PICOF-14

2: Looking Back - Review and Evaluation of November 2023 to April 2024 Climate Outlook ii.Ocean

NOAA

University of Hawaii, BOM, SPC, SPREP, NIWA

PICOF-13 OUTLOOK – November to April State of the Ocean

Ocean surface temperature

Projected

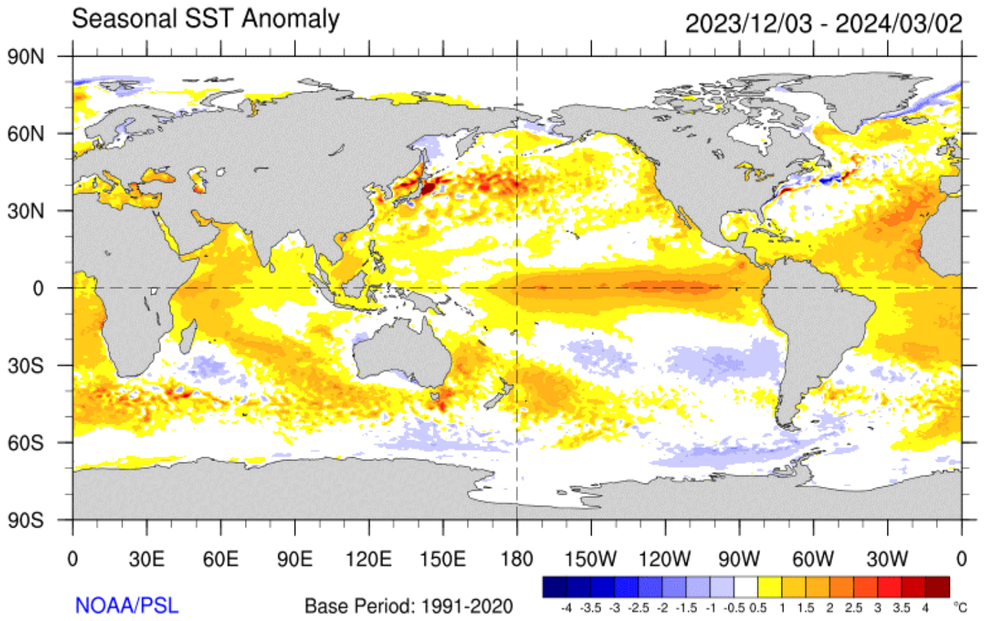
Warmer than average sea surface temperatures are favoured in most of the region, except in New Caledonia, Vanuatu, Fiji, and Niue, where near average conditions are favoured.

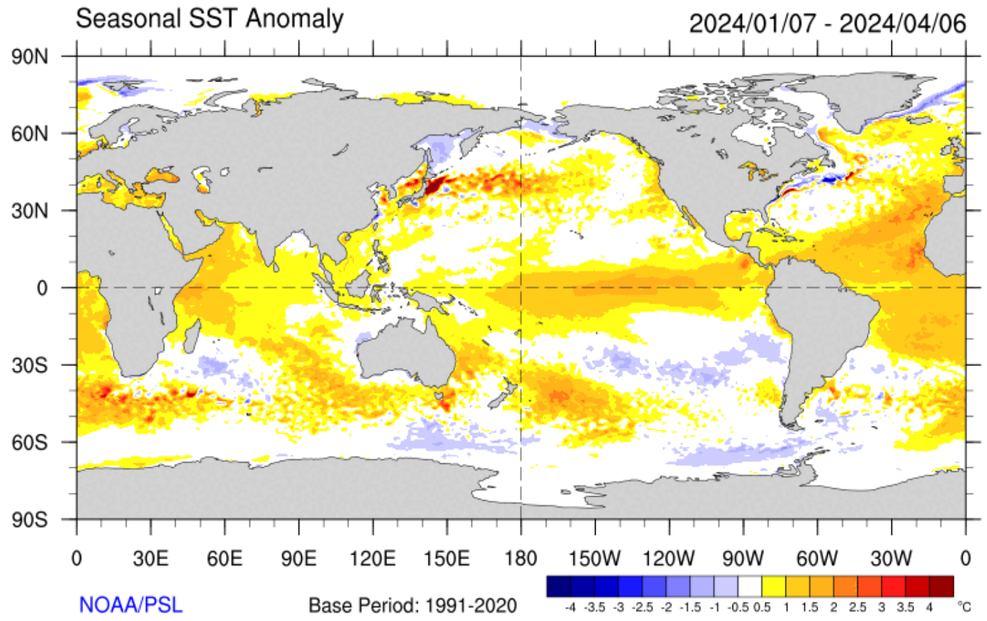
El Niño’s oceanic intensity is forecast to gradually wane during the first half of 2024, but atmospheric influences may linger into the middle part of the year.

PICOF-13 OUTLOOK – November to April State of the Ocean

Observed

During the DJF -JFM period, SST anomalies were above-normal across the central and eastern tropical Pacific Ocean.

