**Atmospheric
Measurement
Techniques**
Discussions

Interactive comment on "The large-scale spatio-temporal variability of precipitation over Sweden observed from the weather radar network" *by* A. Devasthale and L. Norin

Anonymous Referee #1

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1. Genaral comments Weather radar network data for a relatively long period of similar remote sensing equipments is interesting to see. The data filtering seems to be done by "BRDC", and some of the criteria are discussed in this paper. The most problematic areas in radar estimnated precipitation are related in the vertical difference between the radar volume and surface. In this material the gauge-to-radar ratio has been used in corrections, which may be the best method you can have. However, in the Baltic area the effects of the water areas, lake-effect, may not be taken into account if relatively few observations on the surface are available over the sea. The manuscript does not in my eyes clearly say whether the sea areas are included in the analysis or not.

At least the strong snowfall events regularly observed in easterly flows at the north-eastern coast of Sweden does not seem to cause any comments. The relationship between NAO or AO, and precipitation in Sweden is on the other hand something closely related to the relation with wind direction, especially when the upper layer winds are used. This may also explain why there is not much to be said about the lake-effect snowfall that may be below the 85 kPa pressure level surface. Similarly summertime mesoscale phenomena near the coasts, where most of the cities in the northern side of Sweden are, may not show in the analysis. Sea-breeze fronts may also have quite strong echoes from biological targets, insects and birds, that the standard radar data filtering techniques can not handle, and satellite may see the clear weather cloud line as the precipitation source. At some point I was not certain if only the liquid water component of precipitation discussed in this paper, as "rain" or "rainfall" is used, but the title and knowing that at some seasons the northern part of the country should get some snow seems to hint that snowfall is considered as well. If this is not the case some more dramatic revisions in the text should be done. On the other hand long term time series of rain gauges have probably been used in similar analyses, and can still be used perhaps. The positive impact that the radar network data can provide in these studies could be discussed more in this paper. To me it looks like that the better spatial resolution and coverage of large water areas are the strong points. Some weak points exist of course, and perhaps they have been more present in this paper and in my comments.

2. Details

(2) The weather radar data set - I was surprised to see "constant altitude plan polar indicator", while in every weather radar (and even in other fields of radar research) "plan position indicator" has been used. I was afraid that I have got really old already. On the other hand I though that maybe the modern scientist try to avoid using terminology that people could understand, but I still think that "position" is the standard word used in this context. - Reflectivity factor in this chapter, I was wondering but not checking

if the equivalent reflectivity factor has been used. At least it is much easier to deduce from the radar measured quantity, which is reflectivity, as you do not have to decide is the source water drops, ice crystals, sleet, hail or some other stuff. This is probably already decided in the processing of the data set, and the any author just have to use it as it is. - Page 1073 lines 21-26, it is probably clear that what is adjusted is a week long accumulation period of precipitation, but this may be clarified, especially if this is not the case. - Filtering was done for the dataset, and the authors may have to deal with that. However, the limits, page 10704 lines 9-10, seem to be quite close to the maximum observed by rain gauges at the ground. The radar data set itself, of course, can show how critical filtering this might be. In general absolute maxima of short periods in this kind of climate could be the most critical ones in this sense. The comment "far fewer" on line 17 makes me ask, compared to what.

(3.1) Diurnal variations in precipitation - "Often times", page 10706 line 14, ?

(3.3) Correlation with NAO and AO indices - I would need some short clarification about what is meant by these indices, some describtions I have heard are very simple, but this may have evolved a lot during the period of reduced observations and increased modelling. - In my opinion the indices are determined by the circulation, and I would not use terms like "impact" and "influence" in the opposite meaning as is in this paper. - Why ERA analysis is not used for temperature and water vapour? I see no positive impact of using always a bit hazardous remote sensing outside the ECMWF's model frame, and combine it with other parameters from the model analysis, but perhaps similar fields are not provided by ERA analyses (page 10709).

(3.4.) Rainfall response to wind direction - Wind in this chapter is obviously at 85 kPa level, should be clarified. If this is the case then the coastline related sea-/land-breeze and wintertime lake-effect snowfall may not be included at all in this comaprison. This should be commented. - Daily "rain rate" is perhaps OK, even though some wintertime snowfall events, north of Stockholm for instance, I think, have high daily precipitation rate as well (p. 10711).

(4) Conclusions and outlook - Positive and negative correlations (p. 10712 lines 19-23), the text looked quite contradictory at first glance, while "majority" was so and so in different intensities but north high positive and southeastern high negative at the same time. However, I understand this so that the later sentence refers to the correlations stated in the previous lines. Perhaps needs to be clarified.

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