

Use of the dual-wavelength dual-polarization CSU-Chill radar to estimate rainfall from attenuation

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The CSU-CHILL radar was recently upgraded to a dual-wavelength dual-polarization radar system with the addition of a new X-band channel complementing the already existing S-band channel. The CSU-CHILL unique combination of dual-offset Gregorian antenna with collocated dual-wavelength dual-polarization beams makes it a unique platform for studying rainfall. The dual-wavelength system is a non-beam matched system where the S-band component has a 1 degree beam and the X-band component has a 0.33 degree beam. This paper will present processing techniques for dual-polarization and dual-wavelength radars. Particularly, the signal processing techniques used to estimate the specific attenuation at X band compared to the S band frequency will be presented.

During the month of September of 2014 an exceptional flooding event occurred in the northern Colorado foothills, which was observed by the CSU-CHILL radar. Data was recorded in simultaneous dual-wavelength mode, creating a unique data set for the event.. This paper will present the initial results from processing this data set to obtain rainfall estimates demonstrating the processing techniques previously described in the paper