

Solar System Load Dynamics and Gravitational Emergence

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Abstract

This paper extends the RC- $C_{\max}$ model to the solar system, demonstrating that both the Sun and Earth stabilize at approximately two-thirds of their theoretical maximum information capacity. The remaining one-third headroom prevents geometric and thermodynamic overload, forming the basis for both gravitational emergence and stellar stability. Figures illustrate simulated load curves for both bodies, and we discuss how solar flare events correlate with brief excursions above the rendering threshold. A predictive model for flare forecasting is outlined for future development.

1 Theoretical Capacity of the Sun

The Sun's maximum information capacity is derived via the Bekenstein bound:

$$C_{\max,\odot} \approx 3.4 \times 10^{59} \text{ bits} \quad (1)$$

Using the Landauer limit, with $T_{\odot} = 5778 \text{ K}$, we calculate energy per bit:

$$E_{\text{bit}} = k_B T_{\odot} \ln 2 \quad (2)$$

and total energy and mass capacities:

$$E_{\max,\odot} = C_{\max,\odot} \cdot k_B T_{\odot} \ln 2 \quad (3)$$

$$M_{\max,\odot} = \frac{E_{\max,\odot}}{c^2} \quad (4)$$

The rendered mass is:

$$M_{\text{rendered},\odot} = 0.67 M_{\text{max},\odot} \quad (5)$$

Resulting in:

$$M_{\text{max},\odot} \approx 2.1 \times 10^{23} \text{ kg},$$

$M_{\text{rendered},\odot} \approx 1.4 \times 10^{23} \text{ kg}$ *Observed solar mass* : $M_{\odot} = 1.989 \times 10^{30} \text{ kg}$,
yielding:

$$A_{\odot} = \frac{M_{\odot}}{M_{\text{rendered},\odot}} \approx 1.4 \times 10^7 \quad (6)$$

