

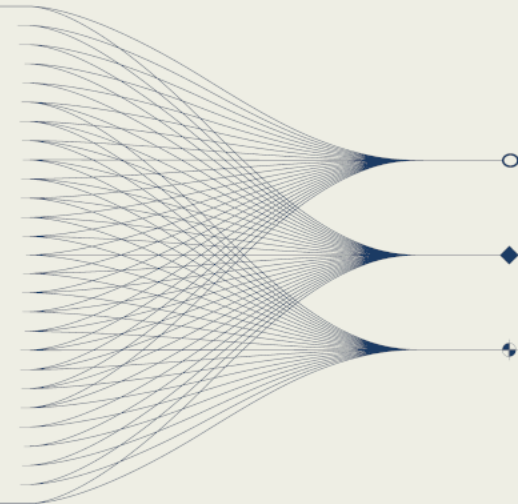
## Integration of mass position monitoring and auto centering on Indonesian seismic networks

Amir Julian Bahari Gunawan

The Agency for Meteorology Climatology and Geophysics of  
Indonesia



Presentation Date: 9 September 2025





## The Outline

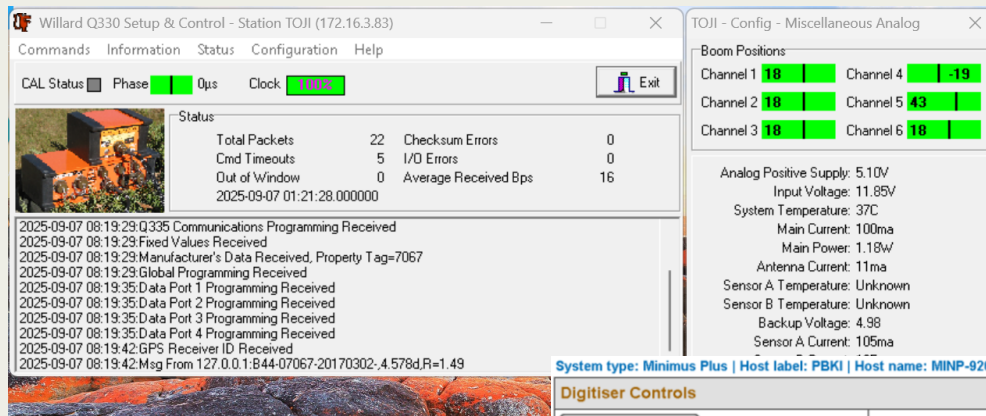
1. The Challenge in Indonesian Seismic Network Maintenance
2. System Integration as alternative solution
3. Proposed Advantages and Challenges

## The Challenge in Indonesian Seismic Network Maintenance

Maintaining optimal performance in large, diverse seismic networks.

**Fragmentation:** Different manufacturers use incompatible interfaces.

**Inconsistent Monitoring:** Manual data collection and health checks are inefficient and unreliable.



System type: Minimus Plus | Host label: PBKI | Host name: MINP-9260 (172.17.82.122) | Serial number: 09260

**Digitiser Controls**

Reboot Reset All Settings The "Reset All Settings" button will ALSO affect settings on other pages

