SnT 2025 8 SEPTEMBER ONLINE DAY 9 TO 12 SEPTEMBER AT HOFBURG PALACE, VIENNA & ONLINE
CTBT: SCIENCE AND TECHNOLOGY CONFERENCE

P3.4-852

CTBT Auxiliary Station Baumata (AS45) Data Quality Using Template Matching Technique and PSD Evaluation

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INTRODUCTION AND MAIN RESULTS

The Baumata (AS45) Auxiliary Stations in Indonesia is part of the CTBT monitoring network. Their data quality is checked using two methods. Template Matching helps find repeated seismic signals and tests how well the stations can detect small events. Power Spectral Density (PSD) analysis measures background noise and compares it to Peterson global noise model. Together, these methods show that AS45 provide reliable seismic data for seismic monitoring.

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Introduction

The Baumata (AS45) Auxiliary Station in Indonesia is part of the CTBT International Monitoring System, which is designed to detect seismic events, including possible nuclear explosions. To ensure reliable performance, the quality of seismic data must be regularly evaluated. Two commonly used approaches are Template Matching and Power Spectral Density (PSD) analysis.

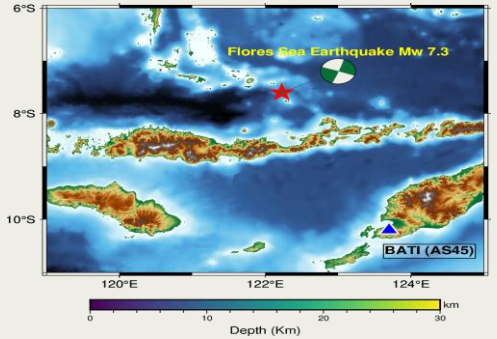


Fig 1. Mw 7.3 Flores Sea Earthquake (red star), AS45 Station (blue triangle)

Methods/Data

Power Spectral Density (PSD) : Noise levels are calculated across frequency bands and compared with the Peterson global noise model. This identifies if the station records are within acceptable noise limits.

Template Matching : A waveform from a known seismic event is used as a reference, and the data stream is searched for similar patterns. This method checks the sensitivity of the Auxiliary Station in detecting repeated or small seismic events.

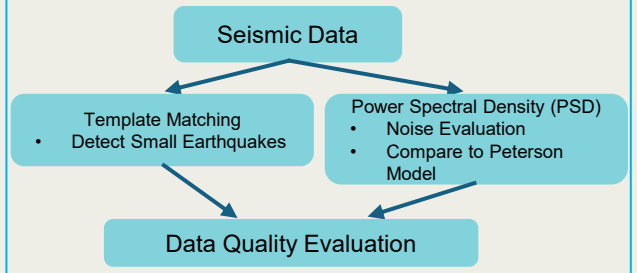


Fig 2. Flowchart of Data Processing

Results

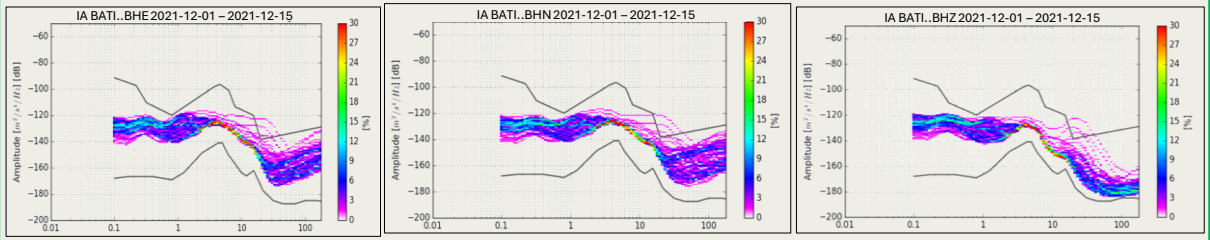
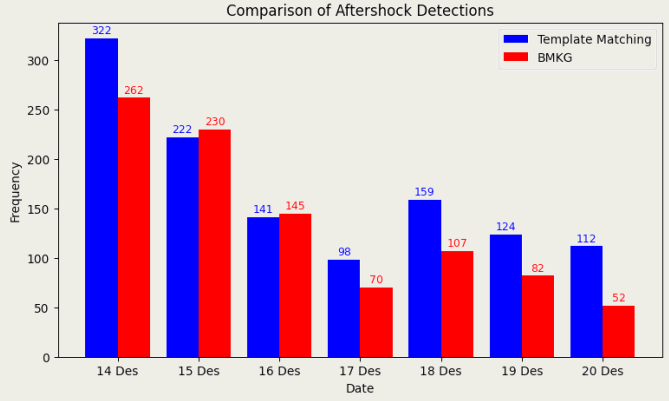


Fig 3. Power Spectral Density of AS45 Sensor

The PSD evaluation reveals that most of the noise levels fall within the global high- and low-noise models, confirming stable station performance. Some variations in noise are observed, mainly due to environmental factors, but these remain within acceptable limits. Combining both methods provides a comprehensive picture of the station's capability: Template Matching ensures event detectability, while PSD ensures background noise quality.



Template Matching shows that AS45 can consistently detect local and regional seismic events, indicating good signal sensitivity.

From the template matching process, a much larger number of aftershocks were detected

Conclusions

- Data quality at AS45 are reliable and good for seismic monitoring.
- Template Matching confirms strong event detection capability, while PSD evaluation verifies acceptable noise levels.
- Together, these methods support the station's role in providing trustworthy seismic data for global monitoring.

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