

Study on Rainfall Forecasting by Using Weather Satellite Imagery in a Small Watershed Located at Mountainous Area of Central Taiwan

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Using meteorological radar and satellite imagery had become an efficient tool for rainfall forecasting. However, few studies were aimed to predict quantitative rainfall in small watersheds for flood forecasting by using remote sensing data. Due to the terrain shelter and ground clutter effect of Central Mountain Ridges, the application of meteorological radar data was limited in mountainous areas of central Taiwan. This study devises a new scheme to predict rainfall of a small upstream watershed by combing GOES-9 geostationary weather satellite imagery and ground rainfall records, which can be applied for local quantitative rainfall forecasting during periods of typhoon and heavy rainfall. Imagery of two typhoon events in 2004 and five correspondent ground raingauges records of Chitou Forest Recreational Area, which is located in upstream region of Bei-Shi river were analyzed in this study. The watershed accounts for 12.7 square kilometers and altitudes ranging from 1000 m to 1800 m. Basin-wide Average Rainfall (BAR) in study area were estimated by block kriging. Cloud Top Temperature]CTTq^from satellite imagery and ground hourly rainfall records were medium correlated. The regression coefficient ranges from 0.5 to 0.7 and the value decreases as the altitude of the gauge site increases. The regression coefficient of CCT and next 2 to 6 hour accumulated BAR decrease as the time scale increases. The rainfall forecasting for BAR were analyzed by Kalman Filtering Technique. The correlation coefficient and average hourly deviates between estimated and observed value of BAR for two typhoon events were 0.619, 0.478 and 6.488 mm , 8.722mm respectively. The preliminary result shows that scheme proposed in this study can be used in mountainous for operational rainfall forecasting. The suggested time interval for rainfall forecasting should be one hour due to high variation in spatial and temporal scale.