

# Seismic Energy Forecast for Japan

2025 October 30, 2025 November 06-27 - potential  
earthquake or eruption in Japan

Version: 0

First Revision: 2025-11-04 19:13:05

Last Revision: Rev. 0 - 2025-11-04 19:13

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# 1. Revision History

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| Version        | Date                   | Author | Description   |
|----------------|------------------------|--------|---|
| 0              | 2025-11-04<br>19:13:05 | MF     | Seismic Energy Forecast for Potential Earthquake or Eruption in Japan |
| first emission |                        |        |   |

## 2. Explanation of Terms and Concepts

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About Features used to produce this forecast

We produced this forecast using the following specific source:

1. astronomical solar system data (same day - 0 shift)
2. seismic sensor GPS data (60 days shift)
3. tropospheric data (60 days shift)

The Purpose it to demonstrate the validity of using GPS + TROPO data several week before a seismic event.

Time series sharpness achievable by astronomical data only can be up to 7 days.

This study demonstrate that using augmented data in past geophysical observations can rise the time line sharpness up to 24 hrs and more.

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About Graph system

Note: **trend graph**

Forecast graph and tables refer to a base value, against it.

For instance if a value of 37 per latitude is the base line and graph value is 0% it means that the location estimated for that period of time is UNDER 37.

Another example is for magnitude graph, with baseline Mw 7.0, 0% means no risk detected, and 100% means high risk detected

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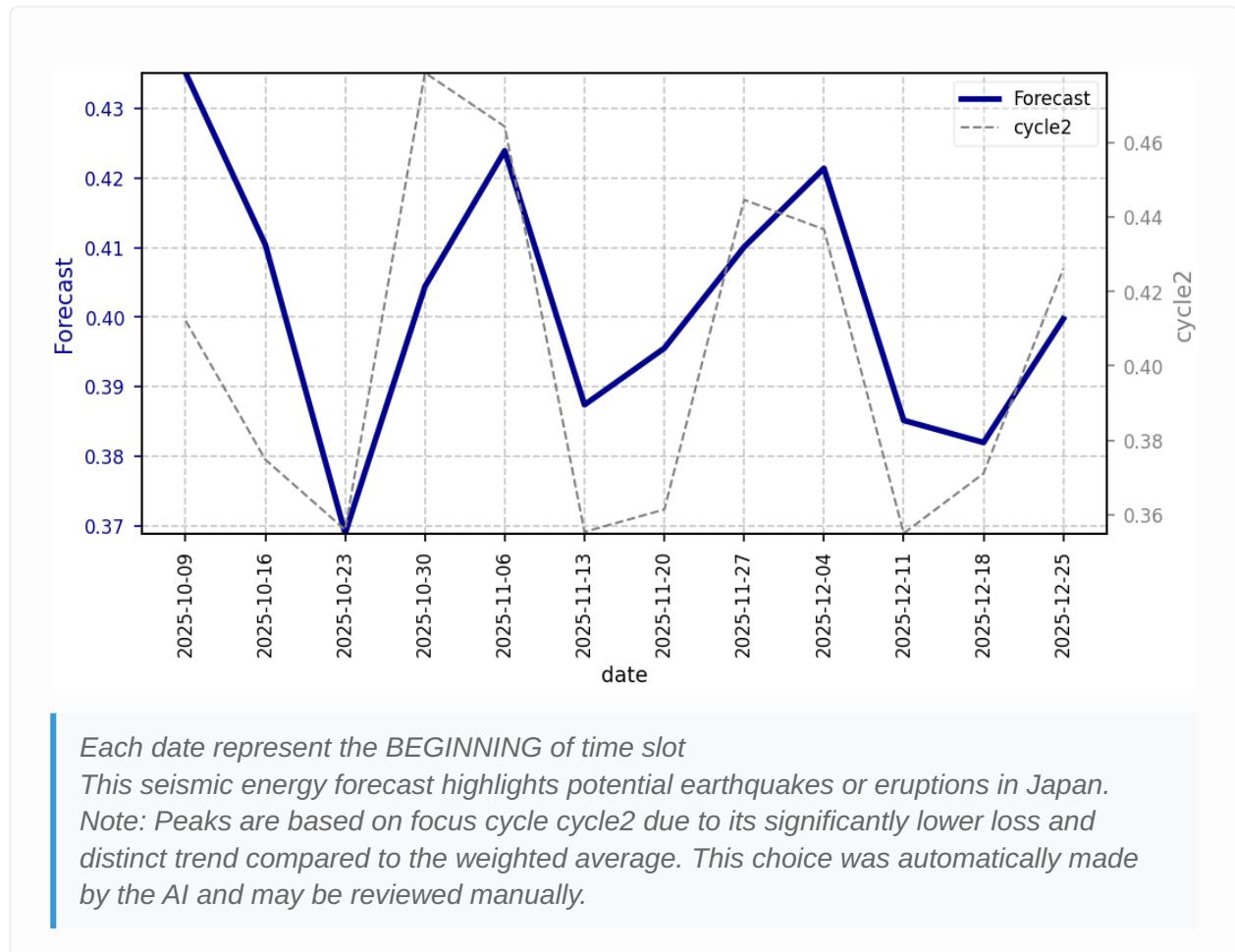
About Time Slot

