

EGU22-10541

<https://doi.org/10.5194/egusphere-egu22-10541>

EGU General Assembly 2022

© Author(s) 2022. This work is distributed under the Creative Commons Attribution 4.0 License.



Insight on the 2014 M_{JMA} 6.7, northern Nagano earthquake sequence evolution in space and time through high resolved earthquake locations

Titouan Muzellec, Grazia De Landro, Aldo Zollo, and Guido Russo

University of Naples Federico II, Naples, Italy (titouan.muzellec@unina.it)

The estimation of spatial and temporal changes in the host medium physical properties is a quest to improve risk evaluation and hazard forecasting application. The space-time evolution of the seismicity gives information about stress variations, fluid content, and pore-pressure changes inside the medium. Thus, the accuracy of arrival-time measurements is crucial for travel-time-based seismological applications, such as earthquake location and travel(delay)-time tomography, especially when double-difference times are used. Standard monitoring networks and tools implements single-station, STA/LTA-based, automatic event detection/location procedures, which may produce inconsistent arrival-times of the same phase among stations. To overcome this problem, refined cross-correlation (CC) techniques for time picking have been recently developed. Their basic approach is to use CC to refine picks of event pairs with high waveform similarity. Similar events are grouped in families, considering the max CC values, the inter-distance and/or the focal mechanism similarity. Two drawbacks of this common approach are (1) the impact of noise from individual receiver levels on the quality of reference trace (RT) and (2) the inability to adjust the systematic shift of automatic picks.

Here we propose a new, fully automatic approach to refine the phase time picks. The CC is used to identify family members with a hierarchical clustering procedure. In each family, after the trace alignment, we build the RT by stacking the events weighted by the signal-to-noise ratio and the polarity. We applied this technique to a catalog of 3574 events of the 2014 M_{JMA} 6.7 sequence occurred at the Northern Nagano prefecture. The results indicate that we can improve the precision of phase picks of similar events and to adjust the systematic shift introduced by the automatic picker with mean differences between refined and automatic picks up to 0,5-1 s.

The high consistency of the phase picks allows to increase the accuracy of absolute location by reducing the mean location error from 0,6 km to 0,1 km and the root-mean-square from 0,15 to 0,075. Consequently, we observe an alignment of the seismicity respect to the main fault plane with an 30°-45° east-dipping angle for the shallow part while the deeper part dips at 50°-65°. Then, the double difference location provides highly resolved hypocenter locations and medium parameters by considering events of the same family as events pair. This improvement allows to use fast-tracking methods, as the V_p/V_s in time and the Coda-Wave Interferometry, to get information about the velocity variations before and during the sequence. By using those

methods, we expect to get accurate information of the physical properties evolution and especially about the role of fluid in the triggering of the sequence.