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Interactive comment on "Pysteps: an open-source Python library for probabilistic precipitation nowcasting (v1.0)" *by* Seppo Pulkkinen et al.

Anonymous Referee #2

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The manuscript deals with precipitation nowcasting and describes a package of programs designed for practical predictions as well as further investigations of forecasting techniques. The article consists of two main parts. In the first part, a brief description of the used methods is given, while in the second part, procedures that are ready for use are described. Basic verification and sensitivity analysis of some parameters of the applied methods are performed and results are shown. The article is very comprehensive and worth of publishing, however, I have several comments concerning the content that are listed below. The article and especially its introduction is written in a too optimistic way that nowcating can solve the prediction of severe weather and in this context, it is mentioned that current NWP models are not able to predict phenomena on convective scale. In the introduction, a lead time of 6h for nowcasting is mentioned.

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Discussion paper

However, in my opinion and based on my experience, the reality is different and reliability of precipitation forecast depends on the type of predicted precipitation mainly. Cases presented in the paper, if I can judge, are characterized by large rainfall areas, which, as a rule, can be sufficiently accurately predicted by extrapolation-based methods for several hours in advance. For this type of situations, however, NWP model predictions give also good results. Conversely, cases with isolated convective storms that according to me are not treated in the paper are very difficult to forecast by extrapolation methods reasonably, however, they may cause very dangerous local flash floods. Moreover, I find it a pity that the authors did not try to verify the proposed methods for a continuous series of data, e.g. covering 3 months. I wonder if the proposed methods would produce as good results in such a case as they are presented in the paper. Some publications have indicated (e.g. Mejsnar et al., 2018. Limits of precipitation nowcasting by extrapolation of radar reflectivity for warm season in Central Europe. Atmos. Res., 213, 288-301) that extrapolation of convective precipitation and also NWP model forecast is very difficult in inland areas. Although I do not require performing additional tests or verifications, I still consider it fair to mention the known prediction problems in both the introduction and the conclusion sections.

Besides, the applied technique based on application of FFT needs further additional comments. Is this technique reasonable in case of isolated convection, when large majority of the area evinces no precipitation? Section 5.3 Line 29 Could you briefly describe what you mean by “localization”? Section 5.4 Line 10 You write: “Thus, our main hypothesis is that dynamic scaling properties are necessary to produce ensembles with realistic temporal evolution and dispersion of precipitation across spatial scales.” I am not sure whether I understand what you mean. Could you kindly add some comments on “realistic temporal evolution” and its consequences? Looking at animations (line 27), I agree that the cascade decomposition smooths and decreases precipitation. It seems to me that the model expects and forecasts dissipating of storms. However, this is realistic only under several specific conditions. Under other conditions, increase of precipitation can occur. In any case, the presented smoothed fields in the animation

do not look very realistic to me and the fact that they provide better RMSE verification values is a simple result of the known general feature of RMSE. To sum up, I find the article and the software very useful but readers and especially users should be aware that any forecasting technique has also its weak points, at least at present.

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