

ABSTRACT

Etna Volcano increased its activity in July 2024, and this was monitored by the International Monitoring System (IMS) infrasound network. At NDC Iraq, we will present an analysis of data from Etna Volcano in Italy, using the IMS stations I48TN, I26DE, I42PT, and I11CV. This analysis will utilize the NDC-in-a-box tools and will focus on the events of July 2024. We used International Data Centre (IDC) products related to volcanic activity to locate and analyze the data using DTK-GPMCC and Geotool software. In this work, we will check the events on July 7, 2024, July 15, 2024, and July 23, 2024, in the Etna Volcano area and correlate them with the LEB and REB Bulletins.

INTRODUCTION

Infrasound monitoring is one of the three waveform technologies utilized by the CTBT (Comprehensive Nuclear-Test-Ban Treaty) verification regime. The International Monitoring System (IMS) infrasound stations can detect very low-frequency sound waves emitted by volcanic eruptions, which could provide near real-time warnings. IMS infrasound stations detected the activity of Etna volcano in July. Towering above Catania on the island of Sicily, it has one of the world's longest documented records of volcanism, dating back to 1500 BCE. However, recent studies have revealed that this volcano is also capable of giving rise to highly explosive activity, such as the Plinian eruption of 122 BC. Through this work, we analyzed infrasound data using NDC-in-a-Box software.

METHOD

We analyzed infrasound data from the Etna Volcano using IMS stations, including I48TN, I42PT, I26DE, and I11CV. The analysis was conducted with NDC-in-a-Box tools (version SHINIAB_Jul2024_Rocky9.4), complemented by software such as GeotoolQT (version 7.0_3.2.3) and DTK-GPMCC (version 6.11.5). Additionally, secure web portal system tools were used to facilitate data access and processing.



Fig 1. IMS infrasound stations I26DE, I48TN, I42PT, I11CV



Fig 2. Etna Volcan

DATA ANALYSIS

Day 2024/07/07 three events from REB and LEB bulletins 04:52:20.44, 05:17:22.38 and 06:09:28.50. We requested data by VDMS in GeotoolQT to compare bulletin REB and LEB.



Fig 3. REB and LEB Bulletins 2024/07/07

INFRASOUND DATA

For the integration of the infrasound data, the waveforms of the I48TN, I26DE, and I11CV, I42PT stations were used. Third octave band configuration is a good compromise between computation time, frequency separation of sources over several decades, measure accuracy and detection of any type of source.

