

OLR Totals and Anomalies, 7 Day OLR



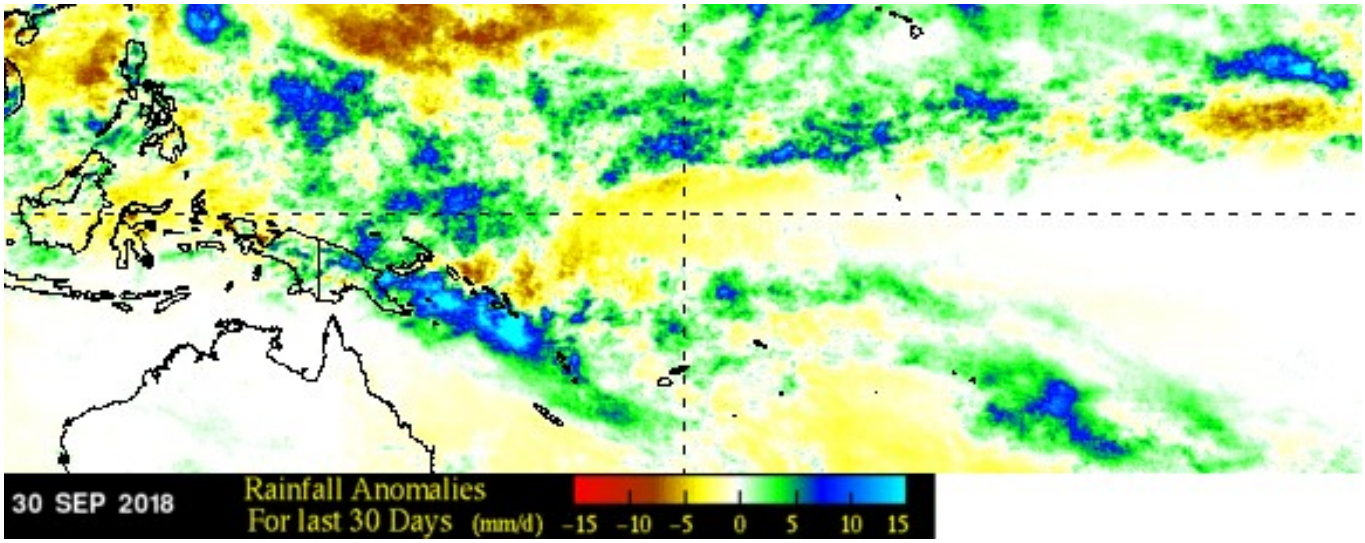
Bureau of Meteorology MJO - Cloudiness: http://www.bom.gov.au/climate/mjo/#tabs=Cloudiness

