

Minutes for Metro Atlanta AMS/NWA Local Chapter Meeting: 12 January 2012

Total Attendance: 34

Treasurer's Report

Total Assets: \$1899.56
37 members: 26 full /11 students

New Business

- Next meeting: February 23, 7pm at The Weather Channel. Must RSVP prior to attending the meeting.
- Palmetto AMS Chapter, mini technical conference, Wed, March 14, in Columbia, SC
 - Deadline to submit abstract, March 1
- Science Fairs in the Area, looking for judges, contact James
 - Rockdale County Fair, Friday, January 27, 11a-4p
 - Fayette County Science Fair, Tuesday, January 24
- Going to the Annual Meeting? Go visit our poster! Thanks Daniel!

Old Business

Get Your Polo Shirts!

If you ordered a shirt, please see Laura Belanger at the next meeting.

Featured Presentation

John Trostel, Director of GTRI and EAS Graduate Student

Theory of Weather Radar and Dual-Pol

History of Weather Radar: During WWII, radar installed on east and west sides of the Panama Canal were also used to look at weather as early as 1943. A second network was established in India in 1944 for both airborne and ground-based configurations. After the war, the Air Weather Service made great use of the APQ-13s, with up to 60 in operation at one time. The last one was removed from service in 1977. The NWS first used the WSR-xxs radars. First detection of tornado on April 9, 1953.

Doppler Radar has been around since 1958, when there were 2 experimental radars. Now we use the WSR-88D. DOW 7 is Dual polarization and Dual Frequency radar, yielding double speed dual-pol data via 45 degree and horizontal/vertical simultaneous modes.

The future of radar: MPAR or Multiple Function Phased Array Radar, for tracking weather, aircraft and surveillance, Homeland Security; faster update rates and multiple beams.

Specifications of WSR-88D: Specifications, "Moments", Radar Range Equation for Precipitation

Doppler Processing: Equation -- Doppler frequency as a function of target motion, V and radar wavelength (λ).

Advantages of Polarmetric Radar: Tornadic debris has distinct signature, discrimination of precipitation types, estimation of precipitation amounts.

Dual Pol Upgrade: Out with the old, in with the new. Expected sensitivity loss due to the dual polarization hardware at a typical site will be less than 4.0 dB and may typically be 3.5 dB or less. Rather than adding more power for both the horizontal and vertical pulses, they went a cheaper route, and cut the legacy power in half for each of the pulses.

New Products: Differential Reflectivity (ZDR): defined as the difference between the horizontal and vertical reflectivities, each expressed in units of dB. Correlation Coefficient (CC) is a measure of how similarly the horizontally and vertically polarized pulses are behaving within a pulse volume. When the pulses behave very similarly (similar size, shape, etc), result in high CC. When the pulses behave very differently (different sizes, shapes, etc) result in low CC. CC is very good for determining the melting layer, which can be identified by a ring of low CC surrounded by higher CC. Differential Phase Shift (ϕ_{DP}): as the pulse propagates through different media, there is a delay that is apparent in the phase of the return pulse. This provides valuable information on the nature of the scatterers that are being sampled. Because ϕ_{DP} cannot be reset as the pulse travels outbound, the value is increased with each area of liquid scatterers it encounters. This is a cumulative product, where it starts at 0 at the radar, and only increases. A secondary product is then used, called Specific Differential Phase (KDP), which is the range derivative of ϕ_{DP} . Higher values of KDP are indicative of heavy rain areas, and is usually unaffected by hail.

Steve Nelson, SOO at National Weather Service, Peachtree City

Recent Application of Dual-Polarization Radar Data

Dual-Polarization Schedule: KFFC, KHTX already operational. KBMX scheduled operational by 26 Feb, KJGX on 11 Mar.

Winter Precipitation Detection flow chart from Schlatter/WDTB. To estimate the type of precipitation falling to the ground, we generally use soundings and models. Instead, we can now use a combination of Dual-Pol products and thermodynamic profiles. First, search for the melting layer using CC, then determine if there may be any re-freezing near the radar (examining all elevation angles). Then confirm with ZDR.

Tornado event from 22 December 2011. Unseasonably warm air mass with a non-significant low pressure system over the area. Not a tremendous amount of MU CAPE, and shear was strong, but not off the charts. There were some ingredients for possible storm rotation. The Significant Tornado Parameter showed values around 1 across the Atlanta Metro area (not very high). There were 6 tornadoes in Georgia, most of the occurring in the late afternoon. All these QLCS tornadoes were fairly weak, with the highest at EF2, but mostly EF1/EF0. With these tornadoes occurring fairly close to the radar, forecasters were able to see indications of the debris ball in the Dual-Pol data. Three of the tornadoes occurred in a 30-minute period in southern Coweta, northern Fayette, and southern Fayette counties.

Hail event from 11 January 2012: 0.75 inch hail reported in Meriwether county. Signature not evident on CC, but area of high ZDR surrounds low ZDR at this same time, and confirms hail at the beam level.