

Process analysis and sensitivity of emissions to O₃ and particulate matters of a high pollution episode in Taiwan

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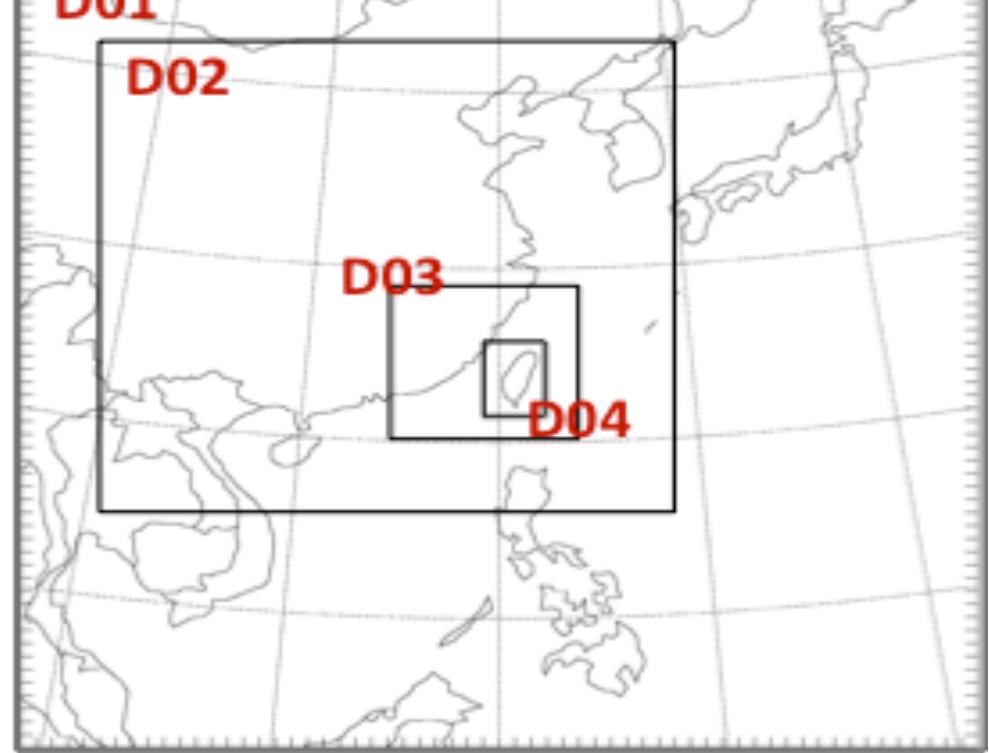
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Introduction

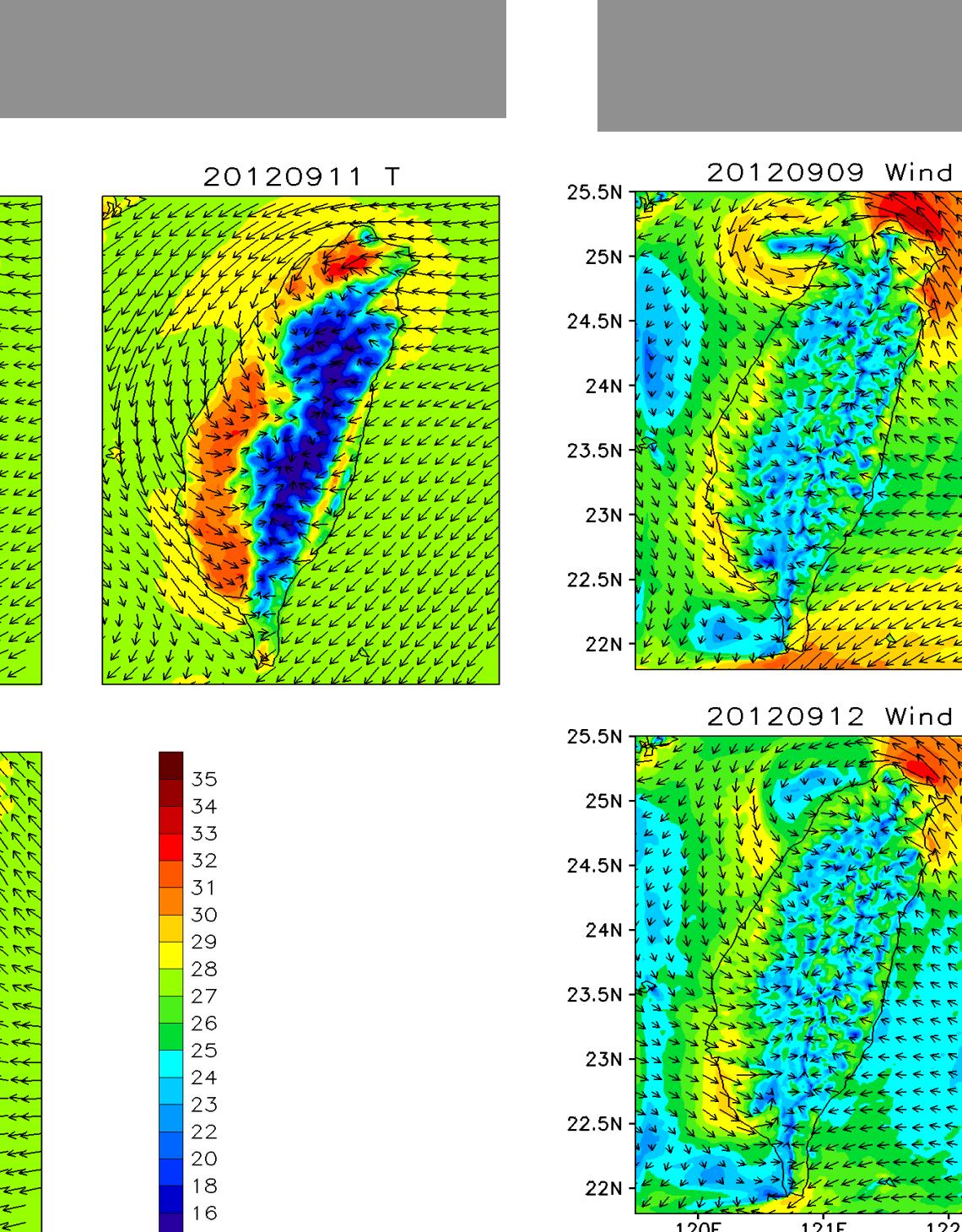
1. Process analysis and sensitivity of precursor emissions to ozone (O₃) and particulate matters (PM) are studied using Community Multiscale Air Quality (CMAQ) modeling system for a high pollution episode to understand Taiwan's air pollution problem.
2. Study objective includes: (1) identify processes that contribute to high O₃/PM problems, (2) understand response of O₃ to its precursors, (3) assess model performance
3. Simulation episode: September 9 ~ September 15, 2012. The selected episode was associated with a typical land-sea breeze circulation.

