

ENSO Update and Outlook

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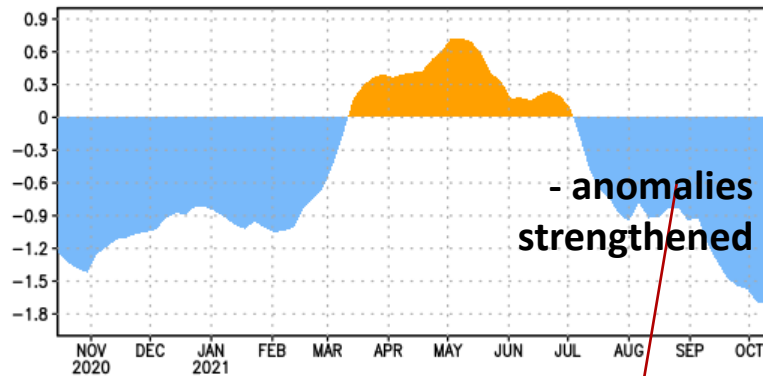
Recent Evolutions and Current Condition

Recent Evolutions

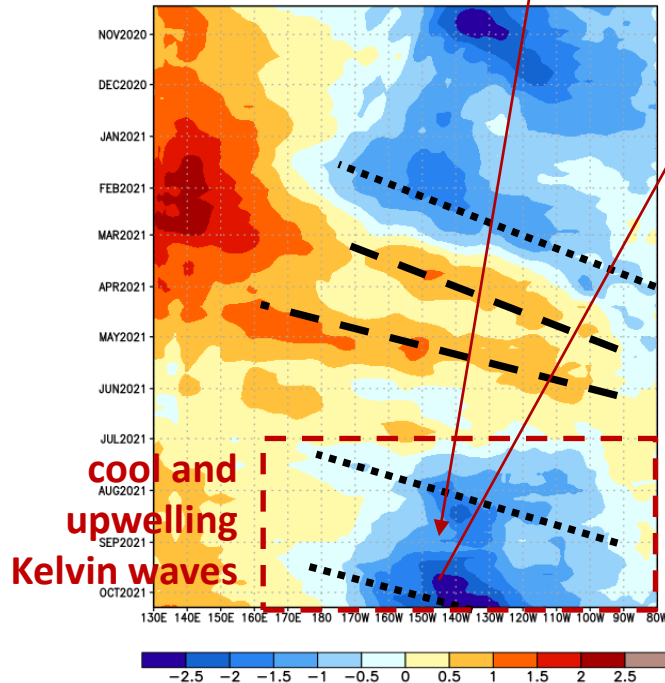
Upper-Ocean Heat

The current conditions have been **developing to La Niña** since Jul 2021.

EQ. Upper-Ocean Heat Anoms. (deg C) for 180–100W

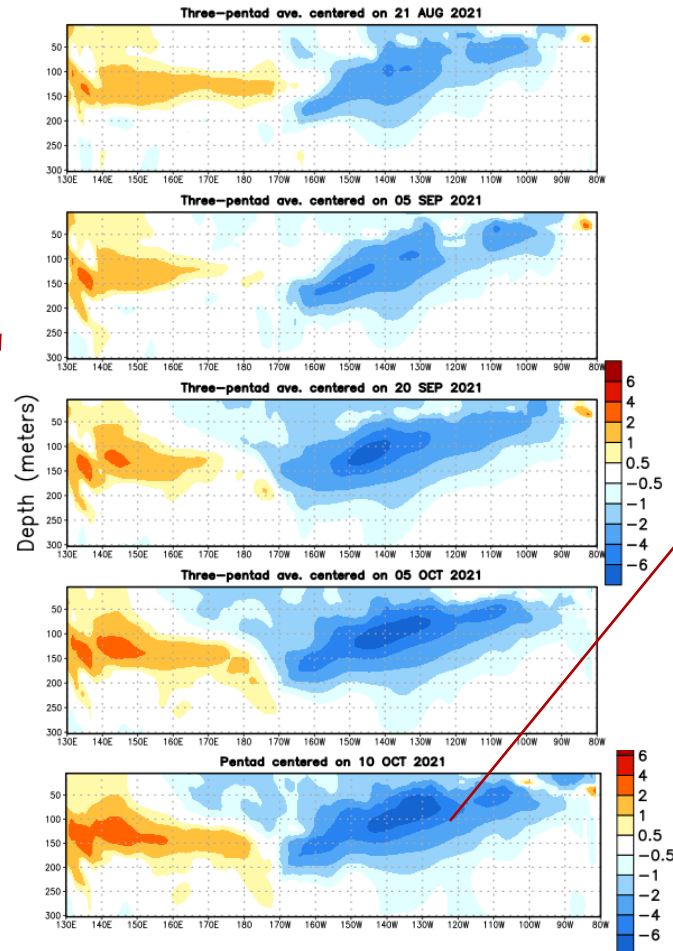


EQ. Upper-Ocean Heat Anoms. (deg C)



Sub-surface Temperature

EQ. Subsurface Temperature Anomalies (deg C)