NASA Tropical Rainfall Measuring Mission (TRMM) 30-Day Rainfall Averages

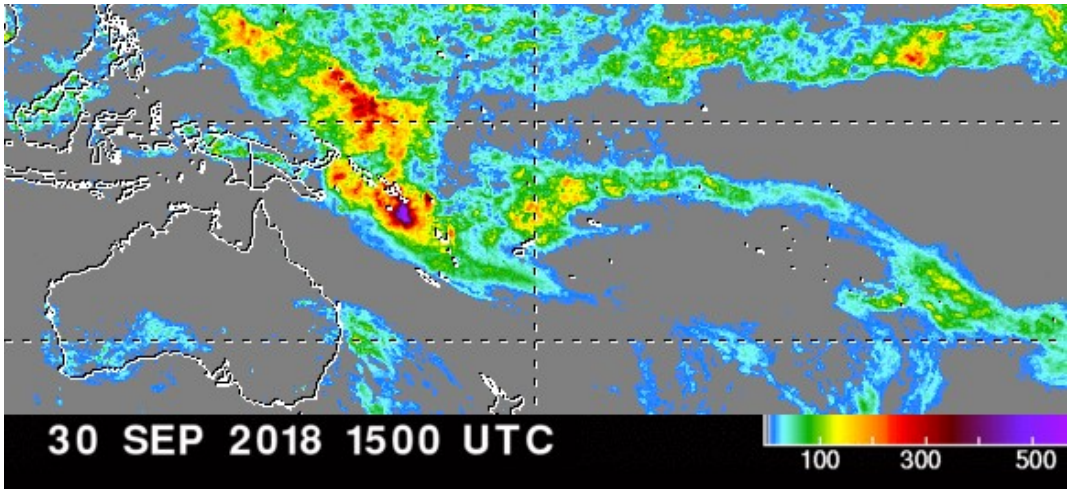


Cloud and Rainfall

30-Day Rainfall Anomalies

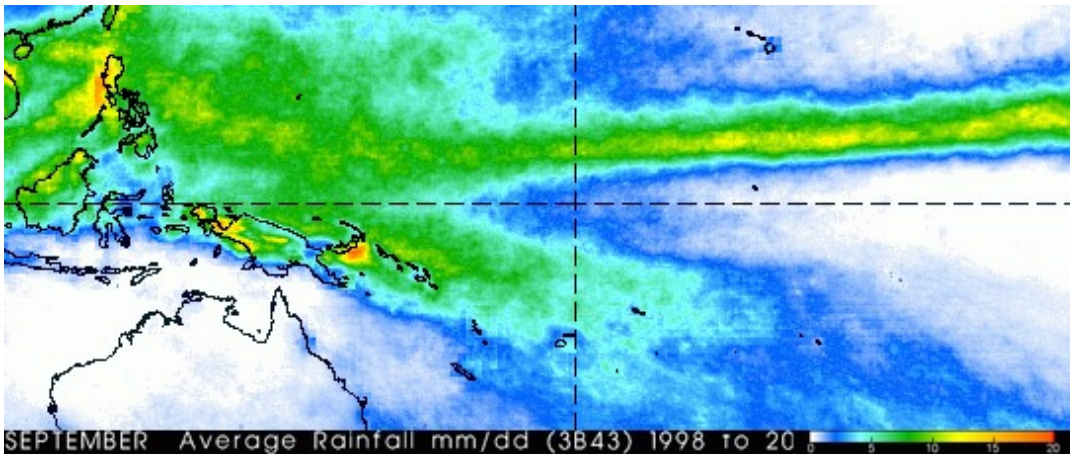


7-Day Rainfall Accumulation



NASA TRMM:
http://trmm.gsfc.nasa.gov/

Current Month Rainfall Climatology



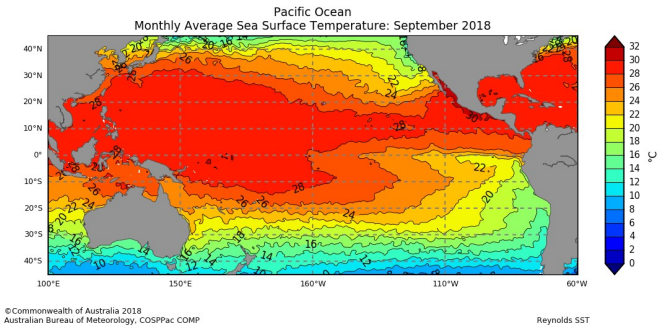
Oceanic Conditions - Sea Surface Temperature

Sea surface temperature (SST) anomalies for September show SSTs were slightly warmer than average across much of the equatorial Pacific Ocean. In comparison with the month of August, SST anomalies for September indicate warmin of the surface waters of the central equatorial region and adjacent areas of the north Pacific. Palau, western regions of Federated States of Micronesia and New Caledonia and parts of the Coral Sea show cooler than normal conditions. With BoM ENSO status as at El Niño Alert (70% possibility of El Niño developing in the upcoming months), monitoring of SST and dissemination of information to respective stakeholders in countries would be of importance. Regions with continuity of SST increase could start to witness impacts on marine ecosystem and resources. The September values for the NINO indices were:NINO3 +0.3 °C, NINO 3.4 +0.3 °C, and NINO4 +0.6 °C.

The SST decile map for September shows a very similar pattern to the SST anomalies. A large region in the central to eastern south tropical Pacific to the American coast was in decile 4-7, including some substantial regions in decile 2-3. Surrounding this was a boomerang-shape of deciles 8-9 and 10 extending well into both hemispheres. Affecting parts of Marshall Islands on its western boundary was a large region of decile 10 to highest-on-record, located between latitudes 10° N and 20°N from 170°E to 130°W.

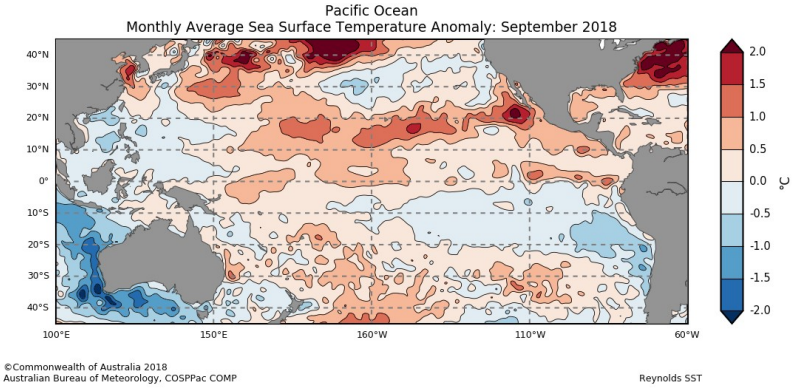
Mean SST

Bureau of Meteorology COSPPac Ocean Portal: http://cosppac.bom.gov.au/



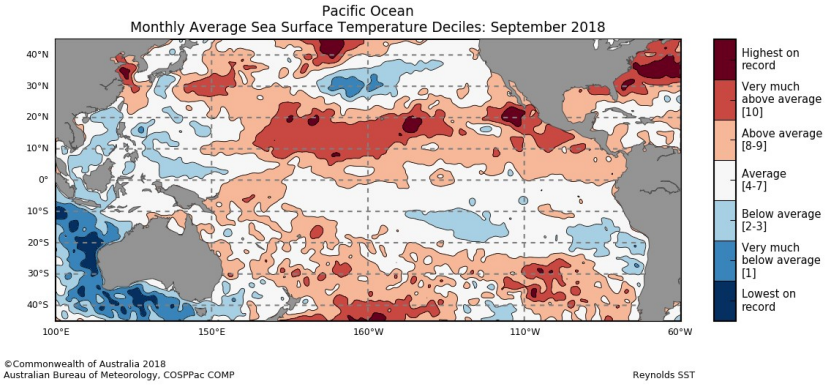
Anomalous SST

Bureau of Meteorology CO-SPPac Ocean Portal:



SST Deciles

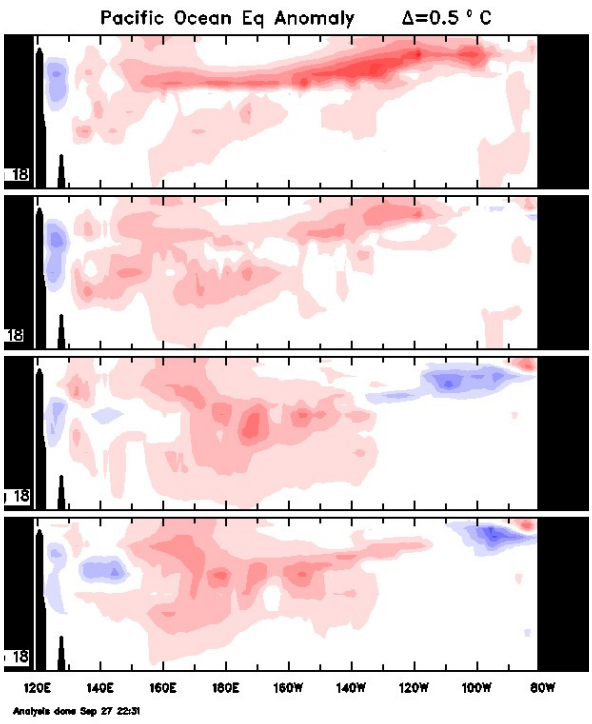
Bureau of Meteorology CO-SPPac Ocean Portal: http://cosppac.bom.gov.au/



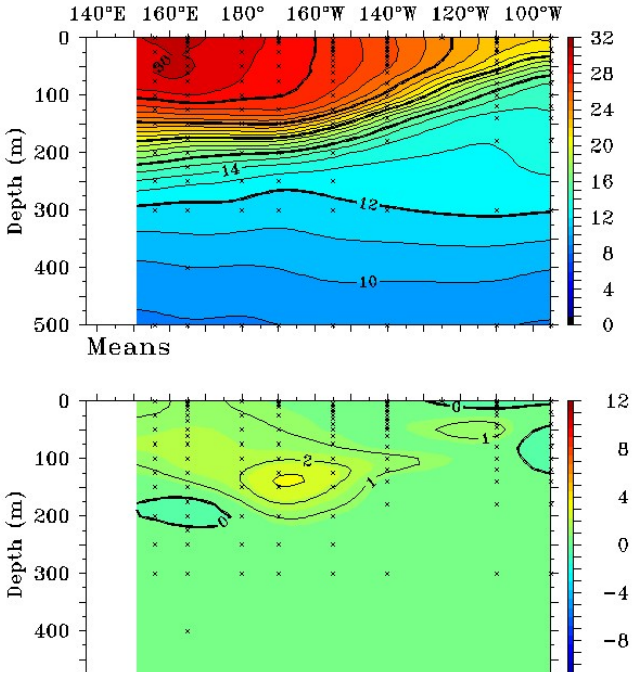
Oceanic Conditions - Sub Surface

The four-month sequence of sub-surface temperature anomalies (to 20 September) shows a persistent pool of warmer than average water in the equatorial Pacific down to a depth of about 300 m. These were very similar to the August pattern. During September the pool of slightly cooler than average water in the shallow sub-surface of the eastern equatorial Pacific, which had emerged in August, decreased in both strength and volume.

Sub-surface Temperature



Bureau of Meteorology Sea Temperature Analysis (monthly anomalies): http://www.bom.gov.au/mine/sst.shtml



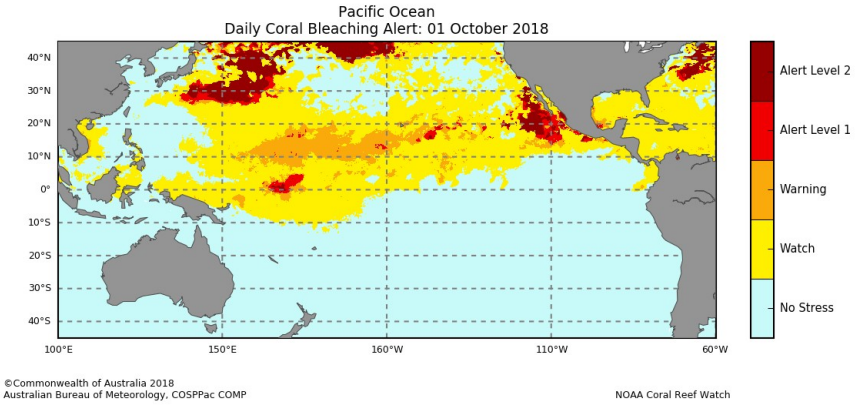
TAO/TRITON Data Display (weekly means and anomalies): http://www.pmel.noaa.gov/tao/jsdisplay/

Oceanic Conditions - Coral Bleaching

The daily Coral Bleaching Alert for 01 October 2018 shows Alert level 1 and warning for a few countries in the western tropical Pacific especially Nauru, Kiribati, RMI and east of New Guinea Islands. The four week-coral Bleaching Alert from 7th October shows watch level in the equatorial region with countries such as Nauru, Marshall Islands and Kiribati reaching to Alert levels 1 and 2.