Note: each date point represent **the beginning of the time slot**

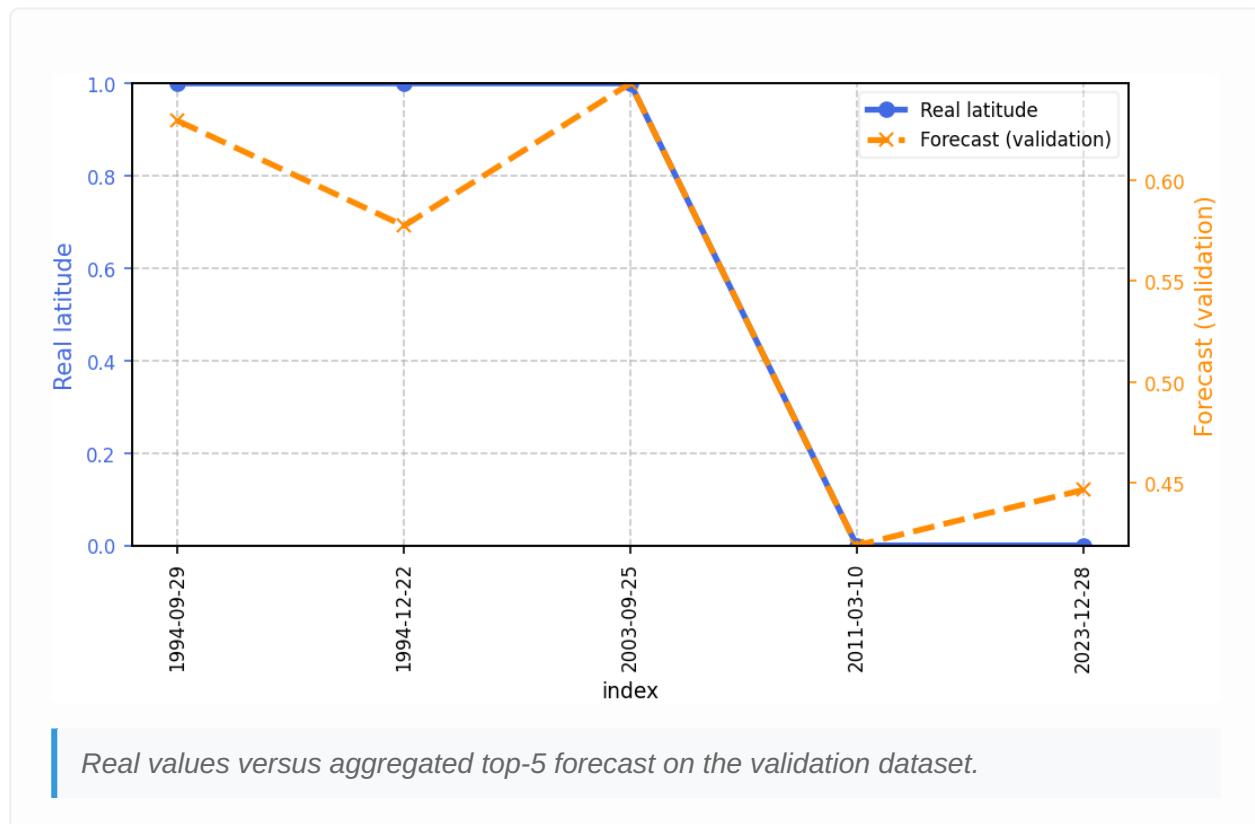
For instance if a forecast time point is on 2025-01-01 and the graph resolution is 7 days, it's a forecast for 2025-01-01 until 2025-01-06 (UTC)

### 3. Forecasts

#### 3.1 Latitude Seismic Energy Forecast, res:1 week, UTC (focus: cycle2)



### 3.2 Validation Quality Check



## 4. Features Used For Magnitude

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### Combined Features Analysis Report - trialsetJAPAN-M75- LAT-39\_20251104-075216

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**Generated:** 2025-11-04T19:14:52.068458 **Cycles Analyzed:** explore, cycle1, cycle2, cycle3, cycle4