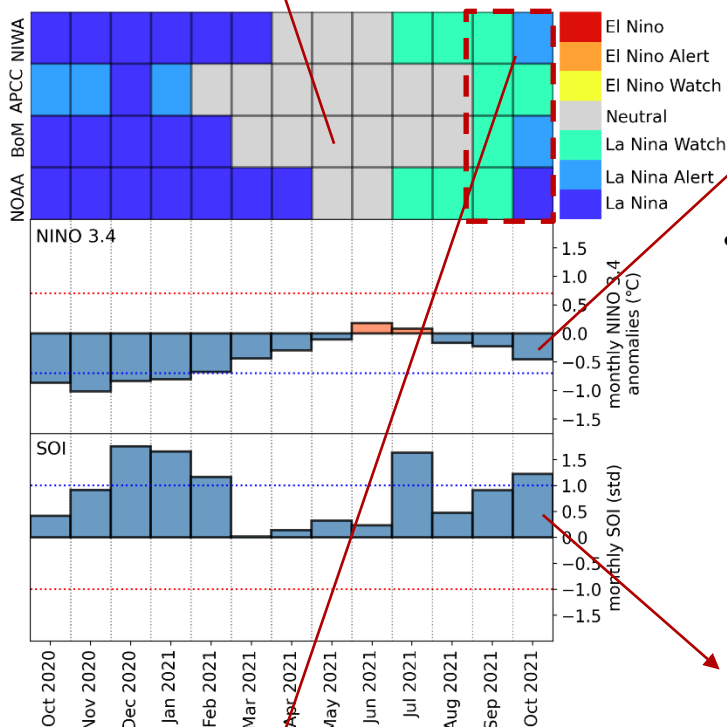
ENSO Tracker and Current Status

Inactive or neutral

The current conditions have been **shifting to La Niña development**.

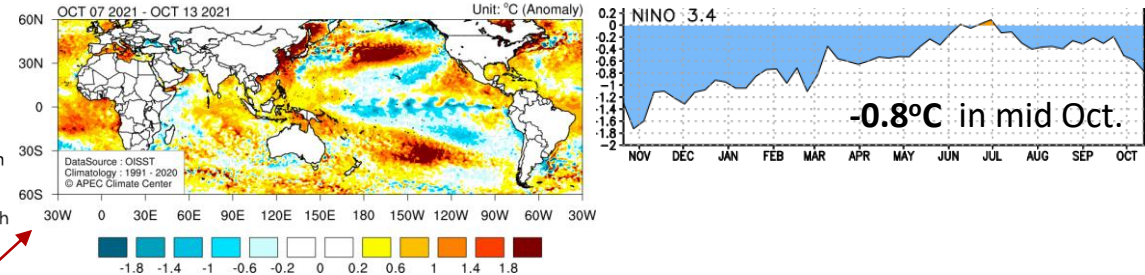
Tracker of ENSO Status

Pacific Regional Climate Centre ENSO tracker

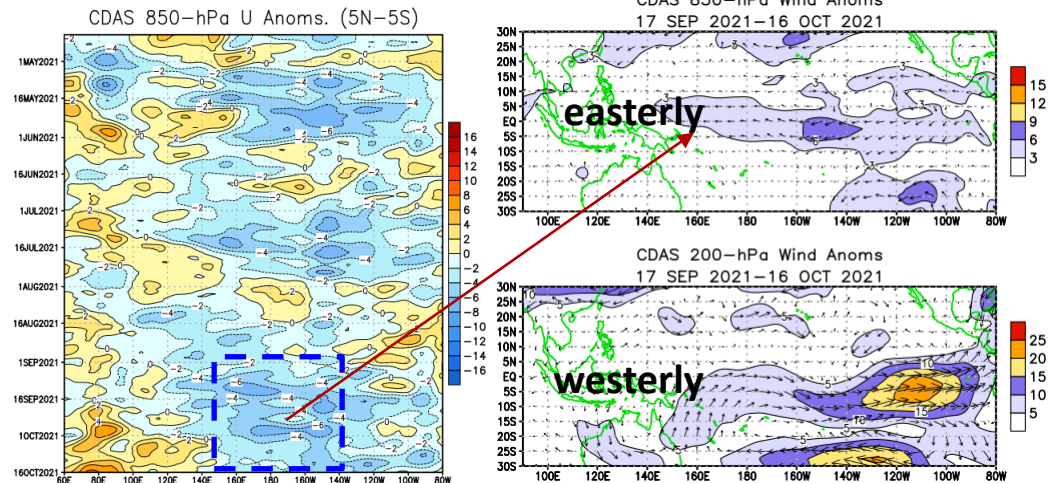


- **La Niña watch** was activated in Sep.
- **La Niña watch to La Niña event** was expected in Oct.

Sea Surface Temperature



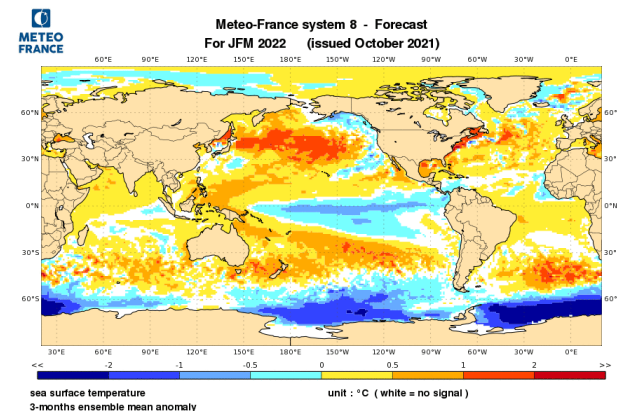
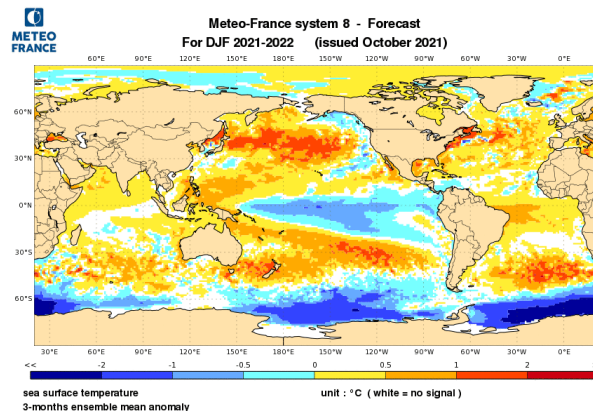
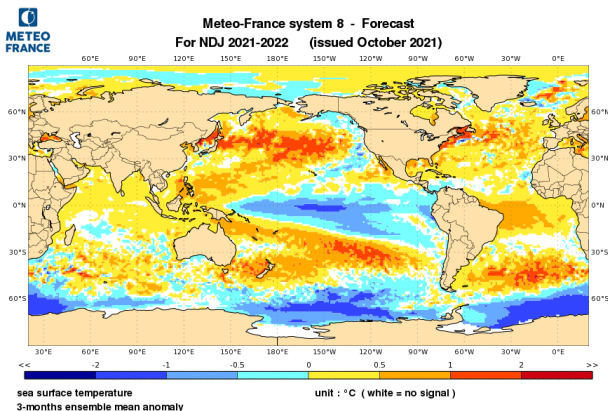
- Below average SSTs, low level easterly and upper level westerly across the eq. central and east-central Pacific.