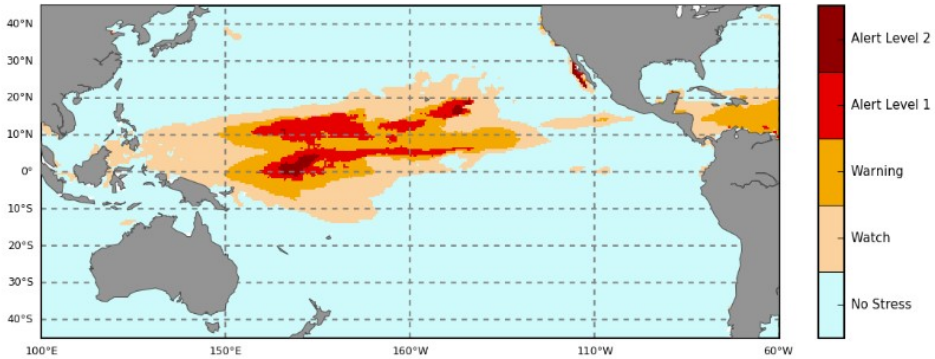
Daily Coral Bleaching Alert

About Coral Bleaching:
http://www.bom.gov.au/cosppac/apps/portal/help/



4-Weeks Coral Bleaching Outlook

Bureau of Meteorology
COSPPac
Ocean Portal:
http://www.bom.gov.au/



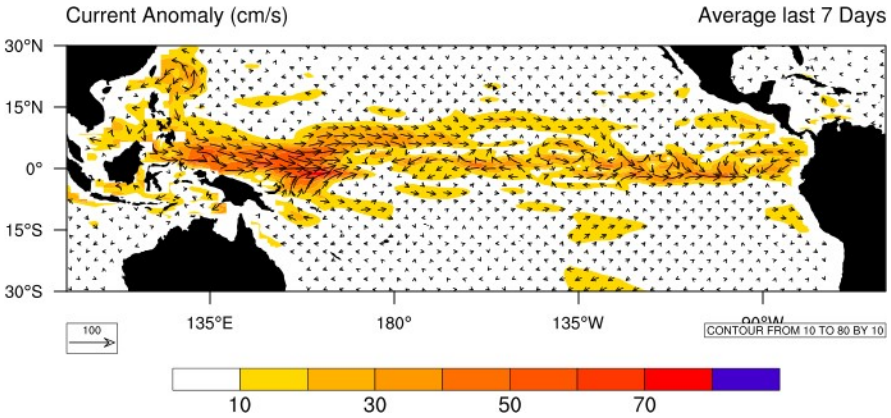
Oceanic Conditions - Ocean Surface Currents and Sea Level

The most recent seven-day ocean surface currents plot shows an enhanced Equatorial Countercurrent in the western and eastern Pacific. The South Equatorial current was weak in the equatorial Pacific, which would be consistent with a developing El Niño. Note that the South Equatorial Current is usually evident on and south of the equator.

Sea level in September was generally above normal in most COSPPac partner countries, with highest anomalies in Kiribati. In contrast, FSM and RMI experienced slightly below normal sea level

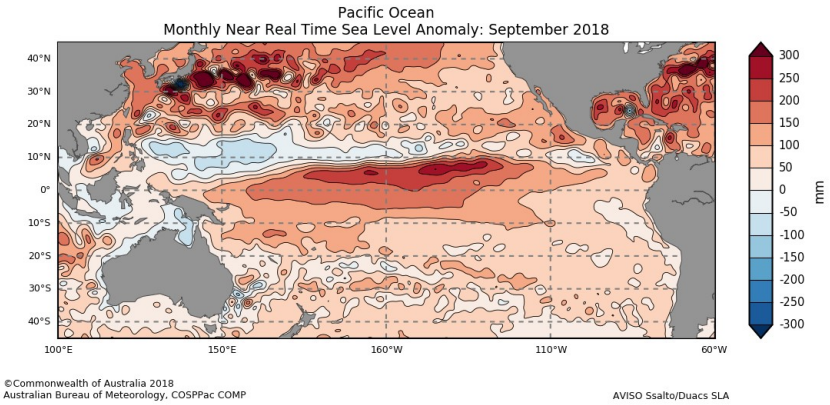
Ocean Surface Currents (Last 7-Days)

