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

Development of a Fault and 1-D Seismic Velocity Model Database for Madagascar: Implication for Tectonic Studies.

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INTRODUCTION AND MAIN RESULTS

This presentation provides an overview of the fault distribution and velocity model structure of Madagascar. All published information on fault lines, along with studies on velocity structures derived from seismic data collected by our National Data Center and temporary seismic stations, has been compiled into a centralized database to support research and analysis under authorized access. Our main results include a regional classification of fault lines and a systematic classification of velocity structures by method, contributor, and seismic station.

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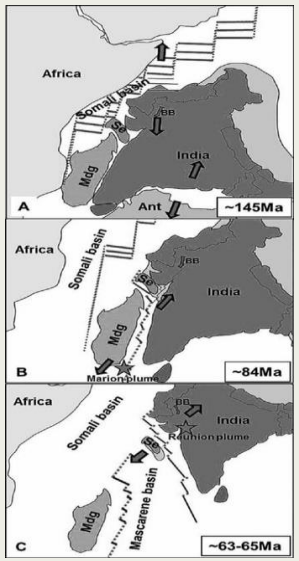
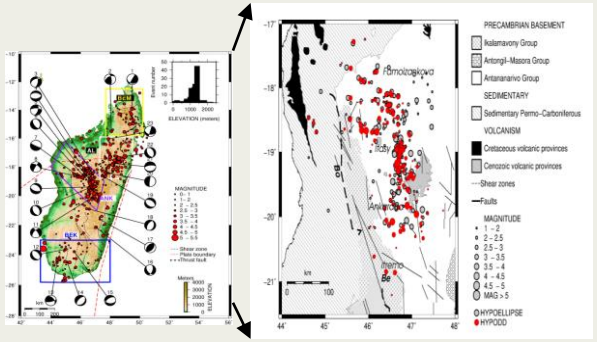
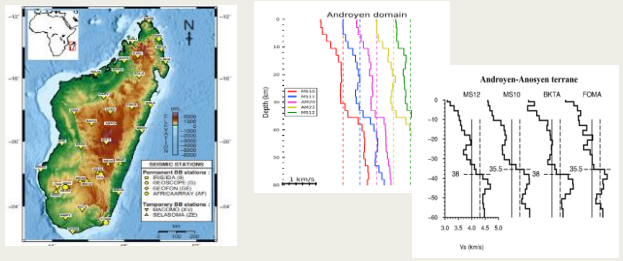
Introduction





Rakotondraibe et al., 2020



Andriampenomanana et al., 2017

- Active tectonic dynamics in Madagascar, including ongoing rifting and faulting.
- . Critical need for a comprehensive database to support tectonic studies.

Objectives:

- Create a national reference database for Madagascar for fault community and velocity structure.
- Define existing faults (active- non active- non identified): Update of the tectonic Map.
- Group seismic velocity results for Madagascar.

Methods/ Data

Data collection

- Geological map, Satellite, Seismological study, Geophysics.

Fault catalog

- Categorized by zone (Color scale)
- Parameters: Strike, dip, rake, length, location.
- Categorized by the authors.

Seismic velocity model compilation

- 1-D and 3-D velocity model compiled from published researches.
- Parameters: P-waves, S-waves, Depth.

