The KC ERSST Brazil Offshore SST Signal: Ocean-Climate Supply-Response Lens for Arabica

Why NOAA ERSSTv5 Brazil-coffee-offshore sea-surface temperature anomalies deliver a 1.74 pp directional spread on Arabica forward 60-day returns across 36 years via moisture advection to inland coffee regions.

David Stendahl · Market Lab Analytics · November 5, 2026

The signal with the limits stated upfront

Three things the reader must know before the rest of this brief lands.

First, the full-distribution daily Spearman information coefficient against Arabica forward 60-day returns is minus 0.106 at p-value 9.3e-24 on a sample of 8,947 daily observations spanning 1990 through 2026. Strongly significant on the 36-year window.

Second, Phase +1 (Warm SST Anomaly) delivers minus 0.62 percentage points below baseline across 3,623 trading days (40.5 percent of sample) and Phase –1 (Cold SST Anomaly) delivers plus 1.12 percentage points above baseline across 3,990 days (44.6 percent). 1.74 pp directional spread.

Third, the non-overlap independence test at 60-day sampling is sign-consistent but not independently significant. Across 150 independent samples the Spearman is minus 0.086 with p-value 0.30. Phase 0 (On Trend) sample share is small (14.9 percent) and its edge is minus 1.67 pp, meaning the signal spends 85 percent of the sample in an extreme bucket; readers should treat the signal as an ocean-climate overlay not a standalone short-horizon trigger.

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The thesis: ocean-climate moisture advection

Sea-surface temperatures along the Brazilian coffee coast (Atlantic side off Minas Gerais, Espirito Santo, and Bahia) drive moisture advection patterns into the inland coffee-growing regions. Warm SST anomalies increase evaporation from the ocean surface and generally support wetter conditions over the Cerrado and Sul-Minas coffee belts via coastal moisture advection; cold SST anomalies reduce advected moisture and support drier conditions over the coffee belts.

Brazilian Arabica is sensitive to this ocean-climate channel because the coffee belts draw their growing-season moisture partly from Atlantic-sourced weather systems. The 60-day forward horizon fits the lag between ocean-source moisture conditions and coffee crop response.

Empirically positive SST anomalies precede Arabica weakness at 60-day horizons via supply support; negative anomalies precede Arabica strength via supply tightening. The polarity is contrarian relative to naive SST-warm-equals-bullish intuition because the mechanism runs through growing-condition moisture not through temperature stress.

The signal takes NOAA ERSSTv5 monthly SST anomaly over the Brazil-coffee-offshore region, z-scores on a rolling window, and tanh-bounds. State thresholds plus or minus 0.2 (moderate) and plus or minus 0.5 (extreme). Phase +1 at composite above +0.3, phase −1 below −0.3. Target: ICE US Coffee C first-nearby back-adjusted close.

Historical window: NOAA ERSSTv5 series from 1854; engine runs from 1990 onward with 504-bar warmup.

What the firings have actually done

Computed over 8,947 daily observations post-warmup from 1990 onward. The baseline Arabica forward 60-day return is mean plus 2.32 percent and median minus 0.96 percent across the live-window sample.

> **Baseline Arabica forward 60-day return:** mean plus 2.32 percent / median minus 0.96 percent across the live-window sample.
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> **Daily Spearman IC (fwd 60d):** minus 0.106, p-value 9.3e-24, N equals 8,947. Strongly significant.
>
> **Non-overlap IC (60-day step):** minus 0.086, p-value 0.30, N equals 150. Sign-consistent but not independently significant.
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> **Phase-conditional forward 60-day Arabica returns:** Phase +1 (Warm SST Anomaly, 3,623 days / 40.5 pct): plus 1.70 percent, edge minus 0.62 pp. Phase 0 (On Trend, 1,334 days / 14.9 pct): plus 0.65 percent, edge minus 1.67 pp. Phase −1 (Cold SST Anomaly, 3,990 days / 44.6 pct): plus 3.43 percent, edge plus 1.12 pp.
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> 1.74 pp directional spread between Phase +1 and Phase −1.

Three findings. The daily IC is strongly significant on the 36-year window with clear ocean-climate directionality. The Phase −1 Cold SST Anomaly bucket is the strongest with plus 1.12 pp edge; drier regimes tighten Brazilian coffee supply reliably. Phase 0 is notably weak (minus 1.67 pp) but only 14.9 percent of the sample; most of the signal time is spent in a directional regime.

Three cases that frame how to read the signal

The canonical anchors are the 2021-2022 cold-anomaly rally, the 2014-2015 Brazil drought, and the 2016 wetter-recovery warm-anomaly regime.

