中央氣象署115年第四十屆天氣分析與預報研討會
40th Conference on Weather Analysis and Forecasting

# 颱風劇烈天氣引發電離層干擾模擬

# Simulation of Ionospheric Disturbances Induced by Severe Typhoon Weather

蘇秝蓁[1] (Su Li-Zhen), 陳佳宏[1] (Chen Chia-Hung)

[1]國立成功大學 地球科學系
[1] Department of Earth Sciences, National Cheng Kung University

## 摘　要

颱風為熱帶地區常見的劇烈天氣系統，其強烈對流、降雨及近地面風場變化不僅影響對流層，也可能透過大氣重力波(Atmospheric Gravity Waves, AGWs)向上傳播至高層大氣，進而造成電離層電子密度擾動。本研究以「颱風劇烈天氣引發電離層干擾模擬」為主題，探討颱風活動與電離層擾動之間的可能耦合機制。本研究期望連接美國國家大氣研究中心(National Center for Atmospheric Research, NCAR)的Weather Research and Forecasting (WRF)及Thermosphere-Ionosphere-Electrodynamics General Circulation Model (TIE-GCM)模擬系統，以探討颱風劇烈天氣與電離層擾動之間的關聯，進一步了解低層大氣與高層電離層之間的垂直耦合作用，並提供未來太空天氣監測、GNSS訊號誤差分析及電離層擾動研究之參考。

關鍵字：劇烈天氣、電離層擾動、大氣重力波、WRF、TIE-GCM

## Abstract

Typhoons are severe weather systems commonly observed in tropical regions. Their intense convection, heavy precipitation, and significant variations in near-surface wind fields not only affect the troposphere but may also propagate upward to the upper atmosphere by Atmospheric Gravity Waves (AGWs), subsequently inducing perturbations in ionospheric electron density. This study, entitled “Simulation of Ionospheric Disturbances Induced by Typhoon-Related Severe Weather,” aims to investigate the potential coupling mechanisms between typhoon activity and ionospheric disturbances. This study aims to couple the Weather Research and Forecasting (WRF) model with the Thermosphere-Ionosphere-Electrodynamics General Circulation Model (TIE-GCM) from the National Center for Atmospheric Research (NCAR) to explore the correlation between severe typhoon weather and ionospheric disturbances. This will further clarify the vertical coupling processes between the lower atmosphere and the upper ionosphere, providing a valuable reference for future space weather monitoring, GNSS signal error analysis, and ionospheric disturbance research.

Key words: severe weather, ionospheric disturbances, atmospheric gravity waves, WRF, TIE-GCM