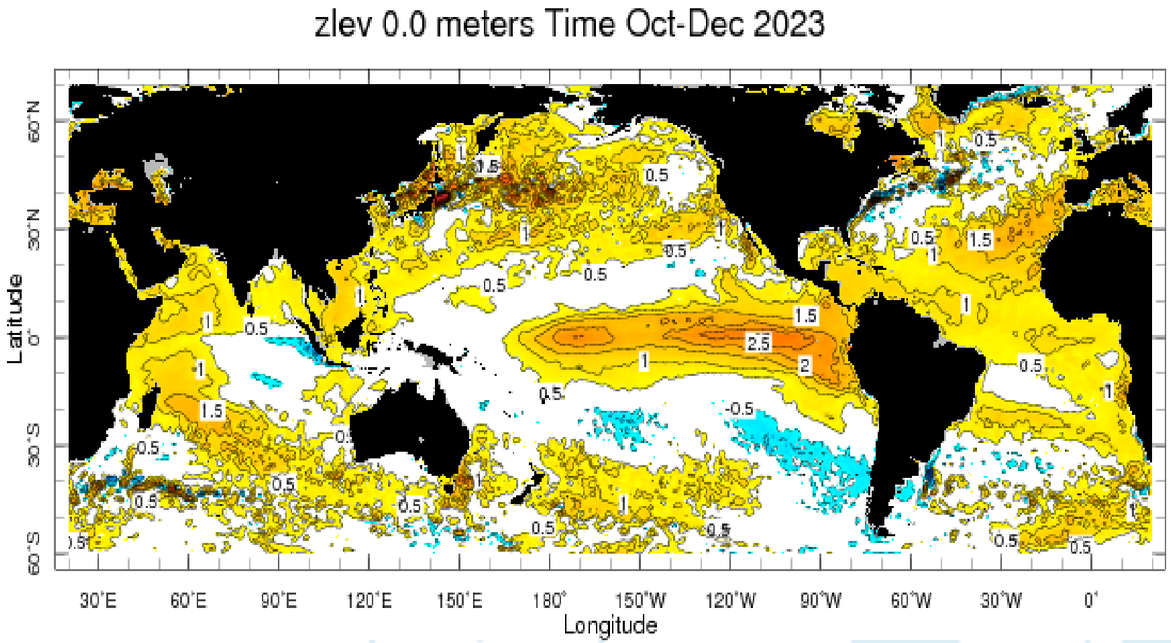


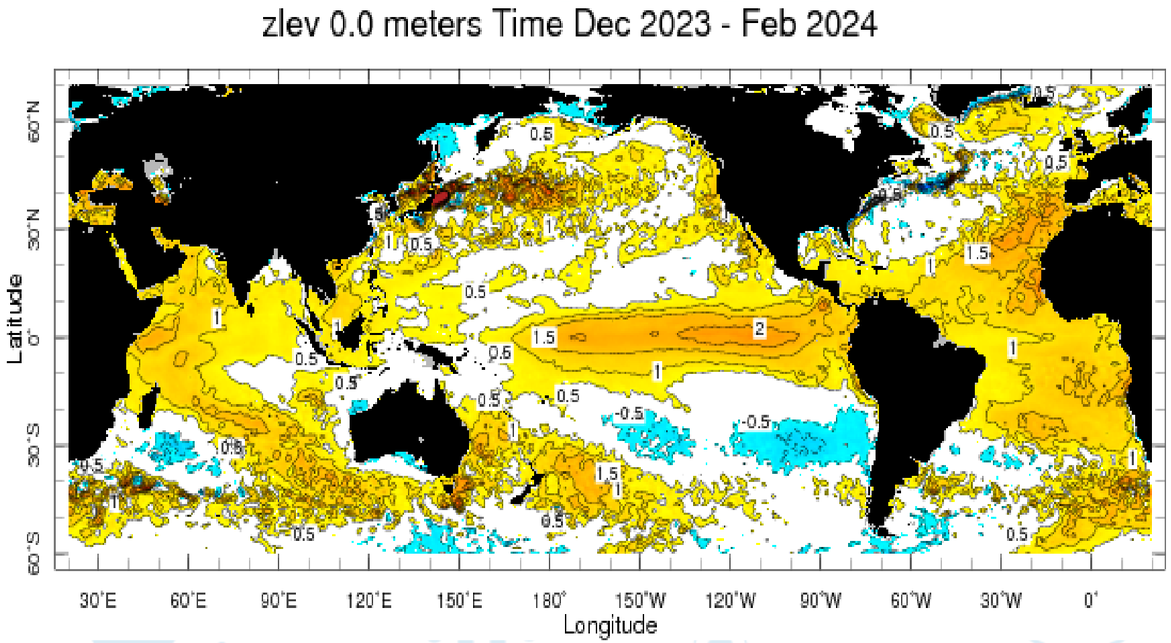


Seasonal sea surface temperature anomaly maps for 12/3/23 to 3/2/24 and 01/07/24 to 04/06 2024

PICOF-13 OUTLOOK – November to April State of the Ocean

Observed





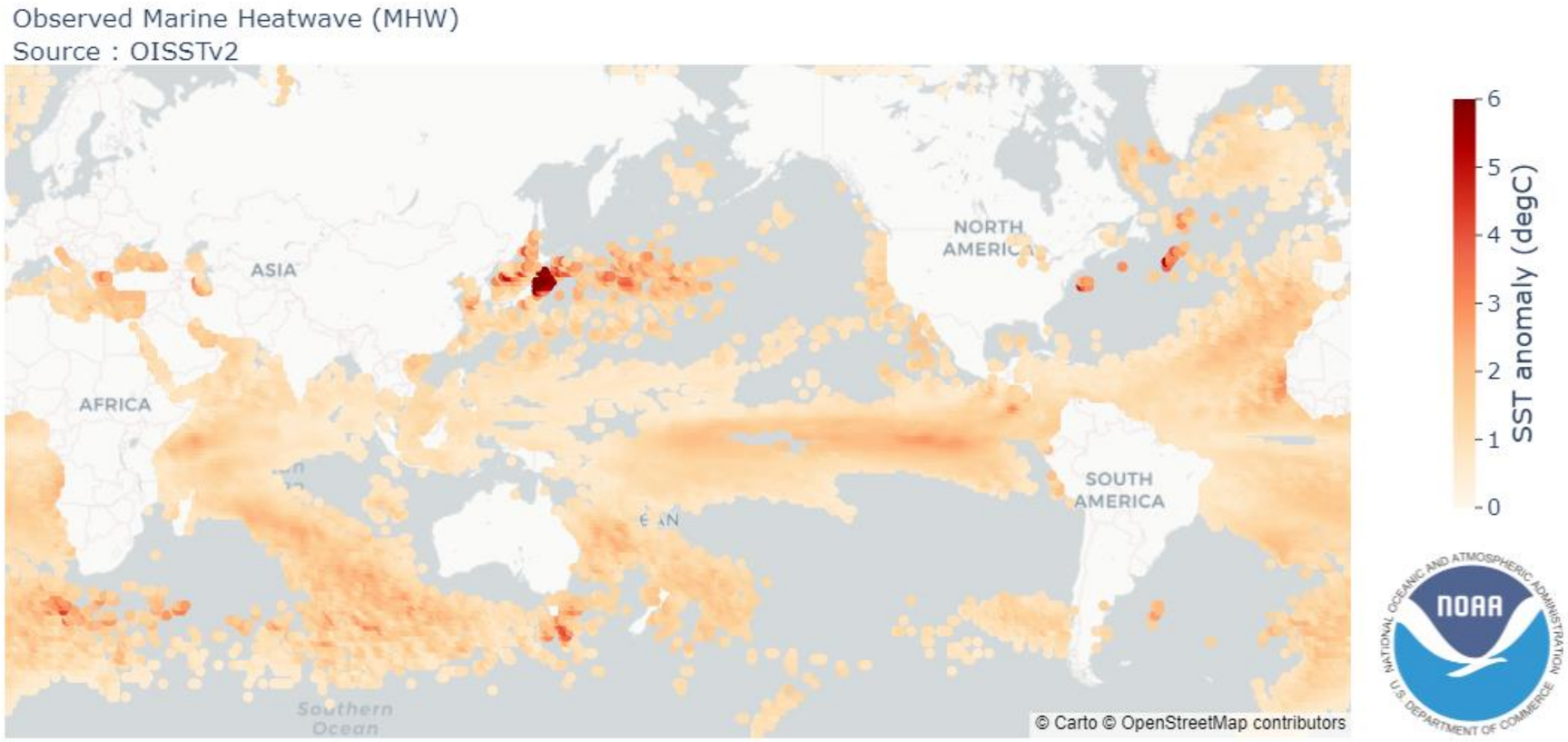
These maps display the seasonal (3-monthly) sea surface temperature anomalies for the globe.

