Review of the manuscript No. essd-2024-185 '*MUDA: dynamic geophysical and geochemical MUltiparametric DAtabase*' submitted to *Earth System Science Data (ESSD).*

Recommendation: <mark>accept.</mark>

<u>Focus</u> of the paper: this is the data descriptor article where the authors presented the new dynamic geophysical and geochemical MUltiparametric DAtabase (MUDA).

<u>Relevance:</u> The presented study is the original primary research within the scope of the journal since it presents a novel software for seismic and geophysical data processing.

<u>Abstract</u> is well written and clearly describes the undertaken study.

<u>Structure:</u> The article is well organized with structured sections and subsectiocs. The logic between these sections is well maintained.

<u>Introduction</u> presents a background, defines research goals and provides a clear statement of research problem of processing and handling seismic data efficiently. The authors described the existing main seismic networks of Italy: RSN managed by INGV, Federation of Digital Seismograph Networks, FDSN, International Seismological Center, ISC, SEED etc. The state-of-the-art section presents the purpose of the research investigation which is supported by the pertinent literature. Literature is well referenced and relevant.

<u>Motivation</u> is explained: today, the interaction between tectonics and crustal fluids dynamics is still lacking a simultaneous monitoring of the relative key factors. This study contributes to fill in the gaps through presenting a novel instrument for development of multiparametric monitoring (MUDA).

<u>English</u> language: acceptable. Clear, unambiguous, professional English language used throughout.

<u>Data</u> used in this study are described: The authors used data collected by multidisciplinary monitoring networks stored in MUDA (geophysical and geochemical MUltiparametric DAtabase), a new dynamic multiparametric database.

<u>Methods</u>: The methodological approach is well explained and described: MUDA is a MySQL relational database with a web interface developed in php, aimed at investigating in quasi real time possible correlations between seismic phenomena and variations in endogenous and environmental parameters. Methods described with sufficient information. The workflow is well structured.

<u>Results</u> are reported: The authors present case examples of using data from MUDA using five main target areas, such as the Garda region, Lake Garda, eastern Alps, Po alluvial basin and Northern and Central Apennine chains. These data enabled to test and compare seismicity in these areas. They well explain how the data are applied and used. Thus, the authors noted functional approach of MUDA: it collects data from different types of sensors such as hydrogeochemical probes for physical-chemical parameters in waters, meteorological stations, detectors of air Radon concentration, diffusive flux of carbon dioxide (CO_2) and seismometers belonging both to the National Seismic Network of INGV and to temporary networks installed in the framework of multidisciplinary research projects.

<u>Discussion</u> interpreted the major outcomes of this study: the authors highlighted the efficiency of MUDA which daily publishes data updated to the previous day and offers the chance to view and download multiparametric time series selected for different time periods. The advantages of the results are described regarding the novel tool for network data management and seismic data sharing.

<u>Conclusion</u> The resultant dataset provides broad perspectives in the framework of future high frequency and continuous multiparametric monitoring. The importance of this paper is well summarized as follows: MUDA contributes to the development of seismic monitoring tools aimed at detecting and identification of possible seismic precursors for short-term earthquake forecasting. This clearly contributes to the mitigating geological hazard and risks in

mountainous areas such as Italy.

Actuality, novelty and importance of the research is clear: The authors developed MUDA – a new infrastructure of the National Institute of Geophysics and Volcanology (INGV) which aims at archiving and disseminating multiparametric seismic data

Academic contribution: The paper increases the knowledge in seismic monitoring, mitigating geophysical hazards and risks through operative monitoring of seismic signals using MUDA. The paper deserved to be published in ***Earth System Science Data (ESSD)***.

Figures: Figures are of acceptable quality, easy to read, relevant and suitable. They include seismograms, print screens of MUDA, with working interface, tables, maps and workflow chart, and other illustrations

Recommendation: This manuscript can be accepted based on the detailed report above.

With kind regards,

- Reviewer.

13.07.2024.