## EXPLORE Analysis

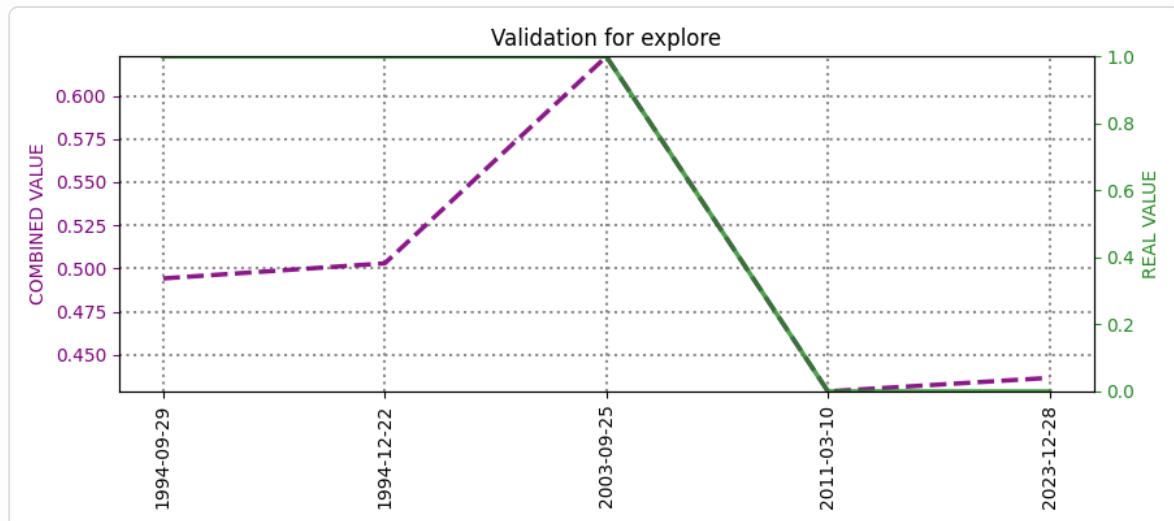
### Trial Statistics

| Metric                              | Min  | Max  | Average |
|-------------------------------------|------|------|---------|
| Hyperopt Loss (lower is better)     | 0.50 | 0.58 | 0.54    |
| Metric Score (F1) (lower is better) | 0.00 | 0.00 | 0.00    |

| Contribution Type | Trials |
|-------------------|--------|
| Direct            | 5      |
| Inverted          | 0      |

### Validation Analysis

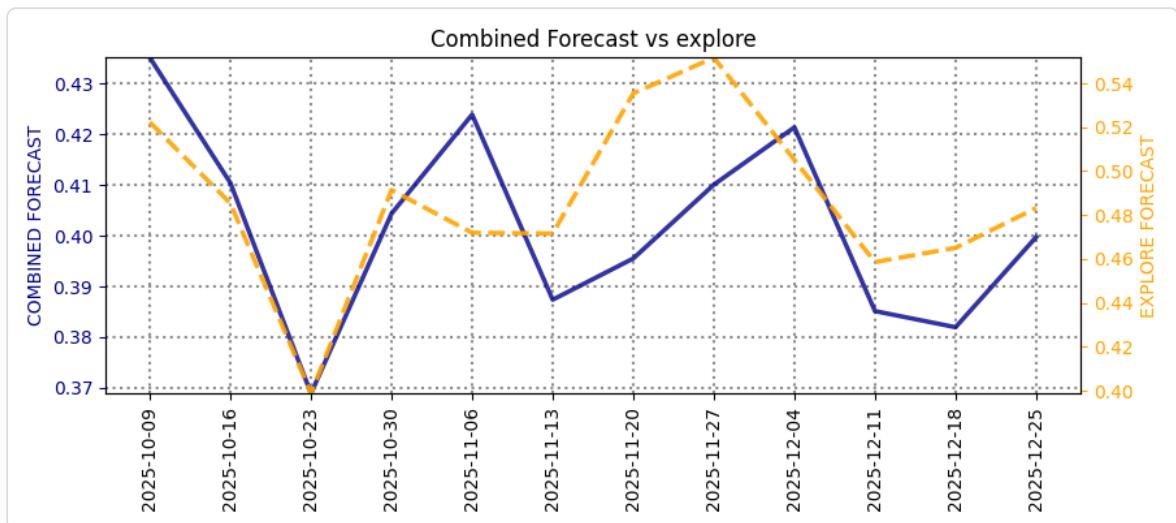
Best trial validation for this cycle contrasted with real values.



### Forecast Analysis

Best trial forecast for this cycle versus the combined forecast.

## Features Analysis • EXPLORE Analysis



## Complete Dataset Overview

*Analysis of ALL features present in the source files*

|            | Astro | Tropo | Pos  |
|------------|-------|-------|------|
| Count      | 25    | 0     | 0    |
| Percentage | 89.3% | 0.0%  | 0.0% |

## Summary Insights

Complete Dataset:

- **Astronomical data** represents 89.3% of all features (25 features)
  - **Target variables** represent 7.1% of all features (2 features)
  - **Dominant category in complete dataset:** Astro features
-