Model Configurations

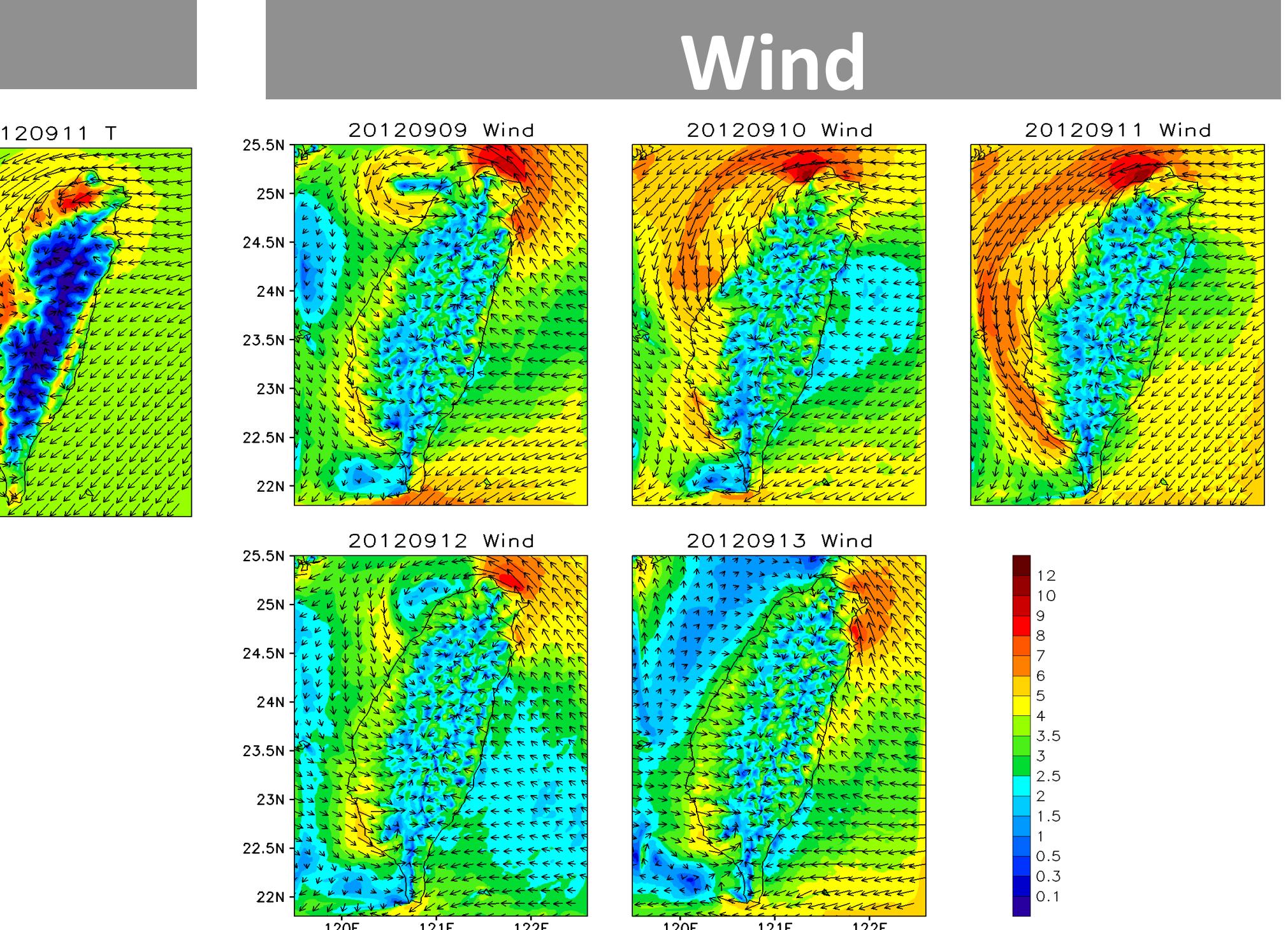
Model	WRF v3.5.1
Grid spacing	81/27/9/3 km
