Supplemantary Material

Effects of Meteorological Conditions on the Vertical Distribution of Nitrogen Dioxide in China Using New-Generation Geostationary Satellite Measurements and Machine Learning

Naveed Ahmad [a], Changqing Lin [a,*], Alexis K.H. Lau [a,b], Kai Qin [d], Chengcai Li [e], Jimmy CH Fung [a,f]

Correspondence to: Changqing Lin (cqlin@ust.hk)

It includes Figure S1-S9

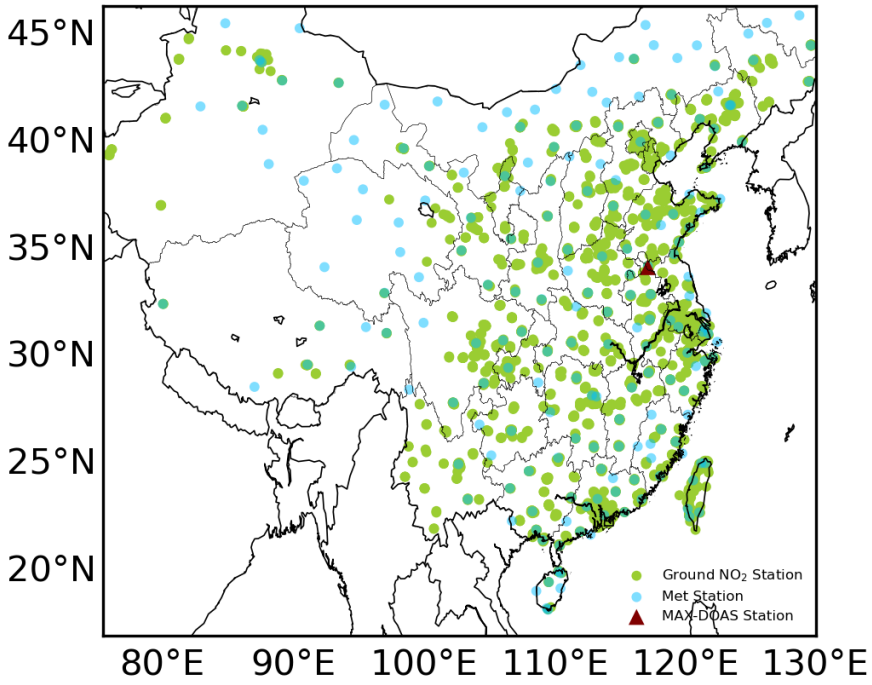


Figure S1: Study region and spatial distributions of ground NO_2 monitoring stations (green circles), meteorological stations (blue circles) and MAX-DOAS station (red triangle).

