



# INSIGHTS ON THE SEISMOGRAM DATABASE AT THE TIMISOARA SEISMOLOGICAL OBSERVATORY: NATIONAL INSTITUTE FOR EARTH PHYSICS

Adina Rău<sup>1</sup>, Mihaela Popa<sup>2</sup>, Victoria Oancea<sup>3</sup>, Daniel Paulescu<sup>1</sup>, Mihail Lungu<sup>4</sup>

1 National Institute for Earth Physics, Romania

2 Academy of Romanian Scientists, Romania

3 LEIDOS, U.S.A.

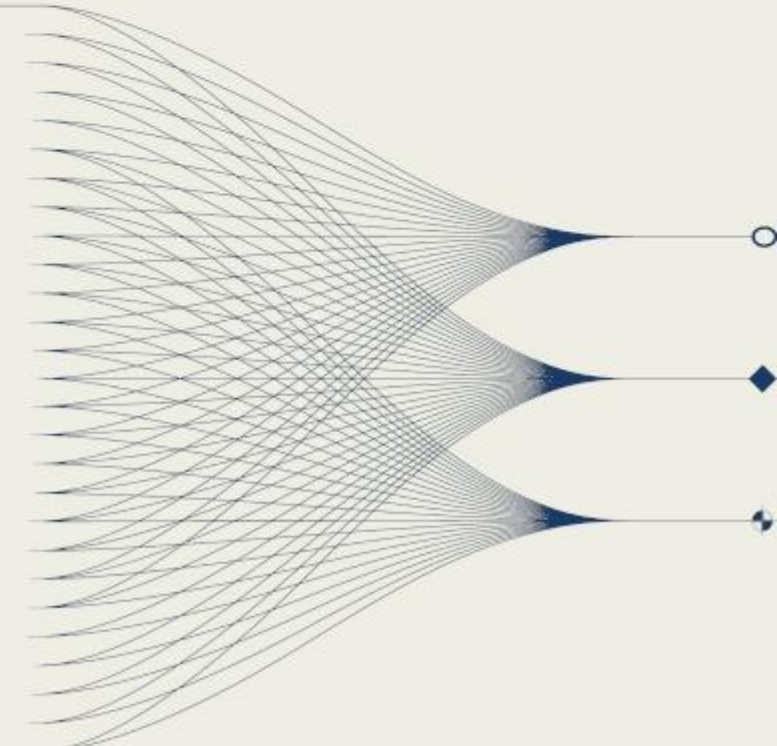
4 West Univerisity of Timisoara, Romania



## INTRODUCTION AND MAIN RESULTS

The National Institute for Earth Physics has a considerable archive of seismograms, documents and equipment related with the evolution of seismology in Romania. Part of this seismological treasure is preserved and stored at the Timisoara Seismological Observatory.

Our goal is to preserve, sort, index and scan the paper seismograms and documents within the Timisoara Seismological Observatory Archive and build up a unitary collection of nuclear tests recorded in Romania. Currently we are contributing with scanned seismograms and metadata information to the Nuclear Explosion Legacy Data repository.





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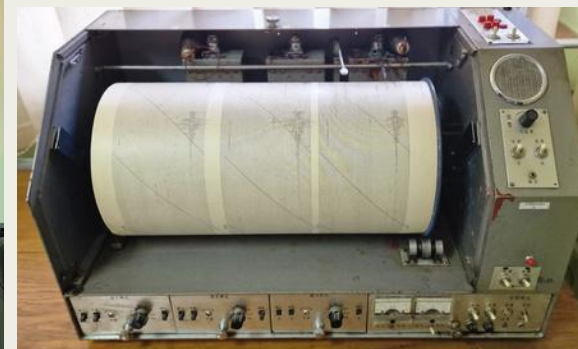
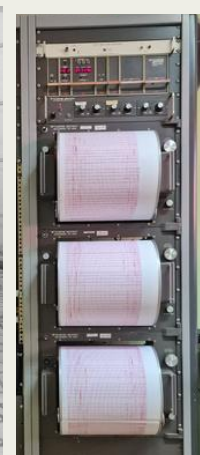
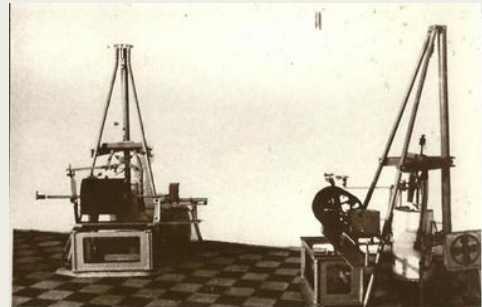
## INTRODUCTION

