Information Circular

Relative Oceanic Niño Index (RONI)

A clearer, more reliable way to track El Niño and La Niña

What's Changing and Why It Matters

El Niño–Southern Oscillation (ENSO) is a natural pattern of ocean and atmosphere changes in the tropical Pacific Ocean that strongly influences seasonal weather patterns across the U.S. and around the world. NOAA's Climate Prediction Center (CPC) is making the shift to use the Relative Oceanic Niño Index (RONI) to better designate past events and predict future ENSO. The traditional ONI relies on a departure from 30-year average that struggles to keep pace with anomalous changes in tropical sea surface temperature (SST), which is particularly problematic in real-time when using a time lagged climatology. RONI solves this problem by comparing the ENSO region to the global tropics, thereby reducing the dependency on the climate base period.



KEY POINTS

- ENSO impacts depend on how warm or cool the east-central Pacific is compared to the rest of the tropics.
- RONI measures that contrast directly, while ONI only looks at one region compared to a 30-year average.
- This makes ENSO classification more stable and better aligned with real-world impacts.
- Thresholds and definitions stay the same—only the measurement improves.
- RONI provides a more stable and physically meaningful measure of El Niño and La Niña conditions, especially in real time.

From ONI to RONI: What's New?

More reliable in real-time: ONI depends heavily on the choice of a 30-year average. As tropical ocean temperatures shift over time, that reference can lag behind current conditions. RONI reduces this sensitivity, leading to more consistent classifications.

ONI asks: Is the Niño-3.4 region warmer or cooler than average in this region?

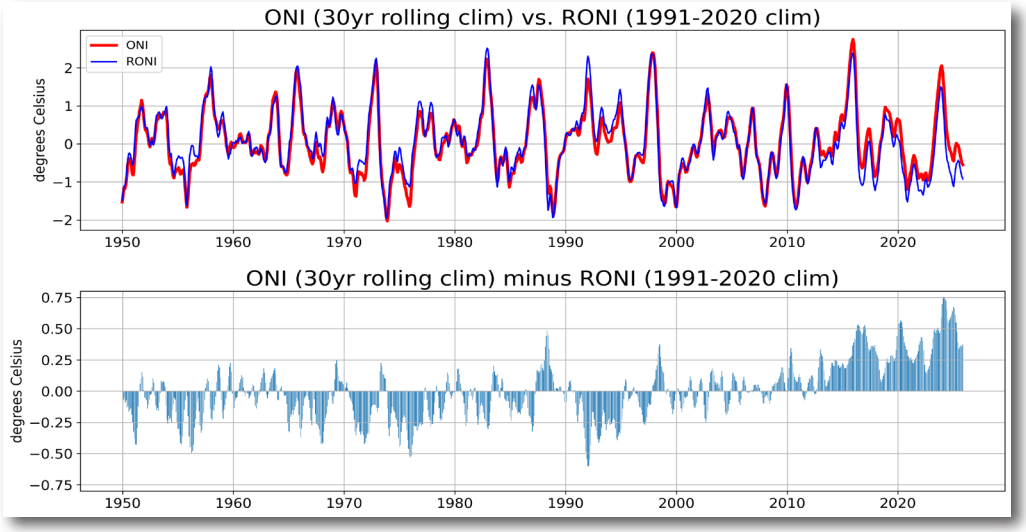
RONI asks: Is the Niño-3.4 region anomaly warmer or cooler than the average tropical ocean anomaly?

That difference helps RONI better represent the ocean-atmosphere system that drives ENSO impacts.

Visually and numerically, RONI looks very similar to ONI—but behaves more consistently.

How is RONI Calculated?

The calculation starts with the same Niño-3.4 SST anomalies used for ONI and subtracts the average SST anomaly (relative to current WMO standard) across the *entire* global tropical belt (20°S–20°N). The difference is then adjusted so the overall variability matches the ONI. What stays the same is the familiar ±0.5°C thresholds and the requirement for five consecutive overlapping 3-month periods to define El Niño and La Niña. Figure shows the difference between the legacy ONI and RONI, and their respective time series, from 1950 to present.