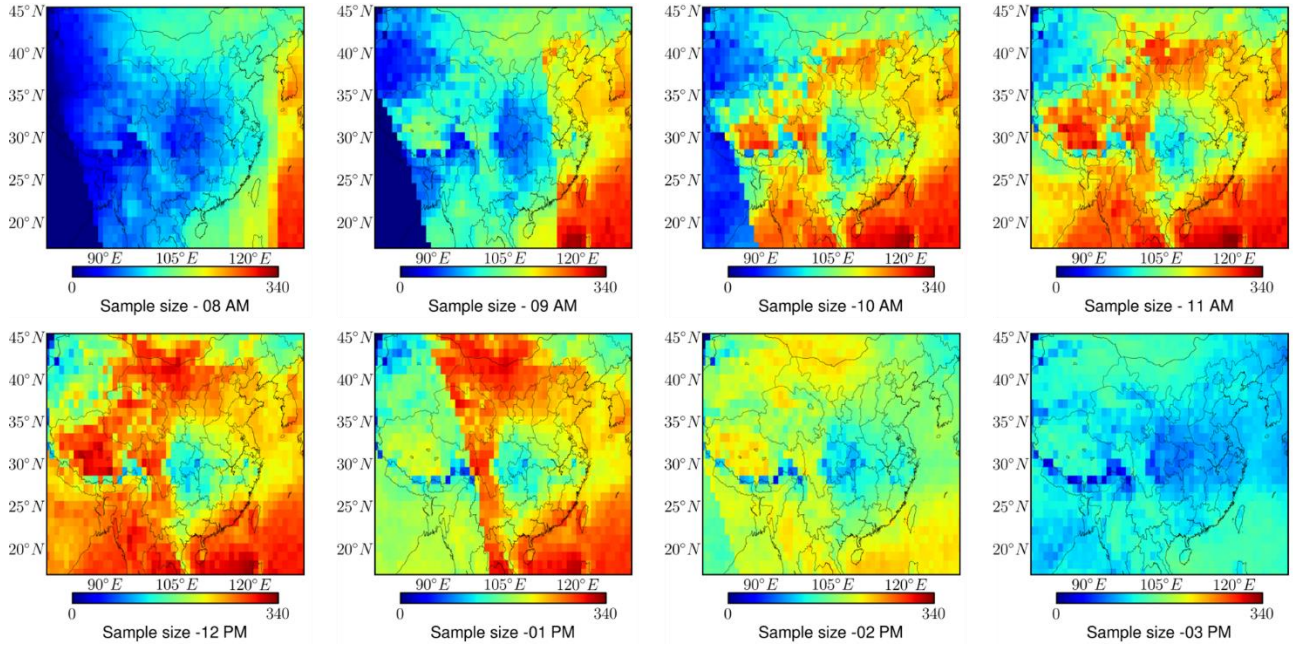


Figure S2: Diurnal variation in the sample size of GEMS measurements of NO_2 VCDs from 8:00 am to 15:00 pm in 2021 (China's local time in UTC+8 was used in this study).

