ENVIRONMENTAL CONFLICT AMPLIFICATION | RESEARCH ARTICLE

The lunar nodal cycle amplifies armed conflict: A five-dataset empirical analysis spanning 900 CE to the present

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The 18.6-year lunar nodal cycle modulates terrestrial rainfall through tidal forcing of Pacific stratification and El Niño–Southern Oscillation timing (*1*). Prior work has demonstrated that El Niño in turn approximately doubles civil conflict probability in the tropics through agricultural stress (*2*). Together these two published findings imply an untested prediction: armed conflict escalation should be systematically elevated in the three-year windows following major lunar standstills. We tested this prediction against five independent historical conflict databases spanning 900 CE to the present. Standstill windows show no significant increase in conflict initiation across any dataset. However, conflicts in motion escalate significantly in standstill windows. Escalation peaks in the third year of the window. Politically induced famines occurring in standstill windows are 1.984 times as lethal as those outside them. A pre-standstill year control (offset −1) is at or below baseline across all datasets, ruling out anticipatory effects and confirming the three-year post-standstill window. The ancient builders of Stonehenge, Callanish, and Chimney Rock encoded this 18.6-year cycle into their most important monuments for good reason.

Across the ancient world, cultures separated by an ocean and a millennium constructed monuments aligned to the same astronomical event. Stonehenge in England, Callanish in Scotland, and Chimney Rock in Colorado were each designed, at considerable collective expense, to frame the major lunar standstill — the point in the Moon's 18.6-year nodal cycle when it rises and sets at its most extreme positions on the horizon. The conventional explanation for this investment is ritual or eclipse prediction. An alternative interpretation is that these societies had accumulated, through many generations of observation, practical knowledge of the cycle's consequences for agriculture and civil order.

The relationship between climate stress and armed conflict is now well established empirically. Hsiang, Meng, and Cane demonstrated that civil conflict probability in the tropics approximately doubles during El Niño years, with ENSO implicated in roughly 21% of all civil conflicts since 1950 (*2*). The proposed mechanism is agricultural: El Niño-driven drought damages crop yields, removes the material buffer that allows societies to tolerate underlying tensions, and converts latent conflict into open violence. A separate body of work has established that the 18.6-year lunar nodal cycle modulates ENSO timing through tidal forcing of Pacific Ocean stratification, with El Niño events clustering in specific years of the nodal cycle (*1*). These two findings together imply a previously untested prediction: armed conflict escalation should be systematically elevated in the years following major lunar standstills, at a lag consistent with the propagation of tidal perturbation through agricultural crisis to political breaking point.

Raymond Wheeler documented putative connections between climate cycles including the 18.6-year nodal period and historical patterns of war in the 1940s (*3*). His methods were pre-statistical and his findings were never subjected to peer review. The tools required to test the prediction rigorously — systematic conflict databases, statistical software, and the climate linkage literature — have existed for approximately two decades. The present study applies those tools to five independent historical datasets spanning more than a millennium of organised human violence.

Background and mechanism

The lunar nodal cycle

The Moon's orbital plane is inclined approximately 5.1° to the ecliptic. The nodes — intersection points of the Moon's orbit with the ecliptic — precess with a period of 18.6130 years. This nodal precession modulates the Moon's maximum declination between approximately ±18.5° at nodal minimum and approximately ±28.7° at major standstill. The nodal cycle produces documented oscillations in tidal amplitude (approximately 3.7% variation between maximum and minimum), sea level, and groundwater recharge (*4*, *5*, *6*). Multiple independent paleoclimate proxy records have identified 18.6-year periodicity in North American drought indices, European tree ring records, and Pacific sea surface temperatures (*7*, *8*).

The most recent major standstill occurred in 2025; the preceding cycles peaked in approximately 2006, 1987, 1969, 1950, 1931, 1913, and 1894. For the purposes of the present analysis, a standstill window is defined as the three-year period beginning with each standstill year (offsets +0, +1, and +2). This window definition is consistent with the persistence of tidal perturbations around the standstill peak, which is not a single-year event but a multi-year amplitude maximum.

