Subterrane

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Technical Parameters: Causality Lens™- Central America 50-Year Earthquake Forecast

System Overview

The **Causality Lens**™ is a proprietary observational framework developed by Subterrane to interpret earthquake generation through the lens of gravitational flow and its causative structure.
It applies first-principles physics to observe how mass, motion, and curvature converge to shape tectonic behaviour- revealing long-term seismic outcomes without simulation or statistical inference.

Core Technical Architecture

Data Processing Pipeline

- Input Formats: Shapefile-based structural datasets defining regional fault systems, plate boundaries, and trench geometries.
- Coordinate Normalization: Gravitational scaling aligns all datasets to a unified regional frame of reference.
- Geometry Handling: Full support for complex tectonic geometries, including line and polygonal forms.
- Spatial Reference System: Normalized coordinate space centered at the regional centroid, ensuring accurate causative orientation.

Physical Framework

Gravitational Boundary Dynamics

The Causality Lens™ incorporates empirically constrained convergence and mass-transport behaviour along the Cocos–Caribbean corridor.
Parameters are derived from physical observation and first-principles gravitational inference, refined within Subterrane's proprietary causation framework.

Stress and Flow Architecture

Stress accumulation and release are expressed as manifestations of gravitational curvature and energy redistribution through crustal and subduction domains.
Relative capacities and thresholds are determined by the structural flow field, *not by numerical fitting or statistical calibration.*

Recurrence and Continuity

Seismic recurrence arises naturally from the geometry of gravitational flux and the continuity of energy flow through connected fault systems- producing non-linear but physically consistent sequences over time.

Fault System Interpretation

Connectivity Framework

Faults are observed as nodes within continuous gravitational channels.
Adaptive geometric and causal criteria identify coherent structures, allowing visualization of how energy transfers across crustal and subduction environments.

Structural Classification

Each identified structure is classified according to depth, geometry, and flow behaviour:
- Continental Faults- upper-crustal shear responses to regional flow.
- Subduction Interface- the Cocos plate descent plane and its coupling field.
- Megathrust Segments- extended corridors capable of large-scale gravitational discharge.

Seismic Energy Parameters

Fault Geometry and Rigidity

Fault geometry and material rigidity define the spatial bandwidth of gravitational release. These parameters follow established geophysical relationships, refined through Subterrane's causation mapping.

Magnitude Scaling

Magnitude is treated as an emergent property of structural release- proportional to moment density across the fault plane and consistent with physical scaling relations observed globally.

Causality Engine

Triggering Conditions

Events are recognized when gravitational stress trajectories intersect threshold curvature within a connected field.
This enables observation of causative timing and spatial propagation without reliance on stochastic modeling.

Slip and Displacement Fields

Observed displacements correspond to distributed curvature relaxation across each fault segment, representing physical flow realignment rather than arbitrary slip assignment.

Energy Redistribution

Post-event gravitational flow adjustment is tracked through the regional structure, illustrating how subsequent instability may arise through feedback along linked corridors.

Visualization System

Color Encoding

- Continental Faults- Blue spectrum
- Subduction Zones- Violet-blue gradient
- Megathrust Segments- Deep purple

Stress and flow intensity are mapped through linear color scaling, conveying accumulation and release cycles derived from causative structure.

Event Representation

Earthquake loci are expressed as proportional forms along the gravitational flow field, distinguishing continental, subduction, and megathrust domains within the 50-year horizon.

Temporal & Output Framework

Observation Horizon

The forecast spans 50 years (2024–2074), representing the projected expression of gravitational stress redistribution through the Central American corridor.
Temporal weighting follows causal nonlinearity- acceleration, delay, and feedback consistent with observed flow behaviour.

Output Generation

- Visual sequences optimized for web presentation.

- High-resolution frame exports at key temporal intervals.
- Structured event catalog summarizing magnitude, class, and time evolution.
Underlying causal data remain proprietary to Subterrane.

Computational Architecture

Performance and Efficiency
- Vectorized processing for high-fidelity structural observation and rendering.
- Optimized geometry caching for stable visualization at scale.

Memory and Data Management
Efficient catalog handling and causal caching maintain performance across long-term observational sequences.

Scientific Basis

The **Causality Lens**™ integrates:
- Gravitational Mechanics- first-principles observation of mass flow and curvature.
- Tectonic Interaction Physics- causative stress transfer and system coupling.
- Empirical Correlation- consistency with magnitude-area relationships observed in global seismicity.
- Regional Parameterization- Central America's gravitational segmentation and energy architecture.

Validation Metrics

Forecast accuracy and realism are assessed through:
- Structural Coherence- fidelity of observed fault connectivity.
- Magnitude-Frequency Alignment- correspondence to known seismic energy distributions.
- Spatial-Temporal Integrity- physical plausibility of clustering and release sequences.
- Causal Continuity- consistency of gravitational flow evolution over time.

Disclosure

All parameters and physical ranges herein represent generalized principles implemented within the **Causality Lens**™ framework. Proprietary algorithms governing gravitational causation, feedback structures, and calibration constants remain confidential.