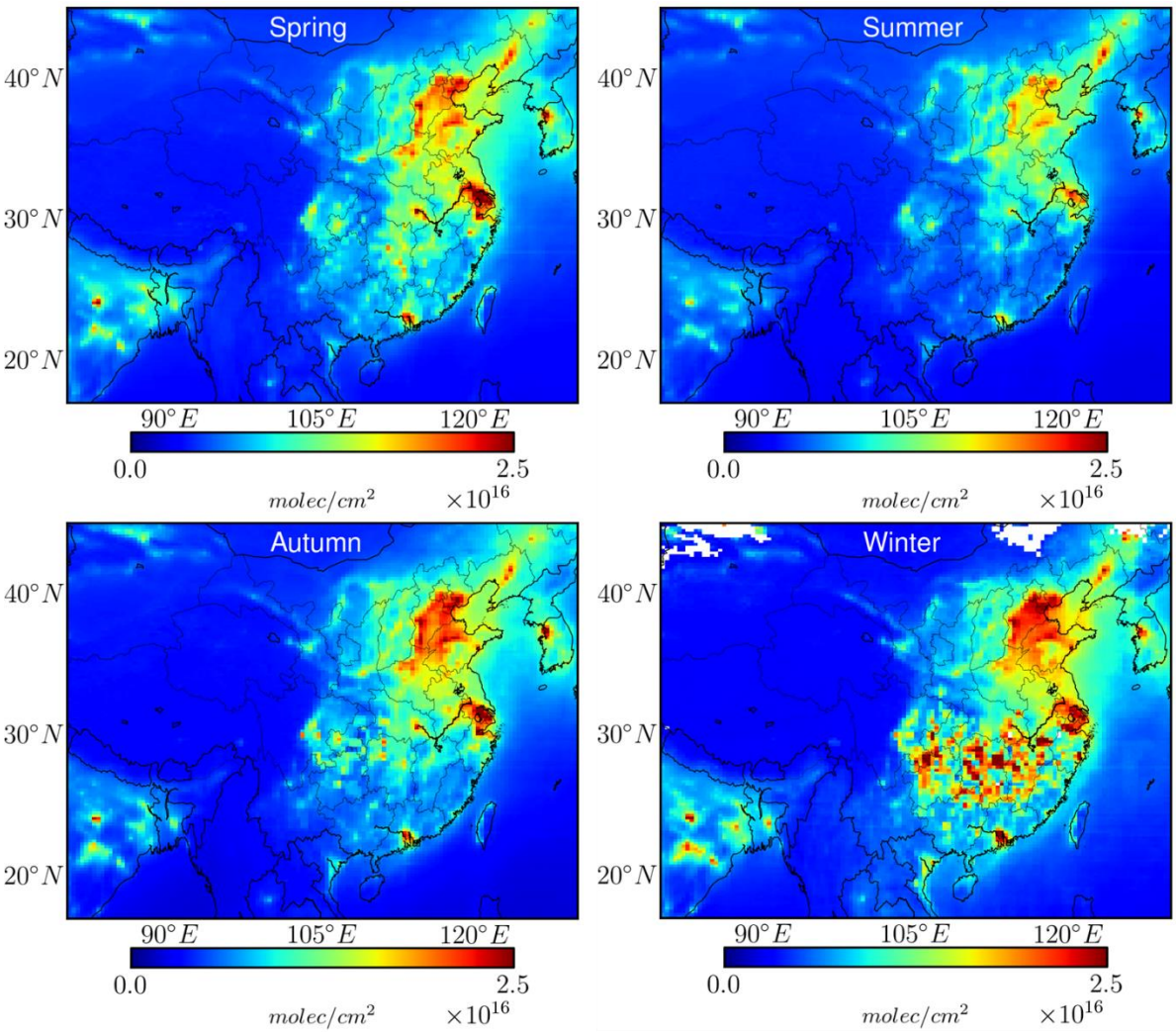


Figure S3: Spatial distributions of seasonal mean of the satellite-derived VCDs of NO_2 for 2021 in the study region.

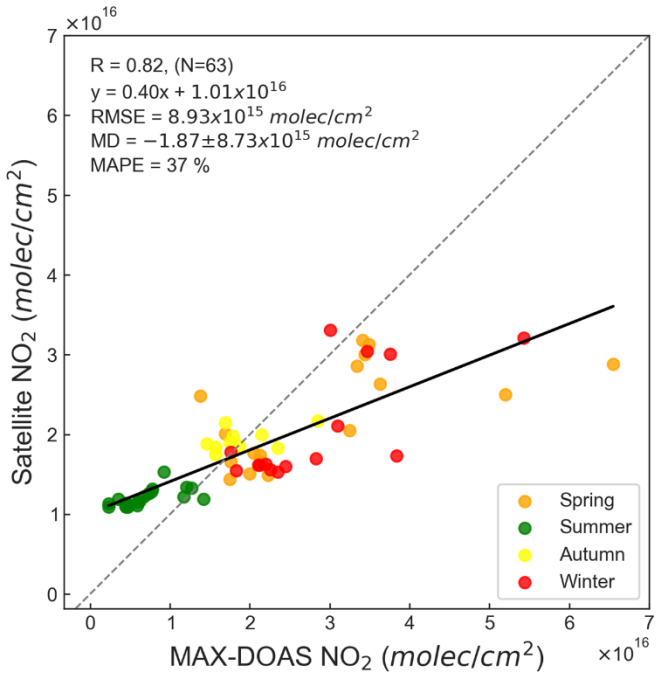


Figure S4: Comparison of hourly NO_2 VCDs between GEMS and ground-based MAX-DOAS measurements during January 1-7 (winter), April 1-7 (spring), July 25-31 (summer), and October 15-21 (autumn) of 2021.

