# Characteristic patterns and minimal dynamics of correlated seismicity in Japanese island region

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The seismicity rates in this study are defined as the seismic event numbers of the given volume having one degree of longitude and 2.5 degree of latitude from the surface to 30 km depth and 30 to 660km depth in the Japanese islands region. It shows that the characteristic trends of time series of strongly correlated seismicity are possibly obtained as transformed seismicity rates by SVD; the one shows the long term change, second does the periodic time series with various periodicity involving annual variation, and third does nearly Gaussian noise. The first two types of time series can be mapped as five clusters in the diagram of newly transformed seismicity rate coordinates, suggesting existence of stable nodes with annual oscilation and gaussian noises. From these stable nodes, it concludes that the minimal dynamics of the seismicity of the Japanese island region is approximated as the simple low dimensional nonlinear dynamics with semi-periodic variable as is similar to van del Pol equation.

Keywords: spatio-temporal variation of seismicity, correlated seismicity time series, minimal non-linear dynamics