Convergence of snow bands in Northeast US storms
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Introduction
Winter storms in the Northeast U.S. often develop elongated bands with locally higher snow rates. Weather forecasting models have difficulty predicting these enhanced snowfall bands since the processes governing band characteristics are poorly understood. Radar observations show that snow bands occur in two main modes, single bands and multi-bands. Single bands are defined as snow bands that are > 250 km in length and usually only occur one at a time during a storm. Multi-bands are sets of smaller bands, usually roughly parallel to each other that move as group. Sometimes multi-bands will converge with a large single band. In other storms, multi-bands will move parallel to the storm motion and do not converge. This project seeks to better understand the conditions under which different types of snow bands occur.

Methods
Dataset
110 winter storms within the coastal Northeast United States region from 1996-2016 were analyzed. Data from six weather radars (KOKX, KBOX, KDIX, KDOX, KENX, KGYX) was used in this project.

Materials
Using the methods described in Hoban (2016), the radar reflectivity is converted into snow rate which is then used to isolate the snow bands. The snow bands are areas of intense precipitation which are shown in yellow. The green represents areas of stratiform (weak) precipitation.

Band Scenarios
Of the 110 storms that were studied, 79 storms were identified as banded storms (having a single band, multi-bands, or a combination of both present for a part of the storm duration). Of the 79 banded storms, 19 were identified with perpendicular-moving convergent bands and 21 were identified with parallel-moving bands.

Convergent bands
Some snow bands move perpendicular relative to the storm motion. Below is a sequence of images every ~30 minutes that illustrates the convergence of multi-bands into a single band. In the first image below, the direction of the bands movement is represented by the black arrows and the overall storm direction is represented by the red arrow. This convergence may in effect ‘fuel’ the single band.

Parallel-moving bands
Some snow bands move parallel to the storm motion. The multi-bands moving in these storms do not converge into a single band. The black arrow overlaid on the image on the left represents the direction of the band motion and the red arrow represents the overall direction of the storm.

Summary
- Multi-bands within winter storms can move roughly perpendicular or parallel relative to the overall storm motion.
- Multi-bands which move perpendicular can converge into single bands and in effect fuel the single band.
- Convergent bands are situated in the northeast and northwest quadrants relative to the low pressure center.
- Parallel-moving bands do not converge and do not move relative to the storm or each other.
- Parallel-moving bands generally occur to the northwest of the low center.


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