Seasonal sea surface temperature anomalies are calculated with respect to the 1991-2020 climatology. Yellow to red colors on the map indicate areas where sea surface temperature for the season shown is above the climatological value for that season of the year, and blue shades indicate where sea surface temperature is below normal. Shading starts at +/- 0.5°C. Anomalies are also contoured at an interval of 0.5°C.

https://iridl.ldeo.columbia.edu/maproom/Global/Ocean_Temp/Seasonal.html

PICOF-13 OUTLOOK – November to April State of the Ocean

Observed

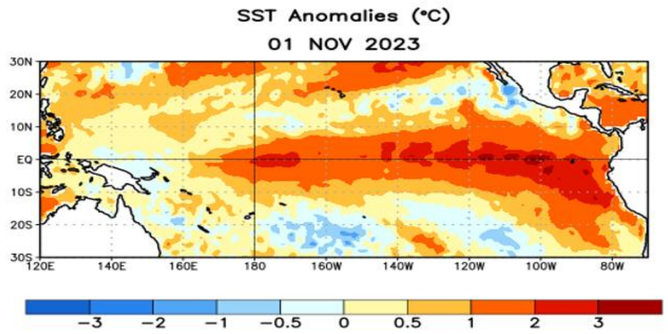


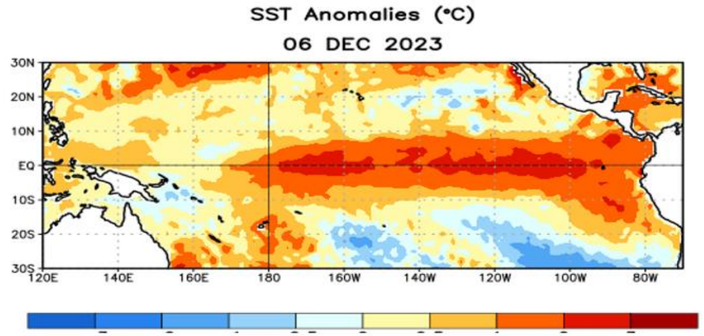
January 2024 Observed Marine Heatwave

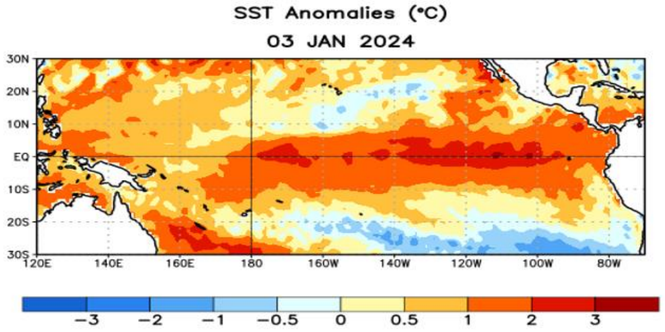
https://psl.noaa.gov/marine-heatwaves/

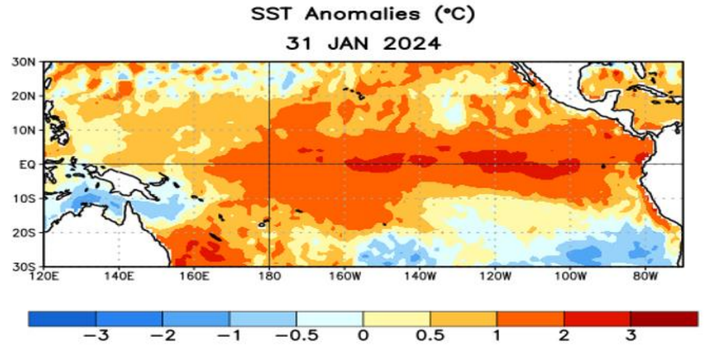
PICOF-13 OUTLOOK – November to April State of the Ocean