**Digitiser Config**

Host Label PBKI Station Code PBKI Network Code IA Site Name PBKI

SeedLink SOH Location Code 00

**Analogue Sensors**

Selection

MILSPEC 26W Connector ANALOGUE 0

**Analogue to Digital Converter**

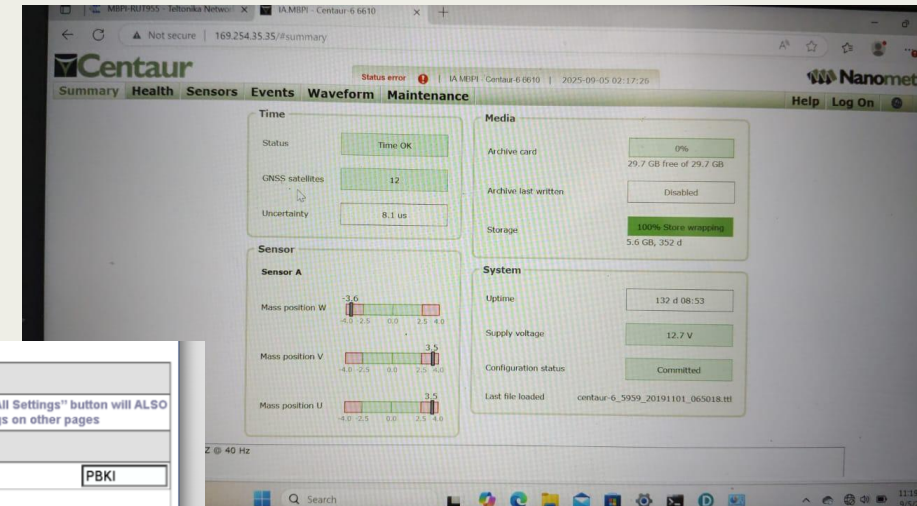
Input gain x1.0 Input range +/- 20.48 V Input resolution 2.441 uV/count

**Identification**

Sensor type Guralp 3T Status LED idle

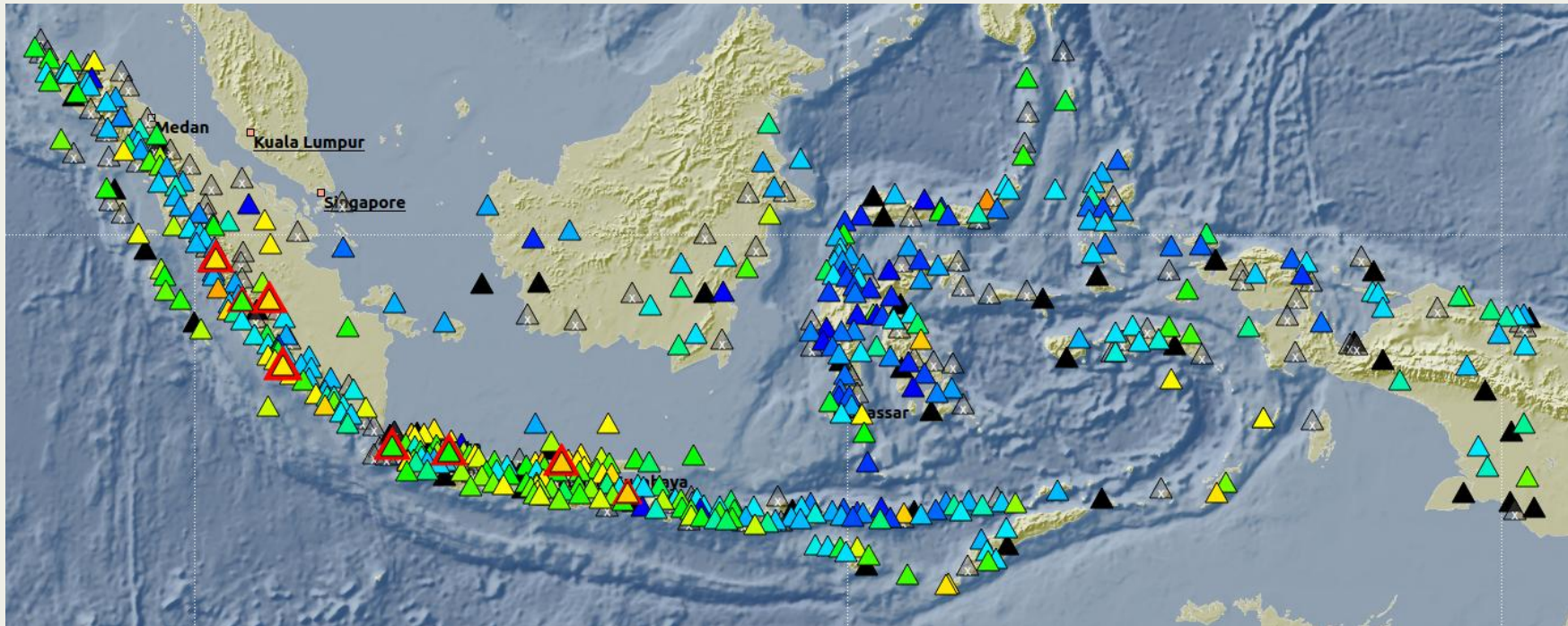
**Mass Centring**

Centre Mass	Mass Readout Z	10.200000 V	Mass Readout N	-9.717501 V	Mass Readout E	0.996250 V
Mass Threshold	4	Recentre Count	27793			



