



The pioneer study of fog detection and horizontal precipitation measurement at subtropical highland of Taiwan

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Heavy rainfall in highland caused by the interaction of tropical storms and sharp terrain is one of the major natural disasters in Taiwan. But there is no quantitative measurement on the fog and its horizontal precipitation (HP) to estimate the storage of water by plants in the highland region of Taiwan. In this pioneer study, we studied the fog detection and its horizontal precipitation amount, existence length and monthly variation at Kuan-Wu recreation area in Shei-Pa National Park of Taiwan. The 20-year (1988~2007) record length of meteorological data at Kuan-Wu was analyzed first to build up the background information of the local weather. The FDID (fog detection and interception device) including two fog detectors, two fog collectors and auto-shooting digital camera was delivered in this field program. The parallel experiment indoor with a fog tunnel also confirms the performance of polypropylene net used in FDID.

FDID has collected data in the field over one year, and the preliminary results show that some components of FDID present the capability of fog event detection and give quantitative data of fog interception. The digital images in 5-min interval via fog collector data detected over 90% happening of fog event in the data available days. Through the RGB diagnosis in different pixel domains (different distances to the camera) on the digital images, the fog events are distinguished into light, medium and heavy fog events. The characteristics of daily and monthly variations of fog events could be explained through the terrain and local climate effects well. We also found the horizontal precipitation from fog provides ~11% extra water amount in the no-rain days.

The happened possibility of fog & stratus cloud with The MTSAT geostationary IR channels by Central Weather Bureau is also validated by the FDID in-situ measurement. It shows that the remote sensing product of fog detection in nighttime has good correlation with FDID ground measurement.