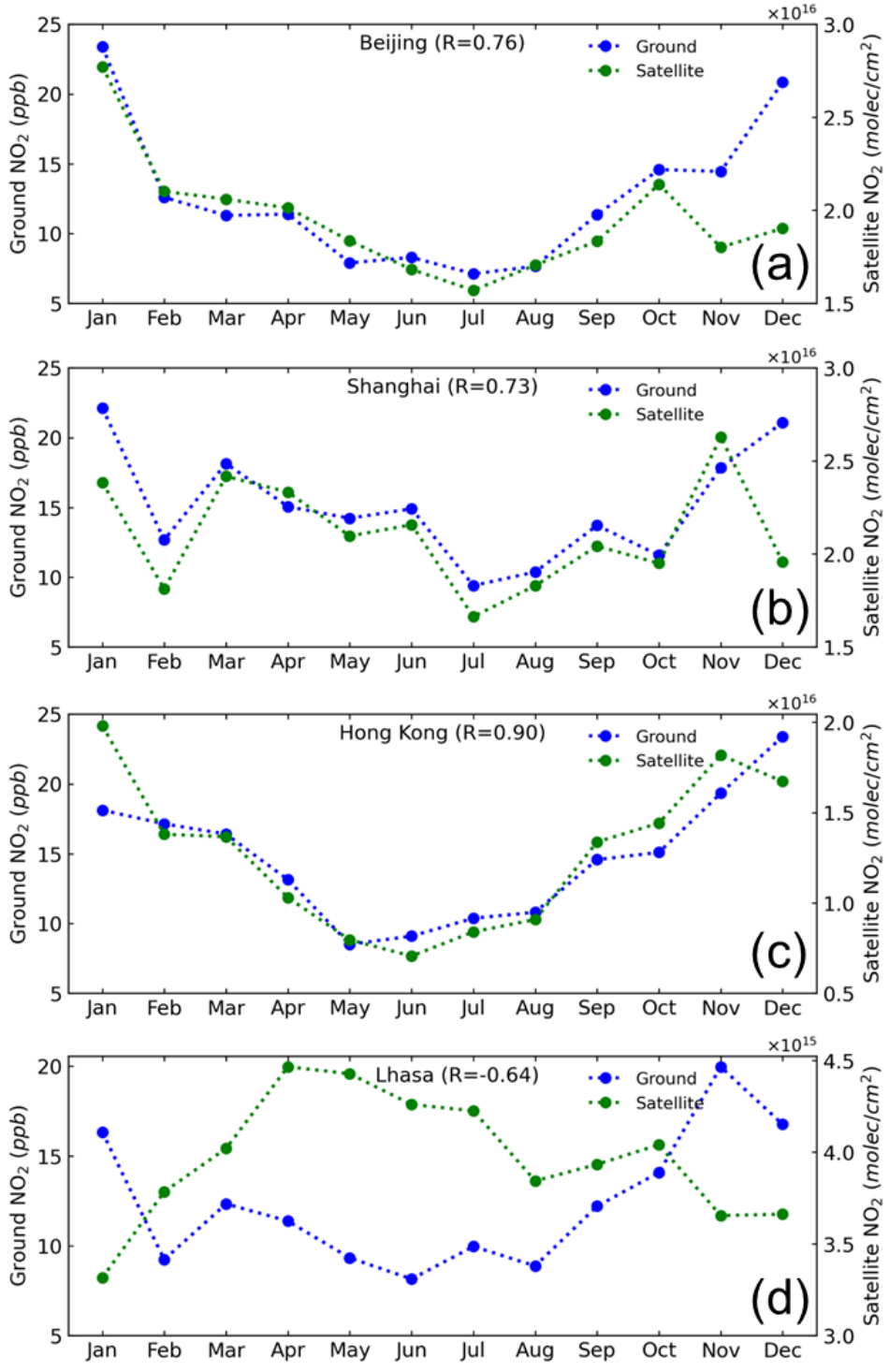


Figure S5: Comparisons between monthly mean of the satellite-based NO_2 VCDs and ground-based NO_2 concentrations in (a) Beijing, (b) Shanghai, (c) Hong Kong, and (d) Lhasa.