## CYCLE1 Analysis

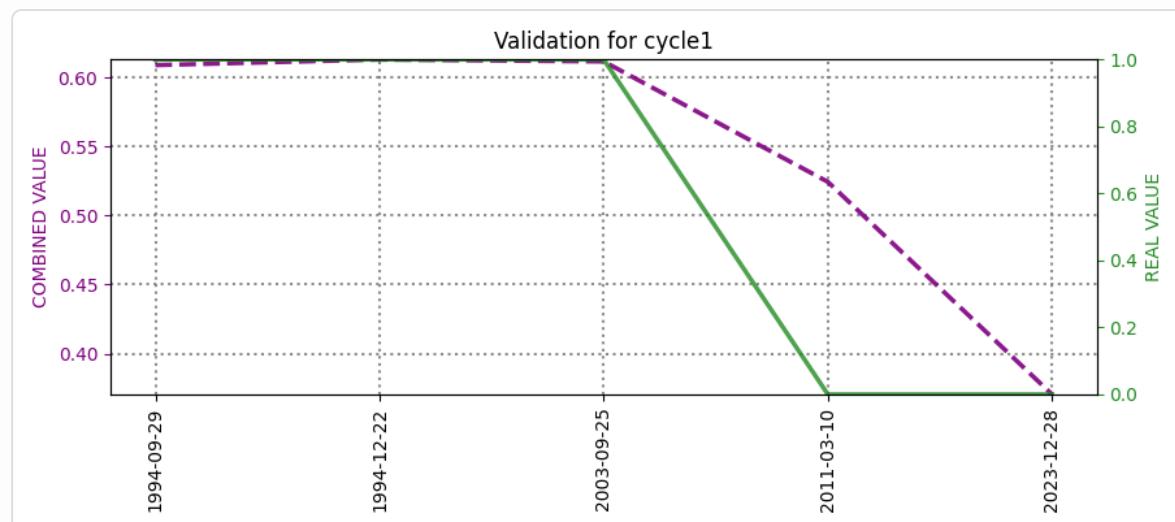
### Trial Statistics

| Metric                              | Min  | Max  | Average |
|-------------------------------------|------|------|---------|
| Hyperopt Loss (lower is better)     | 0.51 | 0.55 | 0.52    |
| Metric Score (F1) (lower is better) | 0.00 | 0.00 | 0.00    |

| Contribution Type | Trials |
|-------------------|--------|
| Direct            | 5      |
| Inverted          | 0      |

### Validation Analysis

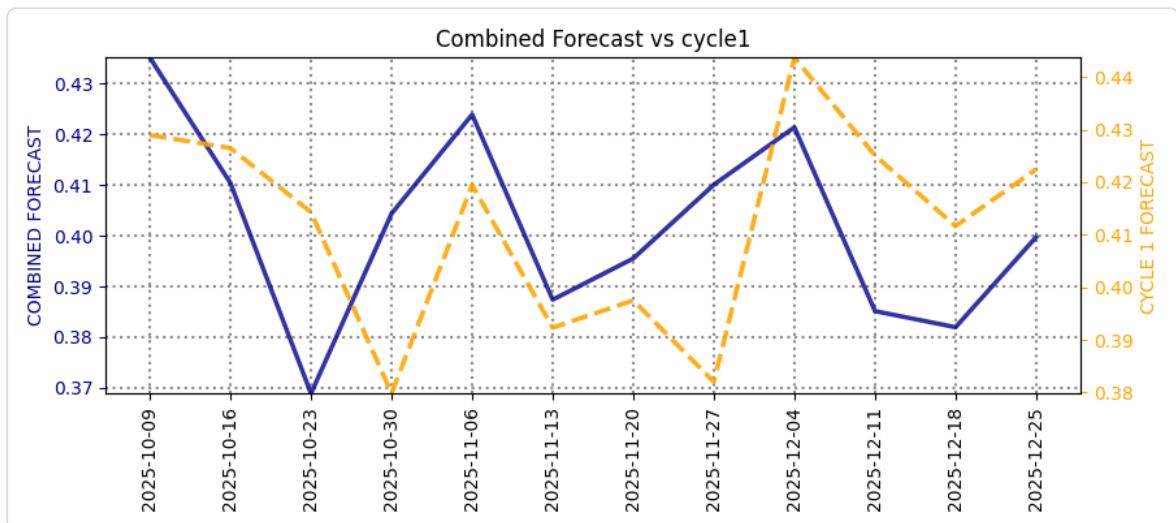
Best trial validation for this cycle contrasted with real values.



### Forecast Analysis

Best trial forecast for this cycle versus the combined forecast.

