

## Transmission network of seismic ACROSS - present and future -

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Seismic ACROSS (Accurately Controlled Routinely Operated Signal System) is a tool for active monitoring of physical condition in the Earth's interior. This method is defined by constant acquisition of subsurface transfer functions between source and receiver with routinely transmission of accurately controlled sinusoidal elastic waves. Currently, several institutions are testing this system.

In central Japan, transmitting stations with 10-20 ton-force class transmitters were built in Toki City, Gifu Prefecture (JAEA) and Morimachi, Shizuoka Prefecture (MRI and Shizuoka Univ.) and Toyohashi City, Aichi Prefecture (Nagoya Univ.). Toki and Morimachi stations are transmitting constantly, 24 hours a day, every day and their signals are detected at Hi-net stations farther than 100km by long term stacking. At observation stations surrounded by the transmitting stations, transmitting signals are overlapped in observed time series. Frequency bands are also overlapped each other (Toki:10-35Hz, Morimachi:3-16Hz, Toyohashi:10-25Hz), therefore, each station is only allowed to transmit unique discrete frequency series signal (line spectra at equally-spaced discrete frequency points) to prevent interference. Additionally no interference transmission is achieved by synchronizing all transmitting and receiving timing with accurate GPS clocks.

Transmission protocol of seismic ACROSS in central Japan is in place since 2007. Frequency spacing and difference of fundamental frequency of transmitting signals are 0.02Hz and 0.0025Hz, respectively (Kunitomo, 2006). This local protocol assigns unique discrete frequency series to 8 ( $=0.02/0.0025$ ) transmitters. Frequency resolution of the current transmitter of seismic ACROSS is less than 0.44pHz, therefore theoretical upper limit of transmitters is more than  $4.5 \times 10^{10}$ . Concurrent transmission by huge number of transmitters is possible if only frequency resolution of observation is sufficient.

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