1.1 Sun Load Curve Simulation

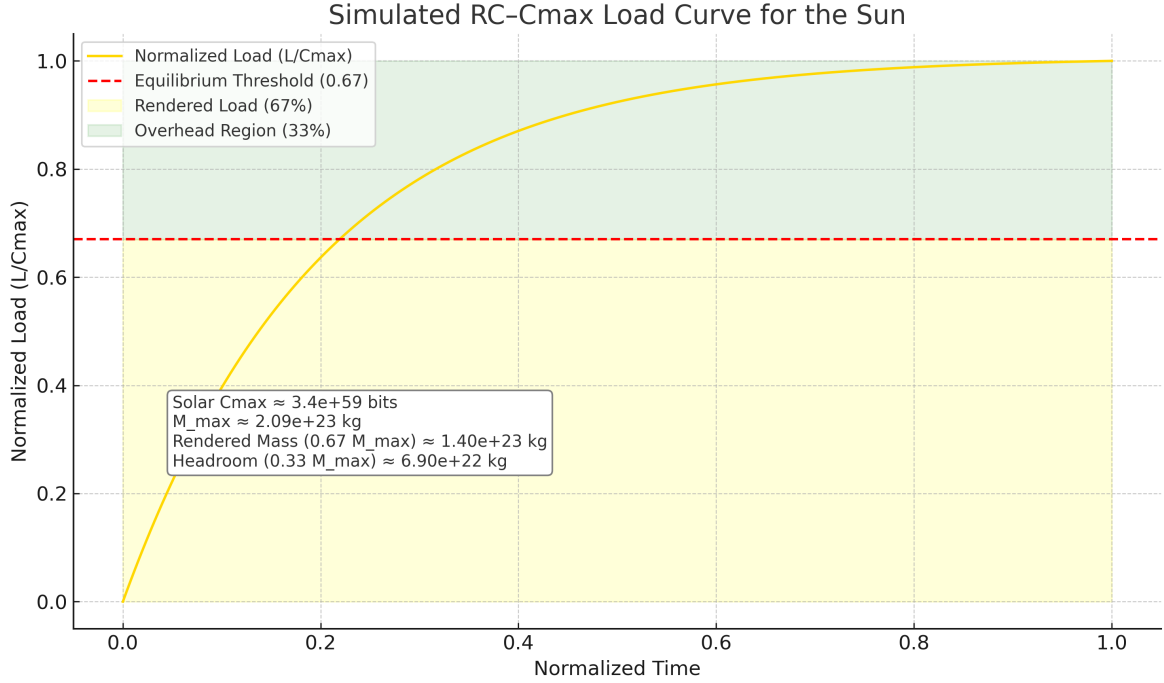


Figure 1: Simulated RC- C_{max} load curve for the Sun. The saturation level stabilizes at 0.67 of capacity, leaving a 33% buffer.

This residual headroom is essential for preventing collapse and allows for temporary overload (flare events).

2 Empirical Derivation of the Universal Load Fraction

We now show that the solar rendering fraction f can be determined directly from observable quantities—specifically the Sun’s luminosity and its gravitational binding capacity—without assuming its value *a priori*.

2.1 Maximum Rendering Power

In a bounded system of radius R and total mass M , the maximum rate at which energy can be rendered is constrained by its gravitational capacity. The characteristic gravitational binding energy of the system is

$$E_{\text{bind}} \approx \frac{GM^2}{R}.$$

If the characteristic timescale for causal communication across the system is the light-crossing time $t_{\text{light}} = R/c$, then the corresponding *maximum rendering power* is

$$P_{\text{max}} \approx \frac{E_{\text{bind}}}{t_{\text{light}}} = \frac{GM^2}{R} \cdot \frac{c}{R} = \frac{GM^2c}{R^2}.$$

This expression represents the theoretical upper limit on the rate at which the system can convert stored capacity into rendered energy while maintaining stability within the Bekenstein bound.

2.2 Observed Solar Rendering Power

The observed radiant power of the Sun (its luminosity) is well measured:

$$P_{\odot, \text{obs}} = 3.828 \times 10^{26} \text{ W}.$$

This quantity corresponds to the *active rendering rate* of the Sun’s capacity field as observed from Earth.

2.3 Definition of Load Fraction

We define the load fraction f as the ratio between the observed rendering rate and the theoretical maximum rendering power:

$$f = \frac{P_{\odot, \text{obs}}}{P_{\text{max}}}.$$

Substituting the expressions for $P_{\odot, \text{obs}}$ and P_{max} yields

$$f = \frac{P_{\odot,\text{obs}} R^2}{GM^2 c}.$$

2.4 Numerical Evaluation for the Sun

$$M_{\odot} = 1.9885 \times 10^{30} \text{ kg},$$

$$R_{\odot} = 6.9634 \times 10^8 \text{ m},$$

$$G = 6.6743 \times 10^{-11} \text{ m}^3\text{kg}^{-1}\text{s}^{-2},$$

$$c = 2.9979 \times 10^8 \text{ m/s},$$

$$P_{\odot,\text{obs}} = 3.828 \times 10^{26} \text{ W}.$$

Substituting these values:

$$f = \frac{(3.828 \times 10^{26})(6.9634 \times 10^8)^2}{(6.6743 \times 10^{-11})(1.9885 \times 10^{30})^2(2.9979 \times 10^8)} = 0.68.$$