## The Challenge in Indonesian Seismic Network Maintenance

**Geographic Scale:** Large networks like Indonesia's exacerbate these challenges.



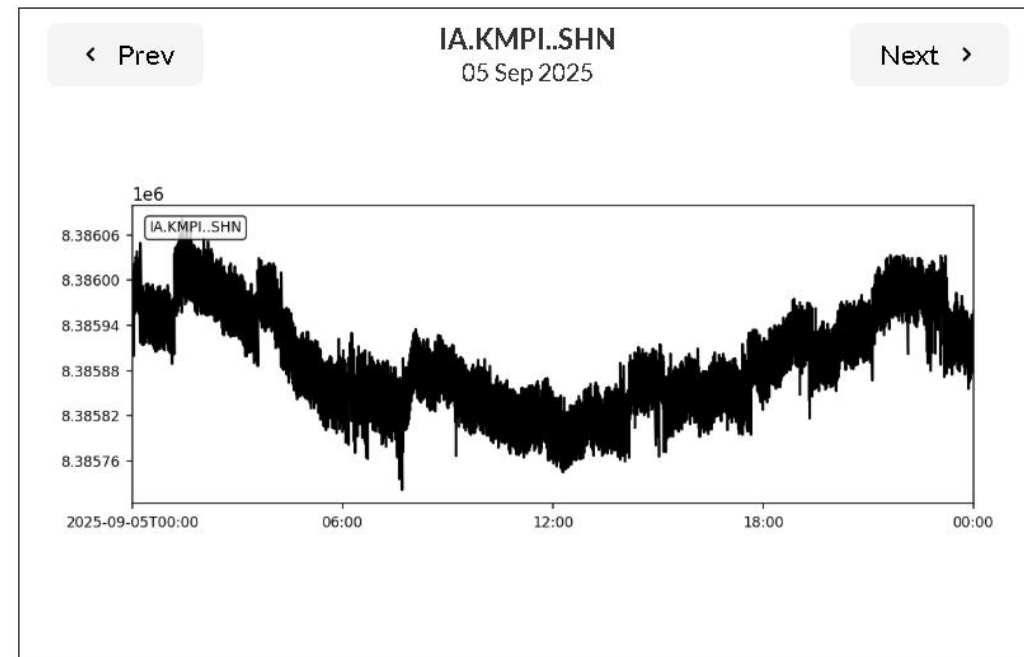
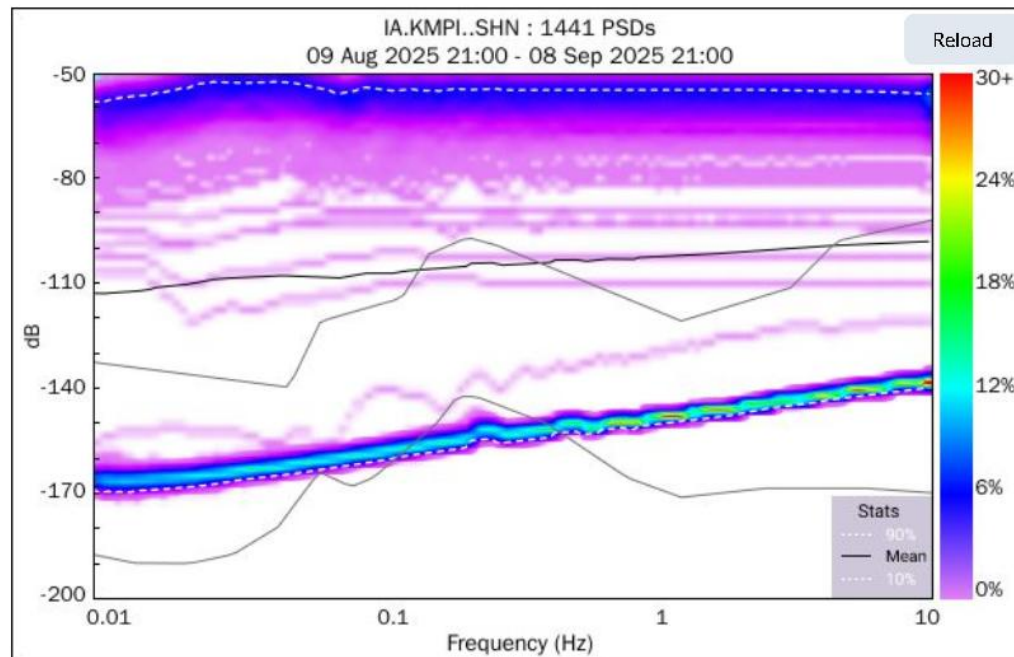
Indonesian Seismic Network Consist of 552 stations





