

Relationship between major eruption and large earthquake: A comparative study between Japan and Indonesia

Md. Mahmudul Alam^{1*}

¹Dept. of Statistics, Rajshahi University

Volcanic activity and seismicity (magnitude, $M > 7.2$) during a period of more than 125 years in Japan and from 1978 for Indonesia are investigated. Simple and partial correlation coefficient between time and log of distance with the elimination of focal parameters are carried out, which help primarily to decide whether the sampling information are to be rejected as insufficient for regression analysis or to determine the level beyond which it is useful to perform a regression analysis excluding the parameter of the lowest importance. The time-space relationship between major eruptions and large earthquakes could be explained by a transformed linear model. Nonlinear data smoothing algorithm (4253H, twice) suggests that time duration will be smaller for great earthquakes ($M > 7.8$) than that of large earthquakes ($M < 7.8$). That is strain migration will be faster for great earthquakes than large earthquakes. Again, smoothed average distance decreases for large earthquakes ($M < 7.8$) but increases for great earthquakes ($M > 7.8$). That is, strain migration region for large earthquakes is shorter than that of the great earthquakes. Also the correlation coefficient between earthquake and time in both countries indicate that no. of earthquakes are increasing significantly depending on time. Finally, the magnitude of Indonesia follow the non stationary criteria, on the other hand, Japan have the seasonal effect in initial stage and the result of the time series analysis are in good agreement with fitting a appropriate model such as ARIMA(3,1,2) for Indonesia and ARIMA(2,0,1)x(1,0,1) for Japan

Keywords: Seismicity, Eruption, Regression, smooting, ARIMA