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Nonlinear Processes in Geophysics
Discussions
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Interactive comment on "Singular spectrum and principal component analysis of soil radon (Rn-222) emanation for better detection and correlation of seismic induced anomalies" *by* Timangshu Chetia et al.

Anonymous Referee #1

Received and published: 21 August 2019

General comments This study is about anomalies in radon concentration related to earthquakes using singular spectrum analysis, model free method. More detail explanation is needed, since overall there is a lack of explanation of analysis. There are too many figures showing the results. Please provide as many figures as you need to support the results. It is necessary to explain the relevance and differences of previous studies using singular spectrum analysis for radon concentration data.

Specific comments 1. The way to calculate the covariance matrix showed in Fig. 3, 7 and 11 should be described. Scientific implication and/or explanation should be

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included, since few descriptions regarding the figures are in the present paper.

2. Eigenfunctions in Fig. 4, 8, 12 and principle components in Fig. 5, 9, 13 are almost the same considering the difference in sign. Detail explanations how to calculate them are needed in method section.

3. Since the data used in the result section are filtered ones, diurnal and semidiurnal components seemed to be not included in the data. What is the basis of the description regarding lines 20-23 and lines 228-230?

4. Regarding line 63, the reason of criteria, 100 km of mb > 3.1, for selecting seismic activity should be explained.

5. Regarding lines 158-163, lack of description of the way to group the elementary matrices.

6. Regarding lines 186-190 and Table 1, Is which used to calculate correlation coefficient, original data or filtered data? Are the results just 0.5 and -0.5? If not, the smaller digit values should be indicated in Table 1 (e.g. 0.49)

7. Explanation about the w-correlation matrix is needed at method section.

8. Regarding lines 240-242, It can be suggested that the pressure with larger change is dominant, only when the response of radon to temperature and pressure is equal. However, no evidence the response of radon to them are indicated in the paper. Therefore, there is lack of basis for this description.

9. Regarding lines 253-255, detail descriptions indicating which earthquakes have positive anomaly and the others have negative anomaly should be added. Are these results corrected the effects of temperature and pressure? Otherwise, it cannot be distinguished whether it is a change due to an earthquake or a change due to temperature or pressure.

10. Regarding lines 266-268, Raising the water level means that there is a pressure

gradient, which means that the fluid flows from a place with high pressure to a place with low pressure. Radon can be thought of as moving through the ground as well, and rising water levels can also indicate an increase in radon concentration. Please indicate if there is any previous research that supports the argument, in lines 266-268, in the paper.

Technical comments 1. Line 14, the complete name of MPGO also should be indicated here. 2. Lines 52-53, “Latitude 26.61o; Longitude 92.78o” should be “Latitude N26.61o; Longitude E92.78o”. 3. Line 64, “The major problem arises is the” should be “The major problem is the”. 4. Line 68, add spaces like “Stranden et al., 1984; Kumar et al., 2009; Walia et al., 2005”. 5. Line 72, “parameters on radon emanation” should be “parameters on radon concentration”. 6. Line 150, add brackets like “i.e. (Ui, Uj) = 0 for”. 7. Lines 182, and 183, “m3” should be “m3”. 8. Line 197, does percentage correlation coefficient mean coefficient of variation? 9. Fig. 4, 5, 8, 9, 12 and 13, need axis label. 10. “0C” should be “oC”. 11. Line 408, “(200-300 N and 860-980 E)” should be “(20o -30o N and 86o -98o E)”.

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