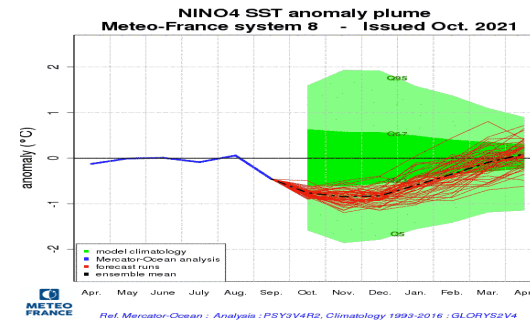
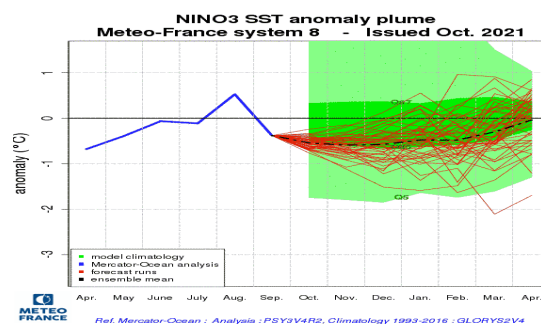
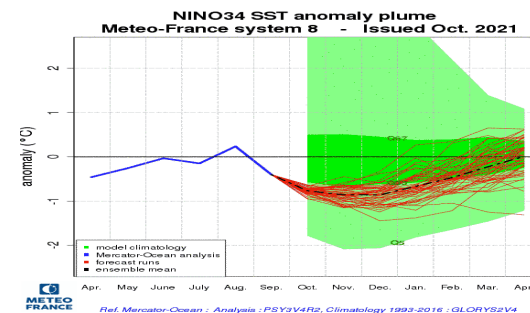
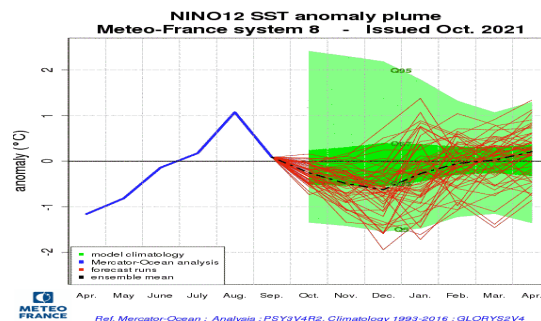
- The tropical Pacific atmosphere consistent with La Niña conditions is observed.

Single and Multi-model ENSO Outlook

MetFR ENSO Forecast



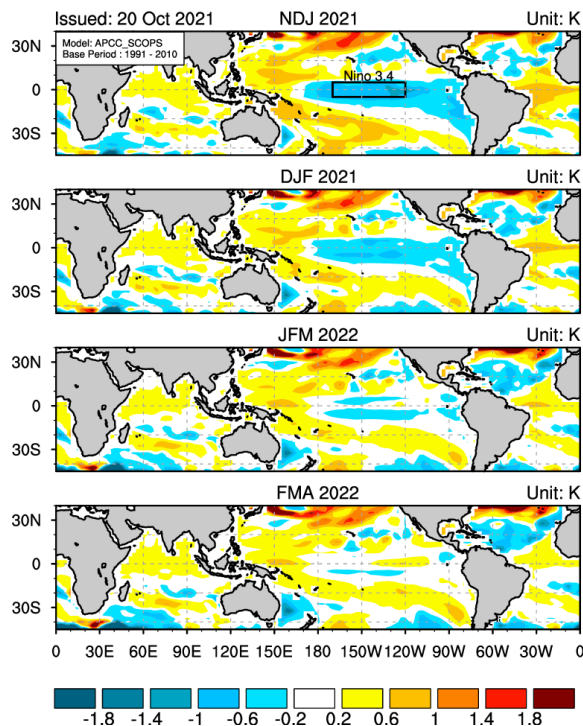
- Below average SST across the tropical central and eastern Pacific Ocean Pacific from NDJ to JFM
- The ensemble spreads for the evolution of Nino 3.4 and Nino 4 indices is smaller than those for Nino 1.2 and Nino 3.