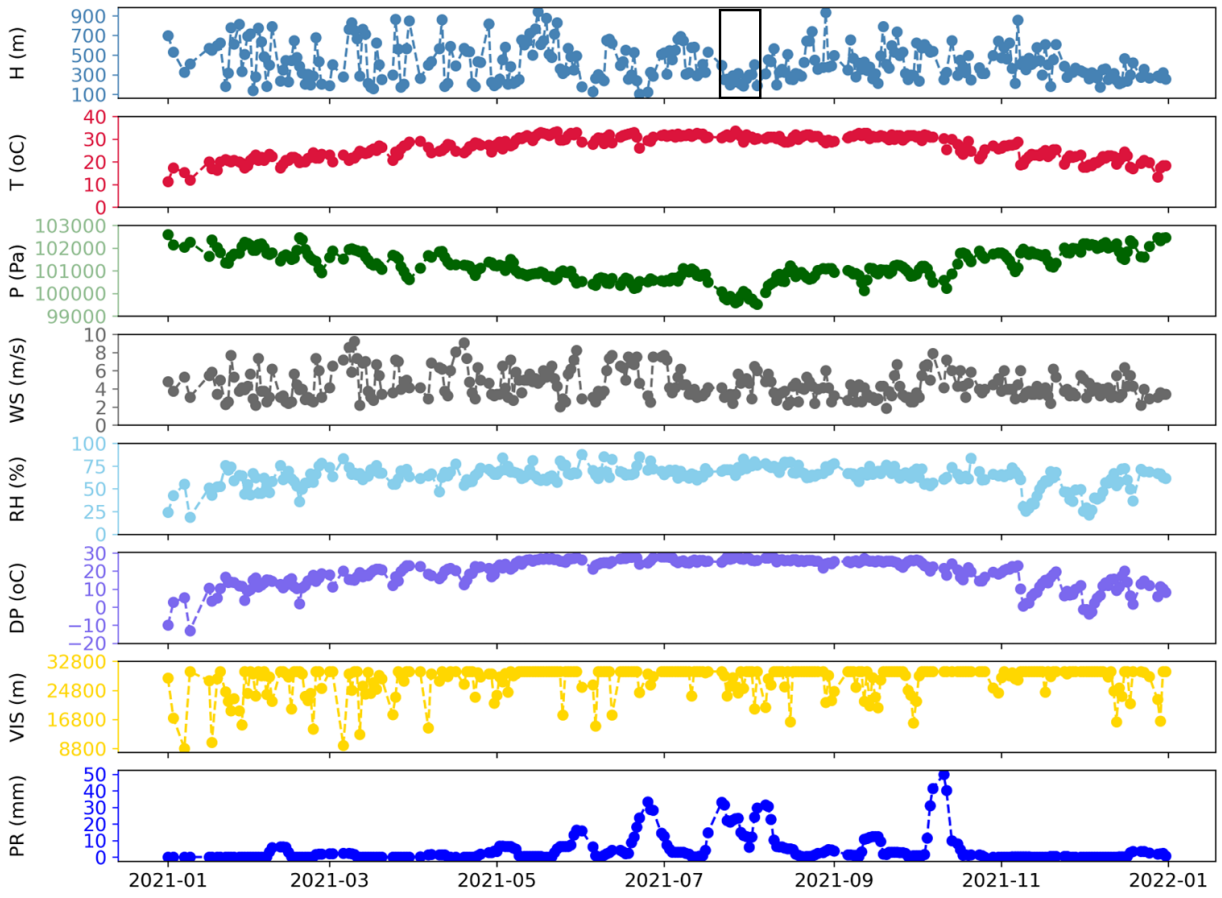


Figure S6: Time series of daily mean NO_2 mixing height (H) and meteorological parameters, including temperature (T), wind speed (WS), visibility (VIS), dew point (DP), relative humidity (RH), precipitation (PR) and air pressure (P), in Hong Kong for 2021.