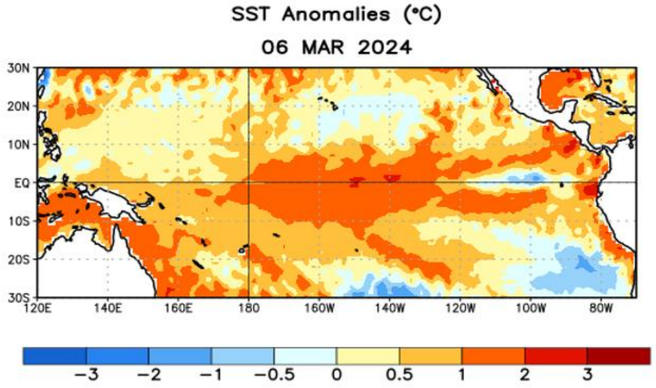
Observed

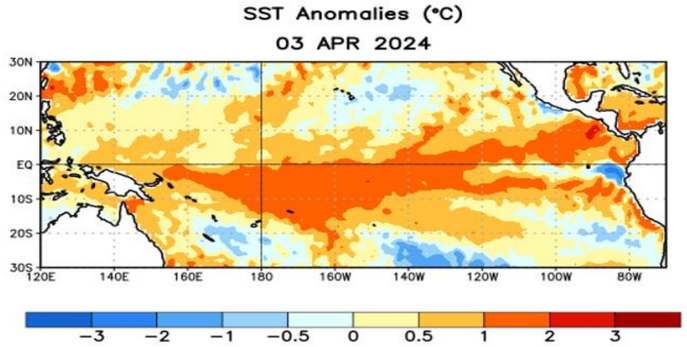








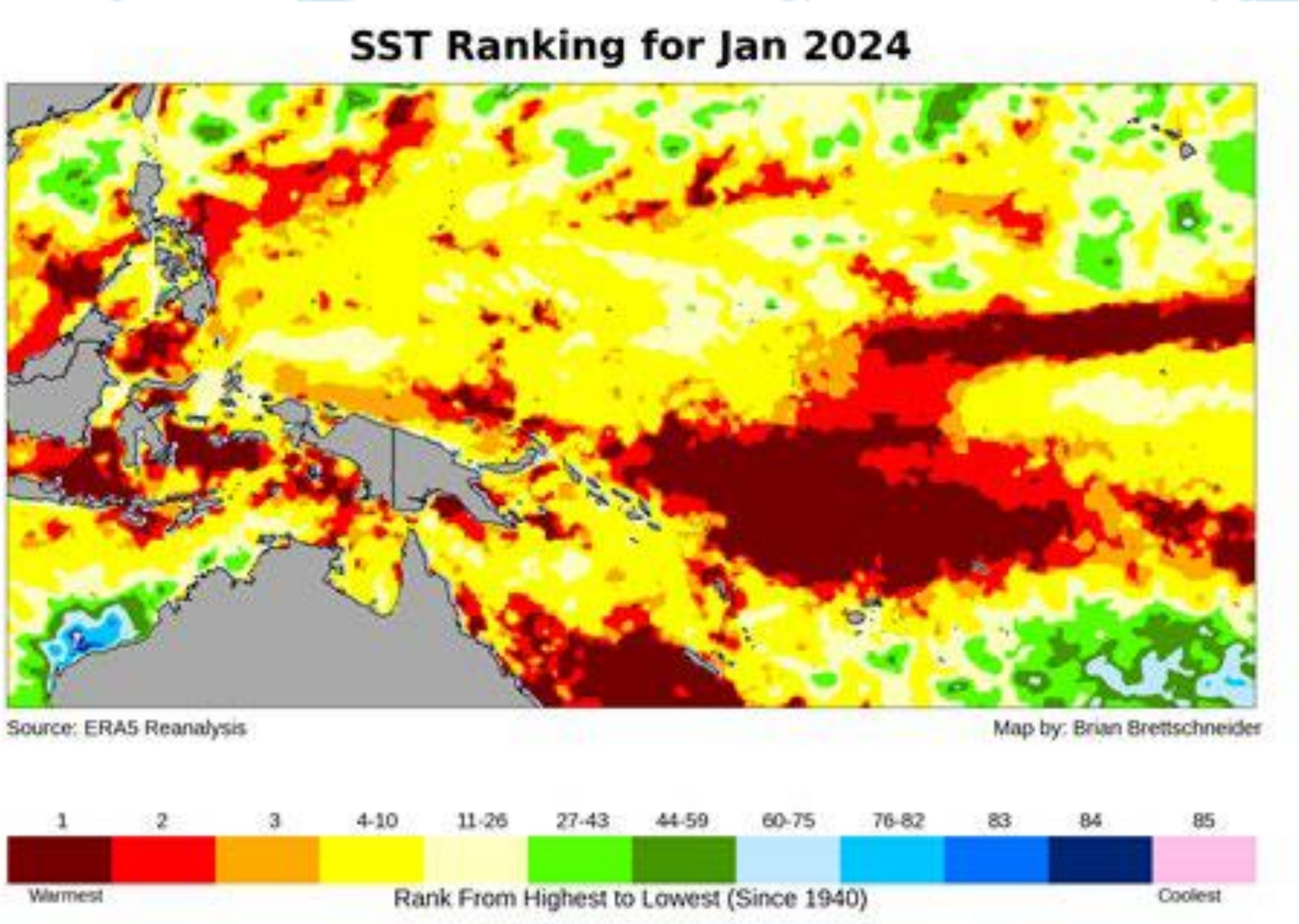




Average sea surface temperature (SST) anomalies (°C). Anomalies are computed with respect to the 1991-2020 base period weekly means.

PICOF-13 OUTLOOK – November to April State of the Ocean

Observed

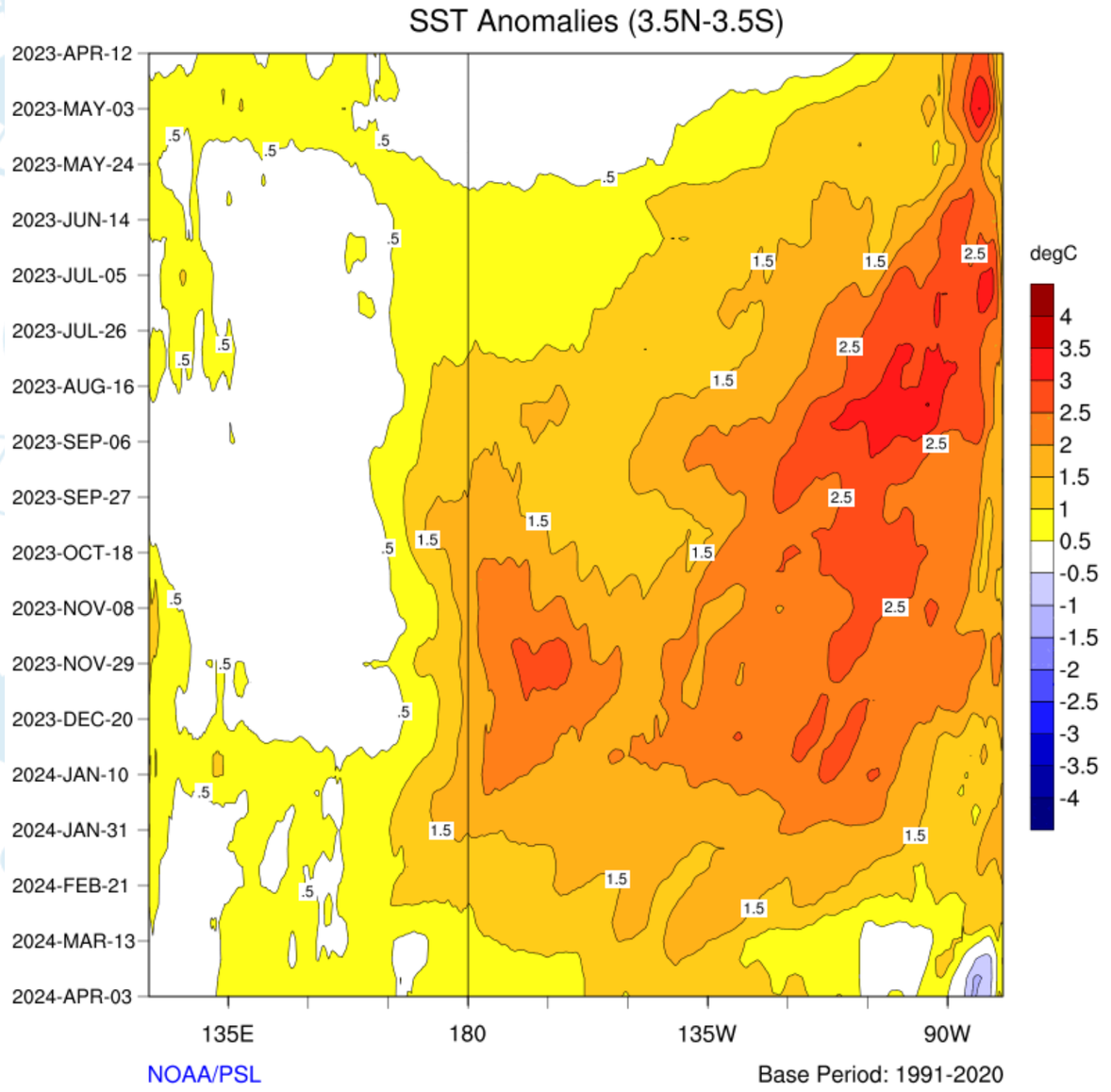


Sea surface temperature (SST) ranking for the western Pacific Ocean for January 2024.

