Application of complex network approach on solar active regions

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Abstract:

In the present work, we designed the active regions (ARs) complex network based on their locations at first occurrence times and lifetimes. In our complex network, all ARs occurred in the lifetime of a specific AR are linked. The unweighted adjacency matrix was used to calculate length scale and clustering coefficient of the network. The degree of nodes was computed for both directed and undirected ARs network. We observed an increase in flare occurrence in each cell corresponding to the hubs of the network. In other words, the nodes with higher degrees in the ARs network have larger chance to trigger flares. This behaviour of the ARs network arises an important question about the prediction capability of flares based on ARs network.