Objective tracking of convection has important forecasting and research applications. Prior studies have employed techniques that track low-level radar reflectivity maxima using only plan view observations or volume estimates (so-called centroid or object-based methods). Those algorithms have been shown to identify too few or too many cells, suffer in the presence of merging or splitting storms, and provide conflicting estimates of storm motion. Moreover, such approaches are designed to work with single radar observations that offer limited spatial coverage. This poster introduces a new storm tracking algorithm that identifies and tracks echo top height maxima in high-resolution three-dimensional multi-radar composites and compares its performance to operational single radar object-based methods. The echo top algorithm is simpler than previous attempts to track convective motion. Moreover, such approaches are designed to work with single radar reflectivity maxima using only plan view observations or volume estimates (so-called centroid or object-based methods). Those algorithms have been shown to identify too few or too many cells, suffer in the presence of merging or splitting storms, and provide conflicting estimates of storm motion. Moreover, such approaches are designed to work with single radar observations that offer limited spatial coverage. This poster introduces a new storm tracking algorithm that identifies and tracks echo top height maxima in high-resolution three-dimensional multi-radar composites and compares its performance to operational single radar object-based methods. The echo top algorithm is simpler than previous attempts to track convective motion. Moreover, such approaches are designed to work with single radar observations that offer limited spatial coverage. This poster introduces a new storm tracking algorithm that identifies and tracks echo top height maxima in high-resolution three-dimensional multi-radar composites and compares its performance to operational single radar object-based methods. The echo top algorithm is simpler than previous attempts to track convective motion. Moreover, such approaches are designed to work with single radar observations that offer limited spatial coverage.

**Technical Detail**

**Data:**
- Next Generation Weather Radar (NEXRAD) program Weather Surveillance Radar-1988 Doppler (WSR-88D) observations merged into high-resolution three-dimensional polarimetric composites using methods established in our research group
- Single WSR-88D radar operational object-based storm cell identifications from NOAA’s Severe Weather Data Inventory (SWDI)

**Case Summary:**
- 11-12 May 2014, severe storms in Kansas and southeastern Nebraska. Analysis time period begins at 18 UTC on 11 May and ends at 8 UTC on 12 May. Here is a link to the NWS SPC event archive: [Link to Movie]

**How Tracking Methods Work:**

- **Object-based**
  1. Identify local maxima in reflectivity at each elevation
  2. Define centroid (closed contour) that best represents and/or isolates cell
  3. Link centroids in consecutive scans by closeness (time increment typically required to be less than 20 min between scans)
  4. Retain cell IDs that have vertical continuity

- **Echo Top**
  1. Identify local maxima in 30 dBZ echo top field
  2. Link maxima in consecutive composite times if within 15 km of eachother at a time increment ≤ 5 min
  3. Keep tracks that are at least 15 min in duration
  4. Extract relevant dynamical and microphysical information from polarimetric variables within a 15 km radius of echo top maximum

**Summary**

- Echo top tracking isolates deeper storms (those extending above the melting level)
- Differences in identified storm location from echo top and object-based methods are typically negligible, but important offsets can occur in strong supercells (object-based methods may identify hook and forward flank precipitation as separate storms)
- Echo top tracking provides less variable estimates of storm motion
- Polarimetric radar composites provide a wealth of information for studying individual storm lifecycles

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