## The Challenge in Indonesian Seismic Network Maintenance

**Core Issue:** Compromised sensor mass position leads to poor seismic data quality.





## System Integration as alternative solution

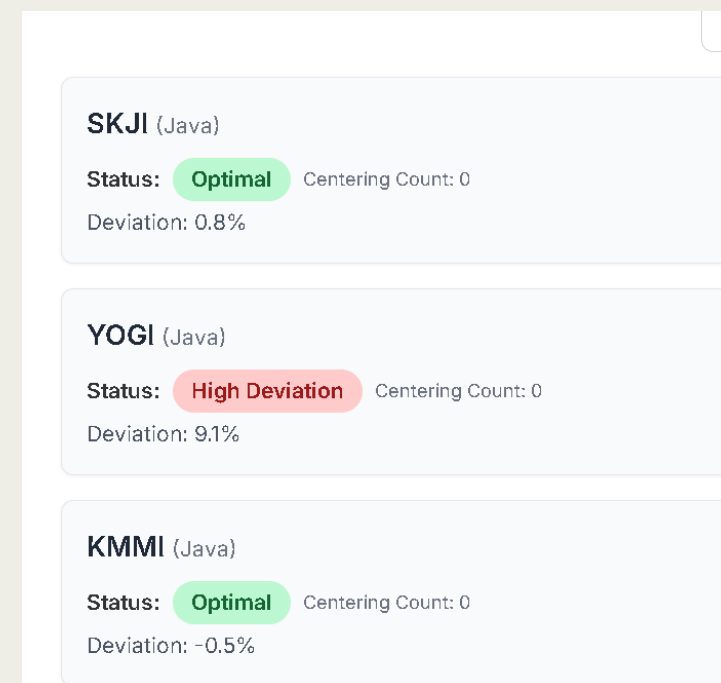
A Web-based dashboard utilizing HTTP to get data and post commands from the Digitizer's web-based GUI.

The screenshot shows a web-based dashboard for managing seismic sensors. At the top, there are tabs for 'All Regions', 'Java', 'Sumatra', and 'Kalimantan'. Below the tabs is a search bar labeled 'Search sensor by ID or region...'. The dashboard displays four sensor entries, each with a status indicator, centering count, deviation, and control buttons.

Sensor ID	Region	Status	Centering Count	Deviation	Check Digitizer	Center Mass	Toggle
SKJI	Java	Optimal	0	0.8%	Check Digitizer	Center Mass	Off
YOGI	Java	High Deviation	0	9.1%	Check Digitizer	Center Mass	Off
KMMI	Java	Optimal	0	-0.5%	Check Digitizer	Center Mass	Off
PABI	Sumatra	Optimal	0	1.5%	Check Digitizer	Center Mass	Off

