

El Niño!

By John Benson

December 2022

*As one, wet merchants turn their eyes towards the west
Trade winds falter as if in dire consequence
Freezing fish to fry fail to materialize
Christ-child, blood-warm current sends to touch the skies
El Niño!*

1. Introduction

I've been known to use the lyrics from rock songs in the titles of my posts. This is one of those times. However, whereas my last such post used a song from the late 1960s, the above lyrics were from a song (same name as this post) on an album that was released the year before Y2K (1999). It is also one of my favorite songs by one of my favorite rock groups. I will tell you the group / CD at the end of this post, as well as an interesting factoid about their lead singer.

Most of my readers (sort of) know what El Niño is. I've written before about this, and I also am known to frequent a blog that covers the dynamic climate system El Niño is part of. They too are infected with a bit of whim. At the beginning of their November Post they had some good descriptions of this system, and well as some information that will probably start to have some serious effects on the World's Weather. I will start this in Section 2 below, mostly use their words, and fill in with mine and a respected climatologist's as needed.

2. ENSO

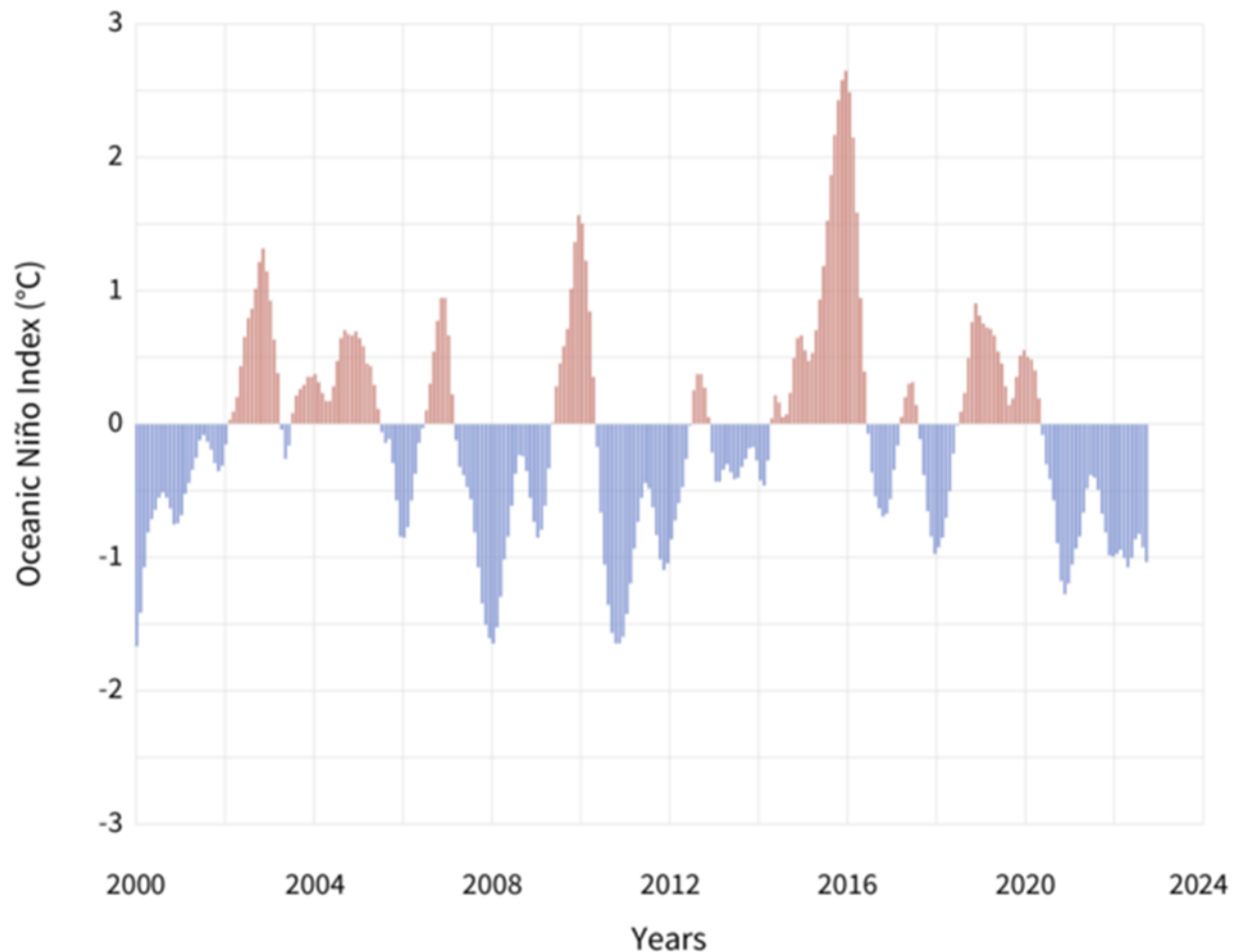
Acronym time! ENSO, the El Niño/Southern Oscillation (the entire El Niño and La Niña system), modifies global weather and climate in somewhat predictable ways. Since ENSO itself can be predicted several months in advance, it gives us an early picture of potential global rain, snow, and temperature patterns, among other climate effects. Check out my September post for a round-up of La Niña's impacts.¹