Bureau of Meteorology POAMA



Monthly Sea Level Anomalies

Bureau of Meteorology COSPPac Ocean Portal: http://cosppac.bom.gov.au/



Pacific Sea Level Monitoring Information

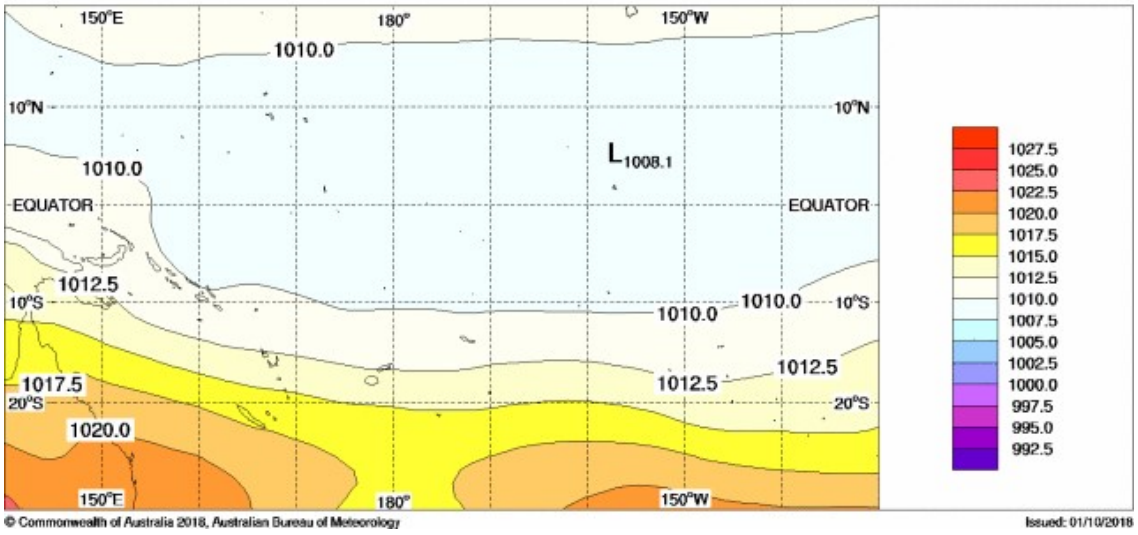
Sea level data products, including tide prediction calendars and archives of quality-controlled weather and ocean measurements, are available from the Pacific Sea Level Monitoring page at: http://www.bom.gov.au/pacific/projects/pslm/

Mean Sea Level Pressure (MSLP)

The September mean sea level pressure (MSLP) anomaly map show positive anomalies greater than 1hPa around the Coral Sea and towards Australia. COSPPac countries were in a region where MSLP was normal, the exceptions being east of Fiji and the Kiribati Islands, Samoa and the Cook Islands where MSLP was between 1 and 2 hPa below average.

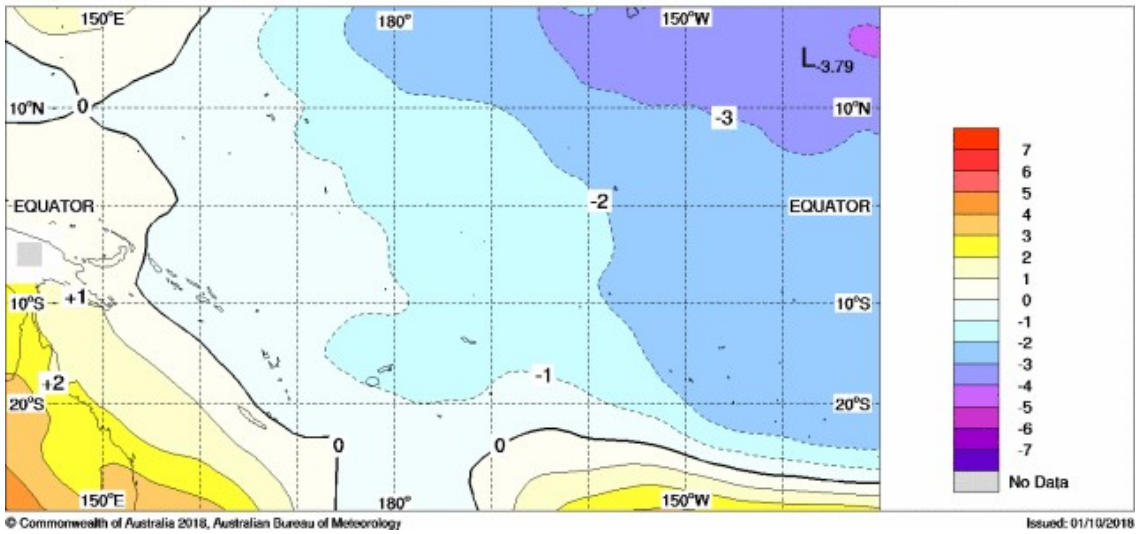
Mean

MSLP 2.5X2.5 ACCESS OP. ANAL. (hPa) 20180901 0000 20180930 0000



Anomalous [with respect to a 1979-2000 mean]