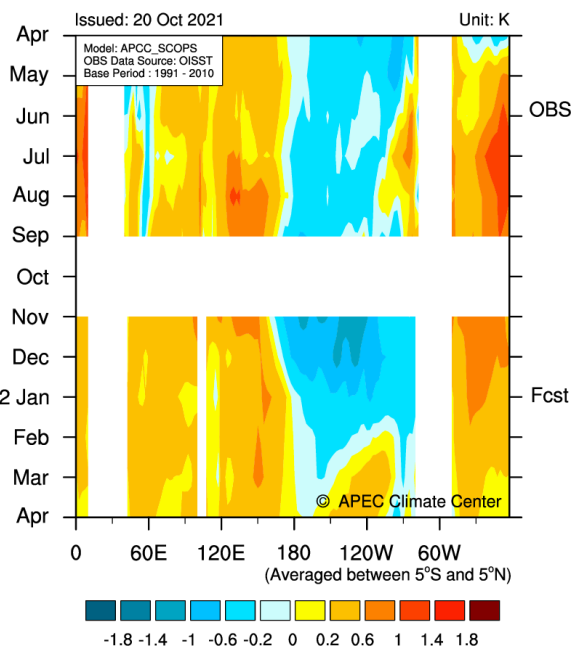
APCC Model – SCoPS ENSO FORECAST

Weak La Niña and La Niña Modoki

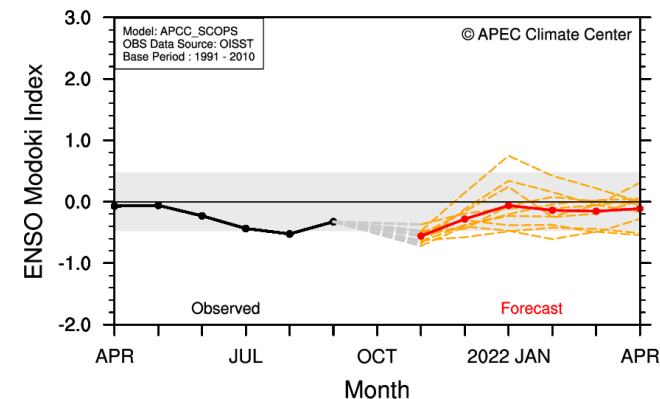
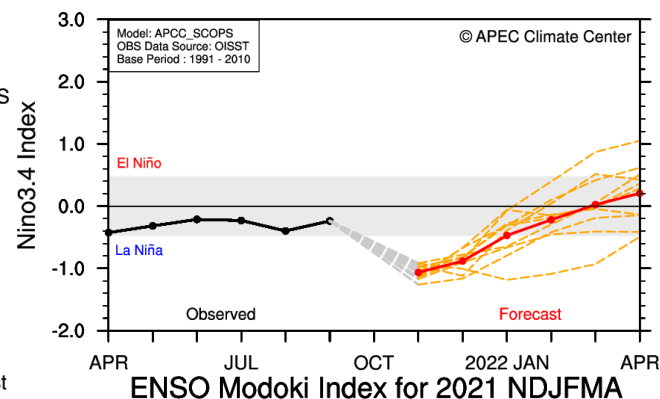
SST Anomaly for NDJ-FMA 2021



SST Anomaly for 2021 NDJFMA



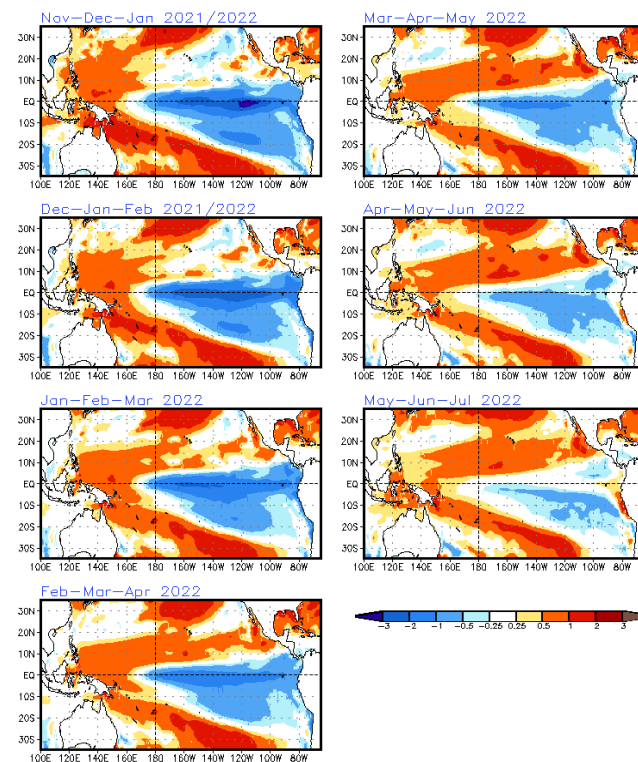
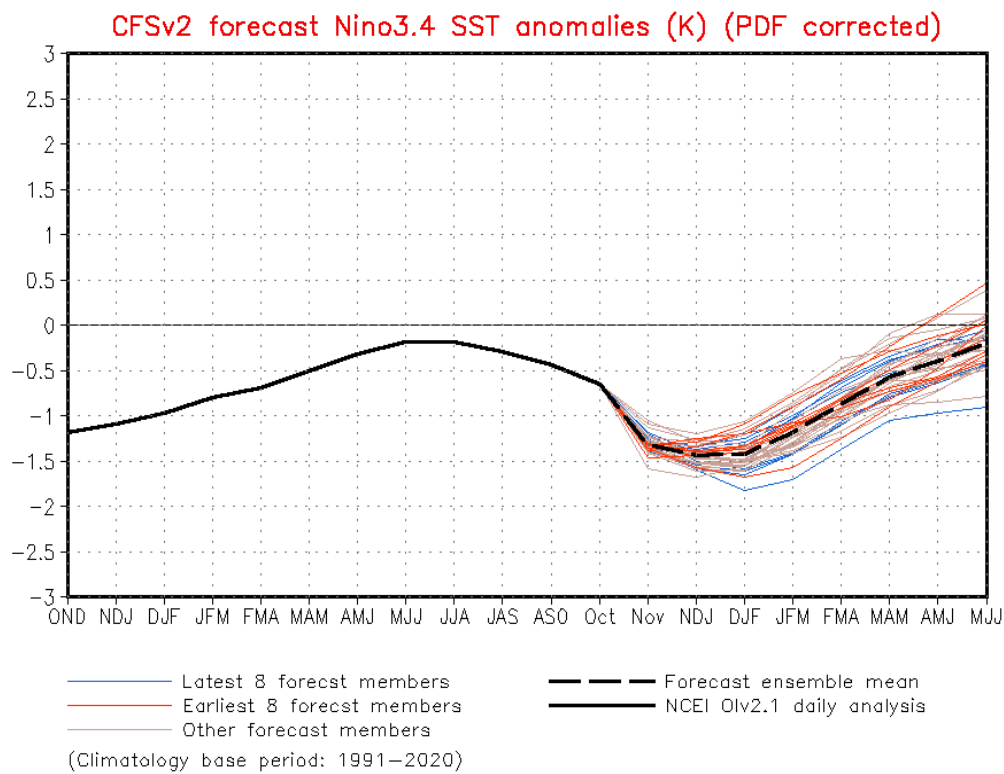
Nino3.4 Index for 2021 NDJFMA



