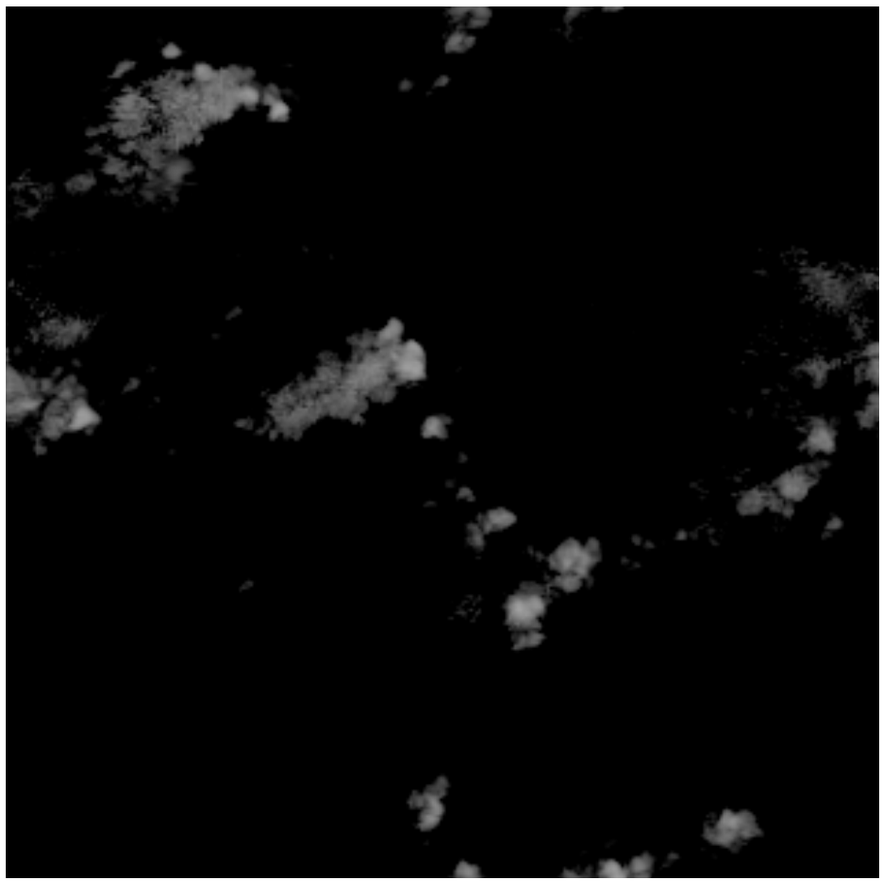
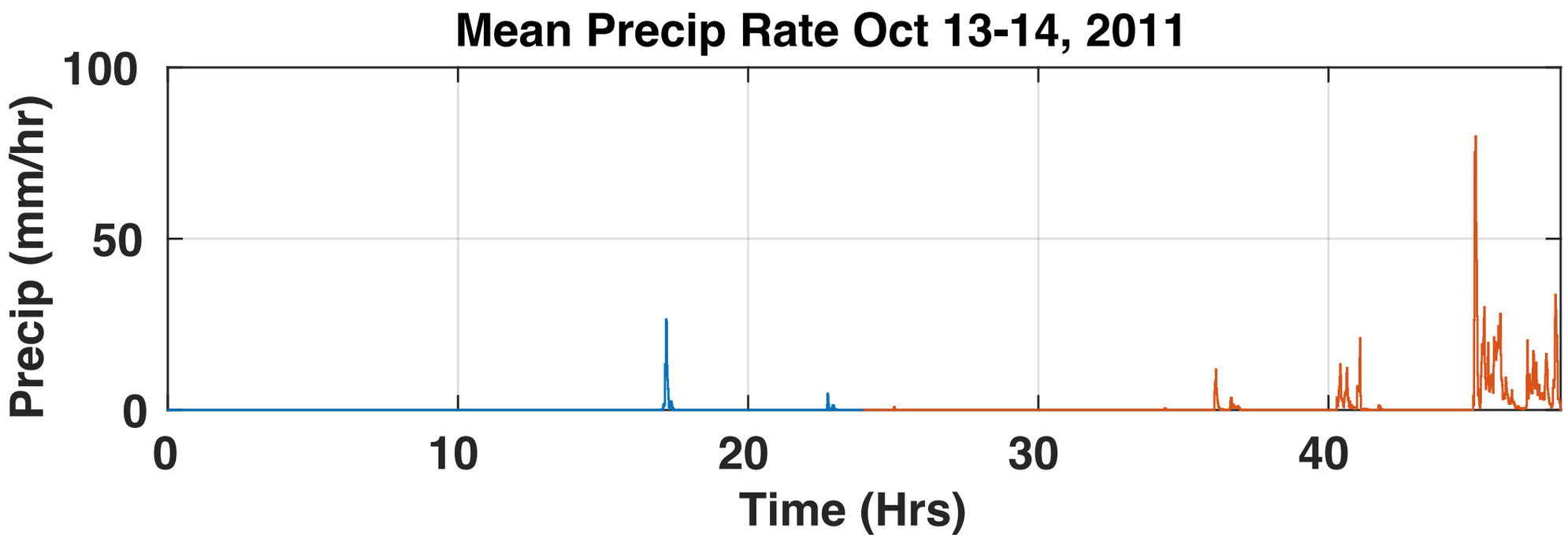