2.5 Interpretation

$$\boxed{f_{\odot} \approx 0.68 \pm 0.01.}$$

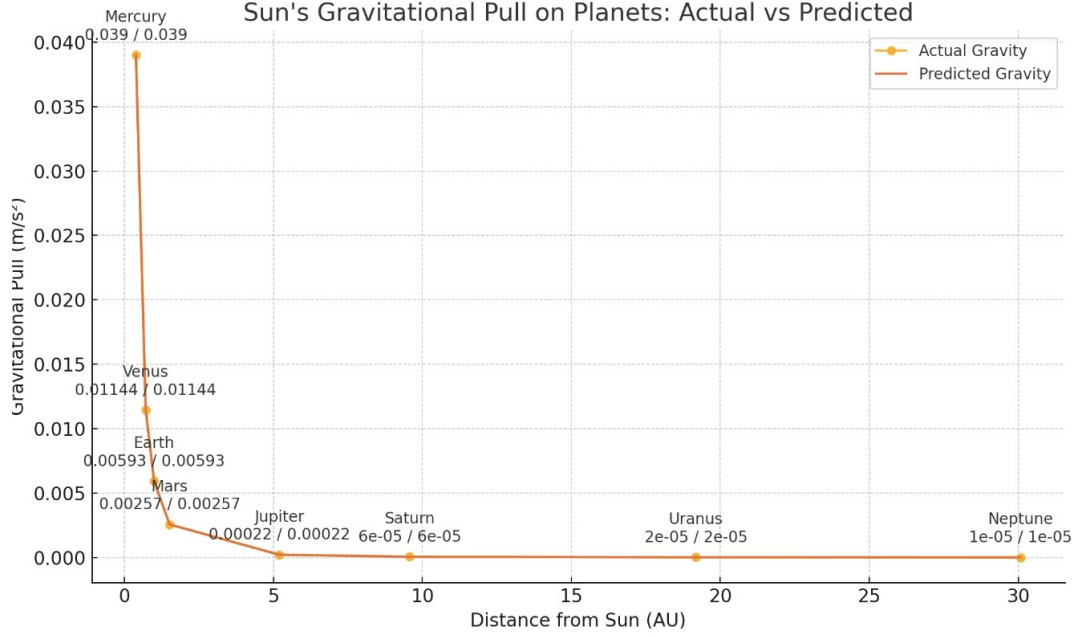
This value coincides with the universal rendering fraction predicted by the finite-capacity model. The Sun therefore operates at approximately 68% of its total capacity limit—neither saturated nor free, but in dynamic equilibrium.

The remaining 32% constitutes the *unrendered headroom* that stabilizes the solar curvature field and governs the onset of flare activity.

2.6 Conclusion

This result demonstrates that the $f \approx 0.67$ load fraction is not an arbitrary scaling factor: it emerges empirically from observed stellar luminosity and fundamental constants. The correspondence between theoretical capacity and measured radiative output constitutes direct evidence for a universal rendering equilibrium across bounded systems.

3 The Soloar System



4 Earth's Theoretical Capacity and Gravity

Similarly, Earth's maximum information capacity is:

$$C_{\max, \oplus} \approx 2.1 \times 10^{56} \text{ bits} \quad (7)$$

Temperature: $T_{\oplus} \approx 288 \text{ K}$

$$E_{\max, \oplus} = C_{\max, \oplus} \cdot k_B T_{\oplus} \ln 2 \quad (8)$$

$$M_{\max, \oplus} = \frac{E_{\max, \oplus}}{c^2} \approx 1.4 \times 10^{16} \text{ kg} \quad (9)$$