In the U.S., our primary measurement for ENSO is the Oceanic Niño Index (ONI), the three-month average of the sea surface temperature in the Niño-3.4 region in the tropical Pacific. Specifically, it's the anomaly, the difference from the long-term average sea surface temperature, where long-term is now 1991–2020. When the ONI is more than half a degree Celsius cooler than average, we're in La Niña territory. It needs to stay there for at least 5 consecutive 3-month-average periods to qualify as a La Niña, but that has not been a heavy lift lately!

See the chart on the next page.

¹ Post quoted in this paper: Emily Becker, Climate.gov, ENSO Blog, "November 2022 La Niña update," <https://www.climate.gov/news-features/blogs/enso?msclkid=bc99417fcfe011ecb283a6abbf45563a>
September Post by the above, mentioned above: <https://www.climate.gov/news-features/blogs/september-2022-la-ni%C3%B1a-update-it%E2%80%99s-q-time>

OCEANIC NIÑO INDEX (ONI)



Seasonal (3-month) sea surface temperatures in the central tropical Pacific Ocean compared to the 1981-2010 average. Warming or cooling of at least 0.5°Celsius above or below average near the International Dateline is one of the criteria used to monitor the El Niño-La Niña climate pattern. NOAA Climate.gov image, based on data from the Climate Prediction Center.

Except for a short break in the summer of 2021, the ONI has been cooler than the La Niña threshold since summer 2020. Heading into our third La Niña winter in a row, we find ourselves in a situation we've only recorded twice before, 1973–76 and 1998–2001. Both of those previous triple-deckers followed strong El Niño years, while this one follows the warmish-neutral winter of 2019–2020. The physics behind why we ended up with three La Niña winters in a row this time is going to be an active research topic for climate scientists!

Author's comment: The chart and text below is from one of my favorite climatologists, Dr. James Hansen. We will return to the ENSO Blog after a few figures and paragraphs.

The past three months were remarkably warm on global average – remarkable because this is a La Nina year, when the cool phase of the El Nino Southern Oscillation keeps the low latitude Pacific Ocean relatively cool. These three months – Northern Hemisphere summer – were each at or near records for the month (Fig. 1), despite the La Nina.

Every month this year has been warmer than the same month last year, even though the present La Nina is as deep as last year (Above NOAA Climate.gov image).²