## Features Analysis • CYCLE1 Analysis



## Complete Dataset Overview

*Analysis of ALL features present in the source files*

|            | Astro | Tropo | Pos  |
|------------|-------|-------|------|
| Count      | 13    | 0     | 0    |
| Percentage | 81.2% | 0.0%  | 0.0% |

## Summary Insights

Complete Dataset:

- **Astronomical data** represents 81.2% of all features (13 features)
  - **Target variables** represent 12.5% of all features (2 features)
  - **Dominant category in complete dataset:** Astro features
-

## CYCLE2 Analysis

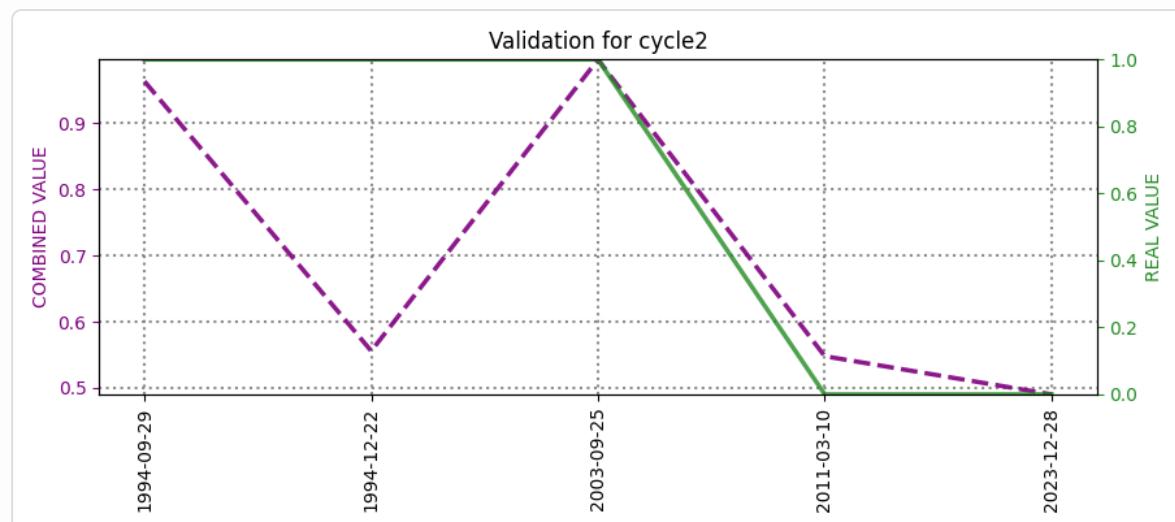
### Trial Statistics

| Metric                              | Min  | Max  | Average |
|-------------------------------------|------|------|---------|
| Hyperopt Loss (lower is better)     | 0.07 | 0.55 | 0.44    |
| Metric Score (F1) (lower is better) | 0.00 | 0.00 | 0.00    |

| Contribution Type | Trials |
|-------------------|--------|
| Direct            | 5      |
| Inverted          | 0      |

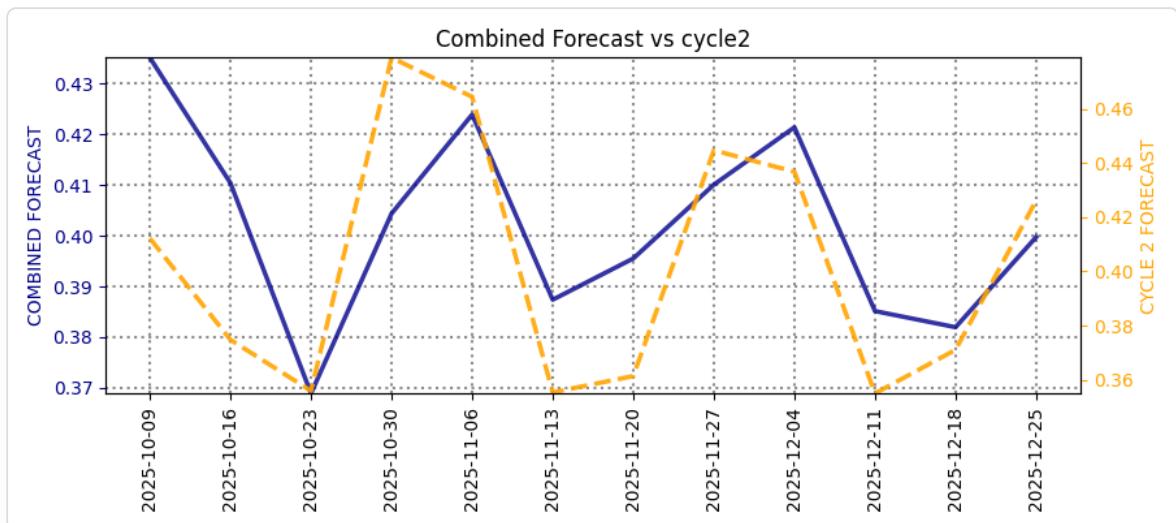
### Validation Analysis

Best trial validation for this cycle contrasted with real values.



### Forecast Analysis

Best trial forecast for this cycle versus the combined forecast.