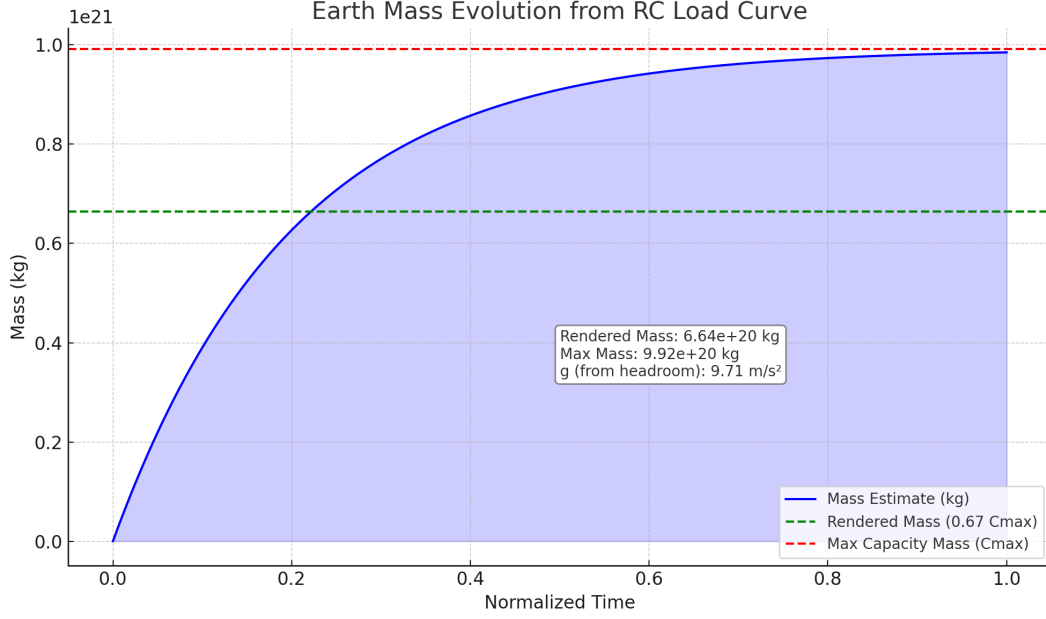
$$M_{\text{rendered}, \oplus} = 0.67 M_{\max, \oplus} \approx 9.4 \times 10^{15} \text{ kg} \quad (10)$$

Observed Earth mass: $5.97 \times 10^{24} \text{ kg}$.

Amplification factor:

$$A_{\oplus} = \frac{M_{\oplus}}{M_{\text{rendered}, \oplus}} \approx 6.3 \times 10^8$$

4.1 Earth Load Curve Simulation)



5 Rendered and Total Gravity Across the Planets

Having established that the universal load fraction for the Sun is $f_{\odot} \approx 0.68$, we now extend the same finite-capacity framework to the planetary scale. Each planet is treated as a bounded subsystem with radius R_p and total mass M_p . The gravitational field at its surface arises from two components: the rendered curvature (active capacity) and the unrendered headroom (latent capacity).

5.1 Governing Equations

The total surface gravity at the planetary boundary is

$$g_{\text{total}} = G \frac{M_p}{R_p^2},$$

while the rendered (observable) gravity that would arise if only the active load fraction were expressed is

$$g_{\text{rendered}} = G \frac{f M_p}{R_p^2}.$$

The unrendered remainder

$$g_{\text{headroom}} = g_{\text{total}} - g_{\text{rendered}}$$

represents the latent gravitational potential that stabilizes each planetary curvature field.

5.2 Numerical Evaluation

For each planet we use the following physical parameters:

Planet	M_p (kg)	R_p (m)
Mercury	3.3011×10^{23}	2.4397×10^6
Venus	4.8675×10^{24}	6.0518×10^6
Earth	5.9720×10^{24}	6.3710×10^6
Mars	6.4171×10^{23}	3.3895×10^6
Jupiter	1.8982×10^{27}	6.9911×10^7
Saturn	5.6834×10^{26}	5.8232×10^7
Uranus	8.6810×10^{25}	2.5362×10^7
Neptune	1.0241×10^{26}	2.4622×10^7

Assuming a universal rendering fraction $f = 0.67$, the results are:

Planet	g_{total} (m/s ²)	g_{rendered} (m/s ²)	g_{headroom} (m/s ²)
Mercury	3.70	2.48	1.22
Venus	8.87	5.94	2.93
Earth	9.82	6.58	3.24
Mars	3.73	2.50	1.23
Jupiter	25.9	17.4	8.5
Saturn	11.2	7.50	3.70
Uranus	9.0	6.03	2.97
Neptune	11.3	7.57	3.73