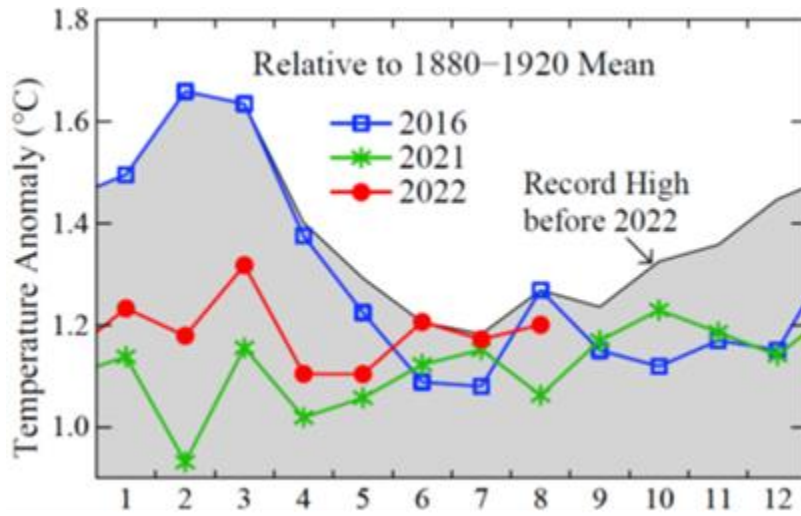


Fig. 1. Monthly global temperature anomaly.

Our interpretation is that the current warmth is spurred by the record Earth energy imbalance, which in turn is spurred by rapid growth of greenhouse gases, reduction of human-caused aerosols, and the rising phase of the solar irradiance cycle. NOAA and the relevant scientific community predict that the La Nina will continue at least through this coming winter, for a third consecutive year.

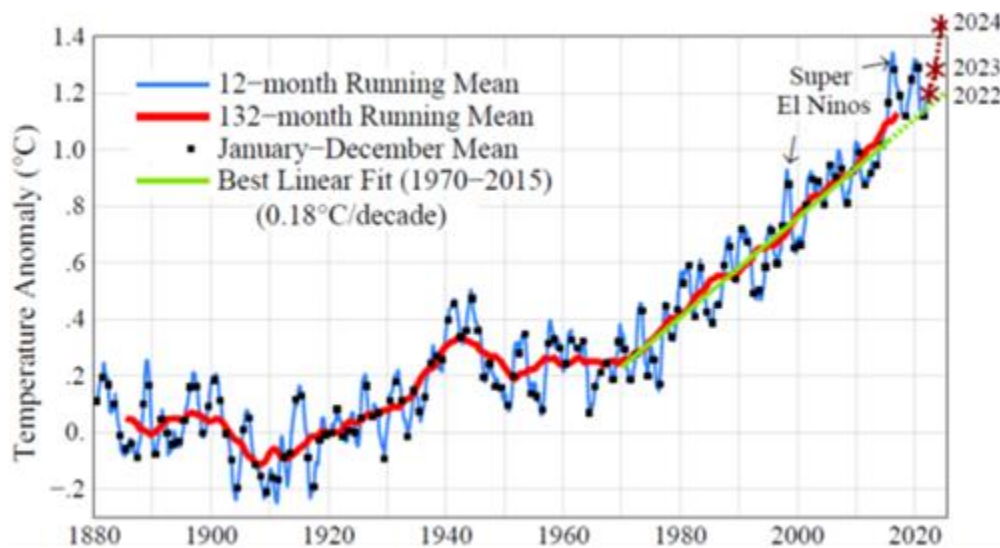
El Nino/La Nina are the largest cause of global temperature variability on the time scale of a few years and they are notoriously difficult to predict more than a few months ahead. Nevertheless, we have some inside information, which encourages us to hazard a prediction for the next three annual mean global temperatures – we might then learn something from comparison with future reality. Prediction of the annual 2022 global temperature is child's play at this point: the final four months this year should average higher than the same months last year, so the 12-month running mean at the end of this year will have ticked up to about the level in 2017. That will put 2022 in approximately a dead heat with 2017 for 4th warmest year in the record.

The next year, 2023, will be warmer because of the present strong planetary energy imbalance, which is driven by the factors noted above – mainly increasing greenhouse gases. Perhaps an El Nino will begin in the second half of the year, but the El Nino effect on global temperature lags by 3-4 months. So, the 2023 temperature should be higher than in 2022, rivaling the warmest years.

