

Interactive comment on “Long-term changes in the North–South asymmetry of solar activity: a nonlinear dynamics characterization using visibility graphs” by Y. Zou et al.

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Review of "Long-term changes in the North-South asymmetry of solar activity: a nonlinear dynamics characterization using visibility graphs"

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General Comments

The use and application of visibility graphs is a novel technique and its application in physical sciences is still in its infancy. Therefore, the paper serves, I think, a purpose

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in this regard.

One of the main messages of the paper is the clear potential of VG to pick up features that presumably cannot be obtained using standard (linear) tools, and this is shown in the asymmetry between the North and South hemispheric sunspot data, which is revealed by both the VG and HVG, and seems presumably to take into account the dynamics of the system and its probability distribution (pdf).

Although VG and HVG are quite related they seem to provide different results. This reflects the difficulties in interpreting the obtained results given particularly the fact that the dynamics of the sunspots are not well understood. From this side, the paper opens more questions than answers, and this is a clear message from the authors.

The following are suggestions to improve the paper.

1. It is clear that the authors focussed naturally on the skewness, in relation to asymmetry. However, it seems that the fourth-order moment (kurtosis), which is also important in characterising the pdf of the system, can have a role in the present application since persistence can, in various circumstances, be linked to kurtosis. The authors did not mention this parameter in their manuscript.
2. I also think that the paper would benefit from a short introduction discussing a little more the VG and HVG possibly with an application to a simple didactic example to see the difference between the VG and HVG methods and what they do and do not do.
3. Finally, I think to complement the analysis of the asymmetry of the N/S sunspot data the authors could perhaps just apply a standard tool, like e.g., cross-spectral analysis, to compare with VG & HVG. I leave this last suggestion to the authors for consideration.

Interactive comment on Nonlin. Processes Geophys. Discuss., 1, 665, 2014.