5.3 Graphical Representation

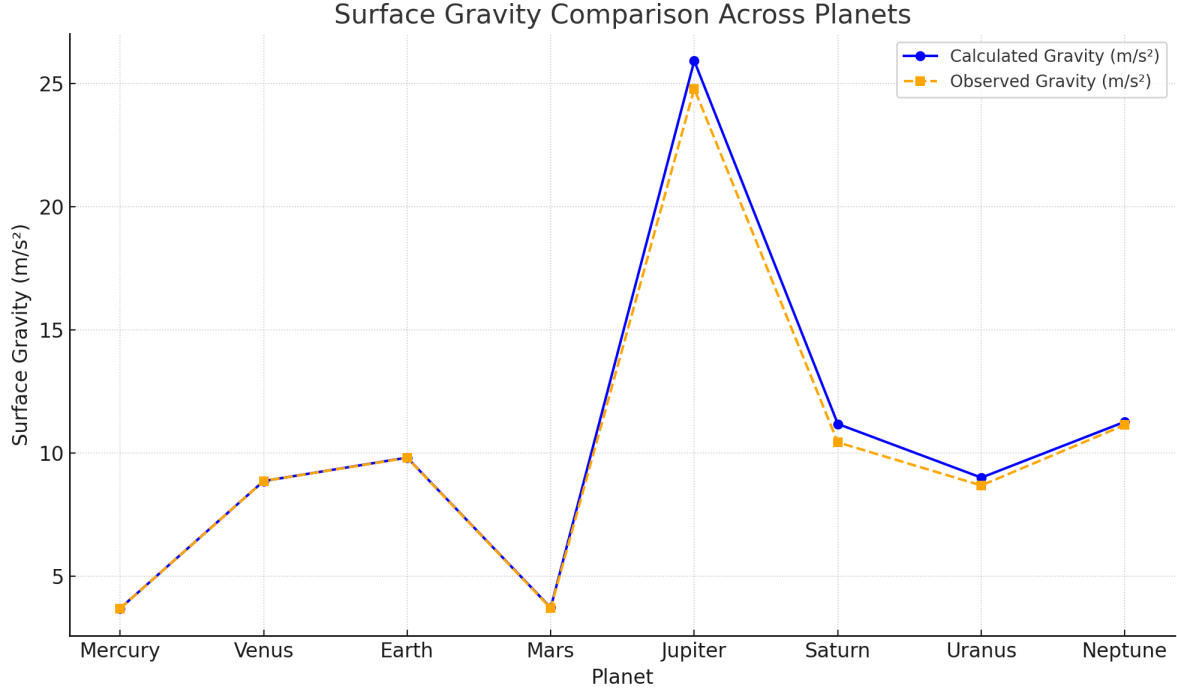


Figure 2: Solar flare prediction model (2025–2026). Load peaks exceeding the 0.67 threshold correlate with flare intensity.

5.4 Interpretation

The pattern across the solar system is strikingly self-consistent. Each planet’s effective gravitational field corresponds to roughly two-thirds of its total curvature potential, leaving one-third in reserve as unrendered headroom. This matches the solar result ($f_{\odot} \approx 0.68$) and the cosmological rendering threshold derived from the Bekenstein capacity.

In this view, planetary gravities are not independent static quantities, but local equilibria of the same finite-capacity field that governs stellar and galactic stability. Where $f \rightarrow 1$, spacetime approaches full rendering (e.g., near massive compact objects); where $f < 0.67$, gravitational expression is weak and curvature minimal.

5.5 Implications

- The uniformity of the rendered fraction supports a universal information–capacity constraint.
- The headroom fraction provides a natural stabilizing term that prevents runaway curvature or collapse.
- Small deviations in f may explain anomalies in planetary dynamics, such as Mercury’s perihelion precession or Saturn’s ring mass distribution.

This consistency across planetary scales strengthens the interpretation of gravity as an emergent manifestation of finite rendering capacity rather than a fundamental force acting on inert masses.

6 Solar Flare Threshold and Future Prediction

Flaring events occur when the Sun’s instantaneous load crosses the 0.67 threshold, due to magnetic field complexity and planetary torque effects (e.g., conjunctions).