NCEP CFS.v2 Forecast

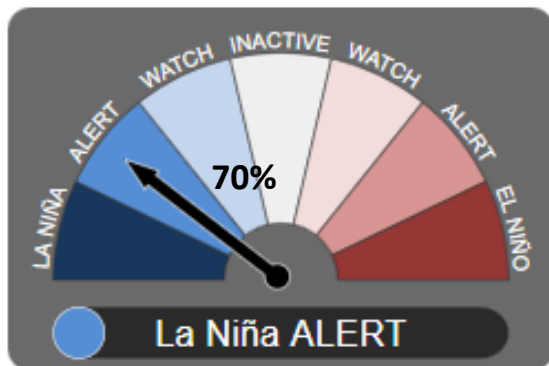
The CFS.v2 ensemble mean (black dashed line) predicts **La Niña to continue through spring 2022**.

(PDF Corrected; Issued: 18 October 2021)



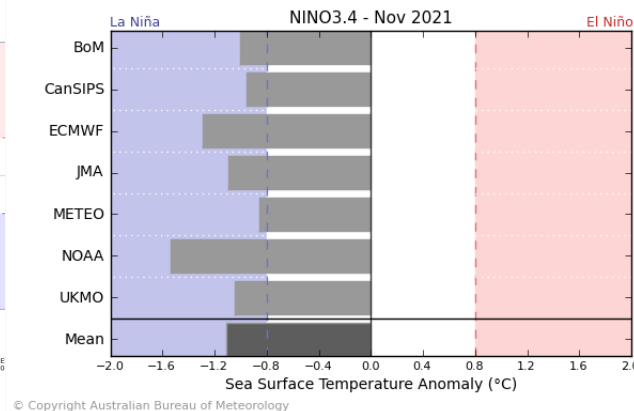
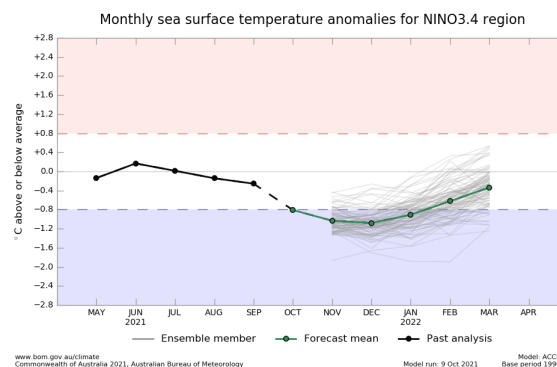
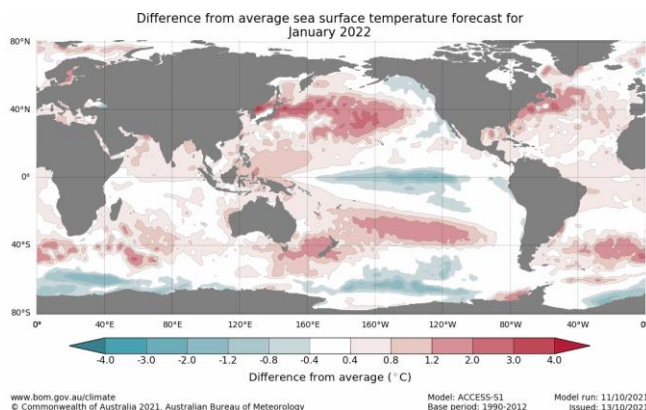
BoM ACCESS-S1 and others