Radiation scheme	RRTMG
Microphysics	WSMS
PBL scheme	YSU
Land Surface	Noah
Update	Land Use Green Fraction
PA	Only IPR
HDDM	



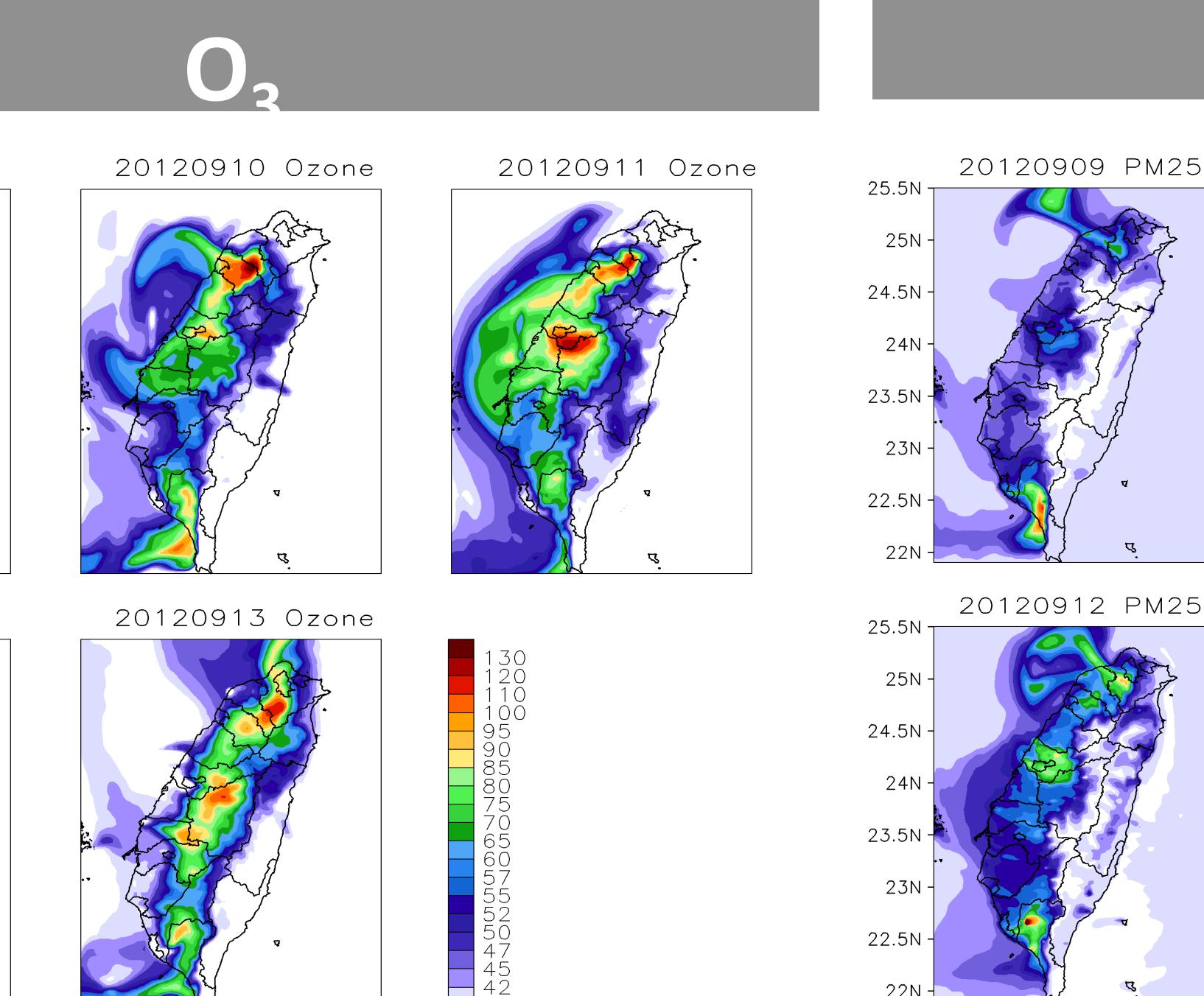
Temp



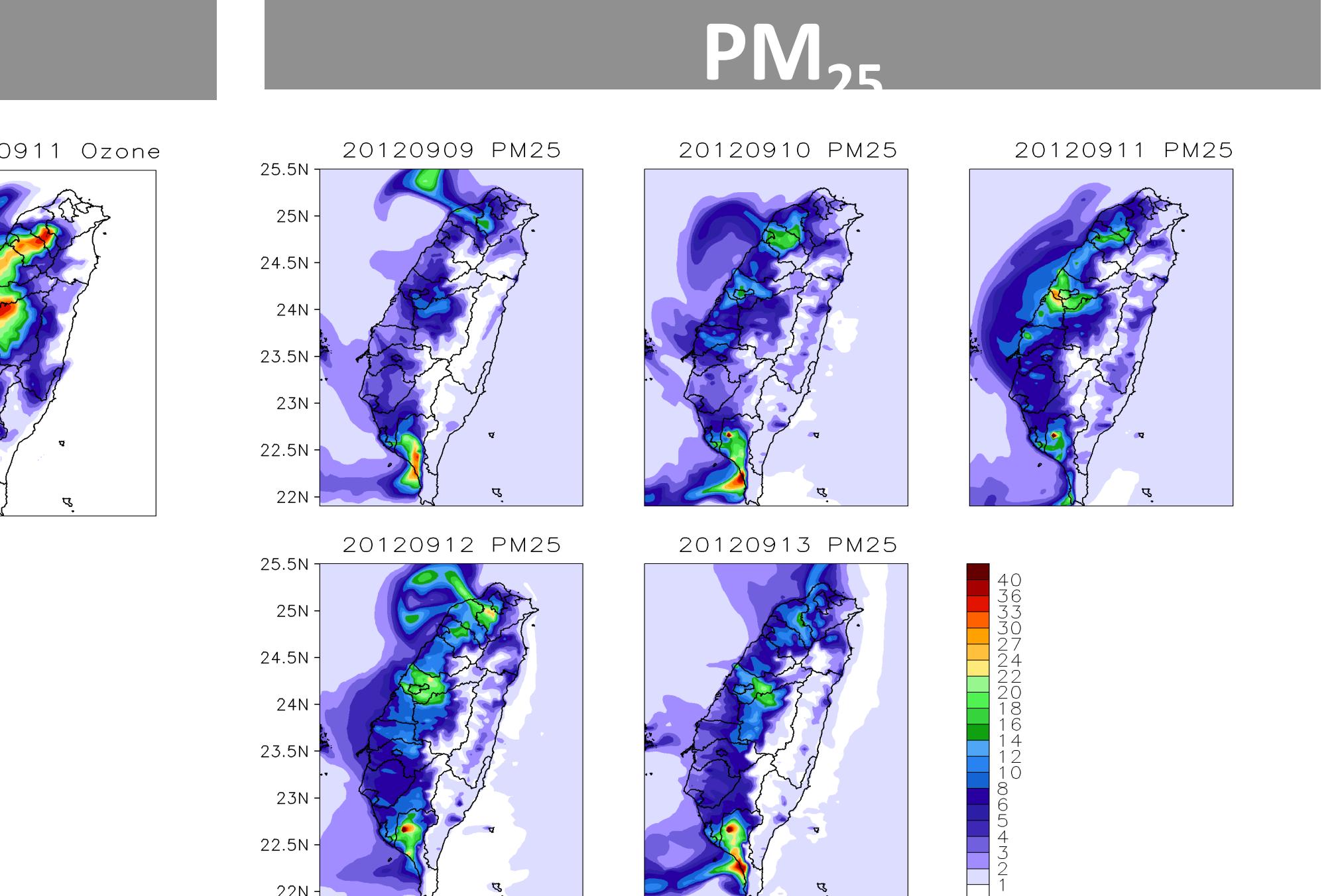
Wind



O₃