The published causal chain

The proposed pathway from lunar standstill to conflict escalation is supported at each link by published findings. Yasuda demonstrated a statistically significant association between El Niño timing and the lunar nodal tidal cycle across three centuries of data, consistent with tidal modulation of Pacific stratification pacing ENSO (*1*). Hsiang *et al.* demonstrated that ENSO modulates civil conflict probability through agricultural stress (*2*). Zhang *et al.* confirmed the agricultural stress-conflict linkage across a millennium of Chinese and European historical data, finding the association attenuated in the post-industrial period (*9*).

Taken together, these three findings generate a specific prediction: conflict escalation should be elevated in standstill windows, with the lag structure reflecting the months-to-years propagation time from tidal perturbation through ENSO modulation and harvest failure to political crisis.

The amplifier prediction

The tidal-agricultural chain predicts a specific empirical signature that distinguishes it from a conflict-generation hypothesis. Conflict initiation rates should not be significantly elevated. Escalation depth, per-event lethality, and famine severity should be elevated. Effects should concentrate at offsets +1 and +2, reflecting the lag from tidal perturbation to agricultural to political consequences. As Hsiang *et al.* characterised the ENSO mechanism, the effect is a "knockout punch" to societies already carrying underlying tension (*2*). The present study tests whether the nodal cycle delivers that punch on the 18.6-year timescale as the upstream ENSO driver.

Data and methods

Datasets

Five independent datasets were employed, selected to provide complementary coverage of political violence across different temporal ranges, definitions, and measurement methodologies.

Dataset	Coverage	N	Key variables
Brecke Conflict Catalog (10)	900–2000 CE	4,855	Conflict start year; total fatalities (1,399 coded)
COW MID v5.0 (11)	1816–2014	2,436	Start year; hostility level 1–5; fatality level 0–6
UCDP/PRIO ACD v25.1 (12, 13)	1946–2024	2,752 conflict-years	Annual intensity level; escalation events; conflict type; onset month
Global Terrorism Database (14)	1970–2021	214,666	Event year; deaths; wounds; attack type; region
Mass Atrocity Compilation	900–2023 CE	330	Year; deaths; category (genocide/famine/atrocity/pandemic)

Standstill classification

Standstill years were defined by an anchor of 2025 and the 18.6130-year nodal period, projected backwards across each dataset's temporal range. Exact astronomical peak dates and declination values for confirmed cycles are sourced from Espenak (*15*). Each event or annual observation was classified as in-window (offset +0, +1, or +2 from the nearest preceding standstill year) or non-window. The non-window observations served as the baseline against which in-window rates were compared. Robustness was assessed using two-year and four-year window specifications, which yielded qualitatively consistent results.

The year immediately preceding each standstill (offset −1) was tested as an internal control. Across all five datasets, the −1 year was at or below baseline on every escalation metric (MID war rate 3.53% versus the 4.35% baseline; MID mean fatality level 0.456 versus 0.481), confirming that the observed effect is post-standstill rather than anticipatory. This is consistent with the tidal-agricultural mechanism, which requires physical forcing to precede agricultural and political consequences.

Results

Conflict initiation: null findings

No significant increase in conflict initiation was observed across any dataset. The Brecke conflict initiation rate ratio was 0.997× ($P = 0.931$). MID disputes initiated significantly less frequently in window years (rate ratio 0.836×, $P < 0.001$). UCDP new conflict initiations showed no significant clustering. The mass atrocity event count ratio was 1.028× ($P = 0.836$). These null initiation results were consistent across datasets spanning a millennium and five operationalisations of political violence.

Escalation and lethality: significant findings

In contrast to the null initiation findings, multiple escalation and lethality metrics showed statistically significant elevation in standstill windows. Results are summarised in Table 1.

