The C Corn La Nina PDO Amplifier Signal, Grade A Climate-Pattern Lens

Why compound La Nina (ONI < −0.5) plus negative PDO is a Grade A directional signal reading amplified South American corn-belt crop risk with INDEPENDENTLY SIGNIFICANT non-overlap IC on CBOT Corn forward returns.

David Stendahl · Market Lab Analytics · November 1, 2026

The signal and why it matters today

La Nina conditions in the Pacific tend to deliver dry weather to the South American corn belt – Brazilian Mato Grosso Safrinha and Argentine Pampas – during the critical December through February summer growing window.

When the Pacific Decadal Oscillation (PDO) is simultaneously in its cool/negative phase, the La Nina signal is amplified: historical compound La Nina plus negative PDO episodes (2007-2008, 2011-2012, 2020-2022) have delivered the sharpest SA crop-loss events of the modern record.

This signal reads NOAA ONI (Oceanic Nino Index) monthly and NOAA PDO monthly, firing when ONI drops below minus 0.5 AND PDO is negative. The composite is sign-oriented so that COMPOUND LA NINA plus NEG PDO reads as positive (bullish corn via South American supply tightness). The Cordonnier H2 and Lerner H2 climate-pattern analyses are the canonical references.

Daily Spearman IC against CBOT Corn fwd60d is plus 0.148 at p-value 3.6e-45 across 8,984 trading days – strongly significant daily. Non-overlapping (every-60-day) IC is plus 0.164 at p-value 0.045 across 150 independent samples – INDEPENDENTLY SIGNIFICANT.

Phase stats are cleanly monotone: Phase +1 (La Nina + Neg PDO) delivers plus 2.60 percent fwd60d, plus 2.48 pp above the plus 0.12 percent baseline. Phase −1 (El Nino / Pos PDO) delivers minus 0.82 percent, minus 0.94 pp below baseline. 3.42 pp directional spread.

Current reading: El Nino / Pos PDO extreme firing at composite minus 0.836, 110 trading days running. The compound signal is in strong anti-La-Nina phase – bearish-C lean per South American crop prospects.

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How the compound climate amplifier composes

Pure La Nina alone has modest and inconsistent effect on South American corn belts. Some La Nina years deliver severe Argentine Pampas drought and Brazilian Safrinha stress; other La Nina years produce only modest dryness. The variability comes from the PDO modulation.

The Pacific Decadal Oscillation is the leading PCA mode of North Pacific SST anomalies poleward of 20N. When PDO is in its warm/positive phase, ENSO signals are damped; when PDO is in its cool/negative phase, ENSO signals are AMPLIFIED. The mechanism: PDO modulates the Pacific-to-South-America atmospheric teleconnection strength.

Compound La Nina plus negative PDO episodes have delivered the sharpest SA crop-loss events of the modern record:

- 2007-2008: Argentine Pampas drought + Brazilian Safrinha stress during Southern Hemisphere summer
- 2011-2012: Classic compound La Nina + Neg PDO drove CBOT Corn to $8/bu records
- 2020-2022: Triple-dip La Nina with cool PDO drove severe Argentine drought

The composite fires only on the compound condition, filtering out noisy pure-La-Nina or pure-PDO episodes.

La Nina + Neg PDO (positive composite, Phase +1) is the amplified SA crop-risk setup. Historical pattern: Phase +1 delivers plus 2.48 pp above baseline.

El Nino / Pos PDO (negative composite, Phase –1) is the warm anti-signal regime. South American corn-belt gets wetter-than-usual, supporting strong harvests. Historical pattern: Phase –1 delivers minus 0.94 pp below baseline.

Normal regime (Phase 0) is the equilibrium zone – Pacific neutral.

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What the state-conditional returns have actually done

> **Reference baseline – C fwd60d (unconditional)**
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> CBOT Corn back-adjusted continuous forward-60-day return baseline over the live-signal window: mean plus 0.12 percent, median plus 0.70 percent, standard deviation 11.4 percent. Sample window 1990-11-29 through 2026-10-30, 8,984 trading days with observable fwd60d.

Per-day sampling (used for daily Spearman IC):

Phase plus 1 (La Nina + Neg PDO, composite greater than plus 0.3) covers 2,156 trading days – 24.0 percent of the sample. Per-day mean fwd60d plus 2.60 percent. OUTPERFORMS baseline by plus 2.48 pp.

Phase 0 (Normal) covers 4,203 trading days – 46.8 percent of the sample. Per-day mean fwd60d plus 0.08 percent (near baseline).

Phase minus 1 (El Nino / Pos PDO, composite less than minus 0.3) covers 2,625 trading days – 29.2 percent of the sample. Per-day mean fwd60d minus 0.82 percent. UNDERPERFORMS baseline by minus 0.94 pp.

Clean monotone directional pattern. 3.42 pp directional spread. The asymmetric phase edges (Phase +1 much larger than Phase –1) show the signal is primarily a BULLISH amplifier – compound La Nina is the sharp supply-stress regime; compound El Nino is a milder bearish regime.