Source: ERA5 Reanalysis, B. Brettschneider.

PICOF-13 OUTLOOK – November to April State of the Ocean

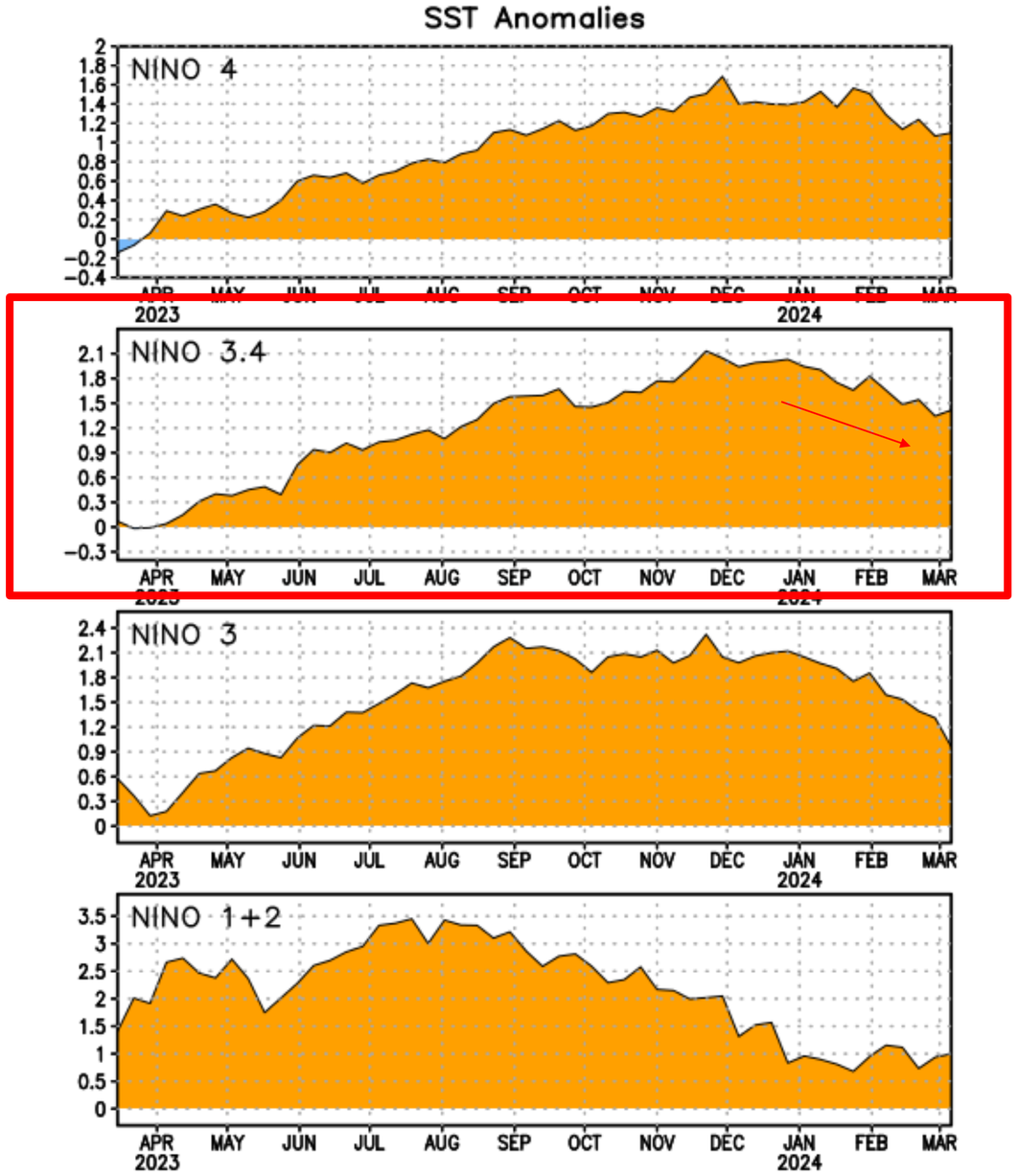
Observed



https://psl.noaa.gov/map/clim/sst.shtml

PICOF-13 OUTLOOK – November to April State of the Ocean

Observed



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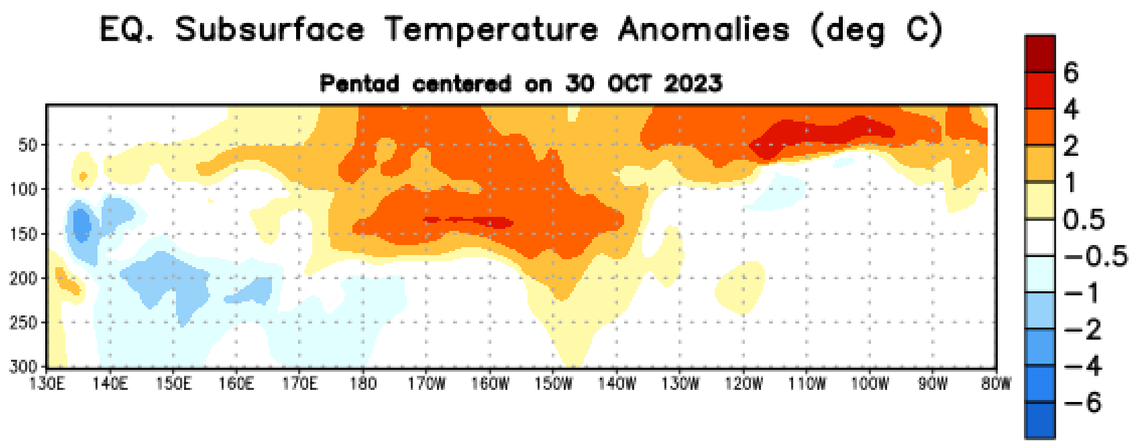
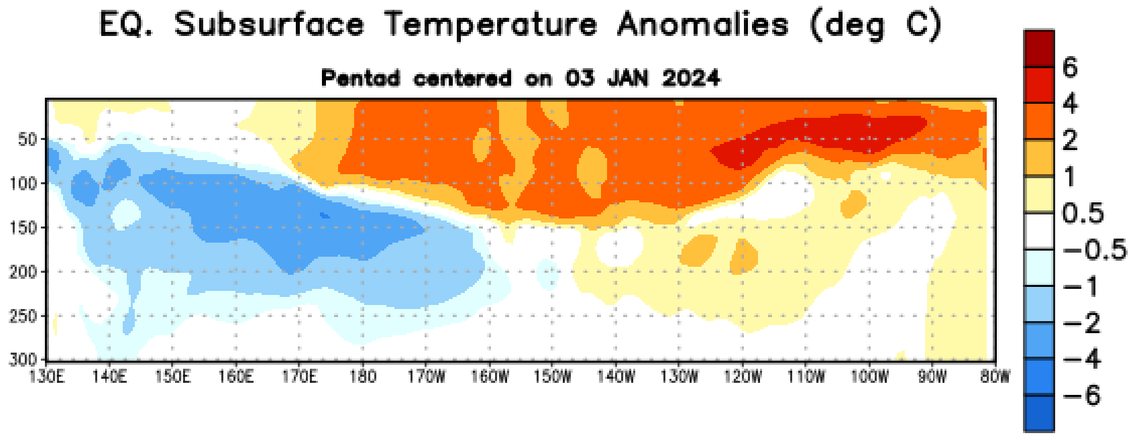
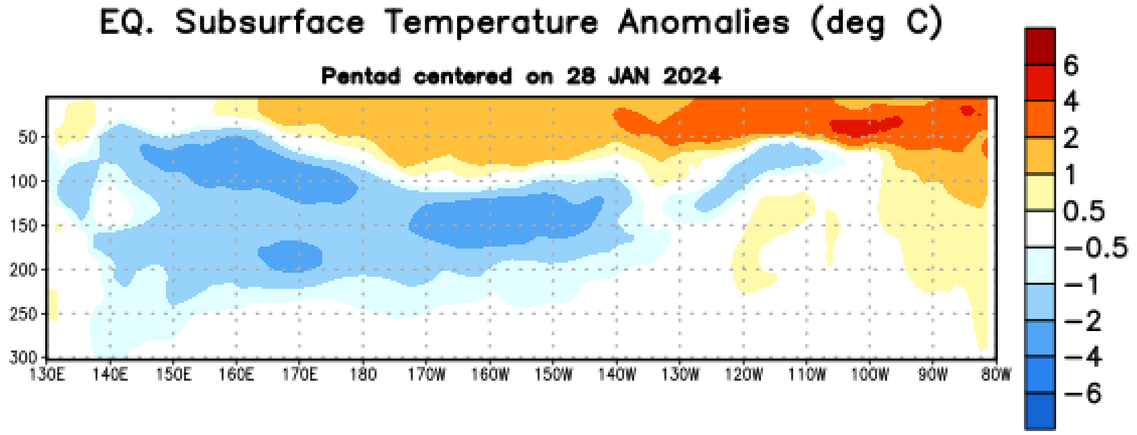
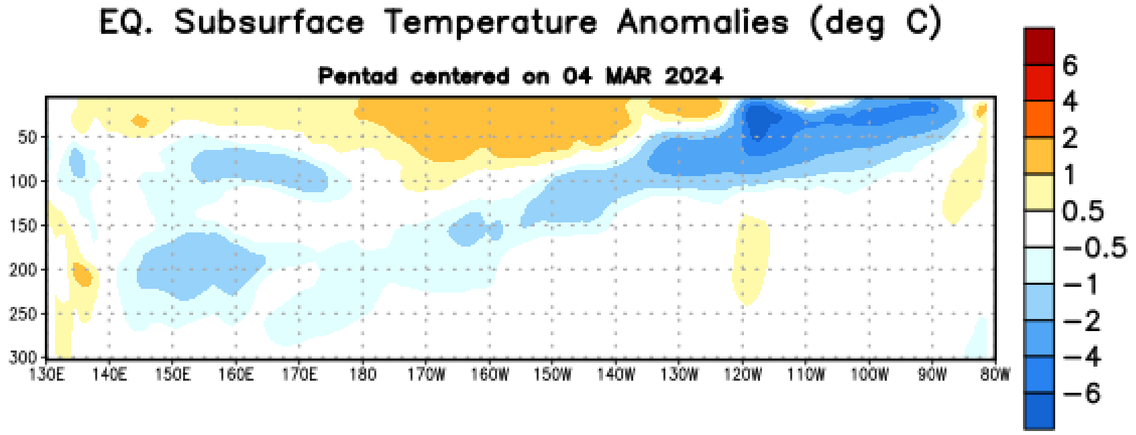
Observed









PICOF-13 OUTLOOK – November to April State of the Ocean

