Supplementary

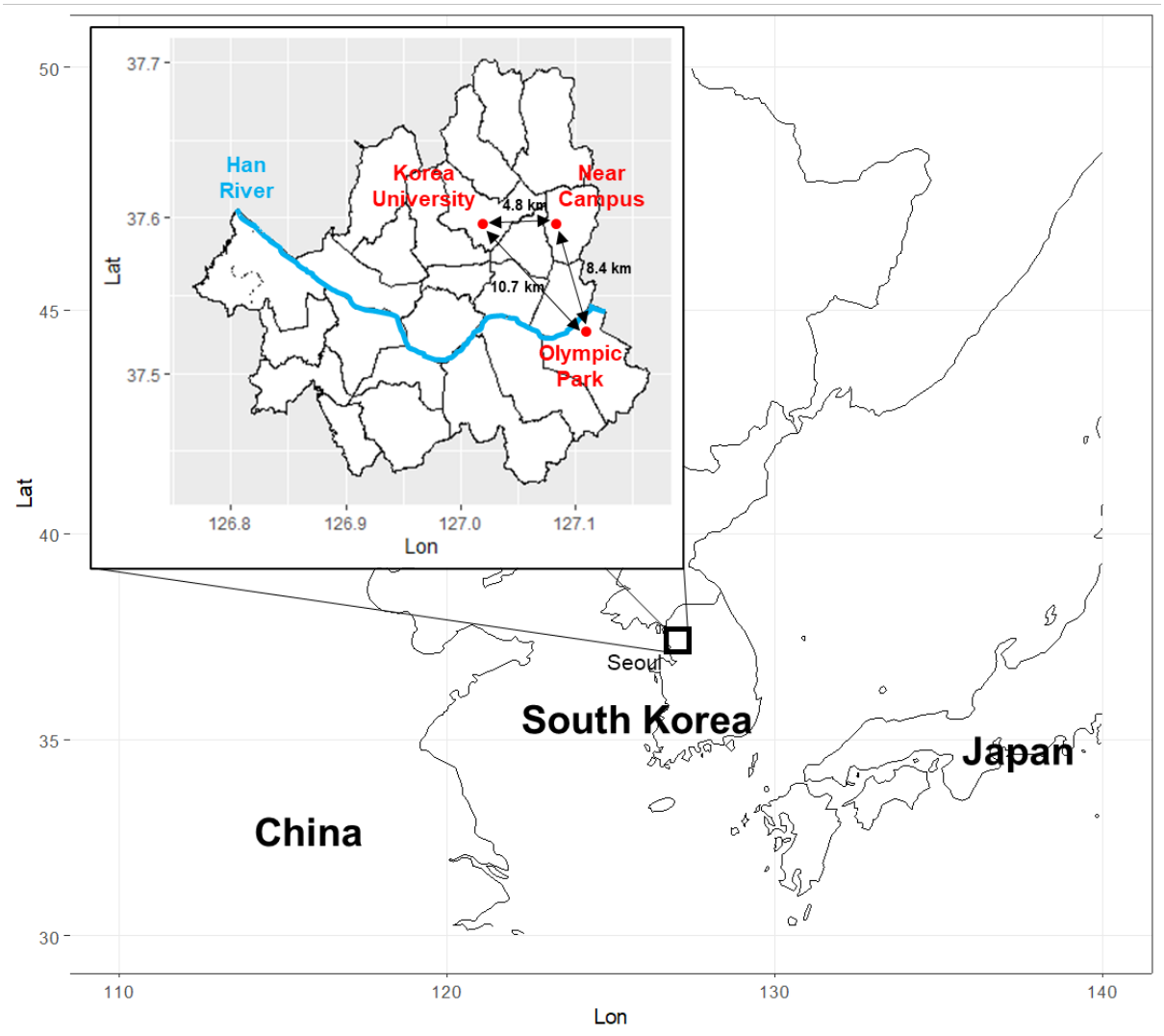

Figure S1. The map shows the locations where HONO measurements were made in Seoul from 2016 to 2019.

```
#Set the pathway of files and model
cd C:\Users\atmos\Desktop\

#import libraries
import pandas as pd
import numpy as np
import tensorflow as tf
import keras

#Read preprocessed input data file and makes the shpae of data be proper to model input
raw_data = pd.read_csv('Dataset_for_model.csv', encoding = 'cp949')
data_X = raw_data[["O3_sc","NO2_sc","CO_sc","SO2_sc","SZA_sc","T_sc","RH_sc","WS_sc","WD_sc"]]
final_val_X = data_X.dropna(axis=0)
final_val_X1 = final_val_X.to_numpy().astype('float64')

#Load model
model = keras.models.load_model('RND_v1.0.h5')

#Calculate HONO
final_val_Y1 = model.predict(final_val_X1)
```

Figure S2. Total code for simulation of HONO using the RND model

Table S1 A range of 10^{th} percentile ~ 90^{th} percentile value of measurement variables and their mean values during whole measurement periods

YY-MM	16-05	16-06	18-06	19-04	19-05	19-06
O_3 (ppbv)	1.9 ~ 86.7, 42.1	3.7 ~ 78.4, 38.5	13.3 ~ 60.2, 35.5	11.4 ~ 51.6, 32.3	21.5 ~ 95.7, 57.4	31.1 ~ 92.1, 59.7
NO_2 (ppbv)	9.7 ~ 49.2, 28.4	5.9 ~ 39.6, 23.9	8.1 ~ 39.7, 21.5	14.2 ~ 52.9, 31	12.8 ~ 53.3, 32.7	11.3 ~ 40.9, 24.2
CO (ppbv)	399.2 ~ 948.3, 650.6	309.9 ~ 649.3, 472.8	242.8 ~ 628, 433.9	313.7 ~ 582.3, 436.2	274.9 ~ 731.5, 471.2	205.5 ~ 498.2, 336.8
SO_2 (ppbv)	1.9 ~ 7.5, 4.8	1.7 ~ 6.2, 3.7	5 ~ 7.2, 5.8	0.7 ~ 3, 1.6	2.2 ~ 5.9, 3.9	1.7 ~ 4.2, 2.8
T (°C)	15.1 ~ 27.7, 20.9	17.3 ~ 28.2, 22.7	20 ~ 28.2, 23.6	9.6 ~ 20.5, 14.8	14.7 ~ 25.7, 20.2	18.1 ~ 26, 22
RH (%)	31.4 ~ 83.5, 58.4	34.3 ~ 81.3, 58.2	31.5 ~ 74.3, 52.6	27.7 ~ 88.1, 56.3	24 ~ 66, 44.9	39.6 ~ 81.4, 59.5
WS ($m\ s^{-1}$)	0.08 ~ 0.88, 0.46	0.09 ~ 1.06, 0.53	0.01 ~ 2.62, 1.07	0.76 ~ 3.66, 1.98	0.74 ~ 4.43, 2.39	0.84 ~ 3.59, 2.09
HONO (ppbv)	0.3 ~ 2, 0.9	0.3 ~ 1.7, 0.9	0.3 ~ 0.7, 0.4	0.3 ~ 1.9, 1.1	0.2 ~ 2, 1	0.5 ~ 2.1, 1.1