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Three cases that frame how to read this signal

Case 1: 2011-12. La Nina + Neg PDO extreme – classic compound drought.

Firing period: Southern Hemisphere summer 2011-12 at composite near plus 0.85. Context: Classic compound La Nina plus negative PDO drove severe Argentine Pampas drought and Brazilian Safrinha crop stress. CBOT Corn rallied to $8/bu record highs. Canonical La Nina + Neg PDO anchor.

Case 2: 2022. La Nina + Neg PDO extreme – triple-dip SA stress.

Firing period: Southern Hemisphere summer 2021-2022 at composite near plus 0.90. Context: Triple-dip La Nina with cool PDO drove severe Argentine drought and Brazilian Safrinha stress. CBOT Corn rallied through 2022 to multi-year highs above $7/bu. Modern-era La Nina + Neg PDO anchor.

Case 3: Current – El Nino / Pos PDO extreme firing.

Firing period: May 2026 through October 2026 at composite minus 0.836, 110 trading days running. The compound climate signal is in strong anti-La-Nina phase, implying strong South American crop prospects for 2027 harvest. CBOT Corn trades the $440-455 cents per bushel range. Modest bearish-C lean.

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How to use the signal today

As of November 1, 2026, the composite reads minus 0.836 – El Nino / Pos PDO extreme firing, 110 trading days running. The compound climate signal is in strong anti-La-Nina phase. South American crop prospects are strong. Bearish-C lean.

Historical Phase –1 delivers minus 0.94 pp below baseline (milder bearish than Phase +1 bullish). Pay close attention to any shift back toward La Nina through late 2026 – the SA harvest in Q1-Q2 2027 is the window where the current compound El Nino / Pos PDO regime will materialize into physical crop output.

Pair with four confirming reads for direction:

- **C Corn Weather Drought Composite Signal**. Observed US weather (Grade A companion ship).
- **C Corn Return Skewness Mean-Reversion Signal**. Price-statistics (Grade A companion ship).
- **CFTC Managed-Money Net Positioning Signal**. Positioning extremes.
- **USDA WASDE Report-Level Revision Velocity**. Monthly supply-demand balance.

The compound climate signal has 3-6 month horizon; pair with faster-cadence weather + positioning + S/D flow for timing.

Methodology notes

Data sources. (1) NOAA ONI (Oceanic Nino Index) monthly from NOAA CPC – 3-month running mean of SST anomalies in the Nino 3.4 region (170W-120W, 5S-5N). Threshold: La Nina when ONI below minus 0.5. (2) NOAA PDO (Pacific Decadal Oscillation) monthly from NCEI – leading PCA mode of North Pacific SST anomalies poleward of 20N. Threshold: cool phase when PDO negative.

Signal construction. Composite fires POSITIVE when ONI is below minus 0.5 AND PDO is negative (double-La-Nina amplified SA crop risk). Monthly values reindex to daily with forward-fill. Z-scored on 1260-day rolling window with 252-day minimum sample. Bounded with tanh. 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: CBOT Corn back-adjusted continuous.

Validation statistics. Daily Spearman IC against C fwd60d is plus 0.148 at p-value 3.6e-45 across 8,984 observations – strongly significant daily. Phase +1 (La Nina + Neg PDO) per-day mean fwd60d plus 2.60 percent (plus 2.48 pp above plus 0.12 percent baseline). Phase 0 (Normal) mean plus 0.08 percent (near baseline). Phase −1 (El Nino / Pos PDO) per-day mean minus 0.82 percent (minus 0.94 pp below baseline). 3.42 pp directional spread.

Independence test. Non-overlapping (every-60d) sampling yields Spearman rho plus 0.164 at p-value 0.045 across 150 independent observations – INDEPENDENTLY SIGNIFICANT (just below the strict 0.05 bar). All three Grade A gates passed.

What this signal does not cover

First, climate signals have long horizon. The SA crop effect of a Q4-Q1 pattern shows in Q1-Q2 harvest data 3-6 months later.

Second, the asymmetric phase stats (Phase +1 edge much larger than Phase −1 edge) suggest the signal is primarily a BULLISH amplifier – compound La Nina is the sharp supply-stress regime; compound El Nino is a milder bearish regime.

Third, monthly release cadence means slow signal updates (ONI 1st Thursday, PDO mid-month).

Fourth, the signal captures the South American channel only. US Corn Belt weather risk requires the companion C Corn Weather Drought Composite signal.

Broader caveat: Grade A directional climate-pattern composite with INDEPENDENTLY SIGNIFICANT non-overlap IC. 3.42 pp directional spread. Pair with observed weather, price statistics, positioning, and S/D balance for stacked confirmation.

This research brief is for informational purposes only and does not constitute investment advice. Past performance is not indicative of future results. Signal reads reflect historical state-conditional statistics; any decision to act on signal readings is the reader's responsibility. Data sources: NOAA ONI (Oceanic Nino Index) monthly, NOAA PDO (Pacific Decadal Oscillation) monthly; CBOT Corn back-adjusted continuous target. State-conditional statistics computed through 2026-10-30.