The National Institute for Earth Physics (NIEP) has a unique collection of seismograms, documents, and instruments from the early stages of seismic network development. While today's Romanian Seismic Network uses advanced technology, evidence of the gradual evolution of these instruments and unique recordings are preserved in the seismological archive at Bucharest headquarters and in the Timisoara Seismological Observatory.

This presentation aims to offer insight into the activity pursued at the Timisoara Observatory for saving, preserving and digital transfer and storage of the seismograms and other important documents.

A short inventory the Seismological Archive of Timisoara:

- Over 120,000 seismograms: smoked paper, photographic paper, ink on paper
- Lanternslides of local earthquakes
- Station books and documents
- Four mechanical seismographs in conservation state (Mainka and Mainka-Curea-Demetrescu)
- Electromagnetic seismograph SKM-III (Kirnos, Russia)
- Electrodynamic seismometer DD1 (Peking Factory, China)
- Electrodynamic seismometer S13 (Teledyne Geotech, USA - still functional)



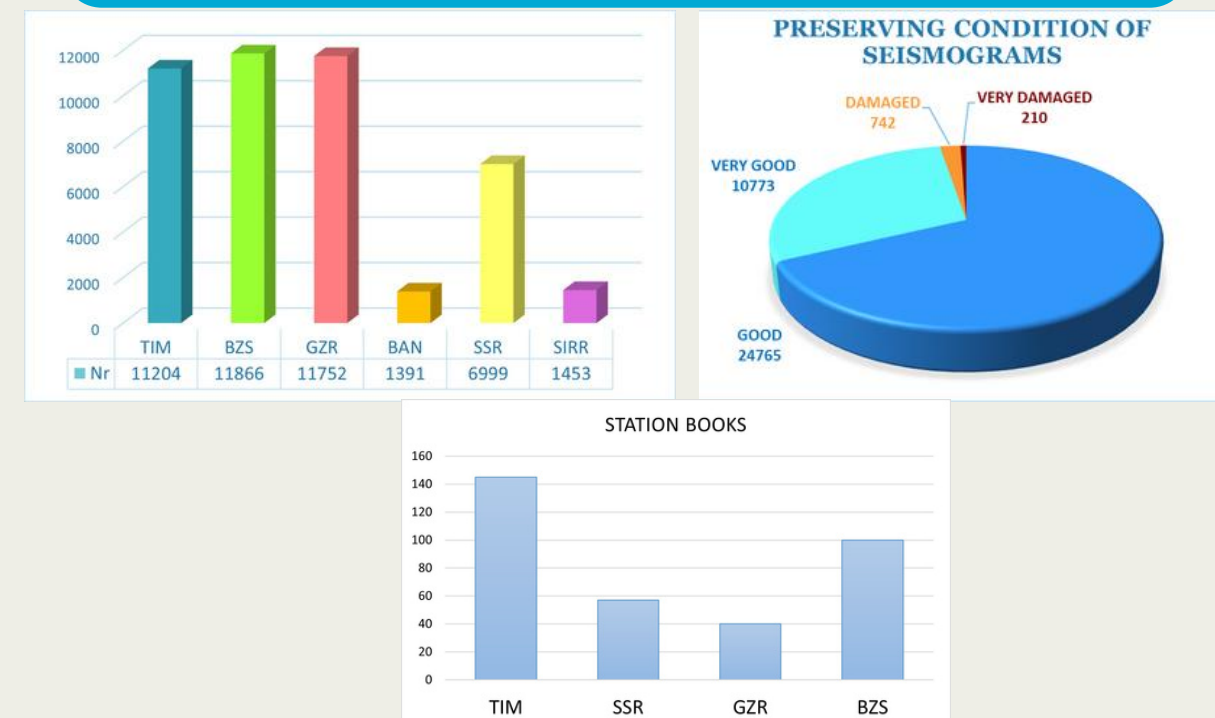
## METHODS

The Seismological Archive of Timisoara Observatory sums up recordings from six seismic stations: Timișoara (TIM), Șușara (SSR), Gura Zlata (GZR), Buziaș (BZS), Banloc (BANR), Șiria (SIRR) for the time interval 1943-2007.

The document and seismogram sorting activity assumes the following steps:

- sorting the seismograms by stations
- arranging the seismograms in chronological order
- sorting the seismograms by each instrument
- creating an indexed collection for each station with relevant information for each seismogram
- searching information in the station books on the evolution and functioning period of each instrument/station
- creating a collection of information on seismic equipment that functioned in the stations in western region of Romania
- scanning seismograms, station books, relevant documents and historical photos
- creating high detailed informational files (metadata) for each scanned seismogram, with relevant details on the analog recording and its quality, instrument, scanned output, etc.

## INVENTORY OF ASSETS @ TIMISOARA OBSERVATORY



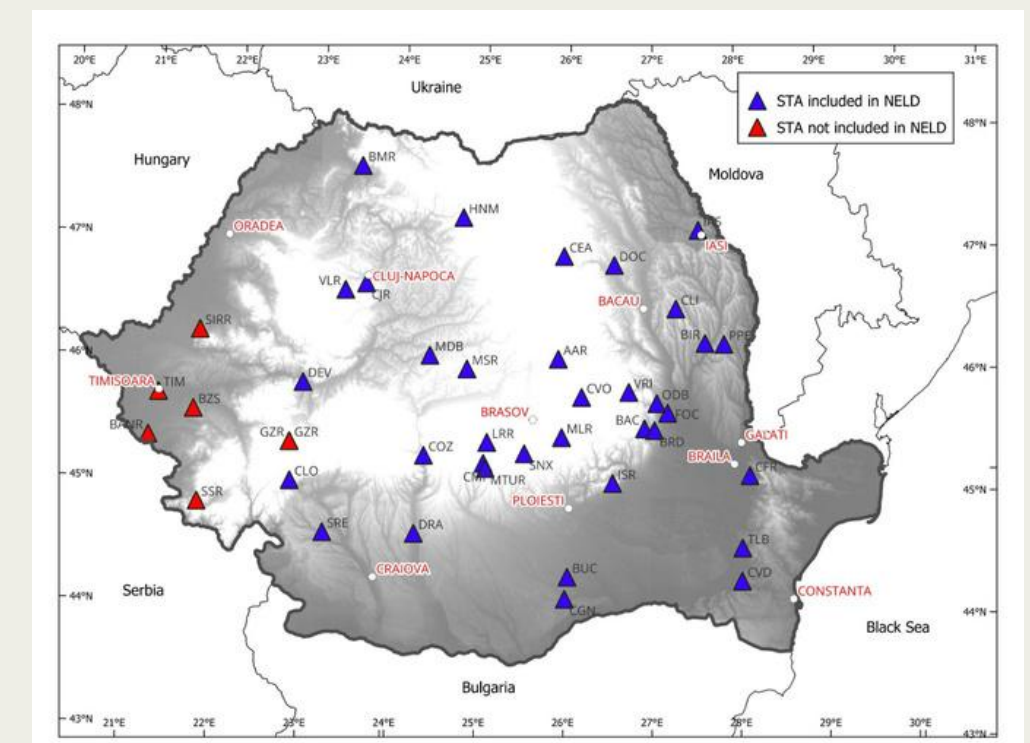
## RESULTS

By applying the mentioned steps, up to this date we managed to achieve:

- ✓ 45,000 seismograms manually sorted and chronologically indexed on station and instrument;
- ✓ Over 300 indexed station books. Over 20 of them scanned and transcribed into editable documents until now;
- ✓ Over 1,500 indexed catalogues of international seismic bulletins and publications
- ✓ Gathering relevant information for seismic instruments on each station (ongoing activity)
- ✓ **Contributions to Legacy Data Rescue for Nuclear Explosion Monitoring Data (NELD)**

NIEP participated at NELD seismogram repository with seismogram recordings in Bucharest Archive (blue stations on map).

