Comparison Between the Niño Index and Planetary Orbits

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Context: It is hypothesized that a fifth force of nature can be observed as interplanetary interactions. Here, we look at potential evidence that Mars acts on Earth according to the expression

$$U(Mars) = -C\frac{sin(\delta)T}{M}\hat{M}_{NP} \cdot (\hat{E}_{NP} \times \hat{M}_E)$$

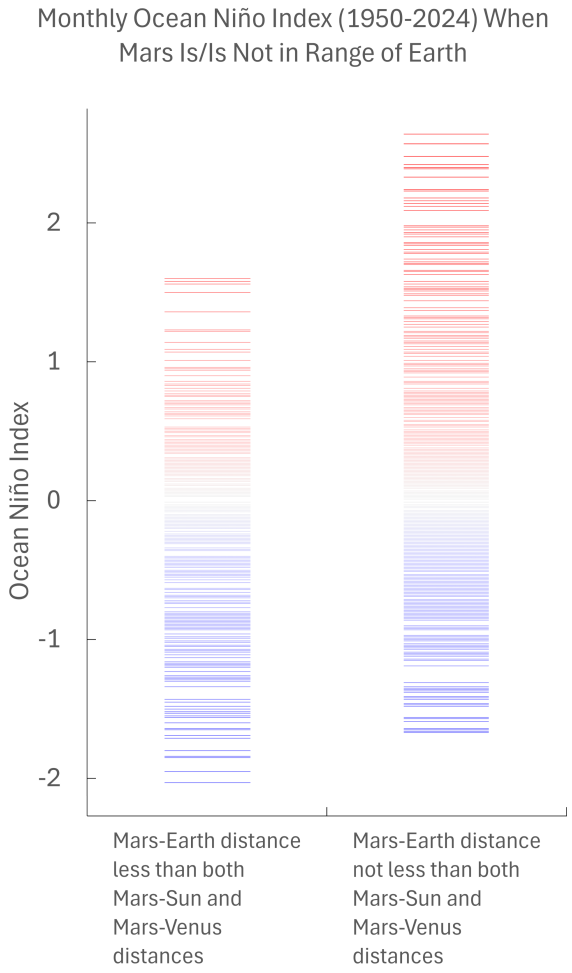
when Mars-Earth distance is less than both Mars-Sun and Mars-Venus distances; C is some positive constant; δ is Earth's latitude from Mars; T and M are Mars' sidereal rotation period and mass, respectively; and $\hat{M}_{NP}$, $\hat{E}_{NP}$, and $\hat{M}_E$ are unit vectors representing Mars' north celestial pole, Earth's north celestial pole, and Mars' position from Earth, respectively. A full description can be found here: Mathematical Model Used to Predict Interplanetary Phenomena

We tested whether our hypothesis has a measurable impact on the Niño Index. To do this, we divided the Niño Index into two periods: when Mars-Earth distance was less than both Mars-Sun and Mars-Venus distances (Mars in range), and when it was not. We then performed a two-sample t-test for means assuming unequal variances.

We used NOAA's Ocean Niño Index (ONI) dataset, which provides monthly sea surface temperature (SST) anomalies for the central Pacific Ocean from January 1950 to September 2024, based on a 3-month running mean [Ref 1]. This dataset relies on SST anomalies derived from the Extended Reconstructed Sea Surface Temperature version 5 (ERSSTv5) dataset, specifically for the Niño 3.4 region ($5°N - 5°S$, $120° - 170°W$), which is a key area for monitoring El Niño and La Niña conditions.

We compared each 3-month average with our monthly variable using the middle month. For instance, the December-January-February (DJF) 1950 value of -1.53 was compared to our binary value of 1 (Mars in range) for January 1950.

We found that the mean Niño Index values were -0.206 when Mars was in range, and 0.129 when Mars was not in range [Ref 2]. An initial analysis with a t-test ($p = 2.24 \times 10^{-9}$, t=6.06, df=702, power=0.398, Cohen's d=0.407, two tail) indicated a potential significant finding. To ensure the robustness of this result, we adjusted the analysis for power=0.9, which increased p to 8.00×10^{-6}, which we present as the primary measure of significance in this study.



References

1. NOAA Physical Sciences Laboratory. (n.d.). Ocean Niño Index (ONI). Retrieved [November 8, 2024], from https://psl.noaa.gov/data/correlation/oni.data
2. Talbot, L (2024). Mars' Effect on Earth's Niño Index.csv. https://doi.org/10.6084/m9.figshare.27638118