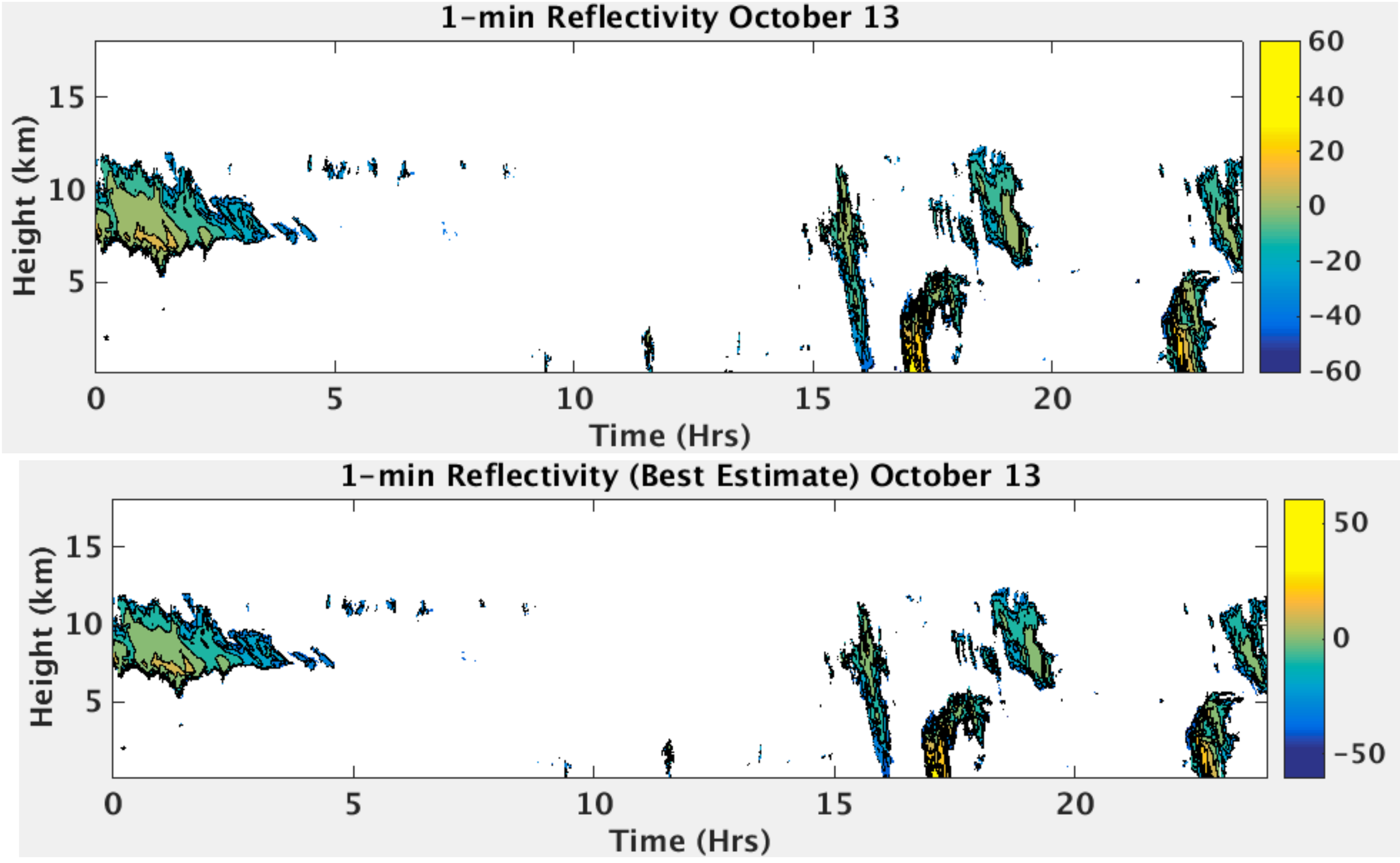
ARSCL Data