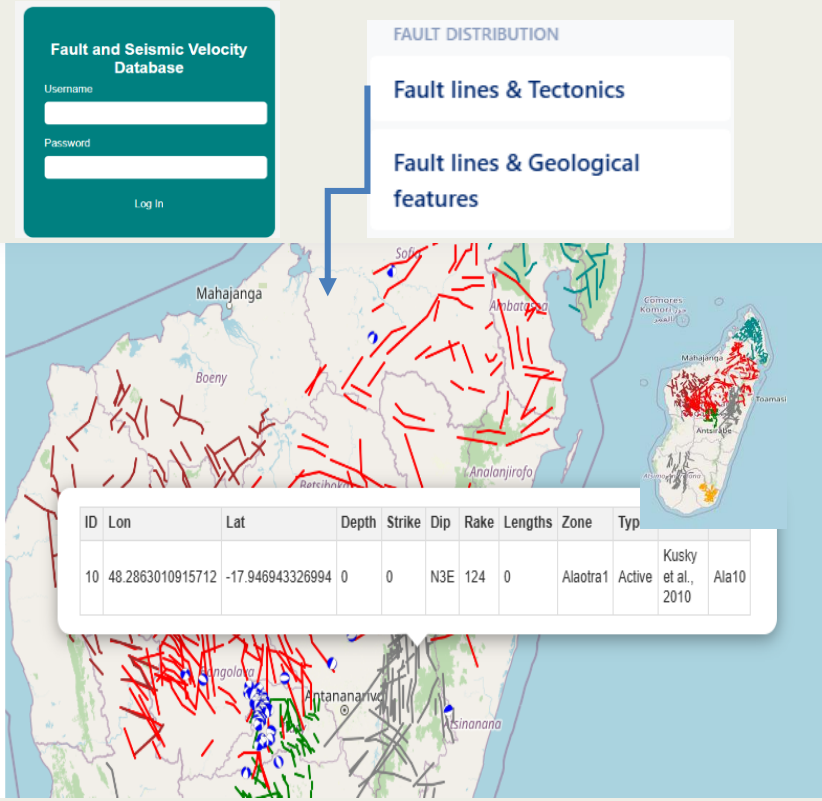
Quality checks

- Poorly constrained data: discarded to ensure reliability.

Data check → Interface creation → Maintenance & update

Reliable & Comprehensive Fault Database and Velocity Model

Results



ID	Lon	Lat	Depth	Strike	Dip	Rake	Lengths	Zone	Typ		
10	48.2863010915712	-17.946943326994	0	0	N3E	124	0	Alaotra1	Active	Kusky et al., 2010	Ala10

- Fault direction : Based on Focal mechanism results, geological survey.
- Distinction of the fault line position and location.
- Acess to all information about the fault.

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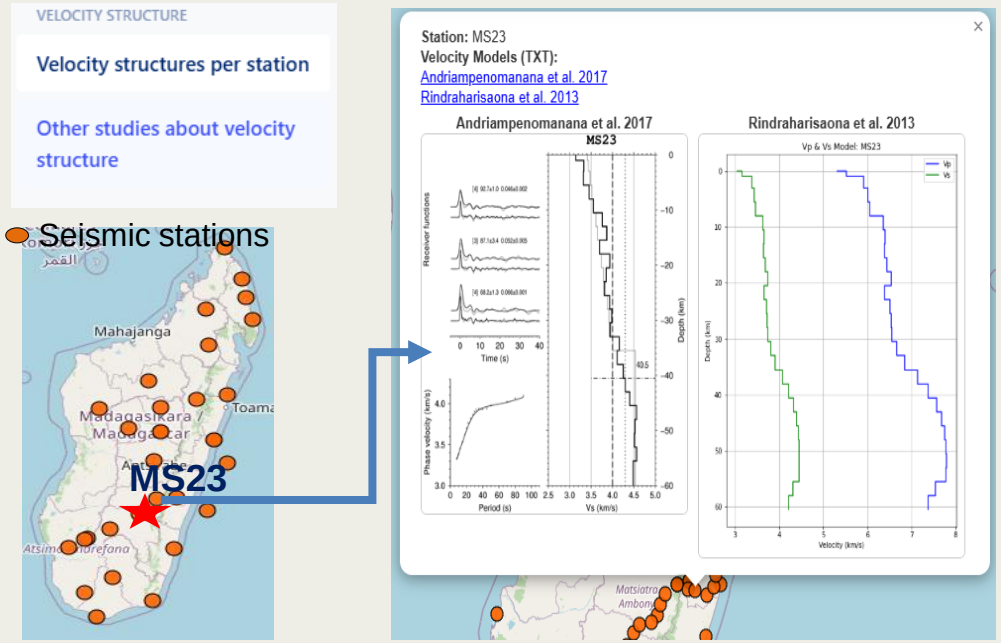
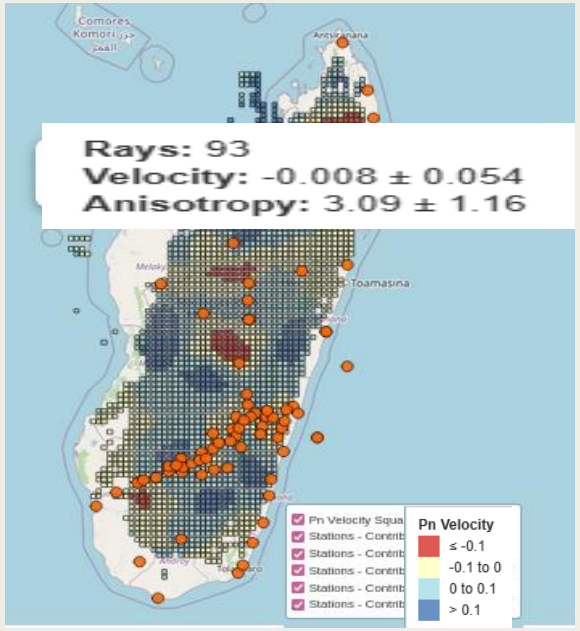
Results