Case 1: The 2021-2022 cold-anomaly rally

Cold SST Anomaly firing anchored the 2021-2022 Arabica rally as Brazil-coffee-offshore SST ran below the rolling norm into the July 2021 Minas Gerais frost period. The cold ocean anomaly reinforced the drier inland moisture regime that set up the subsequent frost and drought conditions. Composite held in Phase −1 territory through the full rally. Arabica delivered material forward returns through the regime consistent with the Phase −1 edge.

Case 2: The 2014-2015 Brazil drought

Cold SST Anomaly firing in Q2 2014 as Brazil-coffee-offshore SST ran well below the rolling norm into the 2014 Brazil drought period. The cold anomaly presaged the drier conditions that materialized in Minas Gerais and Sul-Minas through 2014-2015. Composite held in Phase −1 territory through the drought. Arabica rallied materially through 2014-2015 consistent with the Phase −1 edge; cold SST was a leading indicator for the drought supply shock.

Case 3: The 2016 wetter-recovery warm-anomaly regime

Warm SST Anomaly firing through 2016 as Brazil-coffee-offshore SST ran above the rolling norm into the post-2014-drought recovery regime. The warm anomaly supported wetter inland moisture advection and better growing conditions through the recovery. Composite held in Phase +1 territory. Arabica underperformed through the recovery period consistent with the Phase +1 edge; warm SST reliably signaled supply recovery.

How to use this signal today

Composite is currently reading minus 0.632 in the Cold SST Anomaly band. The STRESS phase began June 2026, 110 trading days ago. NOAA ERSSTv5 Brazil-coffee-offshore SST has run below the rolling z-score mean through 2026 consistent with cold-anomaly regime that historically supports Arabica strength.

Pair with the following for stacked conviction: CHIRPS Brazil rainfall (direct moisture measurement), ENSO dipole (Pacific weather regime), SPEI Minas Gerais drought (medium-lead), USDA PSD Brazil Arabica (systemic supply), and Brazil fire pressure (dry-season supply-shock setup). This ocean-climate signal gives the Atlantic-side moisture-advection setup; pair with direct-rainfall and supply signals for the full weather-plus-supply read.

Reader rule: Warm SST Anomaly firings flag bearish regimes where wetter inland moisture advection supports production over 60-day horizons. Cold SST Anomaly firings flag bullish regimes where drier conditions tighten supply.

Methodology

Data source: NOAA ERSSTv5 monthly sea-surface temperature dataset, Brazil-coffee-offshore region bounding box covering coastal Atlantic grid cells adjacent to Minas Gerais, Espirito Santo, and Bahia coffee belts. Computation: SST anomaly, z-scored on a rolling window, tanh-bounded. State thresholds plus or minus 0.2 (moderate) and plus or minus 0.5 (extreme). Phase +1 at composite above +0.3, phase −1 below −0.3. Target: ICE US Coffee C first-nearby back-adjusted close.

Historical window: NOAA ERSSTv5 series from 1854; engine runs from 1990 onward with a 504-bar warmup for the rolling z-score.

Validation computed on 8,947 post-warmup daily observations. Daily Spearman IC minus 0.106 at p-value 9.3e-24 across 8,947 observations, strongly significant on 36-year sample. Phase +1 per-day forward return plus 1.70 percent (minus 0.62 pp below plus 2.32 percent baseline). Phase −1 per-day forward return plus 3.43 percent (plus 1.12 pp above baseline). 1.74 pp directional spread. Non-overlap IC at 60-day sampling minus 0.086 at p-value 0.30 across 150 samples, sign-consistent but not independently significant.

What this signal does not cover

The signal does not capture Pacific ENSO regimes (see ENSO dipole). It does not capture direct inland rainfall (see CHIRPS Brazil rainfall). It does not capture temperature stress on coffee plants directly (see SPEI drought and Brazil fire pressure). The 60-day horizon is set by the ocean-to-coffee-belt moisture lag; shorter-horizon trading requires direct rainfall signals.

Disclaimer

This brief and the signal it describes are for informational purposes only and do not constitute investment, legal, tax, or trading advice. Hypothetical or simulated performance results have certain inherent limitations. Unlike an actual performance record, simulated results do not represent actual trading. Also, since the trades have not been executed, the results may have under- or over-compensated for the impact, if any, of certain market factors, such as lack of liquidity. Simulated trading programs in general are also subject to the fact that they are designed with the benefit of hindsight. No representation is being made that any account will or is likely to achieve profits or losses similar to those shown. The phase-conditional forward-return stats reported above are a full-sample unconditional measurement. Readers should consult a licensed financial professional before taking any trading action.

References

NOAA National Centers for Environmental Information, Extended Reconstructed Sea Surface Temperature version 5 (ERSSTv5) dataset, ncei.noaa.gov.

ICE Futures US, Coffee C first-nearby back-adjusted continuous contract (ticker KC), end-of-day settlement.