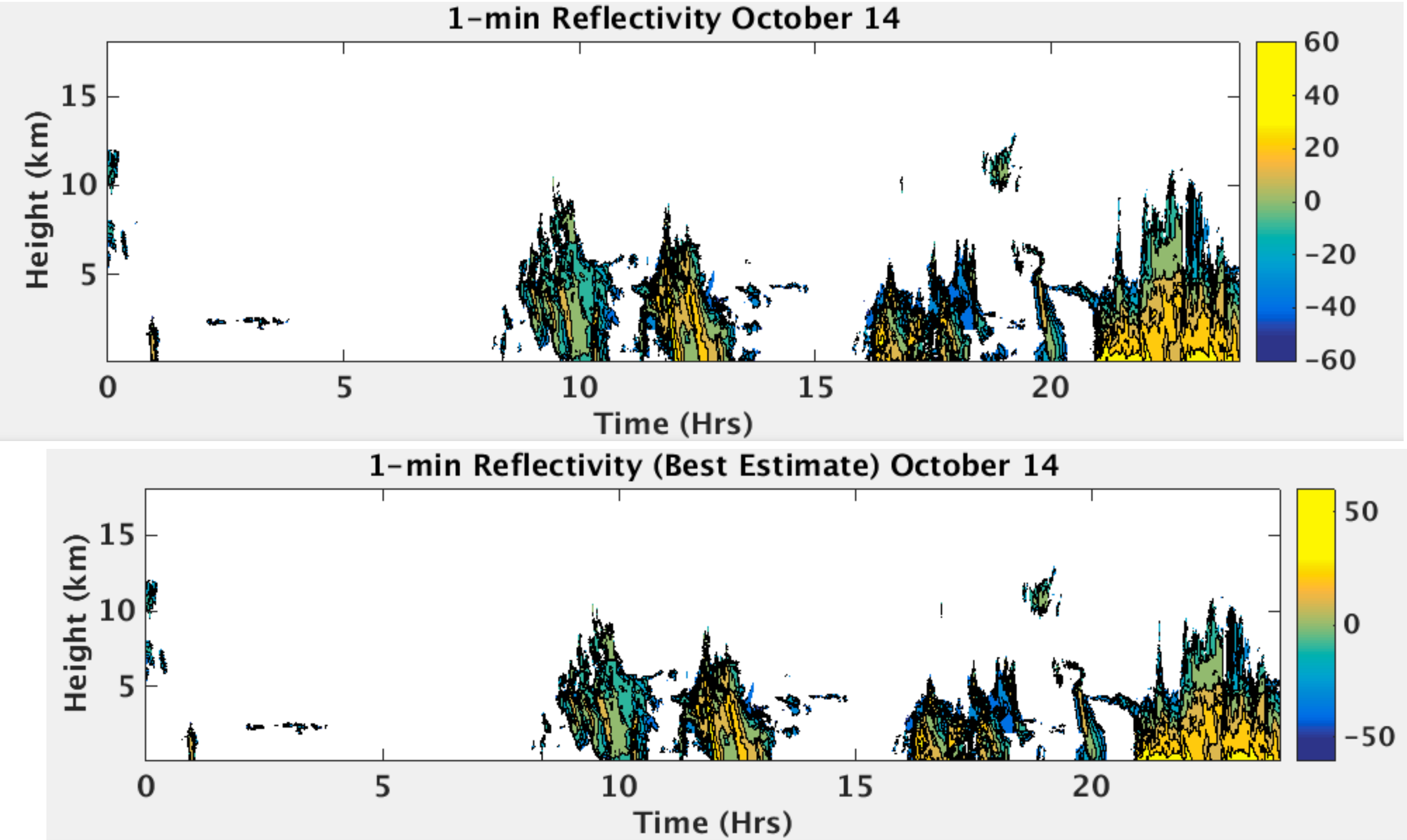
End of run clouds (day 286-287.5)