Day 7/7/2024

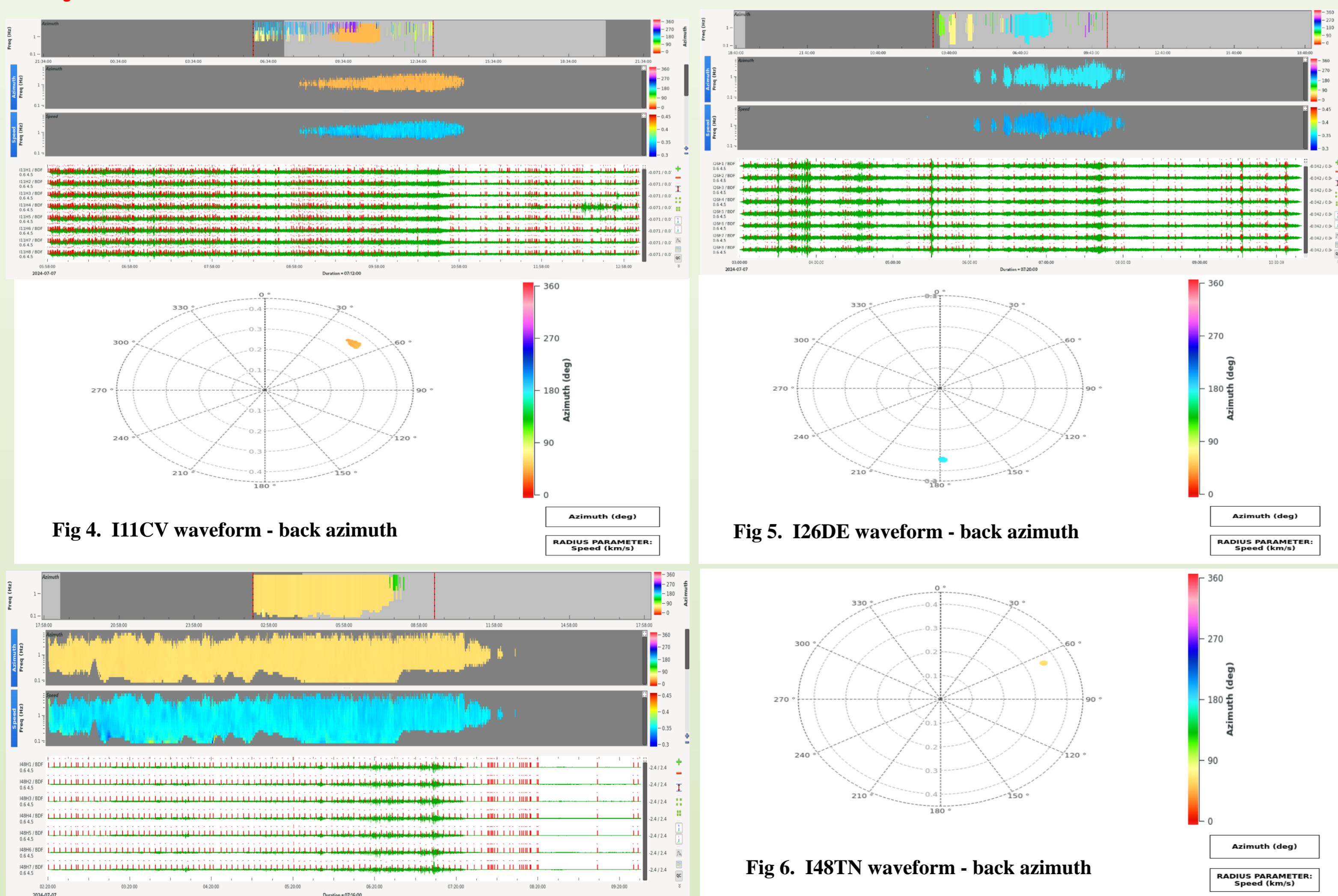


Fig 4. I11CV waveform - back azimuth

Fig 5. I26DE waveform - back azimuth

Fig 6. I48TN waveform - back azimuth

Day 15/7/2024

One event from REB 23:07:54.57 and two events in LEB bulletins 23:07:54.57, 20:01:50.76 we analyzed REB event. We requested data from VDMS in GeotoolQT to compare bulletin from REB and LEB.

