Test Plan: Local Density Gravity Model – Satellite Laser Ranging

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GitHub: https://github.com/hasjack/OnGravity

Objective:

Evaluate whether a local-density-modified gravitational parameter (κr) produces a measurable difference in orbital acceleration in the near-Earth region.

Method:

Use publicly available International Laser Ranging Service (ILRS) data for GRACE-FO satellites at approximately 500 km altitude. Compute residual acceleration after standard gravitational and non-gravitational force modeling. Compare residuals against predicted κr enhancement.

Pass/Fail Criterion:

If residual acceleration consistently shows a statistically significant positive deviation matching the predicted magnitude within uncertainty bounds, the model is supported. Otherwise, the model is not supported under these conditions.

Data Requirements:

- ILRS precise orbit ephemeris
- Standard atmospheric drag and SRP models
- Geopotential model (EGM2008 or later)
- Time span: ≥ 3 days continuous

Expected Signal:

Predicted enhancement: $\Delta a \approx 1 \times 10^{-4}$ m/s² (0.1 mm/s²) radial component.

Notes:

This document defines an empirical test of a concrete model prediction.