257 PRELIMINARY STUDY OF THE MELTING LAYER IN THE TROPICS USING A POLARIMETRIC DOPPLER X-BAND RADAR

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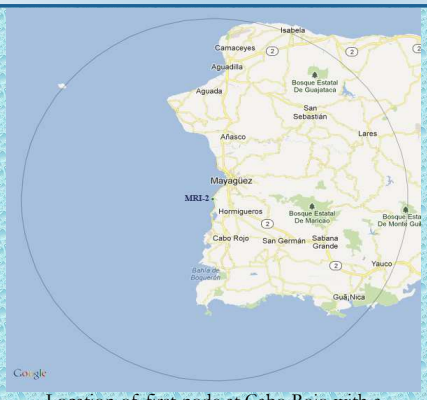
- A study of the melting layer in western Puerto Rico was performed
- First time X-band polarimetric products are used in Puerto Rico
- From over 50 rain events were recorded, only 3 showed melting layer characteristics.
- The three events have different patterns (convective, light rain, mixed moderate rain)
- When present the melting layer has and average height of 4614 m and a width of 208 m..



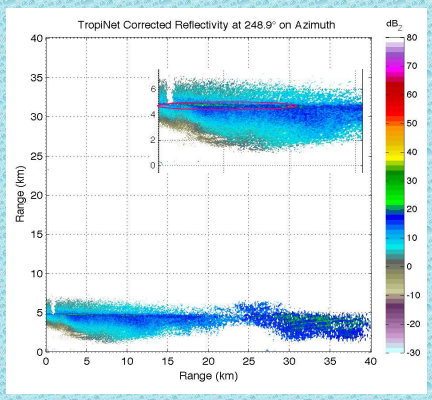
Location of first node at Cabo Rojo with a 40km radius coverage area

Tropinet-1: An X-band Dual-Pol Doppler Radar node at Cabo Rojo, PR

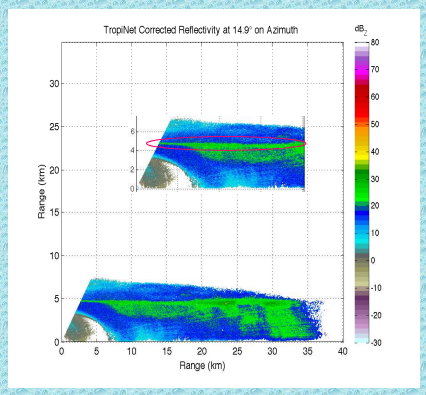
Picture of TropiNet radar at CSU CHILL under testing and calibration campaign

TRANSMITTER	
Type	Magnetron
Center Frequency	9410 +/- 30 MHz
Peak power output	8.0 kW (per channel)
Average power output	12 W (per channel)
Pulse Width	400-660 ns
Polarization	Dual linear, H and V
Max. Duty cycle	0.16%
ANTENNA AND POSITIONER	
Type (diameter)	Dual-polarized parabolic reflector (1.8m)
3-dB Beam width	1.4 deg
Gain	42 dB
Max. scan rate	60 deg/s
RECEIVER	
Type	Parallel, dual channel, linear I/Q output
Dynamic range	95 dB (BW= 1 MHz)
Noise Figure	5 dB
DATA ACQUISITION SYSTEM	
Sampling rate	200 Msps
Dynamic range	105 dB (BW= 1 MHz)

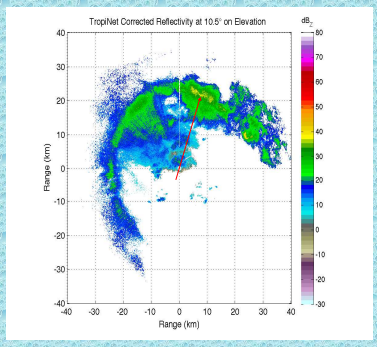
Radar Specifications



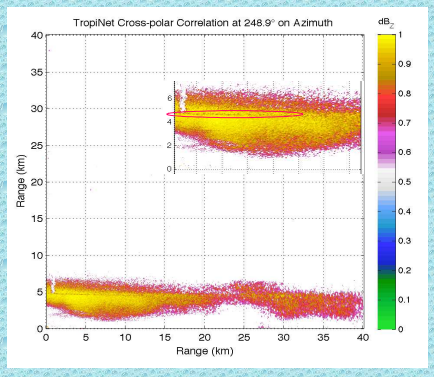
Z_H for strong convective rain event showing the presence of the melting layer.



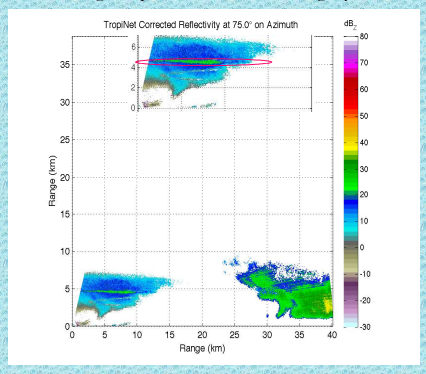
Z_H , Corrected reflectivity for light rain event showing the presence of the melting layer.



PPI Scan of Corrected reflectivity for mixed rain event showing the presence of the melting layer..



Cross-polarization correlation for strong convective rain event showing the presence of the melting layer. A close-up of the first 15 km is shown on the inset..



Z_H , Corrected reflectivity for mixed rain event showing the presence of the melting layer..

- **It is shown that the melting layer can be present in the tropics at altitudes over 4500m**
- **This altitude does not present a problem for short range, but should be for long-range radars.**
- **No particular pattern for the rain events was found that predicted the presence of the melting layer.**

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