Finally, we suggest that 2024 is likely to be off the chart as the warmest year on record. Without inside information, that would be a dangerous prediction, but we proffer it because it is unlikely that the current La Nina will continue a fourth year. Even a little futz of an El Nino – like the tropical warming in 2018-19, which barely qualified as an El Nino – should be sufficient for record global temperature. A classical, strong El Nino in 2023-

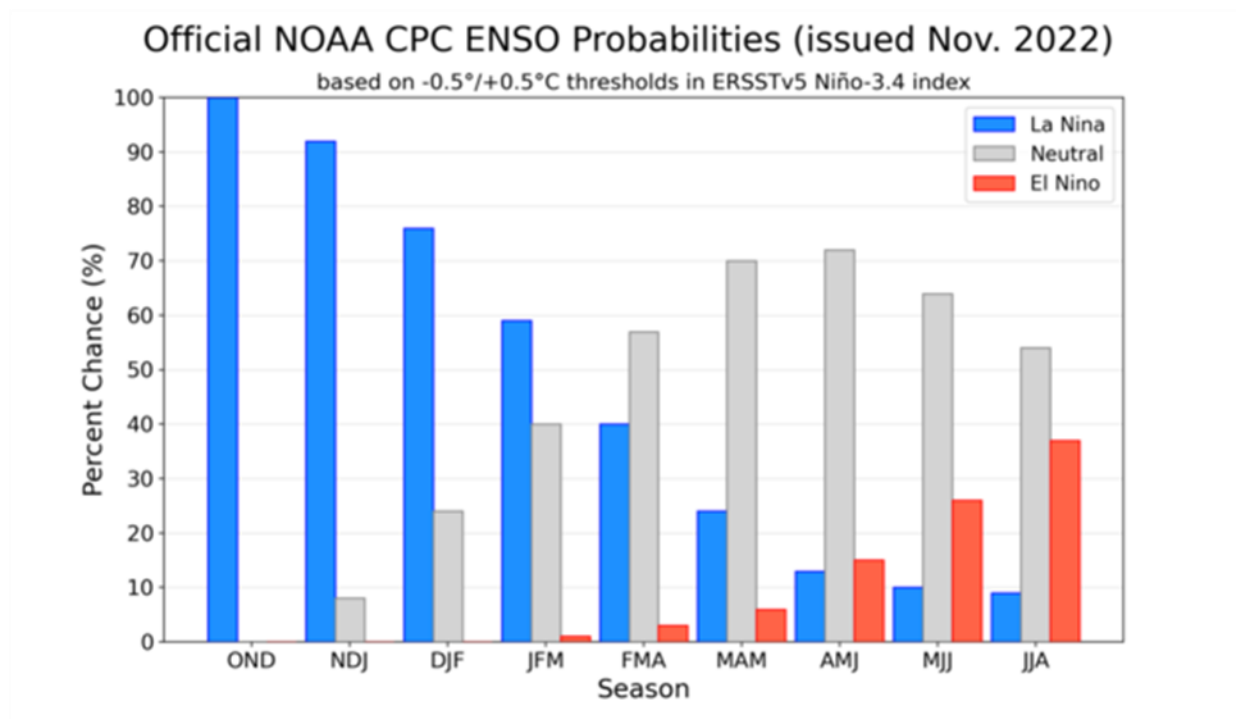
² James Hansen, "August Temperature Update..." 22 Sep 2022, <http://www.columbia.edu/~jeh1/mailings/2022/AugustTemperatureUpdate.22September2022.pdf>

24 could push global temperature to about +1.5°C relative to the 1880-1920 mean, which is our estimate of preindustrial temperature.



[Back to the ENSO Blog.](#)

There's close to a 100% chance that La Niña will remain through the October–December period.



NOAA Climate Prediction Center forecast for each of the three possible ENSO categories for the next 8 overlapping 3-month seasons. Blue bars show the chances of La Niña, gray bars the chances for neutral, and red bars the chances for El Niño. Graph by Michelle L'Heureux.