**The first set of seismograms stored in the Timisoara Seismic Observatory Archive are now included in NELD repository (red stations on map).**





Starting in January 2025, Timisoara Seismological Observatory contributed to the NELD repository with a dataset of 16 nuclear explosions recorded at the following stations: TIM, SSR, GZE, BZS.

The dataset contains 47 high resolution scanned seismograms, with associated metadata files. Data were transferred from NIEP to LEIDOS and were added to the other over 400 scans provided by NIEP in the past.

## EXAMPLES OF NUCLEAR EXPLOSION RECORDINGS

**Station: GZR**

Date/Time (GMT): 1983/09/24 – multiple explosions

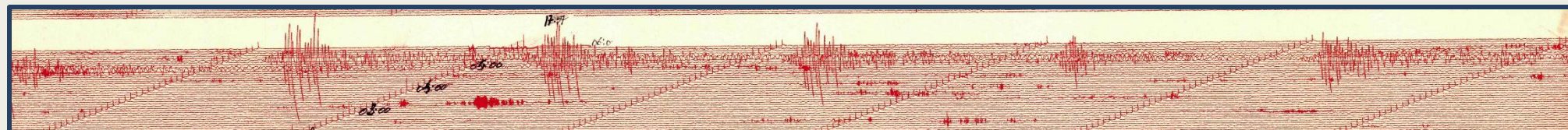
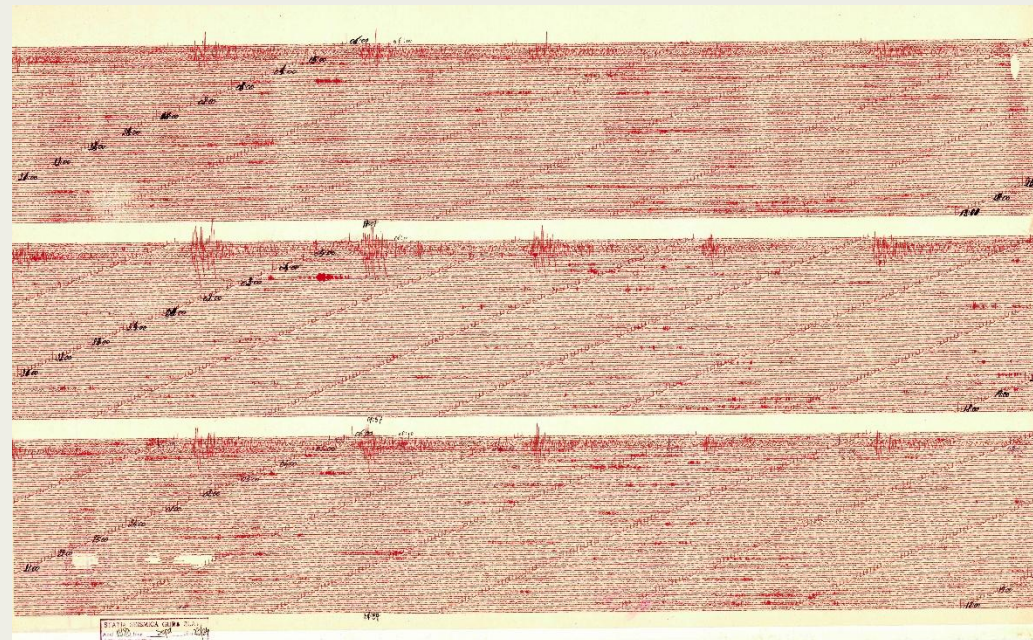
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Location: Western Soviet Union