## Complete Dataset Overview

*Analysis of ALL features present in the source files*

|            | Astro | Tropo | Pos  |
|------------|-------|-------|------|
| Count      | 22    | 0     | 0    |
| Percentage | 88.0% | 0.0%  | 0.0% |

## Summary Insights

Complete Dataset:

- **Astronomical data** represents 88.0% of all features (22 features)
  - **Target variables** represent 8.0% of all features (2 features)
  - **Dominant category in complete dataset:** Astro features
-

## CYCLE3 Analysis

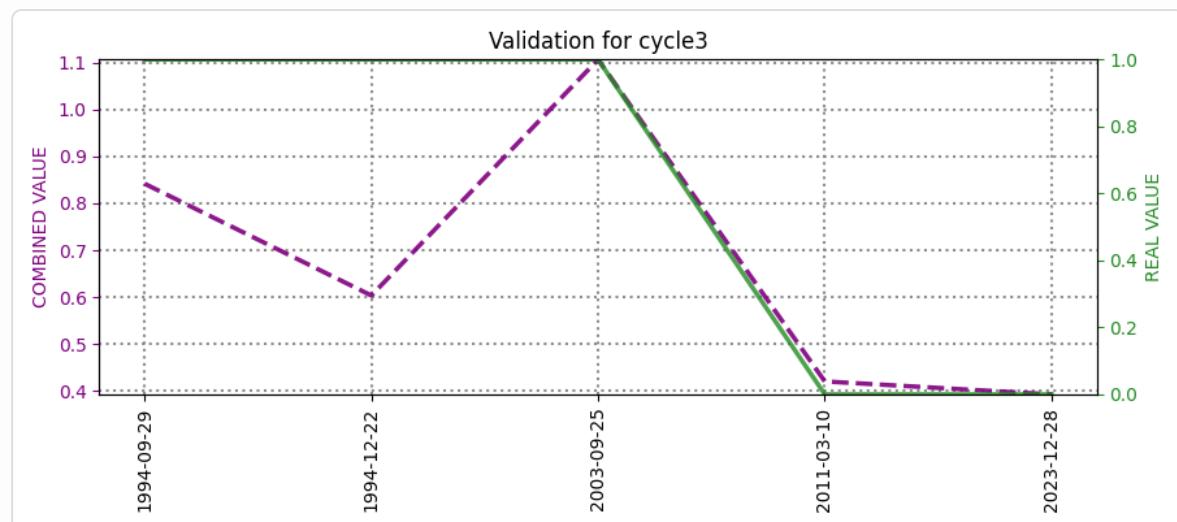
### Trial Statistics

| Metric                              | Min  | Max  | Average |
|-------------------------------------|------|------|---------|
| Hyperopt Loss (lower is better)     | 0.51 | 0.55 | 0.53    |
| Metric Score (F1) (lower is better) | 0.00 | 0.00 | 0.00    |

| Contribution Type | Trials |
|-------------------|--------|
| Direct            | 5      |
| Inverted          | 0      |

### Validation Analysis

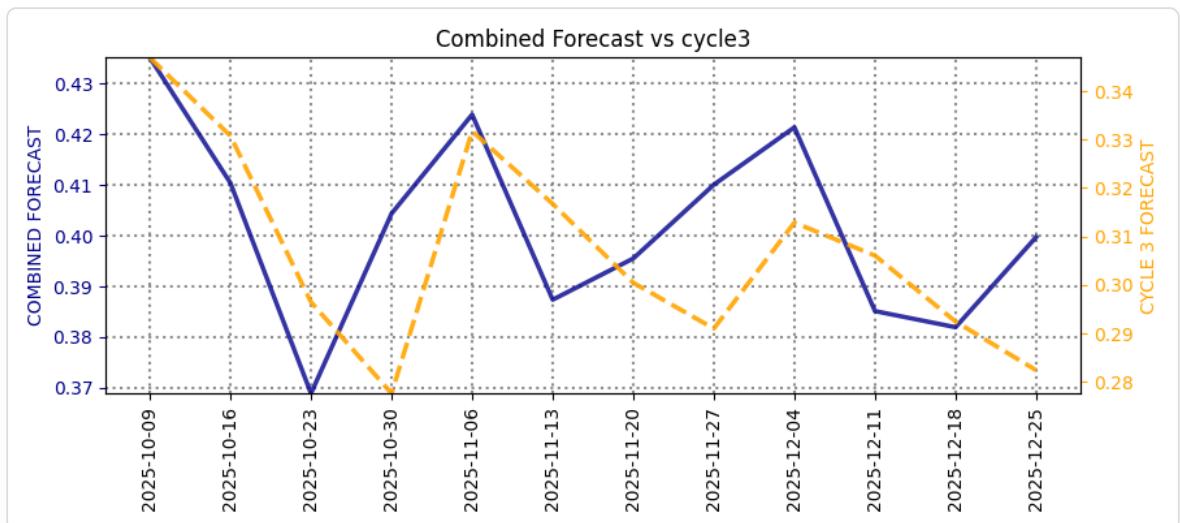
Best trial validation for this cycle contrasted with real values.



### Forecast Analysis

Best trial forecast for this cycle versus the combined forecast.

