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Interactive comment on “Brief Communication: Correlation of global earthquake rates with temperature and sunspot cycle” by R. Rajesh and R. K. Tiwari

Anonymous Referee #2

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The manuscript has discussed possible relation of global earthquake rates to temperature and sunspot cycle by analyzing the data during 1975-2005. The global earthquake rates were calculated based USGS catalogs, using a cutoff magnitude 4.7. The global temperature and sunspot data were obtained from NOAA and SIDC, respectively. The SSA method has been employed to decompose the earthquake rates into different principal components. The authors found there was a strong positive correlation between global earthquake rates and global temperature, and a negative correlation between the earthquake rates and sunspot numbers.

The topic is interesting. But unfortunately, the presentation is not convincing enough to

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support the current conclusion. The manuscript cannot be considered for publication before the following issues have been addressed appropriately.

Major comments: (1) No clear innovation is found in this manuscript. The conclusion is rather weak, before more rigorous analysis and evidence are provided. (2) The authors need to prove that their calculation of global earthquake rates is suitable, because it is a crucial factor in this study. Whenever using earthquake catalogs for statistical study, the first thing is to check the completeness. The increasing earthquake rates may result from the increasing detectability of seismic networks. Is there any magnitude shift in the catalog? Although the authors have employed the G-R' law to find out the minimum magnitude, it seems that $M_c=4.7$ is not appropriate. In fact, there are a lot of works about the completeness of USGS catalogs. Please refer to these works and perform a more rigorous analysis of the earthquake catalog. (3) It is well accepted that Carbon Dioxide may lead to increase of temperature and global warming. Therefore, it is very difficult to know whether the temperature increase is resulted from solar/earth radiations, as the Carbon Dioxide emissions keep increasing during last several decades. (4) If you want to claim the possible correlation between seismicity and sunspot cycle, a much longer catalog of earthquakes should be adopted in the analysis. The catalog from 1975 to 2005 adopted in this study is not sufficient enough to ensure the statistical significance of the conclusion? Also why no recent catalog is adopted?

Minor comments: 1. Page 4 Line 20, it's better to add some references here. 2. Page 5 Line 10, $X_i=\{x_{(i+1)}, x_{(i+2)}, \dots, x_{(i+L)}\}$ should be $X_i=\{x_{(i)}, x_{(i+1)}, \dots, x_{(i+L-1)}\}$ 3. Page 5 Line 14, "d" in formula $\sqrt{\sum_{i=1}^L x_i^2}$ should be explained. The symbol of square root should be corrected. 4. Page 6 Line 15; please give more details on how to normalize the data. 5. To help the readers to understand the SSA approach, it is better to show the first three principal components in some figure. 6. How about the SSA results of global temperature? Is there any principal component of period around 11 years? 7. Page 4, Section 2; please give the full name of "USGS", "NOAA", and "SIDC".

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