Distance: 18.73 degrees

Recorded at Gura Zlata station (GZR), Romania

Instrument: DD1



## EXAMPLES OF NUCLEAR EXPLOSION RECORDINGS

**Station: SSR**

Date/Time (GMT): 1978/12/18 / 07:59:58

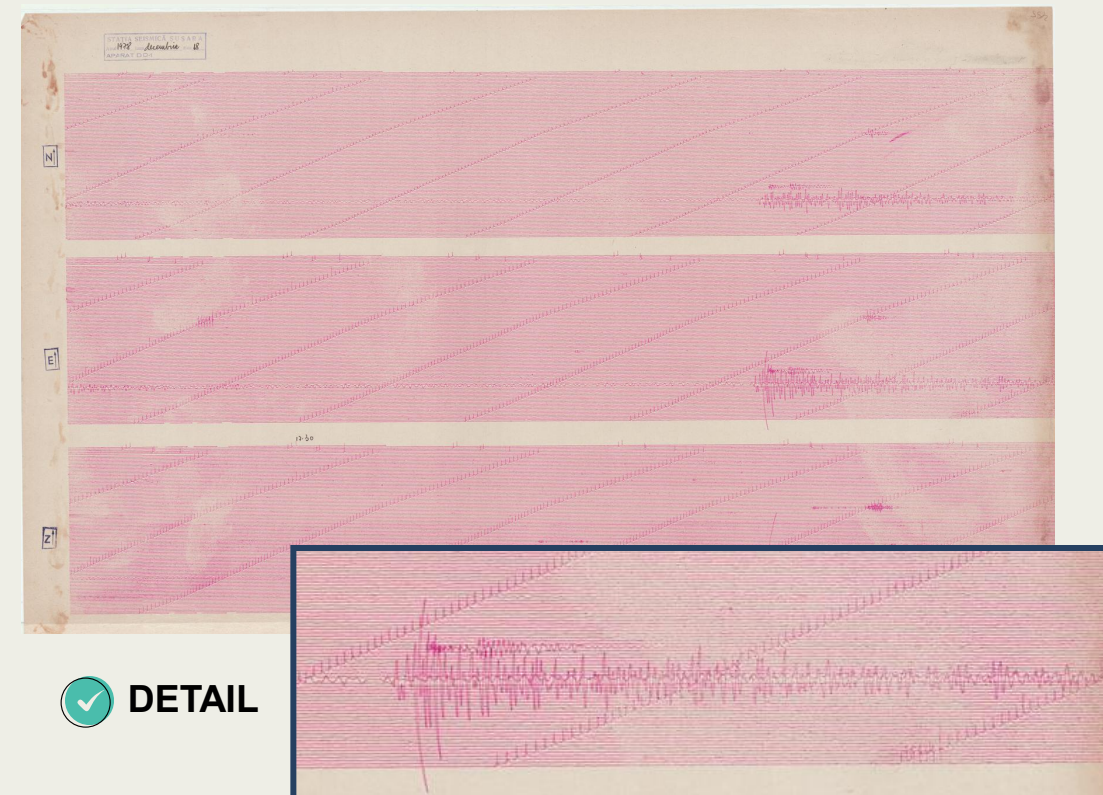
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Location: Western Soviet Union

Distance: 18.4 degrees

Recorded at Susara (SSR) Romania

Instrument: DD1



 **DETAIL**

## DETAIL ON MULTIPLE EXPLOSIONS

## CONCLUSIONS

- Timisoara Seismological Observatory has a considerable archive of recordings of local, regional and teleseismic events, historic photographs, documents and old instruments
  - In a good preservation state
  - Covering an extended period of time (1943-2007)
- Nuclear explosion recordings were identified on the seismograms in the archive. We shall continue to look for such recordings as we move forward with the archiving process.
- NIEP continues data exchange with LEIDOS to incorporate nuclear explosion data recorded on the stations from western Romania, in NELD.

