The Effects of Dry Air Ridging on the Rainfall Distribution of Tropical Storm Hanna
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Introduction:
Rainfall distribution in landfalling tropical cyclones is known to be driven by:
- Track
- Speed
- External Forcing
- Maximum rainfall shifted to left of track in systems undergoing extra-tropical transition and interacting with an approaching upper-level trough (Atallah et al. 2007)
- Interaction with a down stream ridge or low-level boundary can shift heaviest rainfall to right of track

Hypothesis: Interaction of in-situ cold air damming, which formed from rainbands ahead of TS Hanna moving over a dry surface high pressure ridge, and an inland moving coastal front, enhanced rainfall to the left of the storm track.

Track and Rainfall:
- Annotated track of TS Hanna

Mesoscale effects on rainfall distribution:
- Orographically forced ascent
- Coastal frontogenesis
- Cold air damming

Conclusions:
- The interaction of an inland moving coastal front and in-situ cold air damming caused enhanced frontogenesis and isentropic lift to the left of the track of TS Hanna.
- WRF model simulations reveal the importance of the local terrain in the formation of in-situ cold air damming and LOT rainfall shift. Without the mountains, rainfall was reduced and shifted closer to the track of the storm.
- Based on analysis of other events, this type of mesoscale interaction has occurred with other tropical systems and coastal troughs/fronsts.