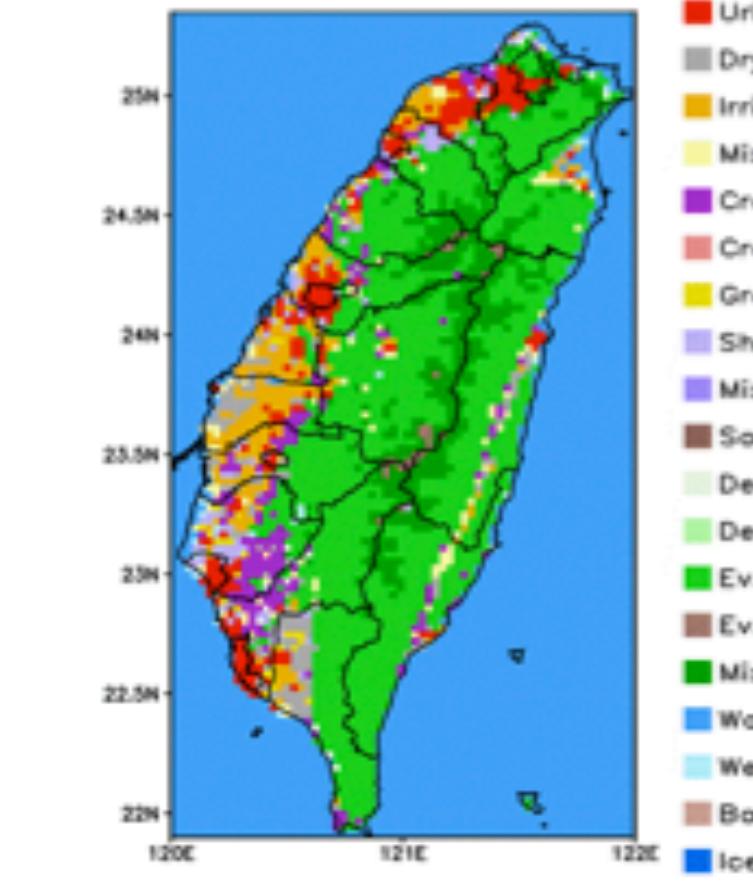
PM₂₅



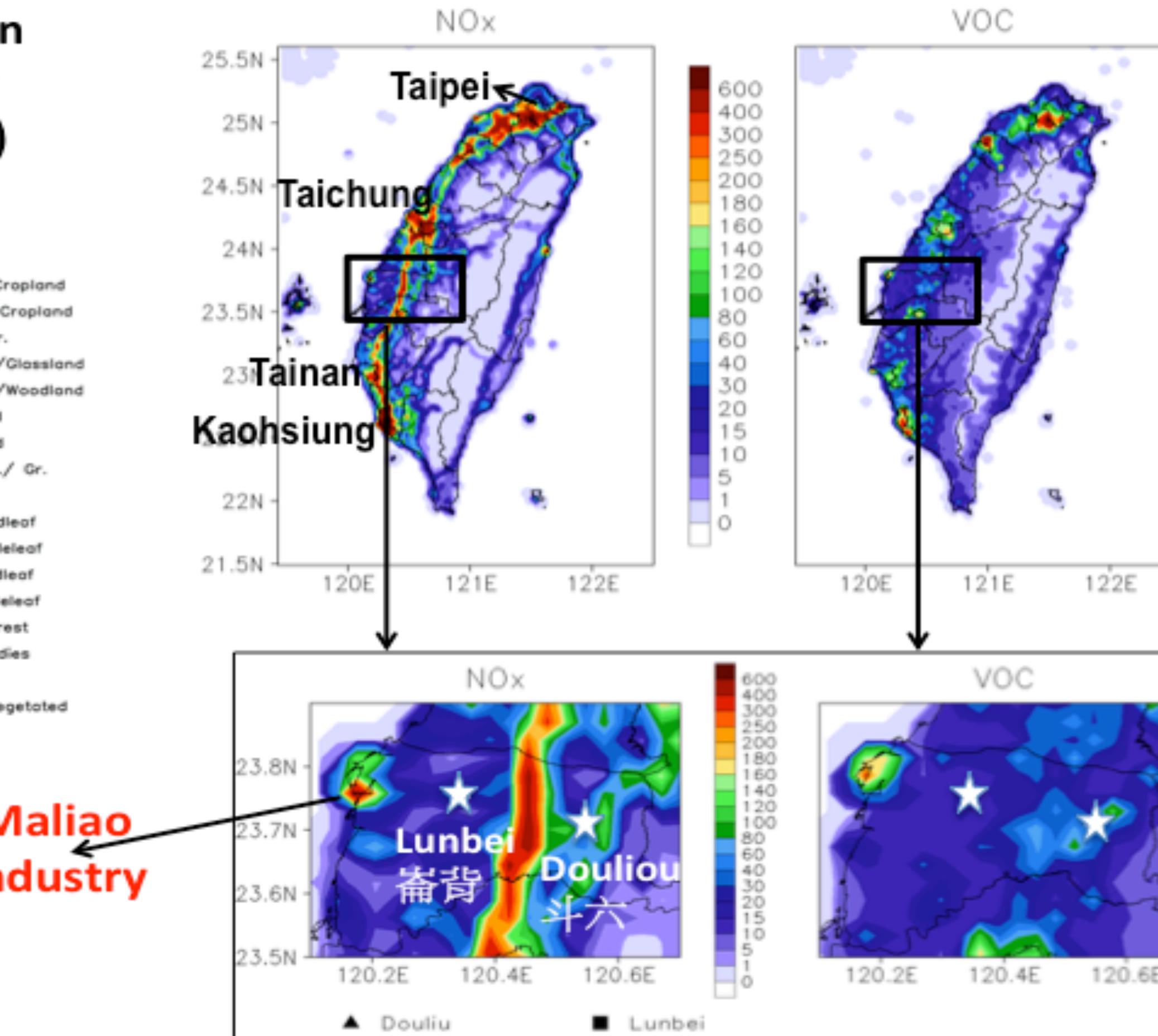
Emission distributions