Sea level

Projected

Slightly higher than normal sea levels are predicted near the equator.

Lower than normal sea levels are forecast in the western part of the region, near Palau, FSM, Marshall Islands, PNG, and Solomon Islands

PICOF-13 OUTLOOK – November to April State of the Ocean

Sea level

Observed

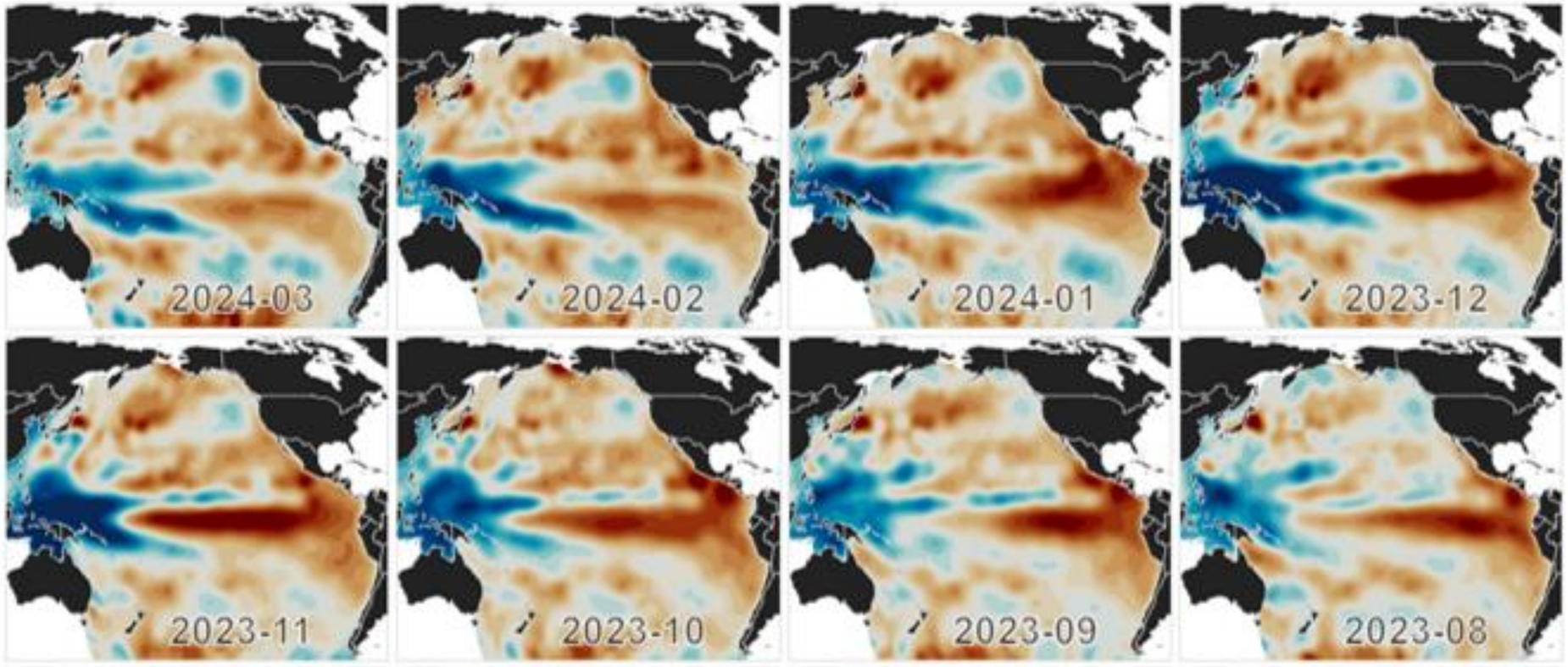
Above-normal sea levels (5-20 cm) were observed across much of the eastern tropical Pacific Ocean and areas north of ~10ºN in the northwestern tropical Pacific Ocean