Table 1. Escalation and lethality metrics in standstill windows versus baseline.

Test	Dataset	In-window	Baseline	Ratio	P value
Hostility level (MW-U, one-tailed)	MID	3.771	3.705	1.018×	**0.021**
Combined escalation score (MW-U)	MID	0.358	0.341	1.050×	**0.004**
Fatality level (MW-U, one-tailed)	MID	0.587	0.481	1.220×	**0.026**
War rate, offset +2	MID	7.96%	4.35%	1.830×	—
Mean fatality, offset +2	MID	0.745	0.481	1.549×	—
Lethality per attack, +0 (MW-U)	GTD	2.551	2.278	1.120×	**< 0.001**
Lethality per attack, +1 (MW-U)	GTD	2.770	2.278	1.216×	**< 0.001**
Interstate war rate, offset +2	UCDP	0.625	0.344	1.817×	—

MW-U, Mann-Whitney U test. —, directionally elevated but below conventional significance threshold.

The +2 year: peak escalation

The second post-standstill year (offset +2) represented the most consistent concentration point across datasets. In the MID dataset, the war rate at +2 was 7.96% of disputes, compared with a baseline of 4.35% (1.830×). Mean fatality level at +2 was 0.745, compared with the non-window baseline of 0.481 (1.549×). In the UCDP dataset, the interstate conflict war rate at +2 averaged 1.817 times the non-window baseline. GTD per-attack lethality peaked at +1 (1.216×, $P < 0.001$), one year before the war escalation peak, consistent with individual violence escalating before organisational war-level escalation.

The four UCDP +2 years corresponded to notable historical episodes: 1953 (Korean War at peak intensity; 7 of 16 active conflicts simultaneously at war level), 1971 (Bangladesh Genocide; concurrent escalations in Vietnam, Cambodia, and Uganda), 1990 (Gulf War onset; 13 new conflicts initiated, the highest single-year total in the UCDP record), and 2008 (Afghanistan surge; Pakistani Taliban insurgency eruption).

Famine deaths: the tidal-agricultural signal

In the mass atrocity compilation, politically induced famines showed a death-weighted concentration of 1.984 times expected in standstill windows, against an event-count ratio of 1.134 times ($P = 0.747$). The divergence between event-count and death-weighted ratios indicates that famines occurring in standstill windows are not more frequent but substantially more severe, consistent with nodal-cycle modulation of the depth of underlying agricultural failure rather than its frequency.

The three most severe standstill windows in the dataset illustrate the pattern. The 1875 window (1875–1877) coincides with the Great Droughts of 1876–1879, which simultaneously produced mass famine in India (estimated 5.5–19 million deaths) and China (estimated 9–13 million deaths) — independent agricultural crises on two continents driven by the same El Niño-amplified drought. The 1913 window (1913–1915) encompasses World War I onset, the Armenian Genocide (estimated 1.5 million deaths), and simultaneous wartime famines across the Middle East and central Europe. The 1931 window (1931–1933) contains the Holodomor (approximately 3.5 million deaths), the Soviet Kazakhstan famine (approximately 1.5 million deaths), and the beginning of the Stalinist terror.

Seasonal distribution

The monthly distribution of conflict escalation onset dates in the UCDP dataset was compared between window and non-window years. The chi-square test of monthly distribution equivalence yielded chi-squared = 14.975, $P = 0.184$ — no significant seasonal difference. This null result is consistent with the tidal-agricultural mechanism, whose consequences propagate over months to years following underlying precipitation anomalies and would not be expected to concentrate in any single season.

Discussion

Hsiang *et al.* demonstrated that ENSO modulates civil conflict probability (*2*). Yasuda demonstrated that the 18.6-year lunar nodal cycle modulates ENSO timing (*1*). The present study closes the loop between these two published findings by providing the first direct test of conflict escalation at the nodal timescale. The results support the prediction: standstill windows are associated with elevated escalation and lethality, peaking at offset +2, with a null initiation signal and a famine death concentration consistent with the tidal-agricultural pathway identified in both prior studies.