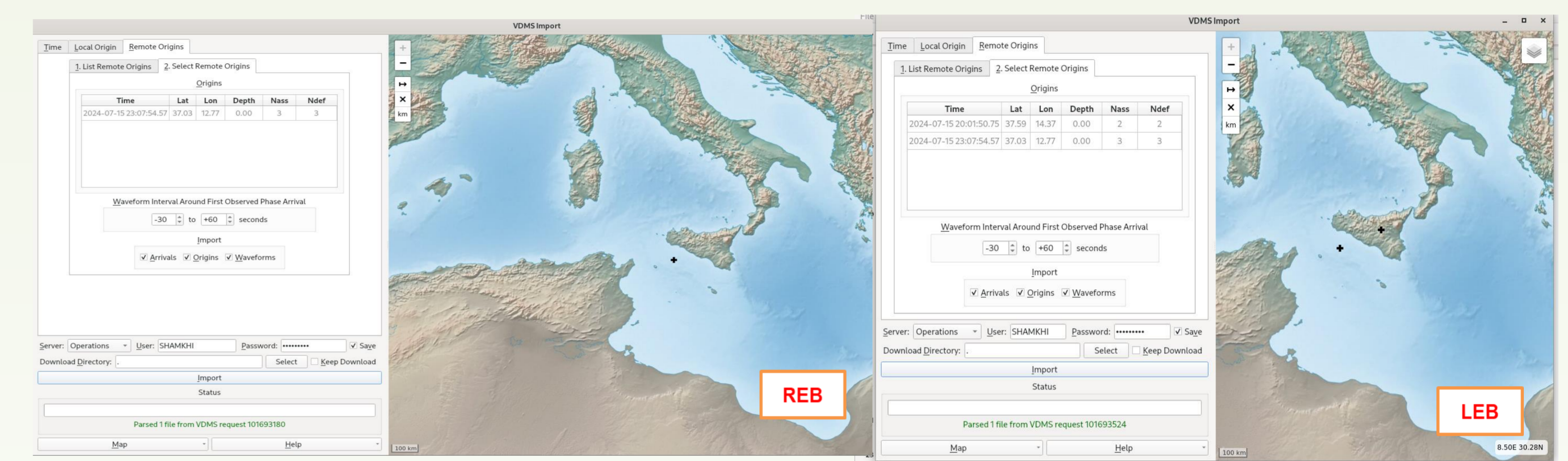


Fig 7. REB and LEB Bulletins 2024/07/15

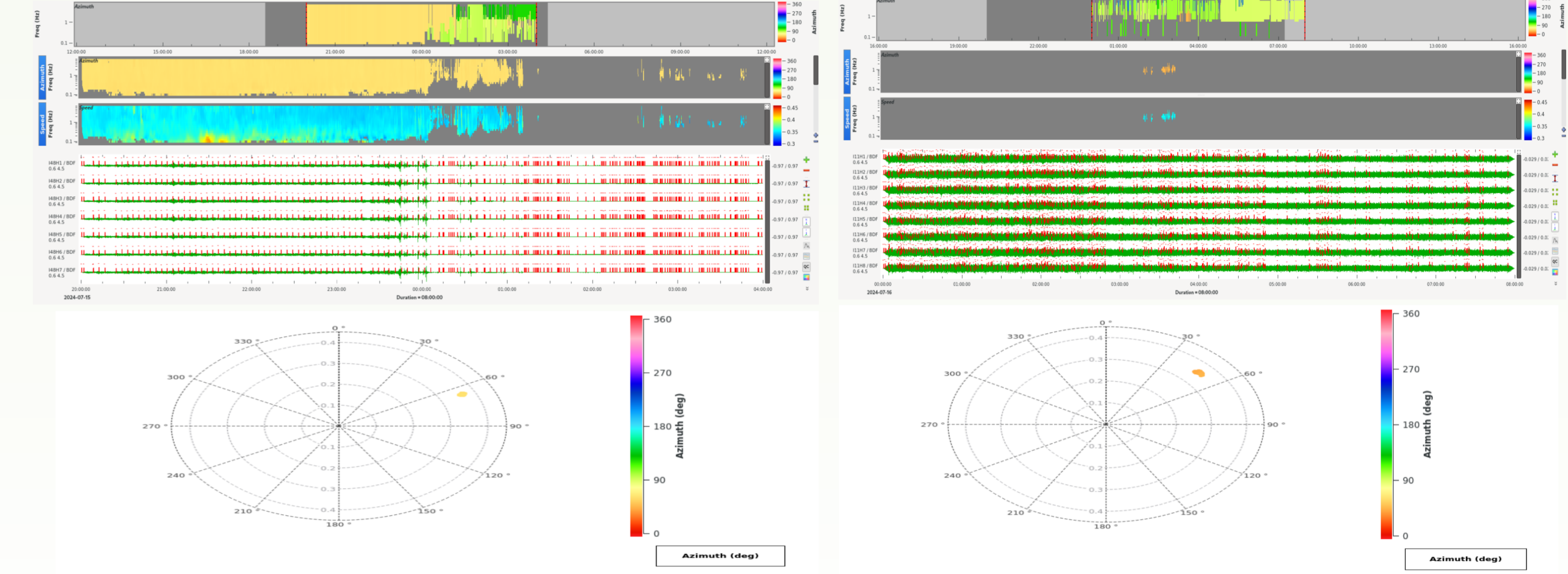


Fig 8. I48TN waveform - back azimuth

Fig 8. I11CV waveform - back azimuth

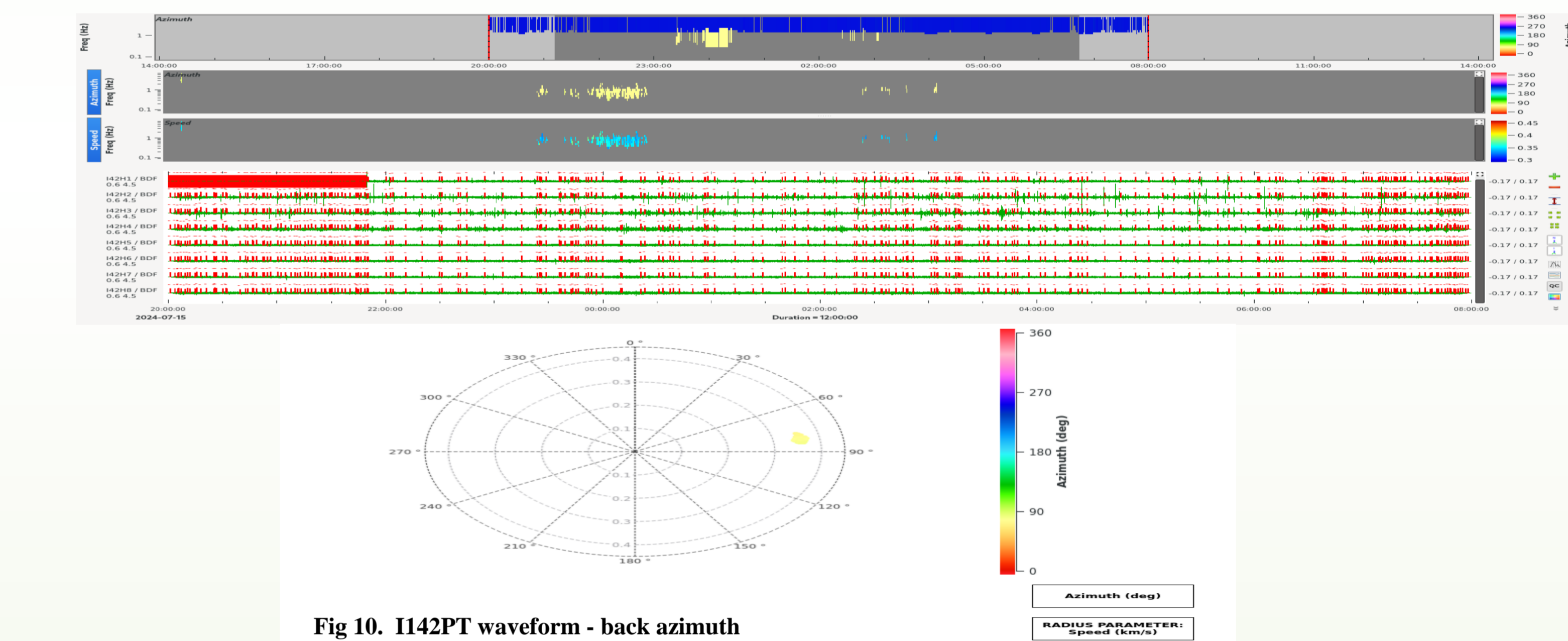


Fig 10. I42PT waveform - back azimuth

Day 23/7/2024

Three events from REB 02:23:32.69, 06:11:42.83, 07:51:48.38 and four events in LEB bulletins 02:23:32.69, 05:46:04.42, 06:11:42.83 and 07:51:48.38 we analyzed REB event. We requested data from VDMS in GeotoolQT to compare bulletin from REB and LEB.

