

Interactive comment on “Characteristics of Convective Snow Bands in the Baltic Sea Area” by Julia Jeworrek et al.

Anonymous Referee #1

Received and published: 22 November 2016

The paper is devoted to 11-year climatology of convective snow bands in the Swedish east coast. Since convective snow bands bring high impact weather to coastal regions of the Baltic Sea, therefore it is important to study their characteristics and climatology. Former studies about the snow bands over the Baltic Sea area have been mostly devoted to understanding of the processes that cause the lake effect over the Gulf of Bothnia, or Gulf of Finland. Both are intensive areas of convection in late autumn or winter, during the cold air outbreaks at the open sea. This article is the first climatological study in this field for the Baltic Sea area. The paper is in many places unclear and I think that several points should be better addressed before considering it for a final publication.

1) The title is not exact, only snow bands that bring high impact weather to Swedish east coast are studied. Even in the introduction nothing is written about other Baltic Sea

C1

coasts that also experience convective snow bands some times per year in average. It should be explained why these areas are let out of the scope of the paper. In the methods is written that the same criteria of detection were applied over the whole area of the sea. What is then the reason to leave other areas than Swedish east coast out? Is the resolution of the climate model not high enough to identify the snow bands also on the Finnish side of Gulf of Bothnia, at northern and southern coast of the Gulf of Finland or at the western coasts of Estonian islands. This kind of discussion should be included at least based on references.

2) The aim of the study is not clearly defined, I think it should be stressed that RCA4 is a climate model with not very high resolution. In earlier papers over this area the snow bands' formation processes have been studied with weather prediction models with much higher resolution. What is the reason to use climate model instead of weather prediction model? The conclusion that model with higher resolution can resolve the mesoscale circulations better is obvious. What is the novelty in this? What is the main new contribution?

3) It is misleading to write, that snowing takes place over the coast, it snows also over the sea (that could be followed also from the results). Andersson and Nilsson (1990) show that the highest precipitation is not at the coast, but close to it over the sea. This should be rewritten.

4) Showing the position of snow bands with just a satellite image (Fig 10) is not convincing, the high impact weather is connected to persistence of weather systems, the satellite image is valid just for the moment of the overflight. A radar image of 24 h or longer accumulation of the precipitation would be a good proof and source for inter-comparison as from there approximate precipitation rates over the sea could be estimated and the regional distribution of the snow bands.

5) Very local characteristics have been chosen to identify the snow bands. Extremely high snow amounts are caused by weather systems that persist for a long time and

C2

are supported by large scale atmospheric circulation. Did you check that in addition to the local favouring conditions to convection the large-scale conditions were fulfilled? I suggest to look these conditions in more detail at least in case of both case study periods.

6) The thresholds have been chosen based on references, mostly describing processes in other regions, more attention should be given to the studies that are devoted to the Baltic Sea region. References to several studies of Finnish scientists in this field are missing: Savijärvi et al 2012, where the same 1998 December Gävle storm is analysed, and Vihma, and Brümmer 2002, if to name some of them.

7) Do I understand right that Gdansk region in Poland comes out as a region where are strong snowfalls. How did you check it, that it is snow, not just rain? Was there the same temperature difference thresholds fulfilled as in the east coast of Sweden, or it just had high precipitation at the same time? Please give references that this kind of events happen often at this coast?

Specific comments:

Page 1 line 6 Cold air could come not only from the continent, but also from the ice covered sea.

Page 3 line 25, some general introduction to model systems is missing.

In Table 2 the logical order would be to begin the case study models with RCA and then go further with the more complex systems.

Was the same criteria applied to the whole Baltic Sea area or only to the region near the Swedish coast (p 5 line 13).

It is enough to present the criteria for detecting of snow bands just in Table 1, to write the same in the text is justified if some closer explanations are added. (p 5 line 31 and further).

C3

How did these days distribute over the area geographically? (p 6 line 10 and further)

The precipitation amounts connected to these snow bands are not large or exceptional, even 17 mm per 24h is too low to call extreme. (the paragraph beginning at p 6 line 22)

Why only the precipitation for the sector shown in Fig 4 is presented? Are other data missing or the days selected could not be associated with precipitation in other regions?

The quality of the figures should be improved to add readability to this work

Fig 9 Coastlines could not be followed

Fig 10 Coastlines and isobars could not be followed

Fig 11 The texts in subplots are not with the same font, ticks are missing at x-axis.

Interactive comment on Earth Syst. Dynam. Discuss., doi:10.5194/esd-2016-43, 2016.

C4