Below-normal sea levels (5-20 cm) were observed in the northwestern tropical Pacific near the equator (south of ~8ºN) extending southward to areas around the Solomon Islands and Samoan Islands.

PICOF-13 OUTLOOK – November to April State of the Ocean

Sea level

Observed



Contours calculated from CMEMS/Aviso gridded sea level anomalies (SLAs) averaged during calendar months with at least 21 days of data. The SLA fields have been smoothed to have an effective horizontal resolution of about 5°. The mean annual cycle and long-term trend have been subtracted from each location. The most recent month is shown in the top left panel with time before present increasing along rows and then columns.
https://uhslc.soest.hawaii.edu/pacific-sea-level-monitoring/

PICOF-13 OUTLOOK – November to April State of the Ocean

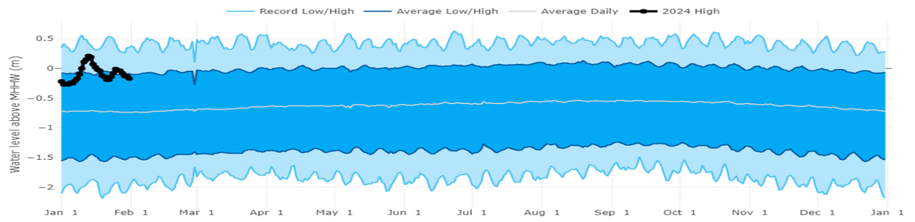
Sea level

Observed

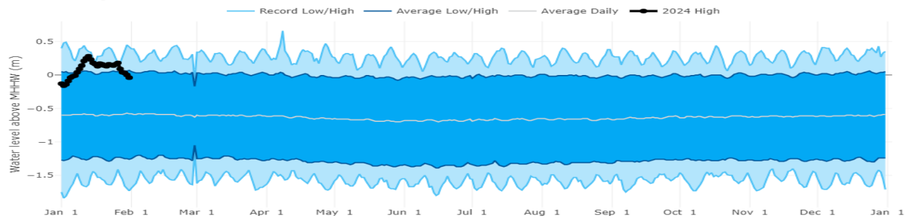
This product provides a preliminary look at the recent or past water levels compared to the long-term records and climatology at the tide gauge station. Updates are typically available by the 15th day of each month using the UHSLC's Fast Delivery of tide gauge data.

https://uhslc.soest.hawaii.edu/pacific-sea-level-monitoring/

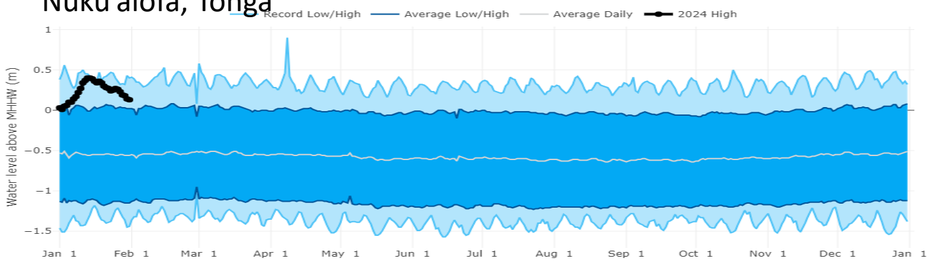
Malakal, Palau



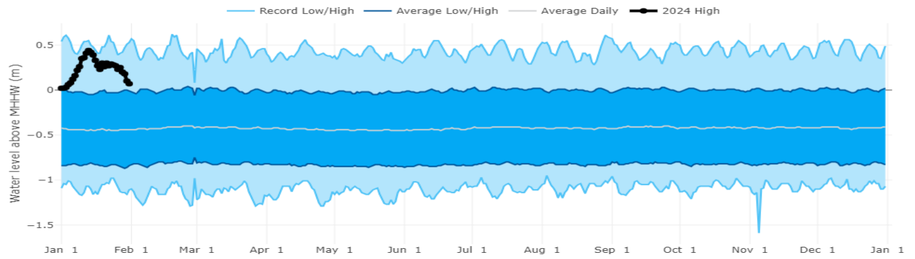
Suva, Fiji



Nuku'alofa, Tonga



Pago Pago, American Samoa



PICOF-13 OUTLOOK – November to April State of the Ocean

Coral Bleaching

Predicted

The risk for coral bleaching is enhanced in the central equatorial to the eastern part of the region.

Coral bleaching may also occur in Tokelau, Tuvalu, Kiribati, Northern Cook Islands, and Marshall Islands. While ocean heat stress is the major factor causing coral bleaching, other localised environmental stressors – **the combination of lower sea levels and warm seas** – could also lead to coral bleaching.

PICOF-13 OUTLOOK – November to April State of the Ocean

Coral Bleaching

Observed

In American Samoa, subaerial exposures of shallow-water coral reefs were observed in Tutuila, including in the villages of Nu‘uuli and Faga‘alu. These events were driven by a combination of factors including El Niño-related sea level drops in the region and extreme low tide events.