Author's comment: The ENSO Blog uses the above chart quite frequently, but some may find it a bit confusing. Each "season" is represented by the first letter of each of the

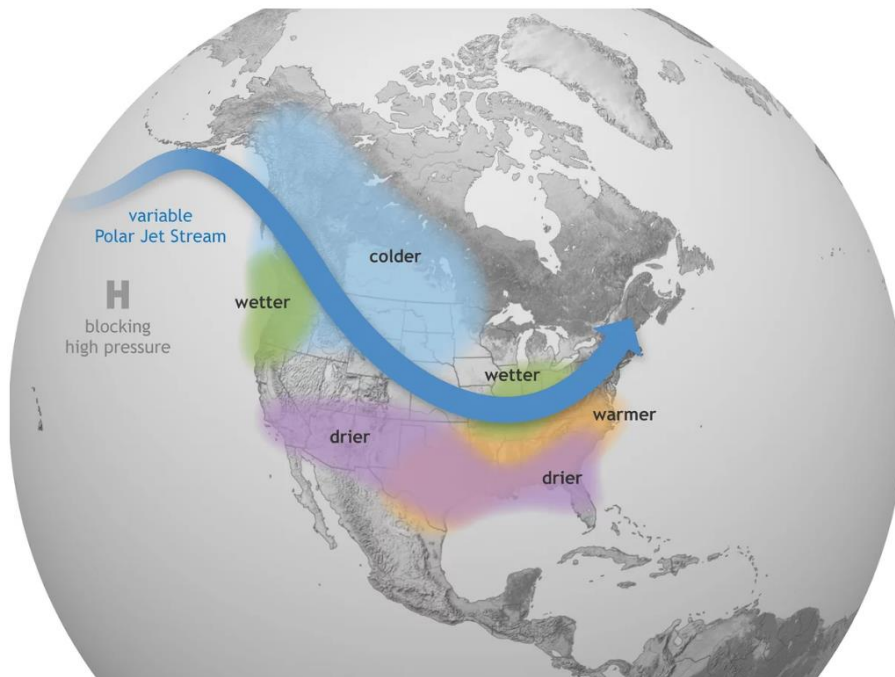
three months. For instance “OND” = October-November-December. That is, fall, 2022. Also note the “overlapping.” Thus each successive bar-set only moves one month, and the second bar set, NDJ, is for November-December-January.

Why are we so certain? To start with, there’s that Niño-3.4 sea surface temperature anomaly, which was -1.0°C in October. The required La Niña ocean-atmosphere feedback, featuring a beefed-up Walker circulation (stronger trade winds, more rain/clouds than average over Indonesia, less over the central Pacific), was in full force for most of October. Also, there is a substantial amount of cooler-than-average water under the surface of the tropical Pacific.

This subsurface water will continue to supply the surface with a source of cooler water for the next couple of months at least...

Over the last week or so, though, the trade winds have weakened. This could mean that we’re near the peak of this La Niña, in terms of the ONI. Sea surface temperature anomalies in the Niño-3.4 region often reach their maximum or minimum in the October–December period, so we’d be right on schedule. Of course, La Niña, and its effect on rain, snow, and temperature is very likely to continue through the winter, regardless exactly when the minimum Niño-3.4 anomaly occurs.

Author’s comment: The Graphic below shows the typical U.S. impact of a La Niña.