## Features Analysis • CYCLE3 Analysis



## Complete Dataset Overview

*Analysis of ALL features present in the source files*

|            | Astro | Tropo | Pos  |
|------------|-------|-------|------|
| Count      | 17    | 0     | 0    |
| Percentage | 85.0% | 0.0%  | 0.0% |

## Summary Insights

Complete Dataset:

- **Astronomical data** represents 85.0% of all features (17 features)
  - **Target variables** represent 10.0% of all features (2 features)
  - **Dominant category in complete dataset:** Astro features
-

## CYCLE4 Analysis

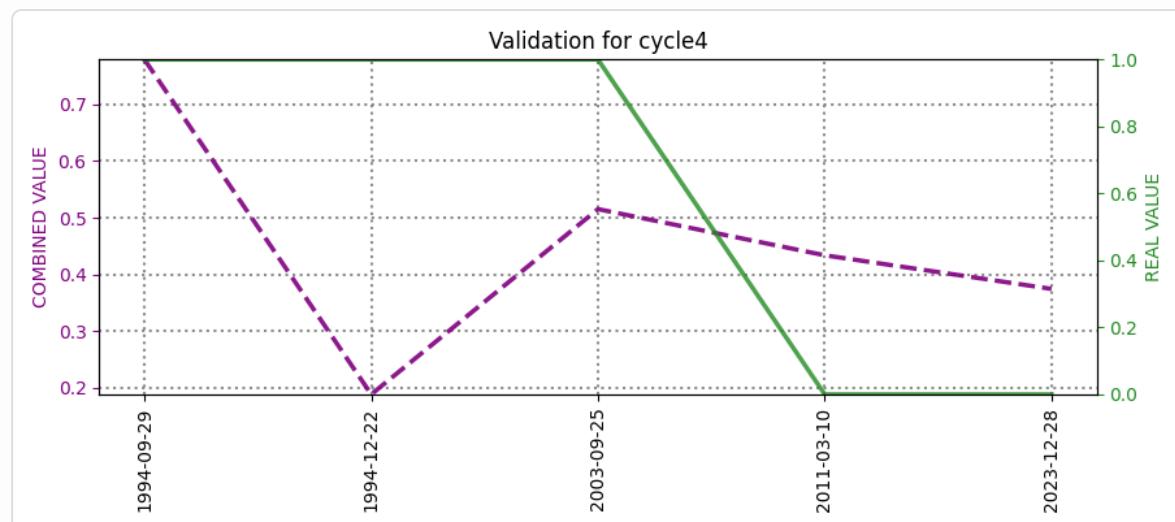
### Trial Statistics

| Metric                              | Min  | Max  | Average |
|-------------------------------------|------|------|---------|
| Hyperopt Loss (lower is better)     | 0.10 | 0.60 | 0.47    |
| Metric Score (F1) (lower is better) | 0.00 | 0.20 | 0.10    |

| Contribution Type | Trials |
|-------------------|--------|
| Direct            | 5      |
| Inverted          | 0      |

### Validation Analysis

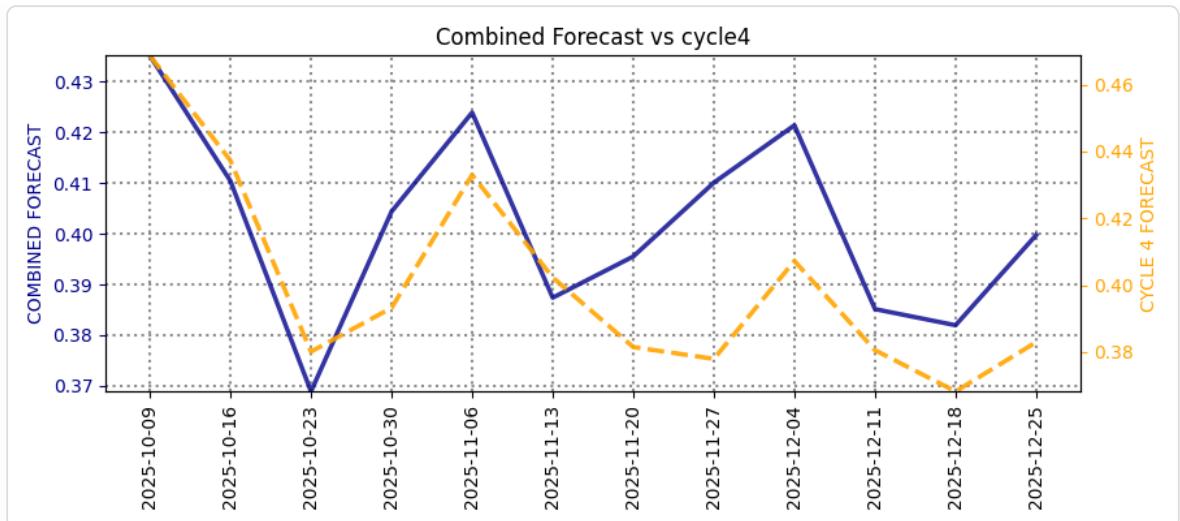
Best trial validation for this cycle contrasted with real values.