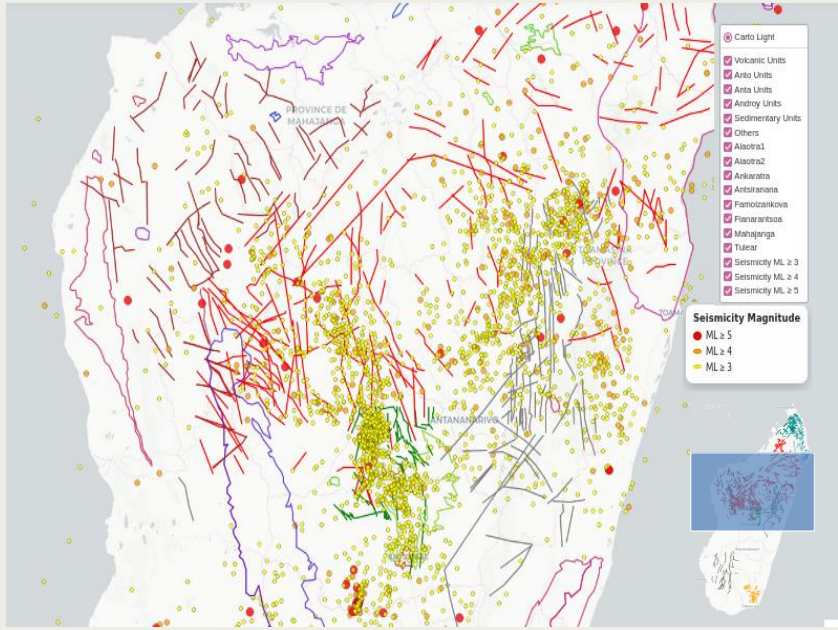


- 1D velocity structure:
  - From various authors (Andriampenomanana et al., 2017 and Rindraharisaona et al., 2020)
  - From different seismic station
  - From different methods

Perspective



- 3D velocity structure: Lateral variation of Pn Velocity
- Shear velocity structure of the crust and upper mantle of Madagascar (From surface wave tomography: Pratt et al., 2016)
- Velocity structure and radial anisotropy of the lithosphere in southern Madagascar (From Surface wave dispersion: Rindraharisaona et a., 2020)



- Relationship between earthquakes and known faults
- Improving 3D seismotectonic's model: geological structure, active faults, and earthquake activity
- Source zonation: essential resource for risk analysis

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