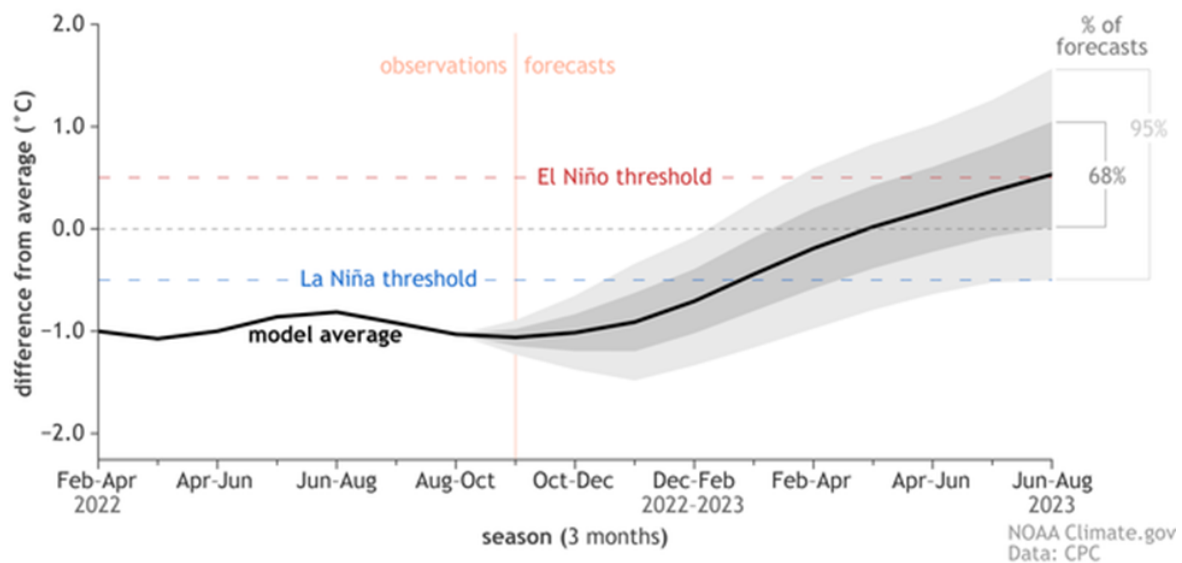
This Climate.gov graphic shows how La Niña generally affects weather conditions in the United States.

Forecasters say there’s a nearly 90% chance that La Niña conditions will be in place from December 2021 to February 2022.

National Oceanic and Atmospheric Administration

Where are we headed? The current forecast from the North American Multi-Model Ensemble (NMME), a set of state-of-the-art computer climate models, is a major factor in the forecaster consensus. At this point, the NMME is predicting a decay of the Niño-3.4 anomalies into the spring.

Seasonal forecasts for Niño 3.4-region sea surface temperatures as of November 2022



Climate model forecasts for the Niño-3.4 temperature anomalies in 2022–23. Average dynamical model data (black line) from the North American Multi-Model Ensemble (NMME): darker gray envelope shows the range of 68% of all model forecasts; lighter gray shows the range of 95% of all model forecasts. NOAA Climate.gov image from University of Miami data.

The exact timing on when that transition occurs is a bit uncertain. At this time, the official forecast is predicting a return to neutral conditions during February–April. What about next summer? Can we get a peek at that yet? The longest lead we currently predict is 9 months into the future, June–August 2023. If you look back at the forecaster probabilities I showed earlier, the chance of El Niño is higher than the chance of La Niña for next summer. Neutral is still by far the most likely outcome—this is not to be interpreted as a forecast for El Niño! The last time we had a greater chance for El Niño than La Niña at these longest leads was December 2019. (Actually, it started with last month’s forecast—I didn’t notice then!)

We’ll keep an eye on the long-term forecast, but for now, the La Niña marathon continues. See you next month!

Final author’s comment and rock band: The reason I interjected Dr. Hansen’s Update is so I could make a reasonably educated layman’s guess (I’m neither a weather nor a climate expert). The basis of my guess is that we (earth’s biosphere) have an extremely large temperature imbalance, as indicated by Dr. Hansen. I have done some thermodynamic analysis as a process engineer, and I know that any earth-like fluid system hates temperature imbalances, and tries to correct them. My guess is that after this summer that our climate will swing into an El Niño phase, and it certainly looks like the last chart above is headed in that direction. The good news for my home-state (California) is that if ENSO swings into a strong El Niño, that typically means an increase chance of a rainy winter (2023/24 at the earliest), and we certainly could use that.

The rock band that performed El Niño was Jethro Tull. It was on the “Dot com” CD. Their lead singer is Ian Anderson, who also writes most of their songs (including El Niño), is their flautist and plays acoustic guitar. Ian’s profession off of the stage is a fish farmer.³

³ <https://jethrotull.com/>