ARSCL data - October 13 Reflectivity



ARSCL data - October 14 Reflectivity



On use of triangles

One of the primary benefits of computing kinematic fields such as divergence using triangles is the ability to generate analysis points through the use of multiple and overlapping triangles. Such employment of triangles has been shown to provide a better estimate of kinematic parameters when compared to centered finite differences on a Cartesian grid. With that in mind, I was surprised by Figure 1, which represents only a small subset of possible combinations… It's certainly not clear that the way in which the authors pursued the analysis is superior to a more traditional objective analysis, and suggests a lack of understanding why triangular methods have been employed at all.

On the limitations of the Mesonet w.r.t. divergence

A further issue with divergence calculations from gridded observational datasets is variation in the exposure of different observation sites within the domain. Less well-exposed sites will record lower mean wind speeds than better-exposed sites, leading to artificial regions of convergence and divergence between stations in the gridded analysis. There is no evidence of measures having been put in place to compensate for this issue, which calls into question the validity of the gridded divergence values.

On counting events

Paper section referenced

The station resolution of the Oklahoma Mesonet is suitable to resolve large MCS events and their associated cold pools. Smaller systems, such as a cold pool from an individual cumulonimbus cloud, might be missed in the Mesonet data.

Comment

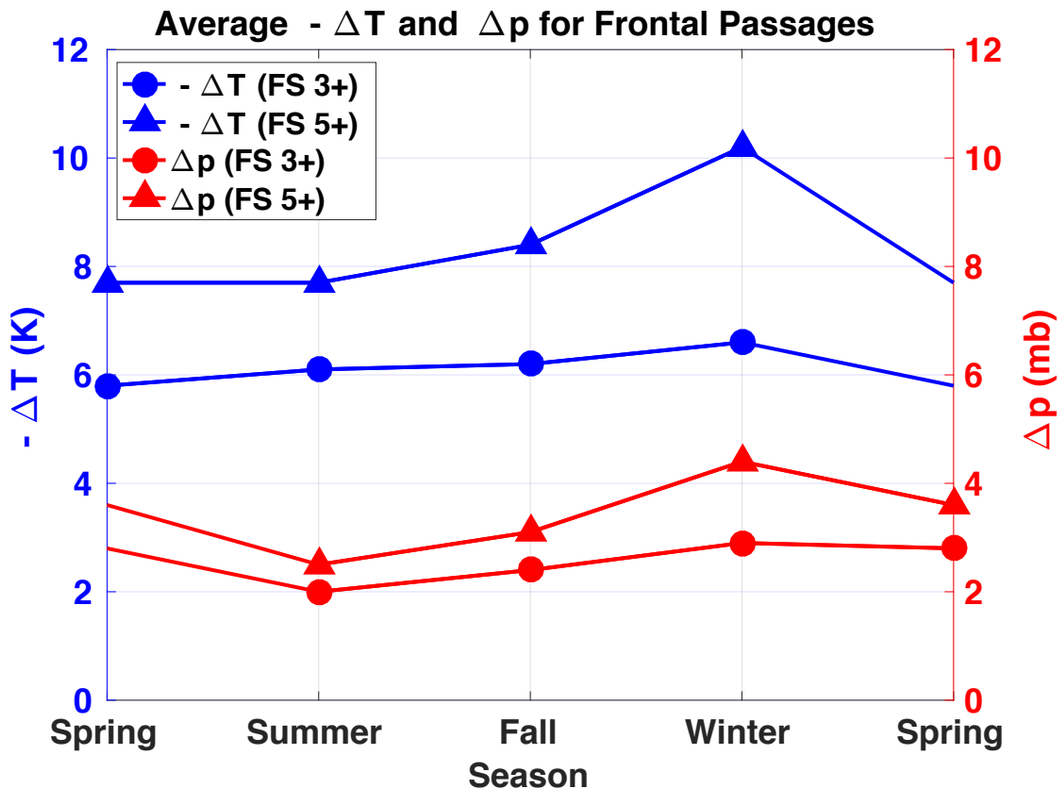
This point highlights a problem with the method, in that small systems could be detected if they pass over a single station but whether this happens or not would be a matter of chance. On the other hand, a large rapidly moving system would be sampled numerous times as it passes over many stations so the dataset of T and P will be heavily biased to larger events. Grouping of T and P instances into events could reduce this issue.