La Niña ALERT Activated



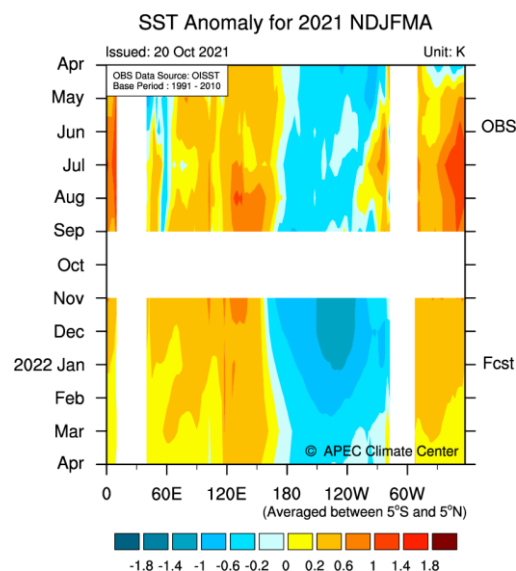
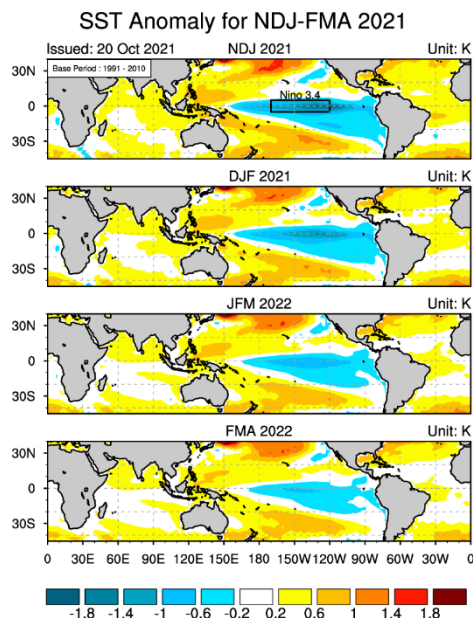
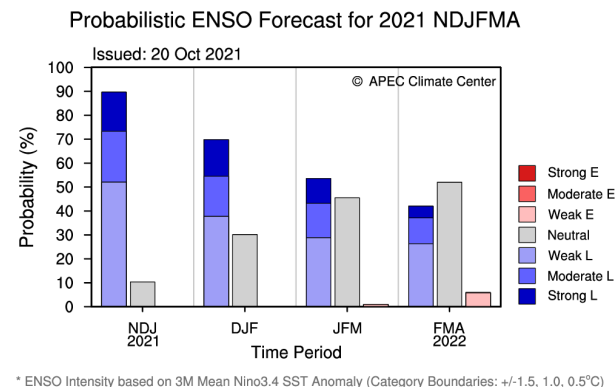
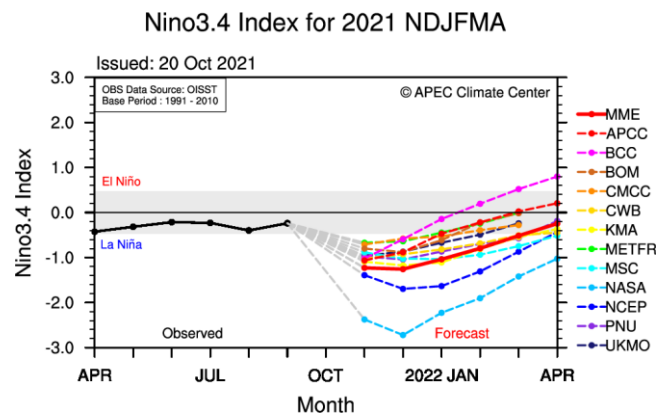
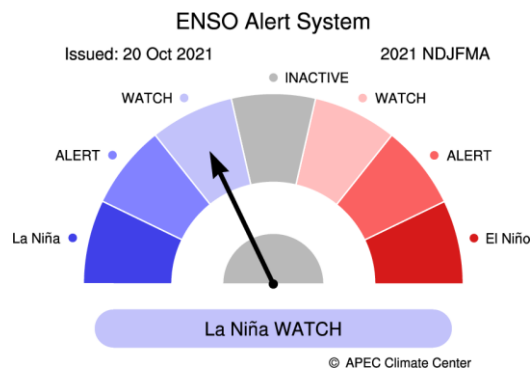
“The chance of a La Nina developing in the coming season has increased”

- Climate models strengthened their negative values well below the NINO3.4 threshold compared to September, this was what tipped the scales towards ALERT.
- Chance of La Niña forming in the coming months around 70%.



- Area with greatest cooling largely in the NINO3.4 region.
- BOM ACCESS-S model reaches La Niña threshold in October.
- All 7 international models surveyed by BOM anticipate further cooling with La Niña thresholds met by November.

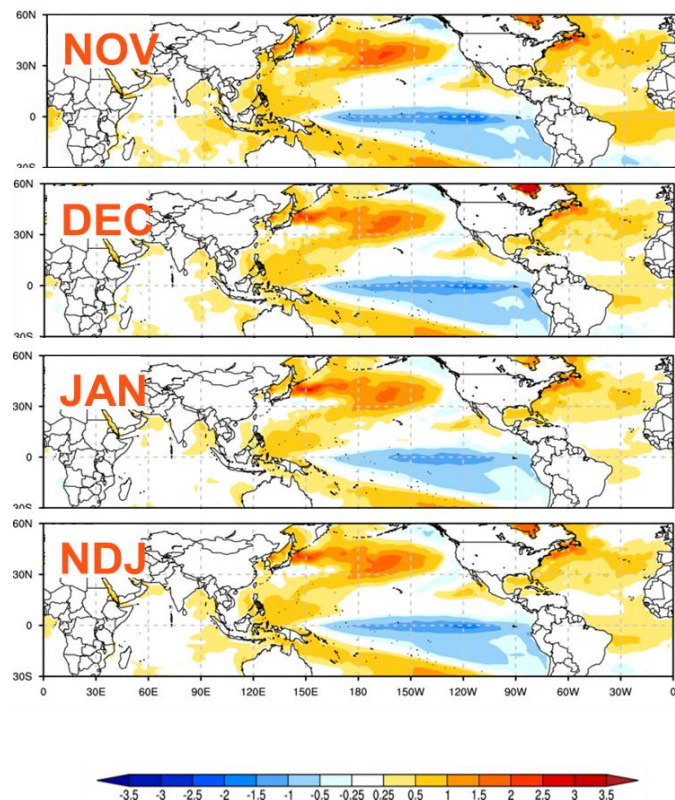
90% La Niña Watch (50% Weak La Niña)