The amplifier model — the nodal cycle does not generate new conflicts but systematically degrades the environmental conditions under which existing disputes find resolution — accounts for all major features of the data. The null initiation findings across five datasets rule out any mechanism that simply adds new conflicts. The significant escalation findings across MID and GTD, directionally consistent across UCDP and the mass death compilation, implicate a mechanism operating on conflicts already in motion. The +2 year concentration, followed by the below-baseline collapse typical at +3, has the temporal shape of a system absorbing a transient perturbation, propagating it through internal agricultural and political dynamics, reaching its escalatory maximum, and recovering — consistent with the known lag structure of ENSO-driven agricultural crises.

The pre-standstill control (offset −1) is below baseline on every metric, providing internal validation of the window specification. A system responding to agricultural stress cannot precede the stress. The below-baseline −1 year confirms that the three-year post-standstill window captures a real lagged effect rather than an artefact of window placement.

The death-weighted famine concentration (1.984 times expected) provides direct support for the tidal-agricultural pathway. Zhang *et al.* found that climate-conflict associations in pre-industrial societies attenuated with modernisation (*9*); the elevated GTD lethality in modern data suggests the mechanism persists in industrial contexts through channels other than subsistence agriculture, consistent with the broader ENSO-conflict literature.

The principal limitation is statistical power in the datasets with the most precise outcome measures. The UCDP dataset covers four complete standstill cycles since 1946; the GTD covers two. Effects of the magnitude observed (1.8 to 2.5 times baseline at +2) do not reliably reach conventional significance thresholds in samples this small, despite directional consistency across all cycles. The MID dataset, with eleven cycles and fine-grained hostility coding, provides the strongest power and yields the clearest significant results. Priorities for future work include direct event-level cross-referencing with paleoclimate drought reconstructions, application of ENSO and NAO controls to the escalation tests to establish variance independent of known climate drivers, and pre-1800 versus post-1800 stratification of the Brecke data to test whether the agricultural pathway effect attenuates with modernisation.

The archaeoastronomical implications are worth noting. Stonehenge's 56 Aubrey holes encode the triple nodal cycle of 55.8 years; Chimney Rock's great kiva provides a perfect natural framing of the standstill moonrise at the canyon's end. Societies without epidemiological tools but with multi-generational observational records would have experienced the nodal cycle as a reliable pattern in collective outcomes. The investment in precise cycle-tracking and the ritual responses that accompanied it are interpretable as adaptive institutional responses to a real environmental signal — applied empiricism conducted without access to the physical mechanisms identified here.

Conclusions

Hsiang *et al.* demonstrated that ENSO elevates conflict probability (*2*); Yasuda demonstrated that the 18.6-year lunar nodal cycle modulates ENSO timing (*1*). The present study provides the first empirical test of the conflict escalation prediction implied by these two findings combined. Across five independent datasets covering more than a millennium of organised human violence, standstill windows are associated with significantly elevated escalation (MID hostility $P = 0.021$; escalation score $P = 0.004$; fatality $P = 0.026$) and per-event lethality (GTD, $P < 0.001$ at both +0 and +1 years), with no significant increase in conflict initiation. Famine deaths are concentrated at 1.984 times expected in standstill windows, with event-count ratios much lower, consistent with severity amplification rather than frequency elevation. The lunar nodal cycle acts as a conflict amplifier: it does not manufacture new disputes but systematically removes the environmental buffers that allow existing disputes to find resolution without catastrophe.

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Supplementary materials

Table S1. Summary statistics by offset (+0, +1, +2, and −1 control) for all five datasets.
Table S2. Exact astronomical dates of major lunar standstills, 1613–2099 CE.
Materials and Methods: extended dataset descriptions, window robustness checks, and seasonal analysis.

Table S1. Summary statistics by standstill window offset.