On divergence for varying triangle size

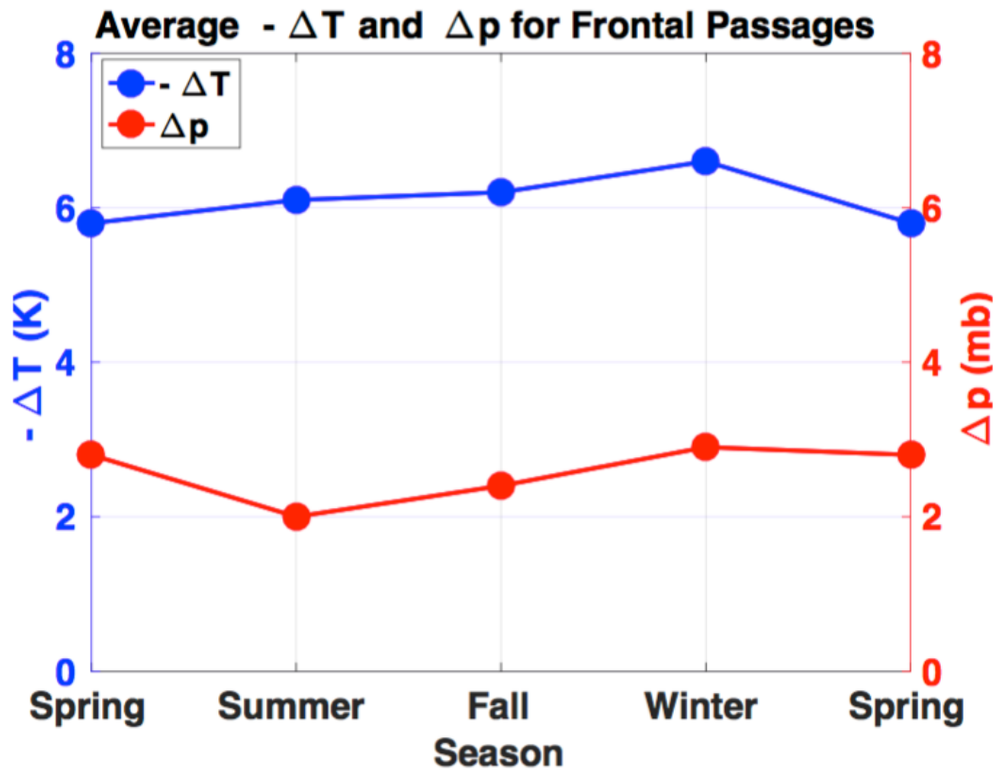
It seems likely that the geometry of the triangle and its orientation, relative to that of the front, could influence the calculated values of divergence. Could you investigate this possibility by using idealized data and varying the triangle shape and size? (I now see this is discussed at lines 341-344 - is a similar correction required for the divergence calculations? e.g. could the divergence threshold vary (inversely) with the size of triangle?)

With regard to Figure 3 (now Figure 13)

Version in initial submission:



Altered version I've shown a few wks ago:



It would be helpful to indicate the sample size for each data point in the plot. Could some indication of data spread be added to each point?

On quality assurance

The manuscript provides little information on data quality assurance. However, given the results are entirely based on the in situ observations, what are the potential “error” values that could impact the temperature and pressure values that serve as a foundation of the results?

On time scale selection

What is the justification for choosing seasonal (monthly) periods versus monthly or even weekly?

This study focused on the seasonal and diurnal cycles associated with fronts and cold pools. However, the length of the dataset provides an opportunity to quantify the inter annual variability of those features at multiple temporal scales (annual, seasonal, diurnal, etc.) Why are these results not included?