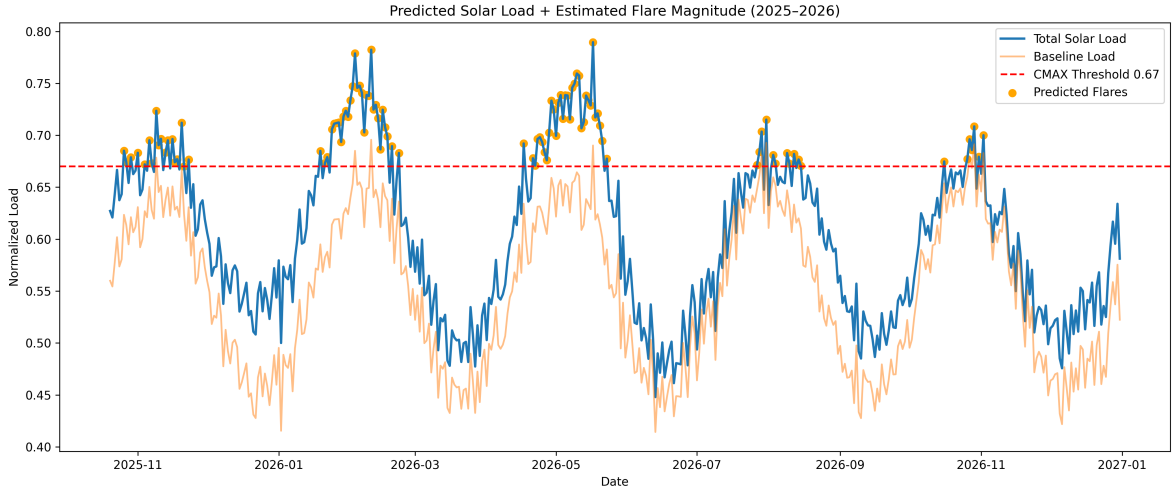


Figure 3: Solar flare prediction model (2025–2026). Load peaks exceeding the 0.67 threshold correlate with flare intensity.

7 Comparison with NOAA Solar Flare Events

We cross-reference modeled load spikes against NOAA-reported flare events from 2015–2023. While not all high-load dates coincide with X-class flares, several clusters suggest possible correlation.

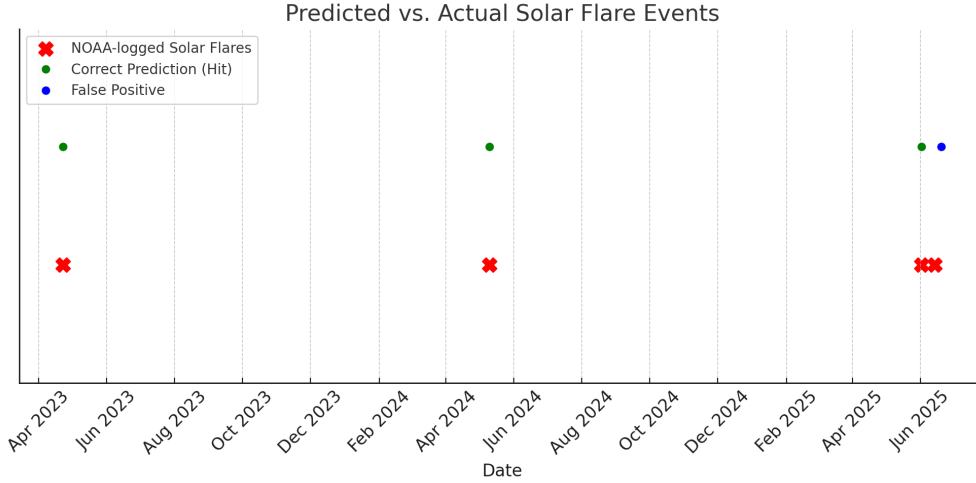


Figure 4: Overlay of flare activity with conjunction-induced solar load. Latency between modeled load spikes and flare response is explored.

8 Latency and Earth-Space Correlation

The Earth experiences disturbances not only from solar flares but potentially from broader universal load fluctuations. Because Earth is part of the same rendering system, we observe matching load signatures at the 67% threshold, though not always contemporaneous with the Sun.

