

## Influence Evaluation of Solar Activity to Seismic Activity by Statistical Models

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Detection of statistical connection between solar activity and seismic/volcanic activities was discussed in the literature. In this talk, statistical models are used to predict seismic energy by the measurements of the solar activity. We used daily data opened to the public.

Auto-regressive models with exogenous variables (ARX models) were used for prediction of the seismic energy. The target variables are the total energy of earthquakes (EQ) of the day after present day, with respective magnitudes 3-3.9, 4-4.9, ..., 7-7.9 and 8+. The explanatory variables are solar/space measurements; sunspot numbers, solar wind velocity, Interplanetary Magnetic Field temperature, proton density, solar wind dynamic pressure and energy of solar wind, magnetic field; Dst and polar cap index. Data observed up to present day are used for prediction. The explanatory variables are selected by Bayesian Information Criterion so as to get parsimonious models. The optimal models have the following features:

- 1) The ARX models are useful for predicting small EQ, whereas poor for big EQ.
- 2) The most relevant explanatory variable is solar wind velocity.
- 3) The coefficient of determination for EQ4-4.9 was 53%.

Thus, it is statistically shown that solar activity affects small EQ.

Acknowledgments on data sources

Solar activity: Goddard Space Flight Center, NASA via the OMNIWeb Data Explorer and the Space Physics Data Facility.

Earthquake events: Advanced National Seismic System (ANSS) database.

Keywords: solar activity, seismic activity, solar wind, interplanetary magnetic field, auto-regressive models with exogenous variables