Japan Geoscience Union Meeting 2015
(May 24th - 28th at Makuhari, Chiba, Japan)

AAS01-P01 会場:コンベンションホール 時間:5 月 27 日 18:15-19:30

The Improvement of Rainfall distribution of typhoon in Taiwan using numerical models and satellite data

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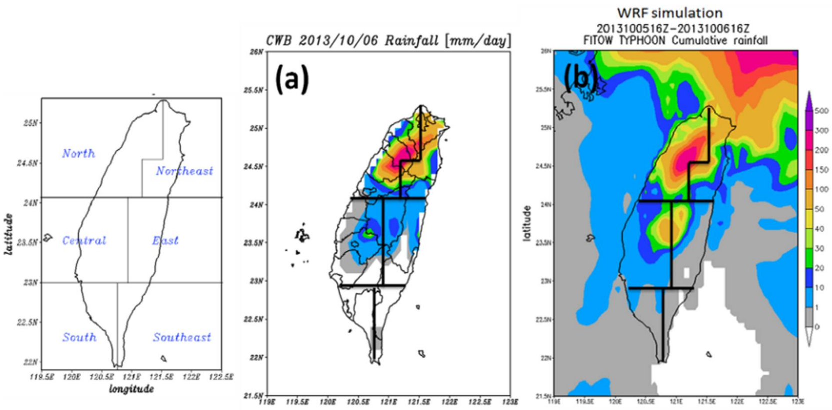
Natural disasters in Taiwan have occurred frequently in recent years. Torrential rainfall from typhoons in recent years has broken the precipitation records. The main factor that caused these calamities is intense concentration of rainfall distribution both in spatial and temporal domains. If precaution is performed in advance, it could alert people to take appropriate measurement to reduce disaster losses. Therefore, precisely estimate rainfall triggered by typhoons has become very important. The purpose of this study provides an accurate estimation of precipitation forecast in Taiwan's region impacted by typhoons.

The study utilizes WRF to simulate different paths of typhoons that had struck Taiwan in recent years, the distribution of rainfall in Taiwan. Compared with the actual rainfall data collected by automatic station and revise it. Established typhoon rainfall distribution of each paths in each region in Taiwan. Moreover, discovering the best typhoon rainfall estimation product or algorithms over the ocean by utilizing satellite remote sensing typhoon rainfall (such as Global Precipitation Measurement, GPM) and compared with the rain radar (ex: Precipitation Radar, PR or Dual-frequency Precipitation Radar, DPR) observations respectively.

WRF model is capable of simulating the rainfall ratio distribution of Taiwan when typhoon strikes. Plus, satellites are able to estimate rainfall of typhoons on the sea precisely. In other words, **this study takes advantage of WRF rainfall pattern combined with satellite rainfall estimation by TRaP (Tropical Rainfall Potential) technology.** Simulating the actual distribution of rainfall and the satellites can estimate valid typhoon rainfall to improve typhoon rainfall accuracy estimation in Taiwan.

キーワード: WRF model, Global Precipitation Measurement (GPM), Precipitation Radar, TRaP
Keywords: WRF model, Global Precipitation Measurement (GPM), Precipitation Radar, TRaP



Rainfall distribution of Taiwan area (a) observation, (b) simulation

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Antarctic temperature and ozone observed by satellite

Antarctic temperature and ozone observed by satellite

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The Formosa Satellite 3, also named as the Constellation Observing System for Meteorology, Ionosphere, and Climate (abbreviated as FORMOSAT-3 /COSMIC, F3/C), is a constellation of six micro-satellites, designed for monitoring weather and space weather. The constellation was launched into an initial circular low-Earth orbit at an altitude of 512 km on 15 April 2006. The six micro-satellites have deployed to six mission obits at around 800 km altitude with 30-degrees separation in longitude for evenly distributed global coverage. The major payload onboard F3/C, GPS occultation experiment (GOX) instrument daily provides more than 2000 soundings of atmospheric vertical temperature profile. By binning radio occultation observations, the three-dimensional temperature structure can be obtained to monitor Antarctic temperature variation. Real-time measurements of vertical temperature structures over the Antarctic region are important for monitoring the formation of polar stratospheric clouds (PSCs) which is a critical factor in the ozone variation. On the other hand, the Ozone Monitoring Instrument (OMI) in the Aura mission observes for total ozone and other atmospheric parameters related to ozone chemistry and climate. The instrument observes Earth's backscattered radiation with a wide-field telescope feeding two imaging grating spectrometers. In this work, more than 6 years observation will be analyzed to provide a quantitative comparison of ozone and atmospheric temperature variation in Antarctic.
Keywords: FORMOSAT-3/COSMIC, radio occultation

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Comparison of atmospheric profile from ceilometer and UAV in the fog forest in central Taiwan.

Comparison of atmospheric profile from ceilometer and UAV in the fog forest in central Taiwan.

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Xitou region, as the epitome of mid-elevation fog forest ecosystem in Taiwan, possesses a rich diversity of flora and fauna and is a famous forest recreation area. Long-term microclimate are monitoring more than 80 years by the Experimental Forest, National Taiwan University. Preliminarily study indicated the mean temperature was 17.05 ^{o}C in Xitou region from June 2005 to May 2013 which was 0.7 ^{o}C warmer than the 1980s. The warming rate was about 0.29 ^{o}C/Decade for the above-mentioned period while from the 1940s to the 1980s it was about 0.1 ^{o}C/Decade. It was nearly three times the warming accelerates. Moreover, literature reviews showed the frequency of foggy days was 87.7% in 2005 and decreased to 75.6% in 2011 (Liang et al., 2009; Wey et al., 2011). These situation may be accompanied with a very rapid development of local tourist industry in Xitou region driven by tourists number increased from 1 million/year in 1999 to 1.8 million/year in 2014. The global warming and the landscape changes could also be the most likely factors causing the dramatic warming accelerates and also decreasing the foggy frequency.

For the purpose of understanding the characteristics of fog layer, atmospheric profile observations from ceilometer and unmanned aerial vehicle (UAV) carrying self-developed measurements were compared from October to December in 2014. The results showed UAV can observe up to 1200m height above ground level and it is more economical than traditional radiosonde instruments. The height of atmospheric boundary layer of Xitou valley was close to the around mountain ridges (~2000m a.s.l.) which was similar to the previous radiosonde observations (Wang, 2011). The ceilometer could provide water vapor profile under high temporal resolution; however it might underestimate the thickness of heavy fog due to the inability of clearly identifying the top height of the fog from the limit of laser power. A total solution of integrating ceilometer, UAV and remote sensing technology for monitoring/understanding the characteristics of Xitou microclimate change are on-going.

キーワード: microclimate, fog characteristics, ceilometer, unmanned aerial vehicle, global warming, landscape changes
Keywords: microclimate, fog characteristics, ceilometer, unmanned aerial vehicle, global warming, landscape changes