

EGU21-859

<https://doi.org/10.5194/egusphere-egu21-859>

EGU General Assembly 2021

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Visualizing the Seismic Wavefield with AlpArray

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The AlpArray Seismic Network (AASN) is a large-scale multidisciplinary seismic network in Europe that consists of over 600 3-component (3C) broadband stations with mean inter-station distance of 30-40km. This dense array allows the recording of the seismic wave propagation of distant earthquakes at a resolution of typical body and surface waves.

By animating the spatially-dense seismic recordings of the AASN, we can visualize seismic waves propagating across the European Alps as a function of space and time. Our 3C ground motion animations illustrate the full spatial-temporal evolution of global body and surface waves and demonstrates how a dense array allows the transformation from translation measurements at single stations to spatial gradients of the wavefield at the surface, capturing both small- and large-scale wave propagation phenomena. The addition of travel-time estimation, ray path illustration, and array-specific information such as slowness vector of incoming waves facilitate identification of seismic phases and their arrival-angle deviations. We will highlight some interesting observations of different seismic wave types in the animations of a few example teleseismic events during the course of the AASN between 2016-2019. Application for future research and education will also be discussed.