- Below average SST along the equatorial Pacific
- Niño3.4 index is below -1°C and gradually increases to -0.24°C
- 90% chance of La Niña conditions with 50% weak intensity
- ENSO-neutral conditions are likely to be gradually increasing and then dominant during FMA

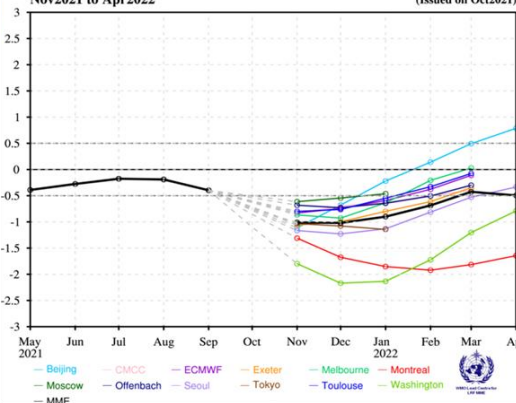
WMO LC LRFMME ENSO Forecast

Weak La Niña



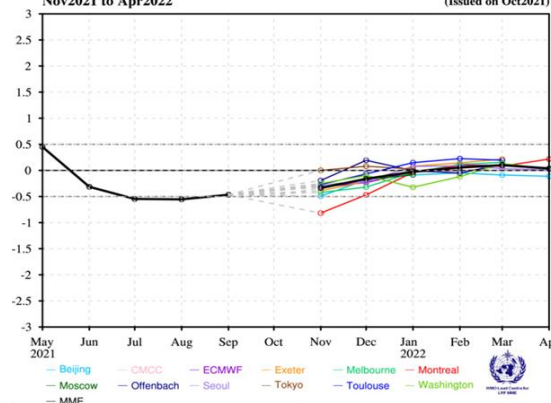
NINO 3.4

Forecast of Nino3.4
Nov2021 to Apr2022



IOD

Forecast of DMI(the Indian Ocean Dipole Mode Index)
Nov2021 to Apr2022



- SSTAs in the Niño 3.4 regions are predicted to evolve towards weak La Niña conditions
- Indian Ocean Dipole (IOD) is predicted to continue being neutral.

(* Similar to GSCU for OND 2021)

❖ Remarks!!

WMO LC LRFMME ENSO forecast information was directly acquired from the LC LRFMME producing center. The GSCU for NDJ 2021-2022 has not yet been released, and will be available after 23 October.

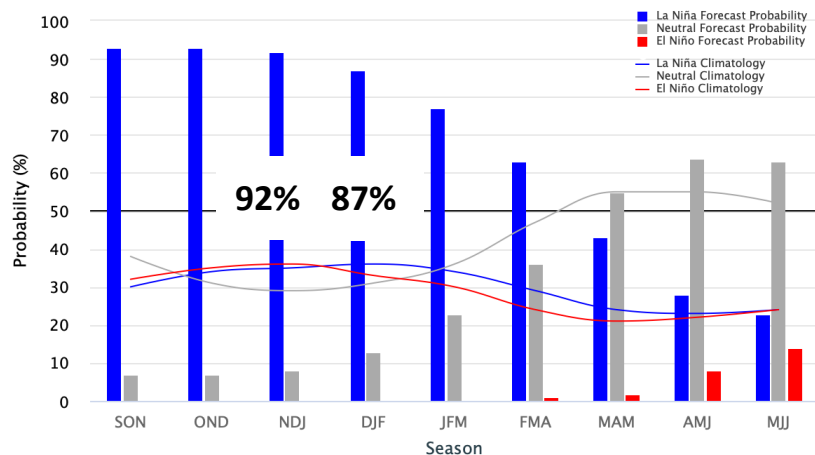
CPC/IRI ENSO Forecast

ENSO Alert System Status: La Niña Advisory

Official CPC/IRI Consensus Forecast (Early-Oct.)

Early–October 2021 CPC/IRI Official Probabilistic ENSO Forecasts

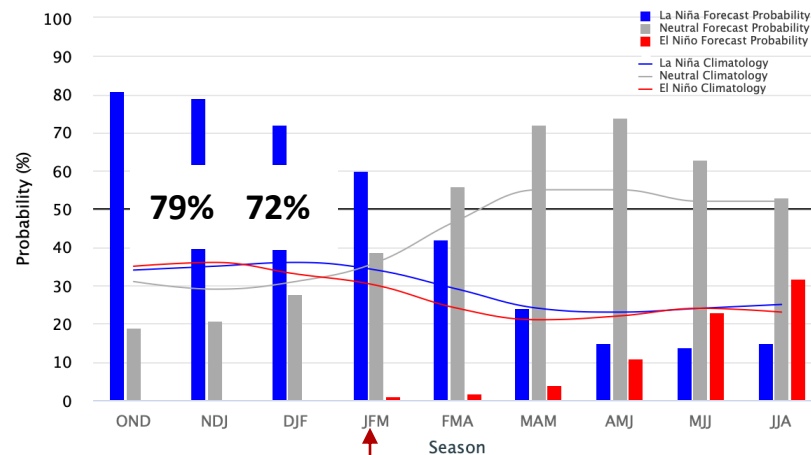
ENSO state based on NINO3.4 SST Anomaly
Neutral ENSO: -0.5°C to 0.5°C



