A method of synthesis magnetotelluric time-series combining interstation transfer functions and a reference site

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A new method to Synthesis magnetotelluric (MT) data is proposed whereby the MT Time-series of local site are derived using an Inverse Fourier transform of electric and magnetic fields spectrum of local site, which are computed by Combining Interstation transfer functions and a Reference horizontal magnetic time series (STICIR). The method is based on the stability of interstation transfer function, assuming that the geoelectrical structures of the subsurface independent of time. Applying the suggested method, two interstation transfer functions need to be estimated: the quasi-MT impedance tensor and the interstation geomagnetic transfer functions, which are used to compute the horizontal electric fields and the vertical magnetic field at the local site, respectively. The interstation transfer functions can be estimated by single site robust or remote reference (RR) method if another reference site existed. STICIR provides a new way to synthesis MT time-series at the local site combining interstation transfer functions and the magnetic fields at a reference site. Due to this property, STICIR provides significant improvements processing MT data when time-series at the local site are affected by local noise or are truncated. A test with good quality of MT data shows that synthetic time-series are similar to natural electric and magnetic time series. For contaminated data example, when this method is used to remove noise present at the local site, the scatter of MT sounding curves are clear reduced, and the low frequency data quality are improved.