MSLP 2.5X2.5 ACCESS OP. ANAL.-NCEP2 (hPa) 20180901 0000 20180930 0000

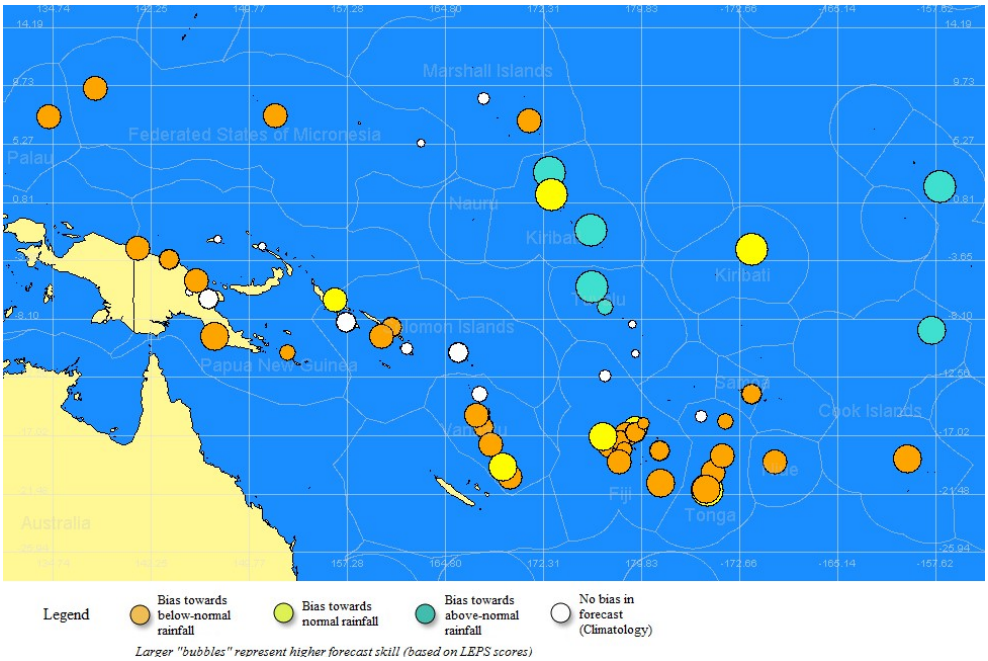


Bureau of Meteorology South Pacific Circulation Patterns: http://www.bom.gov.au/cgi-bin/climate/cmb.cgi?page=indexa&area=spac

Seasonal Rainfall Outlooks Oct. to Dec. 2018

All the selected models favour below normal rainfall for Palau, FSM, New Guinea Islands, Central Solomon Islands, Vanuatu, Fiji, Tonga, Samoa and Niue. Above normal rainfall is favoured for Kiribati and Tuvalu. Models are less emphatic elsewhere.

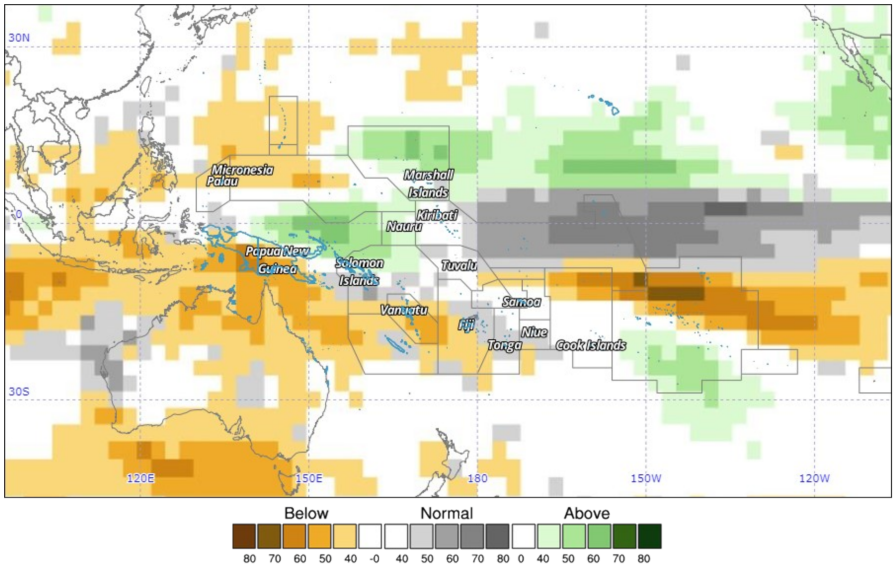
SCOPIC v4



'About SCOPIC' http://cosppac.bom.gov.au/products-and-services/seasonal-climate-outlooks-in-pacific-island-countries
COSPPac Online Climate Outlook Forum: http://www.bom.gov.au/cosppac/comp/ocof/index.shtml