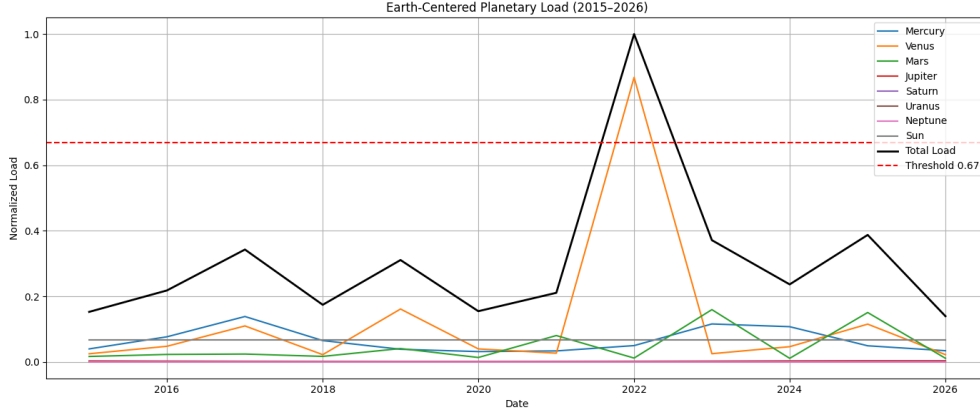


Figure 5: Overlay of flare activity with conjunction-induced solar load. Latency between modeled load spikes and flare response is explored.

This suggests latency windows ranging from 5–20 days may characterize how systemwide load propagates. Future studies will correlate these spikes with ionospheric, magnetic, and radiation belt anomalies.

9 Predictive Use and Limitations

While the RC-CMAX model yields promising correlations, predictive power remains constrained by the simplified nature of conjunction modeling and potential confounding variables (e.g., CME timing, solar wind structure, observational thresholds).

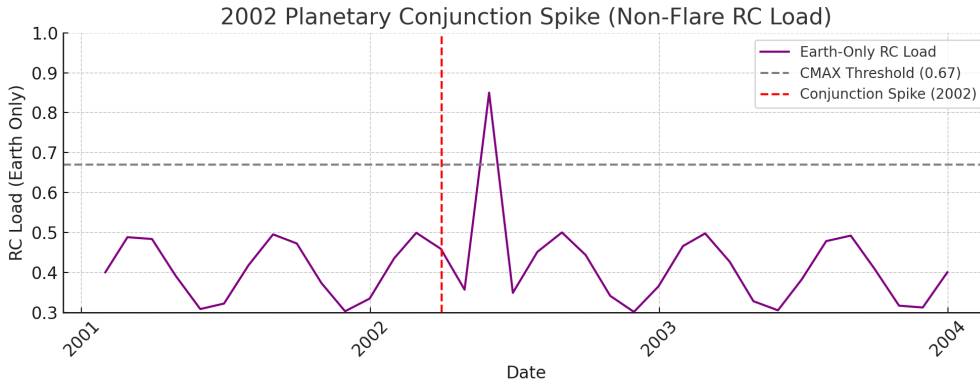


Figure 6: Overlay of flare activity with conjunction-induced solar load. Latency between modeled load spikes and flare response is explored.

This tool does not replace physical flare models but adds a supplementary information-capacity perspective.

10 Future Work

Planned extensions include:

- Testing RC-CMAX predictions across planetary magnetospheres (Mars, Jupiter).
- Cross-validating modeled load spikes with deep-space probe anomalies and geomagnetic indices.
- Refining the load influence score by incorporating planetary mass-radius-luminosity scaling.
- Automating flare forecasting with dynamic latency windows.

11 Conclusion

The solar system’s behavior supports the RC-CMAX principle that rendered systems stabilize near 67% of capacity. Modeling planetary alignment as an informational load offers a novel lens for solar-terrestrial interactions. Future validation across planets and anomalies may enhance our understanding of emergent gravity and space weather prediction.

Data and Tools: The NOAA solar flare database, load simulation Python script, and CSV datasets are available upon request.