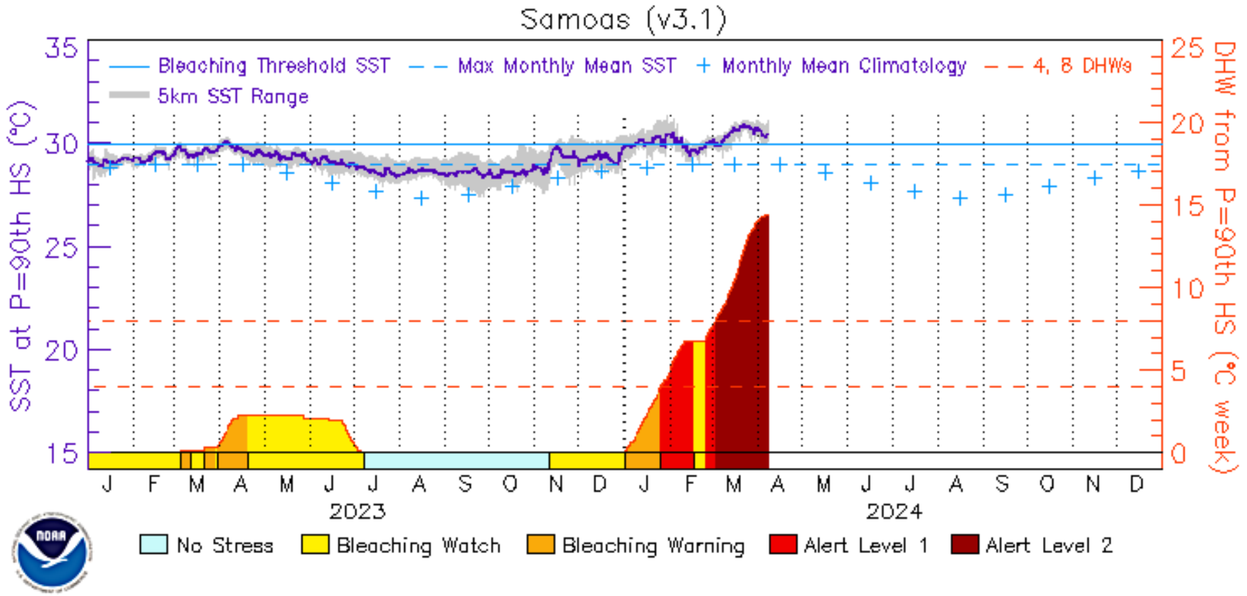
Source: Eric Brown, National Park Service.

PICOF-13 OUTLOOK – May to October State of the Ocean

Coral Bleaching

Observed

Anomalously warm sea surface temperatures were also observed in areas of American Samoa around Tutuila Island, Swains Island, and Rose Atoll—reaching Alert Level 1 during January and February 2024, according to the NOAA Coral Reef Watch.



Time-series graph depicting satellite-based sea surface temperatures, and associated coral bleaching alert levels (red, maroon) for 2023-24. Areas in maroon indicate bleaching Alert Level 2.

NOAA Coral Reef Watch.
https://coralreefwatch.noaa.gov/product/vs/timeseries/polynesia.php#samoas

PICOF-13 OUTLOOK – November to April State of the Ocean

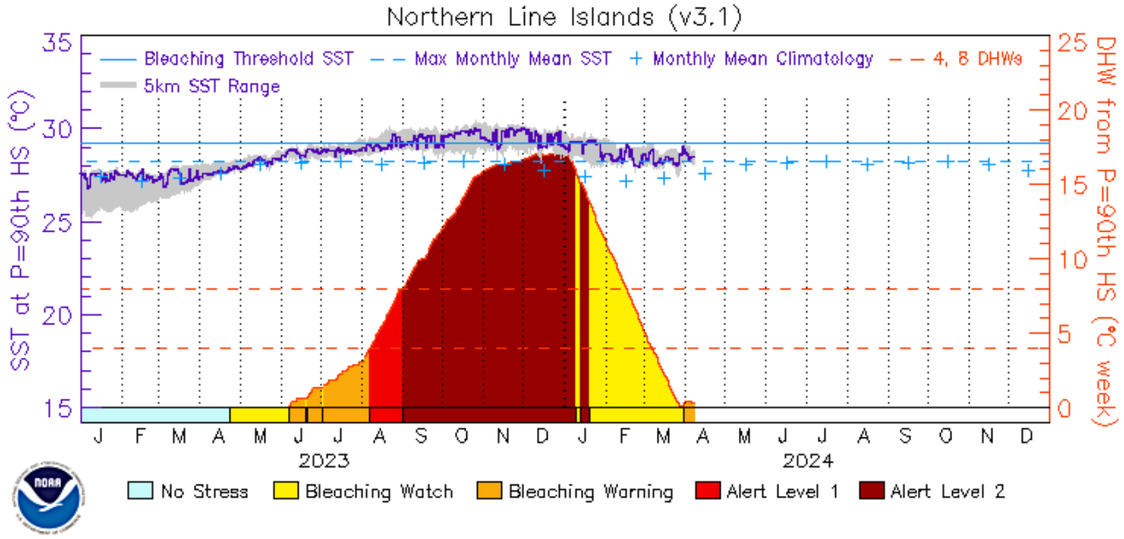
Coral Bleaching

Observed mass bleaching event in coral reef terraces in Palmyra Atoll, Northern Line Islands (January 2024).

Source: Molly Ginther/The Nature Conservancy.

Observed

In the central Pacific, extensive coral bleaching, mortality, and algal overgrowth were observed in Palmyra Atoll, according to field observations from The Nature Conservancy staff and the NOAA Coral Reef Watch.



Time-series graph depicting satellite-based sea surface temperatures, and associated coral bleaching alert levels (red, maroon) for 2023-24. Areas in maroon indicate bleaching Alert Level 2.

NOAA Coral Reef Watch.
https://coralreefwatch.noaa.gov/product/vs/timeseries/polynesia.php#samoas

Summary – November to April State of the Ocean

Ocean Surface Temperature. During the December to March period, SST anomalies were above-normal across most of the region. Peaking in January SST was exceptionally high across the central and eastern tropical Pacific Ocean.

El Niño's oceanic intensity gradually waned during the first half of 2024.

Sea Level. Above-normal sea levels (5-20 cm) were observed across much of the eastern tropical Pacific Ocean. Below-normal sea levels (5-20 cm) were observed in the northwestern tropical Pacific near the equator extending southward to areas around the Solomon Islands and Samoan Islands.

Coral Bleaching. Coral bleaching, due to the combination of lower sea levels and warm seas, was observed at multiple locations across the Pacific.

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www.climate.gov