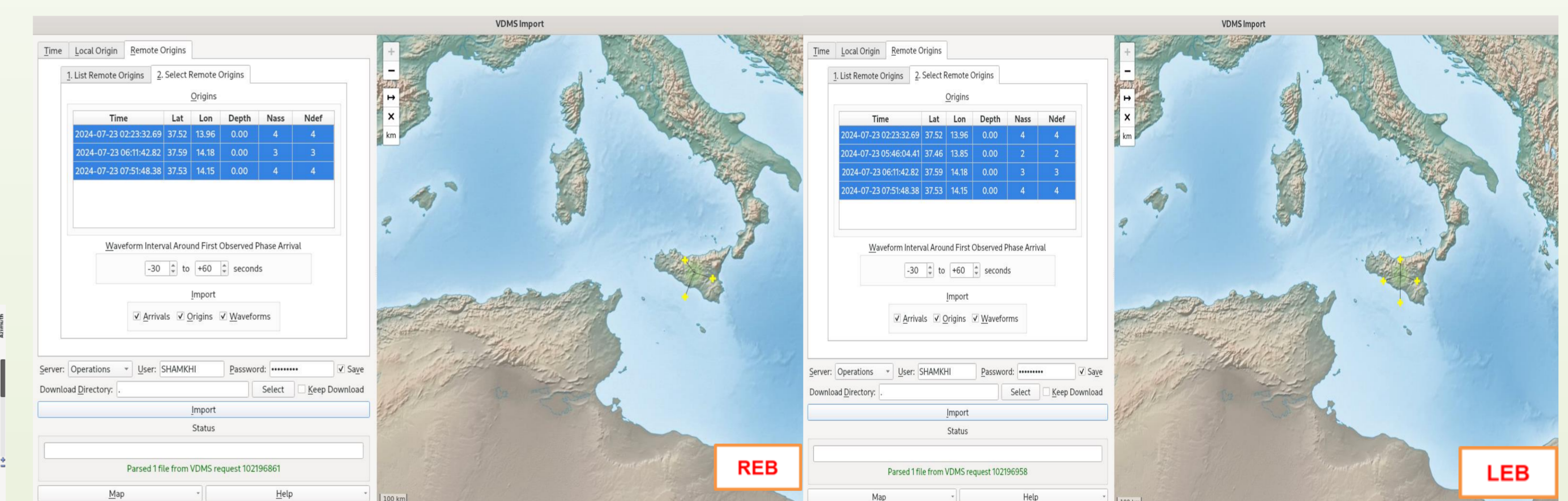


Fig 11. REB and LEB Bulletins 2024/07/23

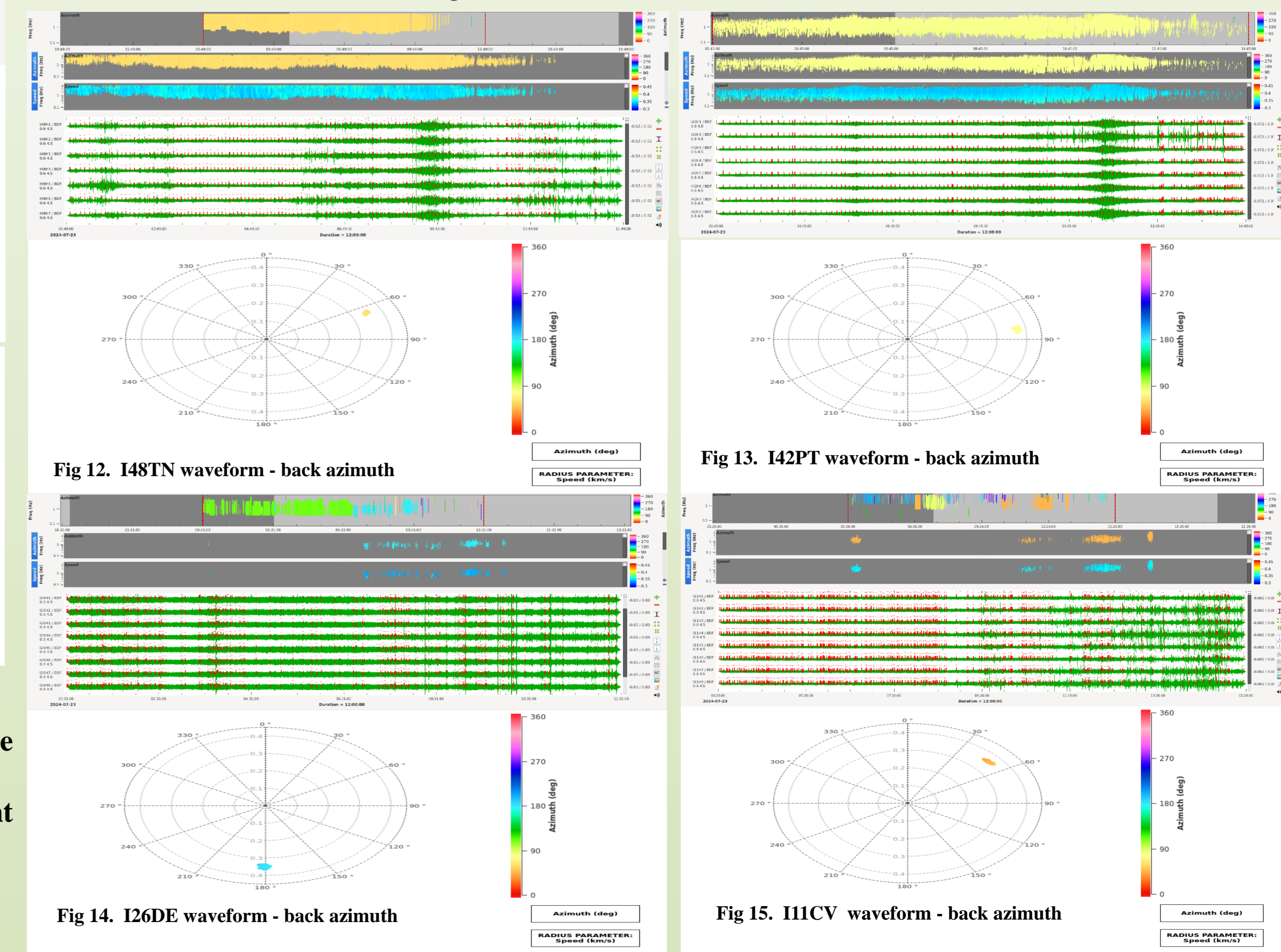


Fig 12. I48TN waveform - back azimuth

Fig 13. I42PT waveform - back azimuth

Fig 14. I26DE waveform - back azimuth

Fig 15. I11CV waveform - back azimuth

CONCLUSIONS

1. Infrasound waveform analysis is highly effective for identifying, classifying, and categorizing the source of events.
2. The latest version of NDC-in-a-Box under Rocky is a valuable tool for integrating data from different technologies.
3. Importing data into GeotoolQT is highly beneficial for event determination and analysis.
4. The detection capabilities of the infrasound IMS stations are notably reliable.