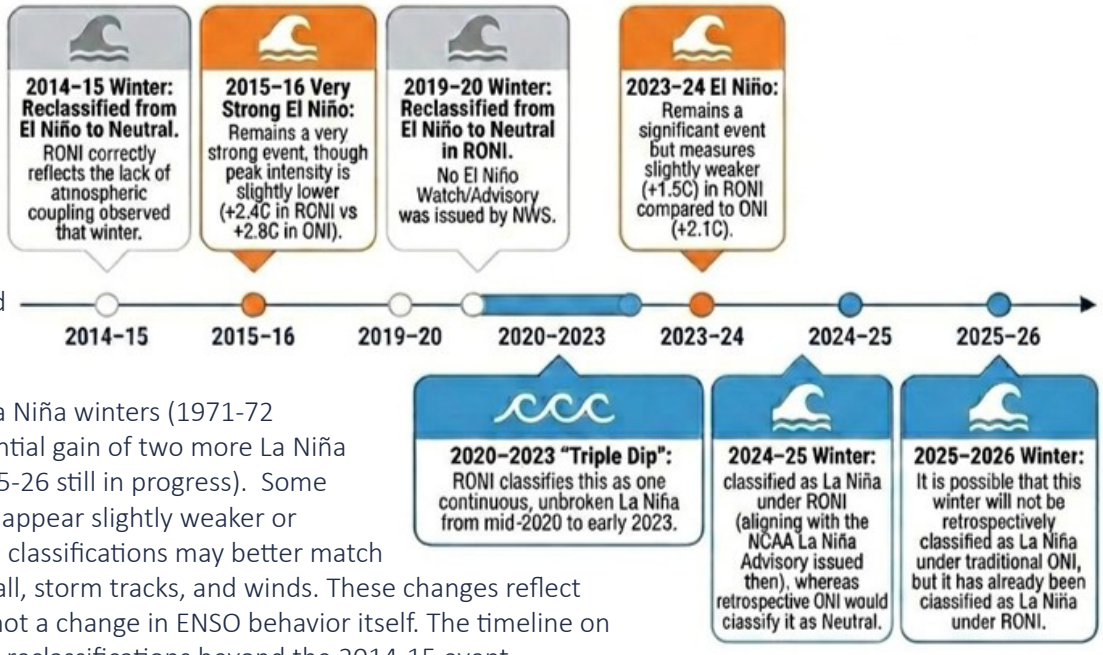


RONI doesn't redefine ENSO, it measures it more effectively.

NOAA National Weather Service
Climate Services

Reclassification of ENSO Events

Due to the shift to RONI, some past historical events were reclassified. Some past events appear slightly weaker or stronger under RONI. By using RONI, there is the loss of three weak El Niño winters (1958-59, 2014-15, and 2019-20) and a gain of one weak El Niño winter (1992-93). There is also the loss of two weak La Niña winters (1971-72 and 1974-75) and the potential gain of two more La Niña winters (2024-25, with 2025-26 still in progress). Some recent past events will also appear slightly weaker or stronger under RONI. ENSO classifications may better match what was observed in rainfall, storm tracks, and winds. These changes reflect improved measurement—not a change in ENSO behavior itself. The timeline on the right depicts the recent reclassifications beyond the 2014-15 event.



More stable ENSO classifications
RONI is less sensitive to which 30-year reference period is used, meaning that the classification of past El Niño, Neutral, and La Niña events is more stable.

Comparable or slightly improved forecast performance
Seasonal forecast skill remains similar to ONI, with slightly lower errors in recent multi-model forecasts.

Clearer connection to impacts
RONI better reflects when ENSO-related atmospheric patterns are actually present, improving alignment with seasonal temperature and precipitation outlooks.

Frequently Asked Questions



- **How is RONI different from ONI?** ONI measures temperature departures in one Pacific region (Niño-3.4). RONI measures those departures relative to the departures across the broader tropical oceans, which better represents the physics that drive ENSO impacts.
- **Does RONI change make El Niño or La Niña events more or less extreme?** No, overall, RONI is adjusted to have the same overall variability as ONI. There may be specific El Niño or La Niña events that change in intensity, but the overall variance of the entire index is the same in RONI.
- **Will this change be retroactive?** Yes, historical ENSO episodes will be reevaluated using RONI. Some past classifications may differ slightly from ONI, reflecting improved alignment with observed atmospheric patterns. This ensures that a 1950 event and a 2025 event are compared equally, regardless of changing ocean temperatures.
- **Will CPC maintain historical ENSO records?** Yes, CPC will provide RONI values for the historical record, similar to existing ONI tables, allowing consistent comparison across time. But RONI is now the primary standard for official advisories and classifications of ENSO events.
- **Does this weaken recent events?** While the 2023-24 El Niño appears "weaker" numerically (+1.5◦C vs +2.1◦C), its impacts remain the same. RONI simply removes the portion of that temperature spike that was caused by general oceanic trends rather than the ENSO cycle itself.
- **How should we reference old studies?** Older studies remain valid, but be aware that the specific "label" (e.g., Weak vs. Moderate) of an event might have shifted with RONI. When comparing with new analyses, users should note which ENSO index was used and recognize that RONI may better represent event strength and impacts.
- **How is this change to RONI going to benefit decision makers who rely on an accurate ENSO forecast?** RONI is better able to capture the expected changes in the atmosphere inherent to ENSO, and El Niño/La Niña categorization is more stable even as the climatology changes. Because RONI is more accurately reflecting the ENSO state, users will be able to more accurately make decisions that rely on associated seasonal forecasts and risk assessments.