

Multi-Source Thunderstorm Rainfall Estimation using Infrared and Lightning Data

Ali Amirrezvani

*City College of New York, NOAA-CREST
New York City, New York*

Lightning-rainfall studies have demonstrated that rainy clouds with colder top temperature (T_b) and with stronger lightning activity generally produce heavier rainfall. The present study confirms the results of existing literature and also shows that there is a strong correlation between lightning (L) and rainfall for thunderstorms. The objective of this study is to improve an infrared-based high resolution rainfall retrieval algorithm for summer thunderstorms. High-resolution cloud-top brightness temperature (CT- T_b) from geostationary satellite (GOES) infrared (IR) in conjunction with cloud-to-ground lightning (CGL) from the National Lightning Detection Networks (NLDN) is used for rainfall classification as well as estimation. We are applying an artificial neural networks (ANN) system for cloud classification as well as rainfall estimation from the combination of IR- T_b and CGL. The presented results are during summer thunderstorms generating heavy rainfall and hazardous lightning events, for two storms in July 2006 and four storms in August 2006. The study area is located at latitude between 32°N to 38°N and longitude from 106°W to 112°W, covering parts of New Mexico, Arizona, Colorado, and Utah.

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