

Array Design Using Array Response Function Optimization

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Designing an array is one of the main tasks during setup planning. Array configuration depends on the goal of monitoring, which may cover a large variety of purposes including monitoring of the desired area, local seismicity, global teleseismic monitoring, etc. In this study, we developed a method to automatically design an array configuration for regional monitoring purposes by optimizing the array response function.

We used the Fuzzy Self-Tuning Particle Swarm Optimization method to optimize the array geometry. Ideally, a well-designed array is defined by an array response function similar to the delta function. We have assigned this criterion as our objective function to introduce the suggested seismic array. In this way, the optimization procedure tries to minimize the power of side lobes by moving the array station's position.

We have implemented a synthetic waveform simulation to verify the suggested array efficiency. In this step, a synthetic event is simulated and relocated using synthetic array beamforming. The suggested array is acceptable if the epicentral difference between the synthetic event and the relocated one is less than 10 km.

Our approach could successfully find the best array geometry and the synthetic event location accuracy is acceptable for different scenarios.

Promotional text

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Oral preference format

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