### Forecast Analysis

Best trial forecast for this cycle versus the combined forecast.

## Features Analysis • CYCLE4 Analysis



## Complete Dataset Overview

*Analysis of ALL features present in the source files*

|            | Astro | Tropo | Pos  |
|------------|-------|-------|------|
| Count      | 20    | 0     | 0    |
| Percentage | 87.0% | 0.0%  | 0.0% |

## Summary Insights

Complete Dataset:

- **Astronomical data** represents 87.0% of all features (20 features)
- **Target variables** represent 8.7% of all features (2 features)
- **Dominant category in complete dataset:** Astro features

## Cross-Cycle Summary

| Cycle         | Best Trial | GPS Features | Tropo Features | Astro Features | Hyperopt Loss | Metric Score (F1) | Hybrid Score |
|---------------|------------|--------------|----------------|----------------|---------------|-------------------|--------------|
| explore       | 135        | N/A          | N/A            | 25             | 0.50          | 0.00              | 0.25         |
| cycle1        | 122        | N/A          | N/A            | 13             | 0.51          | 0.00              | 0.25         |
| <b>cycle2</b> | <b>127</b> | <b>N/A</b>   | <b>N/A</b>     | <b>22</b>      | <b>0.07</b>   | <b>0.00</b>       | <b>0.04</b>  |
| cycle3        | 199        | N/A          | N/A            | 17             | 0.51          | 0.00              | 0.26         |
| cycle4        | 12         | N/A          | N/A            | 20             | 0.10          | 0.14              | 0.12         |

## 5. Astronomical Features Used

### Astronomical Features Used per Cycle - trialsetJAPAN-M75- LAT-39\_20251104-075216

**Focus cycle:** cycle2

| Cycle   | Loss        | Hybrid      | Bodies   | Observers                     | Ephemerides  | Operations      |
|---------|-------------|-------------|--|-------------------------------|--|-----------------|
| explore | 0.50        | 0.25        | 10,<br>101955,<br>136199,<br>299,<br>499             | geo_35.6895;139.6917;0        | az, dec_rate,<br>delta_rate,<br>ra_rate,<br>suntargetpa                    | max             |
| cycle1  | 0.51        | 0.25        | 299,<br>301,<br>699                                  | geo_35.6895;139.6917;0        | delta, delta_rate,<br>el, ra_rate  | max, min        |
| cycle2  | <b>0.07</b> | <b>0.04</b> | <b>101955,<br/>136199,<br/>301,<br/>499,<br/>599</b> | <b>geo_35.6895;139.6917;0</b> | <b>dec_rate, delta,<br/>delta_rate,<br/>lunar_presence,<br/>velocitypa</b> | <b>max, min</b> |
| cycle3  | 0.51        | 0.26        | 101955,<br>136199,<br>499,<br>502                    | geo_35.6895;139.6917;0        | az, dec_rate,<br>delta, velocitypa   | max             |
| cycle4  | 0.10        | 0.12        | 10,<br>136199,<br>301,<br>499,<br>599                | geo_35.6895;139.6917;0        | delta, delta_rate,<br>el, velocitypa                                       | max, min        |

*Bodies are represented by their NAIF ID (unique identifiers for celestial bodies from NASA/JPL); observers use geo\_lat;lon;height schema. Ephemerides are Horizons fields; operations are aggregations like min/max.*

## 6. Summary and Conclusion

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### Summary of Findings

Forecasted latitude relative to threshold 39.0. Below threshold on: 2025-10-09, 2025-10-16, 2025-10-23, 2025-10-30, 2025-11-06, 2025-11-13, 2025-11-20, 2025-11-27, 2025-12-04, 2025-12-11, 2025-12-18, 2025-12-25 (UTC).

### Conclusions

Predicted values are below on 2025-10-09, 2025-10-16, 2025-10-23, 2025-10-30, 2025-11-06, 2025-11-13, 2025-11-20, 2025-11-27, 2025-12-04, 2025-12-11, 2025-12-18, 2025-12-25 relative to the threshold.

Even if the risk appears slight or moderate, preparation is necessary because the epicenter could be near your location. A separate report is required to estimate its position. AI-generated reports may create false alarms or underestimate the risks. Do not use this report to make important decisions. This work is for research purposes only.

## 7. Attribution and Disclaimers

### Data Sources

- Seismic data utilized in this report is sourced from the **USGS Earthquake Catalog** and the **Japan Meteorological Agency (JMA)**.
- Planetary ephemeris data provided by **NASA/JPL Horizons System**.
- All tropo + gps positional data provided by **NASA/JPL**

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### Responsibility Statement

The analysis and conclusions represent the best judgment of our research team based on the available data. This is not an official warning or alert. For official information, please consult your local government and geological survey authorities.