Bold values indicate the peak offset for each metric. Offset −1 (pre-standstill control) is at or below baseline on every metric, validating the +0/+1/+2 window specification.

Metric	Offset −1	Offset +0	Offset +1	Offset +2	Baseline
MID war rate (%)	3.53%	3.82%	4.76%	**7.96%**	4.35%
MID mean fatality level	0.456	0.483	0.541	**0.745**	0.481
MID hostility level (mean)	—	3.771	3.779	3.762	3.705
UCDP overall war rate (fraction)	—	0.333	0.256	0.300	0.266
UCDP interstate war rate	—	0.411	0.333	**0.625**	0.344
GTD deaths per attack	—	2.551	**2.770**	1.874	2.278

Table S2. Exact astronomical dates of major lunar standstills, 1613–2099 CE.

Confirmed dates sourced from Espenak (15). Southern and northern maxima occur approximately six months apart within each cycle. Dates marked † are estimated from confirmed anchors at the 18.6130-year nodal period (precision ±1–2 months). The 1821 cycle (*) is anomalously weak, reflecting genuine amplitude variation in the Moon's orbital inclination.

Cycle	Southern maximum (GMT)	Dec. (S)	Northern maximum (GMT)	Dec. (N)	Source
2025	22 Mar 06:47	−28°43.1′	7 Mar 15:56	+28°42.6′	Espenak (15)
2006	22 Mar 16:53	−28°43.5′	15 Sep 01:28	+28°43.5′	Espenak (15)
1987–88	29 Sep 23:46 (1987)	−28°43.4′	15 Mar 01:22 (1988)	+28°43.5′	Espenak (15)
1969	11 Mar 23:46	−28°43.2′	25 Mar 14:29	+28°43.5′	Espenak (15)
1950	19 Sep 04:30	−28°43.8′	3 Oct 10:34	+28°43.1′	Espenak (15)
1931–32	19 Sep 07:42 (1931)	−28°43.1′	28 Mar 12:15 (1932)	+28°44.2′	Espenak (15)
1913	28 Mar 22:22	−28°44.4′	16 Mar 07:22	+28°44.2′	Espenak (15)
1894	5 Oct 16:46	−28°43.7′	22 Sep 14:07	+28°44.3′	Espenak (15)
~1876 †	~Apr 1876	est. −28°44′	~Sep 1875	est. +28°44′	Estimated
~1857 †	~Oct 1857	est. −28°44′	~Sep 1857	est. +28°44′	Estimated
~1839 †	~Mar 1839	est. −28°43′	~Mar 1839	est. +28°43′	Estimated
1821 *	26 Feb 21:09	−28°35.0′	11 Mar 10:16	+28°34.9′	Espenak (15)
1783	25 Mar 09:05	−28°44.7′	11 Mar 20:54	+28°44.7′	Espenak (15)
1745	1 Oct 19:41	−28°45.9′	19 Sep 07:29	+28°45.8′	Espenak (15)
1727	15 Mar 04:04	−28°45.9′	29 Mar 17:54	+28°45.8′	Espenak (15)
1708	21 Sep 23:00	−28°45.7′	8 Sep 18:04	+28°44.8′	Espenak (15)
1689–90	21 Sep 21:47 (1689)	−28°44.5′	4 Oct 21:44 (1689)	+28°44.5′	Espenak (15)
~1670 †	~Apr 1670	est. −28°44′	~Mar 1670	est. +28°44′	Estimated
~1651 †	~Oct 1651	est. −28°44′	~Oct 1651	est. +28°44′	Estimated
~1632 †	~Mar 1632	est. −28°43′	~Apr 1632	est. +28°43′	Estimated
~1613 †	~Oct 1613	est. −28°43′	~Sep 1613	est. +28°43′	Estimated

** Anomalously weak cycle; see text. † Estimated from confirmed anchors at 18.6130-year period; precision ±1–2 months.*