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Interactive comment on “Complex noise suppression and reconstruction of seismic reflection data from fault structures using Space Lagged Singular Spectral Analysis” by R. K. Tiwari et al.

Anonymous Referee #1

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The paper is interesting but needs major revision before publication. Below please find my comments.

1- title: Please use Singular Spectrum Analysis rather than Singular Spectral Analysis. Similarly, in the text, Space Lagged Singular Spectral Analysis should be changed. 2- A shorter version of Abstract is required. 3- Introduction: The SSA literature is a major point in Introduction. It is very poor and old. Ffor MSSA, see for example: 3-1- Hassani, H and Mahmoudvand, R. (2013). MULTIVARIATE SINGULAR SPECTRUM ANALYSIS: A GENERAL VIEW AND NEW VECTOR FORECASTING APPROACH. International

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Journal of Energy and Statistics. Vol. 01, page 55-83 3-2 Hassani, H., Heravi, S. and Zhigljavsky, A. (2013), Forecasting UK Industrial Production with Multivariate Singular Spectrum Analysis. Journal of Forecasting., 32: 395–408. For 2-D SSA which very important for such analysis, see Zhang, J., Hassani, H., Haibin, Z. and Zhang, X., 2014. Estimating multi-country prosperity index: A two-dimensional singular spectrum analysis approach. Journal of Systems Science and Complexity, 27 (1), 56-74. 4- I have a serious problem with their mathematical formulation. The authors need to revise the paper completely. From the beginning, a proper definition of series $Y(x)$ is needed, what is x and range, ... Dimension has been typed incorrectly. Eigen triplet \rightarrow eigentriple. Equation (3) is the definition of ordinary trajectory matrix and NOT for spatial, it is not easy to understand then. Again, in (4) what is the definition of g_N .

5- The SSA technique is based on two important choices: L and r (window length and the number of eigentriples for reconstruction stage). I could not find any information about these two. For more information about separability between signal and noise from theoretical and practical point of view see, for example. Hassani, H., Mahmoudvand, R. and Zokaei, M., 2011. Separability and Window Length in Singular Spectrum Analysis. Comptes Rendus Mathematique, 349, 987-990. Hassani, H., Mahmoudvand, R., Zokaei, M. and Ghodsi, M., 2012. On the Separability Between Signal and Noise in Singular Spectrum Analysis. Fluctuation and Noise Letters.

For the effect of L and r on reconstruction in multivariate SSA, see Patterson, K., Hassani, H., Heravi, S. and Zhigljavsky, A., 2011. Multivariate singular spectrum analysis for forecasting revisions to real-time data. Journal of Applied Statistics, 38, 2183-2211.

6- Furthermore, I would like to see how the proposed method is sensitive to the noise level. A simulation study would be great help in this regard.

Interactive comment on Nonlin. Processes Geophys. Discuss., 1, 649, 2014.

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