An Objective Algorithm For the Identification of Convective Tropical Cloud Clusters In Geostationary Infrared Imagery

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References
Hennon, C.C., and J.S. Hobgood, 2003: Forecasting tropical cyclogenesis over the Atlantic basin using large-scale data. MWR, 131, 2927-2940.

Introduction
Areas of concentrated tropical convection, or “cloud clusters”, are a necessary precursor for tropical cyclogenesis.

Satellite Data
The HURSAT-Basin dataset (Knapp 2008) provides snapshots of basin-wide activity.

Methodology
Pixels where brightness temperature (T(b)) < 230 K are identified.
Groups of pixels must be at least 4 degrees in diameter and not elongated in shape.
Pixels over land are filtered out.
If the same group persists for at least 24 hours, it is recorded as a cloud cluster.
Tracks recorded for season.

Satellite Data
The HURSAT-Basin dataset (Knapp 2008) provides snapshots of basin-wide activity.

Data are derived from the International Satellite Cloud Climatology Project (ISCCP).

They are available in 3-hour increments in 3 channels (VIS, IR, WV). We use 6-hour time increments and the IR channel in this research.

Current study focuses on Atlantic basin systems.

Results
We analyzed cloud cluster activity during the 2000 Atlantic hurricane season (June 1 - November 30).

121 cloud clusters were identified. Fig. 3 shows the tracks of those cloud clusters.

Fig. 4 shows the monthly distribution of cloud clusters and those that developed into at least a tropical depression.

Fig. 5 shows the activity in June (top) and Sept. (bottom). The spatial distributions are in good agreement with the expected areas of activity in the climatology.

Future Work
Several improvements in the algorithm are planned. Tuning is needed to resolve concerns in the runtime and in the cluster identification process.

Once the improvements are implemented, we will process additional years and other basins. After the data are quality controlled, it will be made available to all who may be interested.

Figure 1. Example of a cloud cluster (courtesy of NRL).

Figure 2. A cloud cluster from the 2000 season. The ‘X’ marks the center.

Figure 3. Tracks from cloud clusters identified during the 2000 Atlantic hurricane season.

Figure 4. Identified cloud clusters (dark) and developing systems (light) during the 2000 season.

Figure 5. Cloud cluster tracks for June (top) and September (bottom) 2000.