Detecting Convective Initiation Using Radar Images

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Summary
- An image processing method to look for first occurrence of 35 dBZ at -10C
  - Compare pairs of reflectivity isotherm images
  - Warp first image to align it with second
  - Look for new 35 dBZ echoes, taking into account morphology
- Used to validate satellite and model forecasts of CI

1. Compute reflectivity at -10C

Why reflectivity at -10C?
Because it is associated with graupel growth and lightning

2. Warp

3. Compare & classify

- Three impossible situations are accounted for
  - Based on connectivity (or distance) checks

- Take image at t₀ and warp it to align it with the image at t₁
  - Warping limited to a 5 pixel movement
  - Determined by cross-correlation with a smoothness constraint imposed on it
  - 5 pixels in 5 min ≠ 60km ± maximum movement
  - Then, do a neighborhood search
    - Pixels above 35 dBZ with no pixel above 35 dBZ within 1.3km of aligned image is “New Convective”