Geophysical Research Abstracts
Vol. 15, EGU2013-11089, 2013
EGU General Assembly 2013

Automated determination of P-wave polarization at GRSN

Luigia Cristiano (1), Thomas Meier (1), Christian Weidle (1), and Frank Krüger (2)

(1) Christian-Albrechts Universität, Kiel, Germany (luigia@geophysik.uni-kiel.de), (2) Universität Potsdam, Potsdam, Germany

Body wave traveltimes are often analyzed for the investigation of crustal and upper mantle structure. In addition, P-wave polarization may yield valuable information on lateral heterogeneity and anisotropy close to the recording station. However, a large number of recordings has to be studied to identify contaminations by noise and to study the dependence of the polarization attributes as a function of backazimuth and epicentral distance. We automatize the determination of Pwave polarization attributes by developing tools for the determination of the incidence angle, azimuthal deviation and linearity in different frequency ranges. We analyzed 20 years of recordings at the German Regional Seismic Networks (GRSN). These tests showed (1) that the tools yield robust estimates of the polarization parameters including quality measures if high quality data for more than about 5 years are available. (2) Misorientations of the sensors may be detected. (3) Incidence angles as well as azimuthal deviations of P-waves vary with frequency. (4) The azimuthal deviations are mainly a function of the backazimuth. (5) Fast propagation directions of P-waves may be determined by harmonic analysis of the azimuthal deviations as a function of backazimuth. Applying harmonic analysis to the azimuthal deviations measured at each station of the GRSN at different frequency bands, we extracted their dependence on the events backazimuth. It has been possible to retrieve the amplitude of the 180° periodicity term representing the anisotropy of the local structure, assuming an horizontal hexagonal symmetry axis for the anisotropy.