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Orientation of short period OBS from P-wave polarisation

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Here we modify and apply a technique to determine the orientation of the horizontal components of the Ocean Bottom Seismometers (OBSs) to OBSs surrounding the Mayotte earthquake swarms. We applied principal component analysis to determine the particle motion directions of P waves, which is used to calculate the orientation angle by constraining the difference between the network-determined and instrument-determined back-azimuths. As short period OBSs are insensitive to teleseismic events, we must use local events and therefore uncertainties in back-azimuth must be taken into account. We tested different cases to check the dependency of the error in orientation angle on the back-azimuth range of the events, no. of events used, magnitude limit and back-azimuth error limit of the individual events. The correct orientation of the horizontal components is crucial to determine the correct amplitude ratios of the P wave and S wave which can further be used to improve the resolution of focal mechanisms of the local events to understand the state of stress in this region. Our goal is to apply this technique to both the Mayotte data and to data from a long-term network on Lucky Strike volcano on the Mid-Atlantic Ridge, in order to better understand the tectonic and magmatic forces driving seismicity.