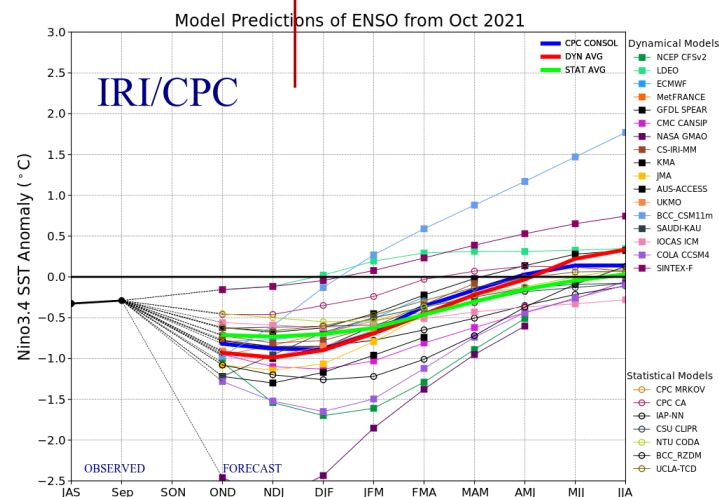
Purely Objective Model-Based Forecast (Mid-Oct.)

Mid–October 2021 IRI/CPC Model–Based Probabilistic ENSO Forecasts

ENSO state based on NINO3.4 SST Anomaly
Neutral ENSO: -0.5°C to 0.5°C



	NDJ	DJF
Dynamical	-0.99	-0.90
Statistical	-0.73	-0.70
Consolidated	-0.91	-0.84



Double-Dip La Niña

2 La Niñas happening one after the other (w/ a transition through ENSO neutral conditions in btwn)

La Niña has formed for second year in a row

Year	DJF	JFM	FMA	MAM	AMJ	MJJ	JJA	JAS	ASO	SON	OND	NDJ
2009	-0.8	-0.8	-0.6	-0.3	0.0	0.3	0.5	0.6	0.7	1.0	1.4	1.6
2010	1.5	1.2	0.8	0.4	-0.2	-0.7	-1.0	-1.3	-1.6	-1.6	-1.6	-1.6
2011	-1.4	-1.2	-0.9	-0.7	-0.6	-0.4	-0.5	-0.6	-0.8	-1.0	-1.1	-1.0
2012	-0.9	-0.7	-0.6	-0.5	-0.3	0.0	0.2	0.4	0.4	0.3	0.1	-0.2
2013	-0.4	-0.4	-0.3	-0.3	-0.4	-0.4	-0.4	-0.3	-0.3	-0.2	-0.2	-0.3
2014	-0.4	-0.5	-0.3	0.0	0.2	0.2	0.0	0.1	0.2	0.5	0.6	0.7
2015	0.5	0.5	0.5	0.7	0.9	1.2	1.5	1.9	2.2	2.4	2.6	2.6
2016	2.5	2.1	1.6	0.9	0.4	-0.1	-0.4	-0.5	-0.6	-0.7	-0.7	-0.6
2017	-0.3	-0.2	0.1	0.2	0.3	0.3	0.1	-0.1	-0.4	-0.7	-0.8	-1.0
2018	-0.9	-0.9	-0.7	-0.5	-0.2	0.0	0.1	0.2	0.5	0.8	0.9	0.8
2019	0.7	0.7	0.7	0.7	0.5	0.5	0.3	0.1	0.2	0.3	0.5	0.5
2020	0.5	0.5	0.4	0.2	-0.1	-0.3	-0.4	-0.6	-0.9	-1.2	-1.3	-1.2
2021	-1.0	-0.9	-0.8	-0.7	-0.5	-0.4	-0.4	-0.5				
2022												

Double-Dip La Niña??

PICOF-9 Statement - ENSO

ENSO State

- Since PICOF-8 (mid-April), ENSO neutral conditions persisted.
- The oceanic conditions, such as the upper ocean heat and subsurface temperature, changed to shift from neutral to La Niña development conditions (starting from mid-Jul 2021 to early-Oct)
- The Niño 3.4 index was -0.8°C in mid-Oct 2021, and the tropical Pacific atmosphere consistent with La Niña conditions is observed.
- La Niña watch to La Nina event was expected in Oct 2021.

ENSO Outlook

- All models indicate a large chance of the presence of La Niña for NDJ 2021-2022. After the maximum peak at November, the relative magnitude will decrease throughout the period considered until April 2022.
- APCC MME and WMO LRFMME predicts a weak La Niña, which will remain until JFM 2022. A large majority of the models predict SSTs to cool further through the boreal winter and then return to ENSO-neutral levels during boreal spring.
- It is likely to be double-dip La Niña episode.

Thank You!

- Individual inputs for the ENSO state and outlook were contributed by representatives from agencies (NIWA, NOAA, BoM, and MetFR).
- WMO LC LRFMME ENSO forecast information was directly acquired from the LC LRFMME producing center. The GSCU for NDJ 2021-2022 has not yet been released, and will be available after 23 October.
- Some information was taken directly from website sources such as NOAA's weekly ENSO discussion (issued 18 Oct 2021), CPC/IRI ENSO Outlook, etc.