Seasonal Rainfall Outlooks Oct. to Dec. 2018

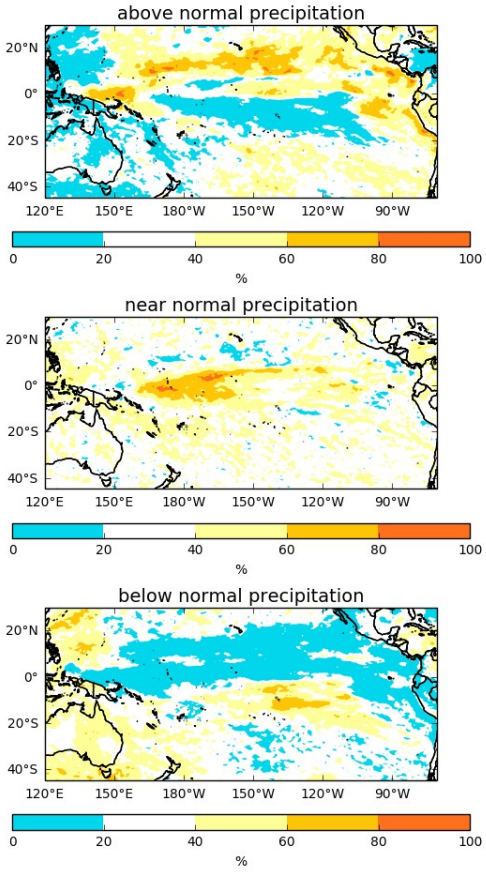
APEC multi-model outlook



APEC Climate Information Toolkit for the Pacific http://clikp.sprep.org/

bability of tercile categories Oct/Nov/Dec Issued September 2(

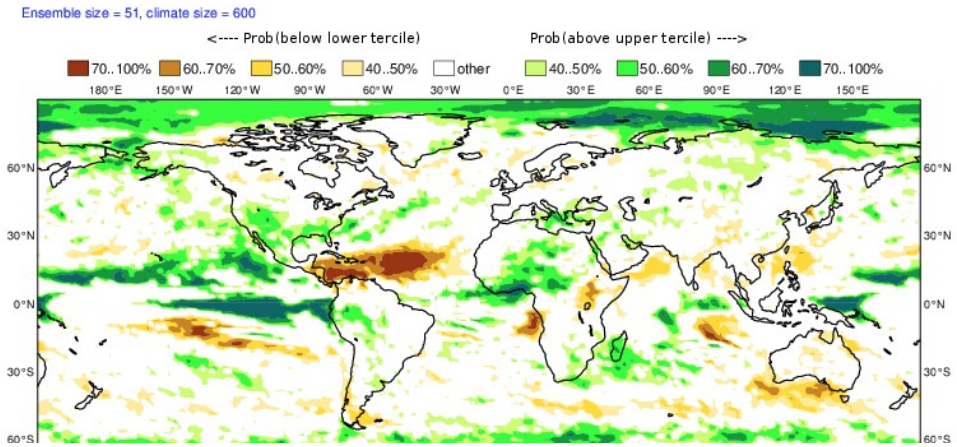
UKMO Pacific region tercile categories



http://www.metoffice.gov.uk/research/climate/seasonal-to-decadal/gpc-outlooks/glob-seas-prob

Seasonal Rainfall Outlooks Oct. to Dec. 2018

ECMWF Tropics tercile summary



http://www.ecmwf.int/en/forecasts/charts/catalogue/

Individual Model Links

UKMO Global long-range model probability maps: http://www.metoffice.gov.uk/research/climate/seasonal-to-decadal/gpc-outlooks/glob-seas-prob

ECMWF Rain (Public charts) - Long range forecast: http://www.ecmwf.int/en/forecasts/charts/seasonal/rain-public-charts-long-range-forecast

POAMA Pacific Seasonal Prediction Portal: http://poama.bom.gov.au/experimental/pasap/index.shtml

APEC Climate Center (APCC): http://www.apcc21.org/eng/service/6mon/ps/japcc030703.jsp

NASA GMAO GEOS-5:http://gmao.gsfc.nasa.gov/research/ocean/

NOAA CFSv2:http://www.cpc.ncep.noaa.gov/products/CFSv2/CFSv2seasonal.shtml

IRI for Climate and Society: http://iri.columbia.edu/our-expertise/climate/forecasts/seasonal-climate-forecasts/

Cyclones and Other Information

Tropical Cyclone Information

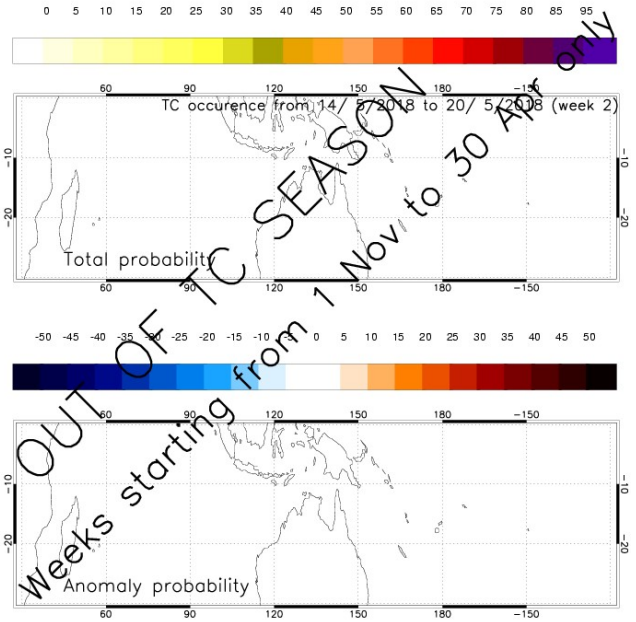
Six tropical cyclones formed in the 2017-18 south Pacific tropical cyclone season. These systems were tropical cyclones Fehi, Gita, Hola, Iris, Josie and Keni. These cyclones affected Solomon Islands, New Caledonia, Vanuatu, Fiji, Tonga, Samoa, Niue and New Zealand during January to April 2018. The long-term average for the region east of the tip of Cape York, Queensland to 120°W for the period 1969-70 to 2011-12 is ten cyclones.

The tropical cyclone season outlook for 2017-18 is available via: http://www.bom.gov.au/climate/cyclones/south-pacific/

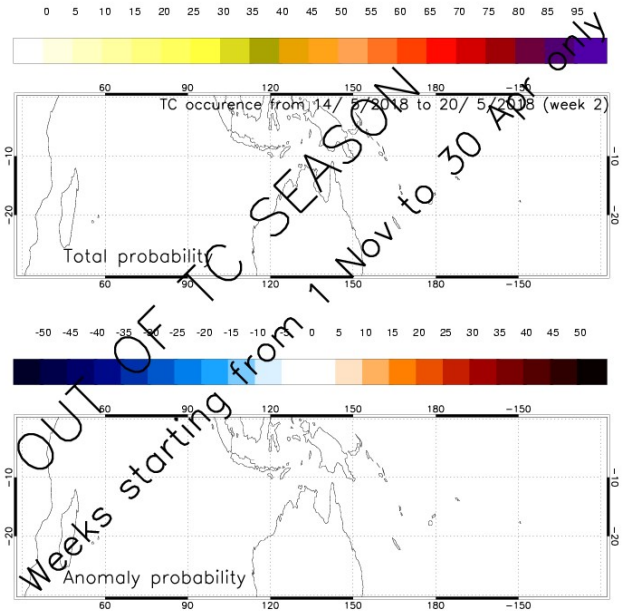
MeteoFrance Tropical Cyclone Weekly Forecast: http://www.meteo.nc/nouvelle-caledonie/cyclone/coin-des-experts

