Chapter 7

Summary

A technique for partitioning precipitation into frontal and convective components has been presented. The method is largely independent of the absolute amount of rainfall, or radar reflectivity, thus bypassing issues associated with radar calibration. It relies on texture features and resembles classifications performed by a human observer. While this approach is inherently subjective in nature, it distinguishes different types of precipitation events and provides a tool to answer the key questions formulated in the introduction.

The method has been validated against weather reanalysis fields, as well as against synoptic data. The classification accuracy compared to both methods is roughly 80-90 %. Skill scores are comparable to those found by other authors dealing with precipitation identification and/or classification, and no significant annual variability in the classification accuracy has been found.

While this method is used for the Baltic area, it is, in principle, easy to transfer to other two-dimensional precipitation images. The only requirements needed to apply this method are a sufficiently large areal coverage and - if one wants to apply the method without adjustments - a similar spatial resolution as that provided in the BALTRAD dataset.

The type of precipitation events are classified from three years of BALTRAD radar images. The method was designed to provide estimates about the spatial distribution of precipitation, as well as seasonal and diurnal variations. It was found that frontal precipitation dominates the Baltic area, with about two-thirds of the rainfall events being frontal. The interannual variability in the investigated period was weak. However, the number of frontal events depends strongly on the season. The fraction of non-frontal events in the warm season (from May through September) is two to three times higher than in the cold season. This is caused by a higher frequency of frontal overpasses in autumn and spring and by differential heating above land surfaces in summer.

The analyses were limited by the size of the radar composite images. All frontal systems may not be identified correctly, especially if a significant fraction of the frontal system lies

outside of the radar range. Hence, it is likely that the frontal partition is even higher than in the above presented results.

The method provides the potential to investigate an important aspect of precipitation - the initial source. This information can be profitable not only in climatological studies, but also for the evaluation of weather and climate models.