

EGU24-19502, updated on 20 May 2024 https://doi.org/10.5194/egusphere-egu24-19502 EGU General Assembly 2024 © Author(s) 2024. This work is distributed under the Creative Commons Attribution 4.0 License.



## SAIPy: A Python Package for single station Earthquake Monitoring using Deep Learning

**Nishtha Srivastava**<sup>1,2</sup>, Wei Li<sup>1</sup>, Megha Chakraborty<sup>1,2</sup>, Claudia Quinteros Cartaya<sup>1</sup>, Jonas Köhler<sup>1,2</sup>, Johannes Faber<sup>1,3</sup>, and Georg Rümpker<sup>1,2</sup>

<sup>1</sup>Frankfurt Institute for Advanced Studies, Frankfurt am Main, Germany (srivastava@fias.uni-frankfurt.de)

<sup>2</sup>Institute of Geosciences, Goethe Universität, Germany

<sup>3</sup>Institute for Theoretical Physics, Goethe Universität, Germany

Seismology has witnessed significant advancements in recent years with the application of deep learning methods to address a broad range of problems. These techniques have demonstrated their

remarkable ability to effectively extract statistical properties from extensive datasets, surpassing the

capabilities of traditional approaches to an extent. In this study, we present SAIPy, an open-source Python package specifically developed for fast data processing by implementing deep learning. SAIPy offers solutions for multiple seismological tasks, including earthquake detection, magnitude estimation, seismic phase picking, and polarity identification. We introduce upgraded versions of previously published models such as CREIME\_RT capable of identifying earthquakes with an accuracy above 99.8% and a root mean squared error of 0.38 unit in magnitude estimation. These upgraded models outperform state-of-the-art approaches like the Vision Transformer network. SAIPy

provides an API that simplifies the integration of these advanced models, including CREIME\_RT, DynaPicker\_v2, and PolarCAP, along with benchmark datasets. The package has the potential to be used for real-time earthquake monitoring to enable timely actions to mitigate the impact of seismic

events.