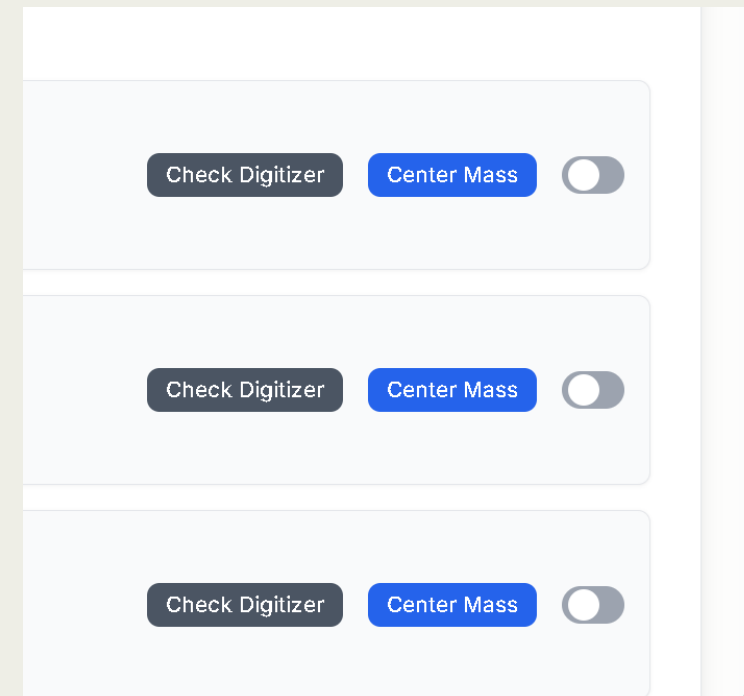
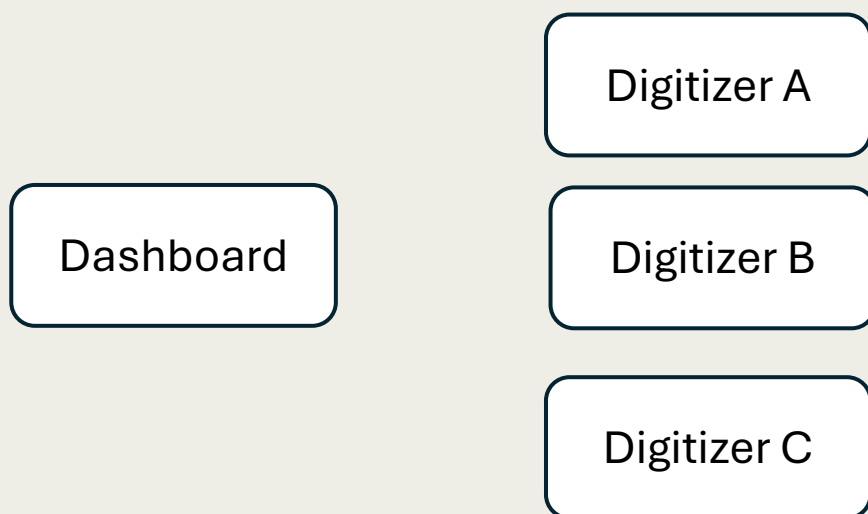
## System Integration as alternative solution

**The Unified Dashboard** is a web-based platform that brings together critical data from all digitizer interfaces, transforming disparate information into a cohesive, centralized view. This dashboard allows for real-time monitoring of sensor health and mass position, with intuitive data visualization that enables users to instantly identify trends and anomalies. Additionally, its filtering capabilities provide the flexibility to explore data by specific regions or individual sensors.



## System Integration as alternative solution

The Integrated Controller is an intelligent system designed to automate key maintenance tasks, shifting the process from reactive to predictive. It features an automated re-centering function that automatically adjusts the sensor mass position when a deviation is detected, thereby preventing data quality issues before they can occur. This system significantly reduces the need for manual, on-site interventions, saving valuable time and resources.







## Proposed Advantages and Challenges

Maximizing Efficiency, Data Quality, and Reliability.

**Enhanced Operational Efficiency:** Centralization and automation streamline processes.

**High-Quality Data:** Ensures the integrity and reliability of seismic signals.

**Minimized Downtime:** Proactive maintenance prevents costly and time-consuming repairs.

**Scalable Blueprint:** A proven model for optimizing any multi-vendor seismic network globally.

Challenges:

HTTP lacks in security and poses a risk for network attack. A better protocol with encryption is desired.