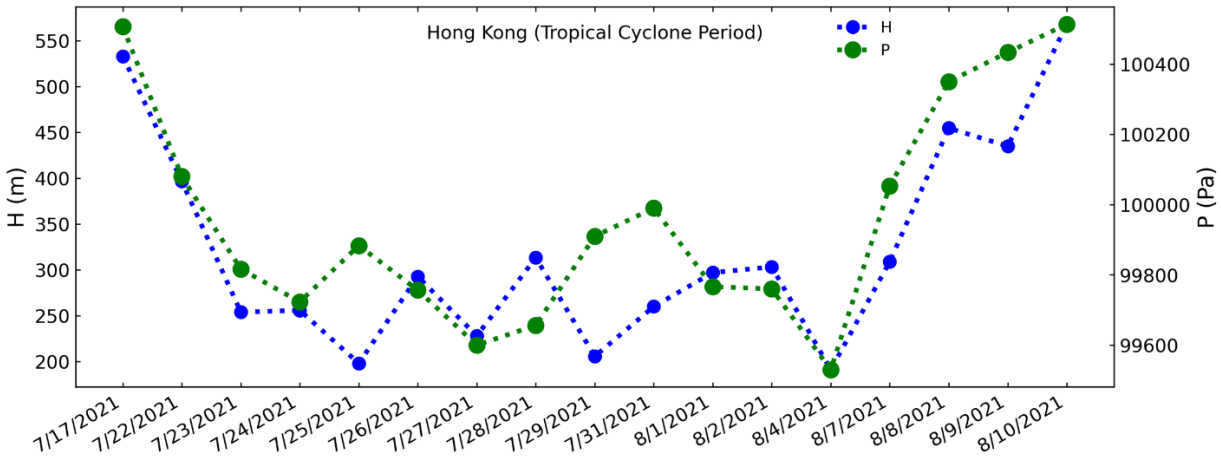


Figure S7: Time series of the NO_2 mixing height (H) together with the air pressure (P) in Hong Kong from July 17 to August 10, 2021.