Meteo France Tropical Cyclone Weekly Fore-

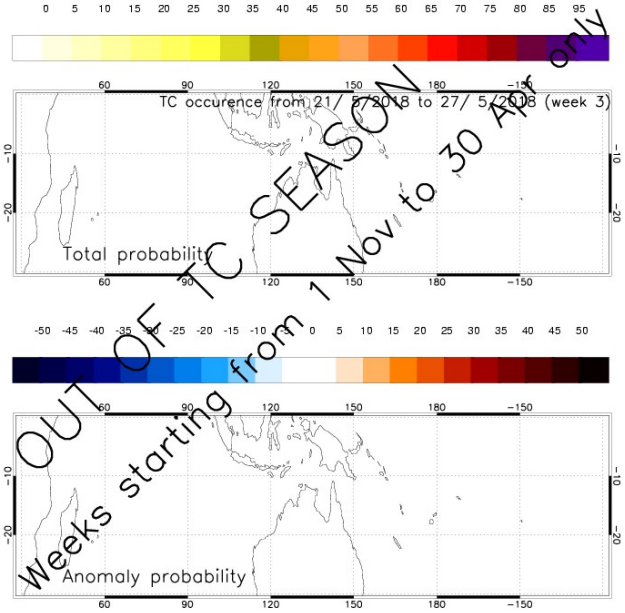
Week 1



Week 2



Week 3



Bureau of Meteorology Tropical Cyclone Climatologies: http://www.bom.gov.au/cyclone/climatology/index.shtml

PACCSAP Tropical Cyclone Data Portal: http://www.bom.gov.au/cyclone/history/tracks/

Fiji Meteorological Service Tropical Cyclone Warnings: http://www.met.gov.fj/

Japan Meteorological Agency Tropical Cyclone Information Page: http://www.jma.go.jp/en/typh/

Bureau of Meteorology Current Tropical Cyclone Page: http://www.bom.gov.au/cyclone/index.html

United States Joint Typhoon Warning Center Tropical Cyclone Warnings and Information: http://www.usno.navy.mil/JTWC/

New Zealand Meteorological Service Weather Warning: http://www.metservice.com/warnings/home

Other Information

Further Information:

Southern Oscillation Index

The Southern Oscillation Index, or SOI, gives an indication of the development and intensity of El Niño and La Niña events across the Pacific Basin. The SOI is calculated using the difference in air pressure between Tahiti and Darwin. Sustained negative values of the SOI below −7 often indicate El Niño episodes. These negative values are usually accompanied by sustained warming of the central and/or eastern tropical Pacific Ocean, and a decrease in the strength of the Pacific Trade Winds. Sustained positive values of the SOI greater than +7 are typical of La Niña episodes. They are associated with stronger Pacific Trade Winds and sustained cooling of the central and eastern tropical Pacific Ocean. In contrast, ocean temperatures to the north of Australia usually become warmer than normal. *http://www.bom.gov.au/climate/glossary/soi.shtml*

Multivariate ENSO Index (MEI)

The Climate Diagnostics Center Multivariate ENSO Index (MEI) is derived from a number of parameters typically associated with El Niño and La Niña. Sustained negative values indicate La Niña, and sustained positive values indicate El Niño. *http://www.esrl.noaa.gov/psd/enso/mei/index.html*

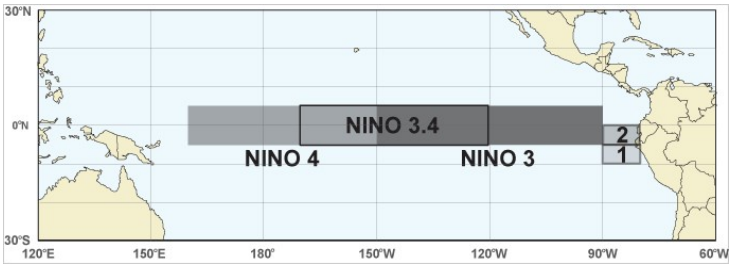
20 degrees Celsius Isotherm Depth

The 20°C Isotherm Depth is the depth at which the water temperature is 20°C. This measurement is important, as the 20°C isotherm usually occurs close to the thermocline, the region of most rapid change of temperature with depth, or the division between the mixed surface layer and deep ocean. A deeper than normal 20°C isotherm (positive anomaly) implies a greater heat content in the upper ocean, whilst a shallower 20°C isotherm (negative anomaly) implies a lower than normal heat content in the upper ocean. *http://www.pmel.noaa.gov/tao/jsdisplay/plots/gif/uwnd_sst_iso20_anom_nocap.gif*

Regions

SST measurements may refer to the NINO1, 2, 1+2, 3, 3.4 or 4 regions. These descriptions simply refer to the spatially averaged SST for the region described. The NINO regions (shown in the figure below) cover the following areas:

Region	Latitude	Longitude
NINO1	5-10°S	80-90°W
NINO2	0-5°S	80-90°W
NINO3	5°N to 5°S	150-90°W
NINO3.4	5°N to 5°S	120-170°W
NINO4	5°N to 5°S	160°E to 150°W



NOTE: NINO1+2 is the combined areas 1 and 2