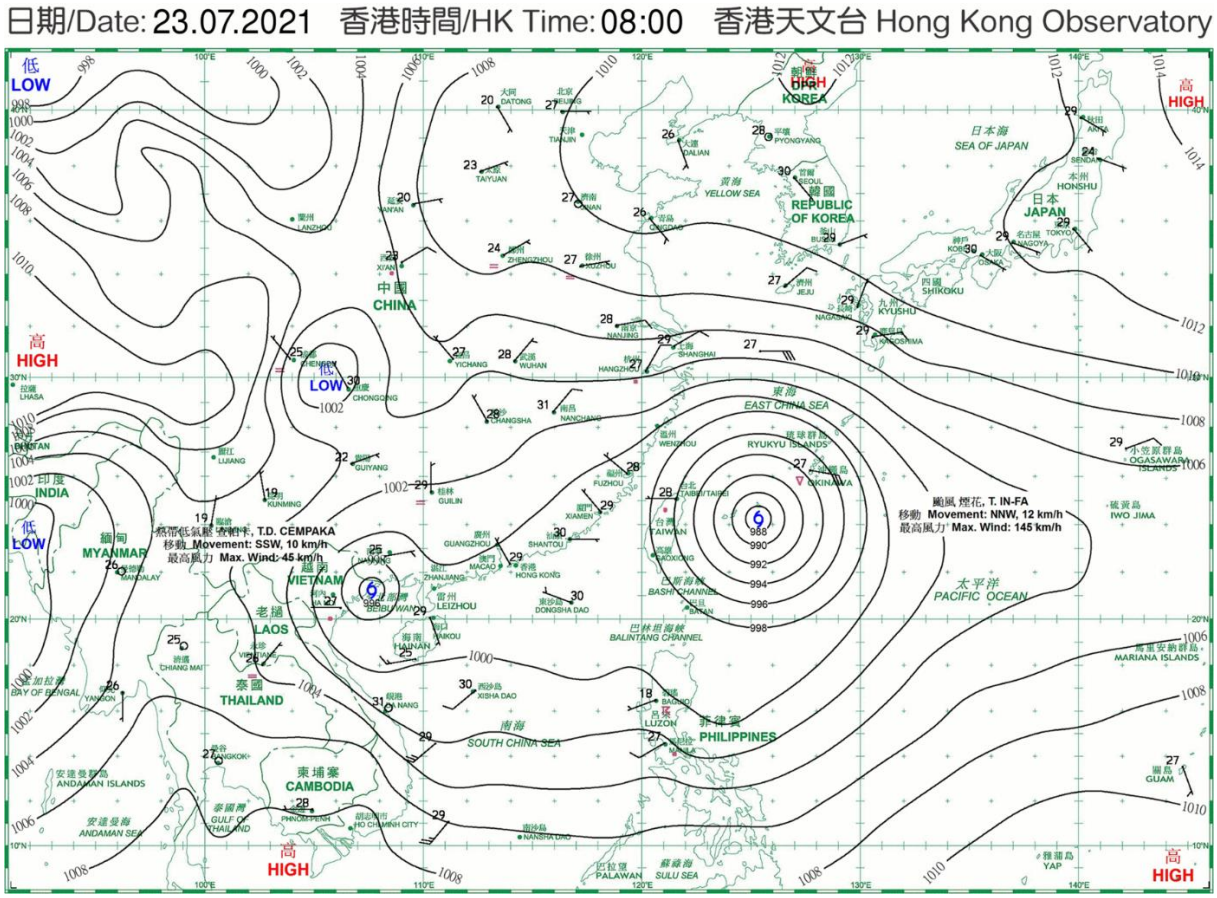


Figure S8: Regional weather chart on July 23, 2021, during the tropical cyclone period.

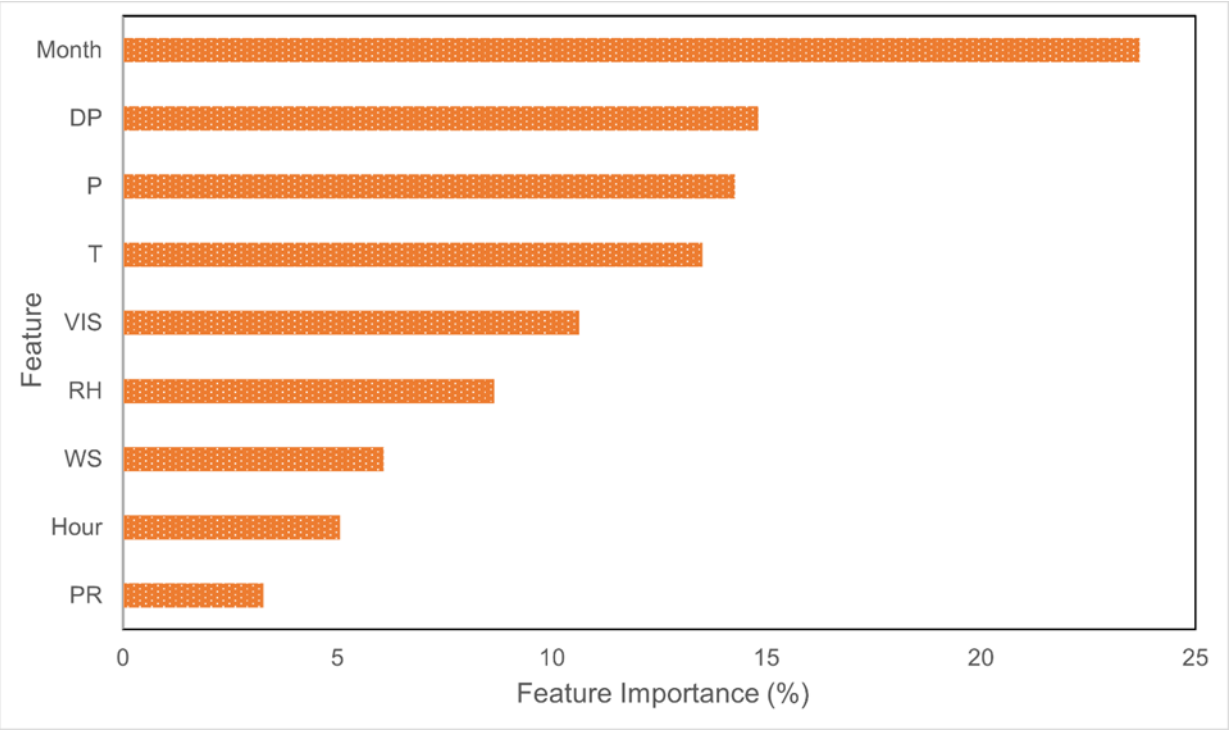


Figure S9: Relative importance of individual explanatory features (e.g., meteorological and time variables) in the random forest (RF) model.