Data source: Taiwan Emission Inventory Data System (TEDS)

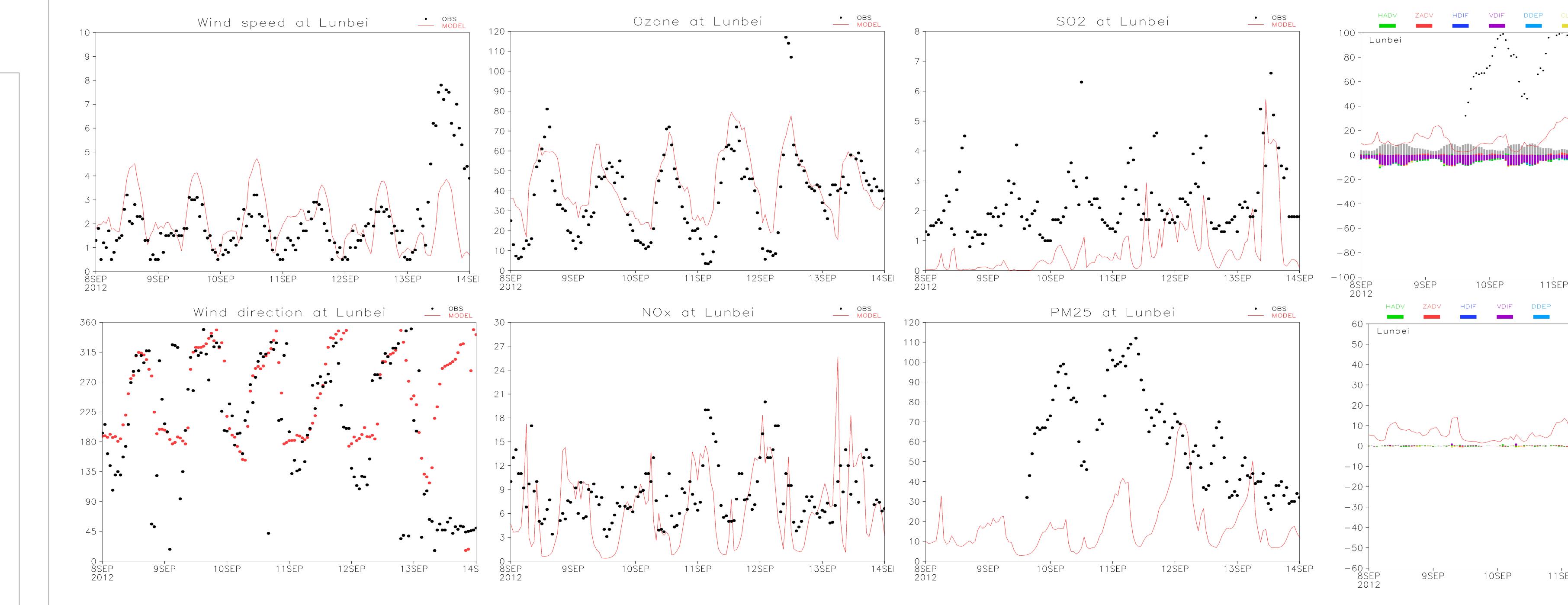
Landuse



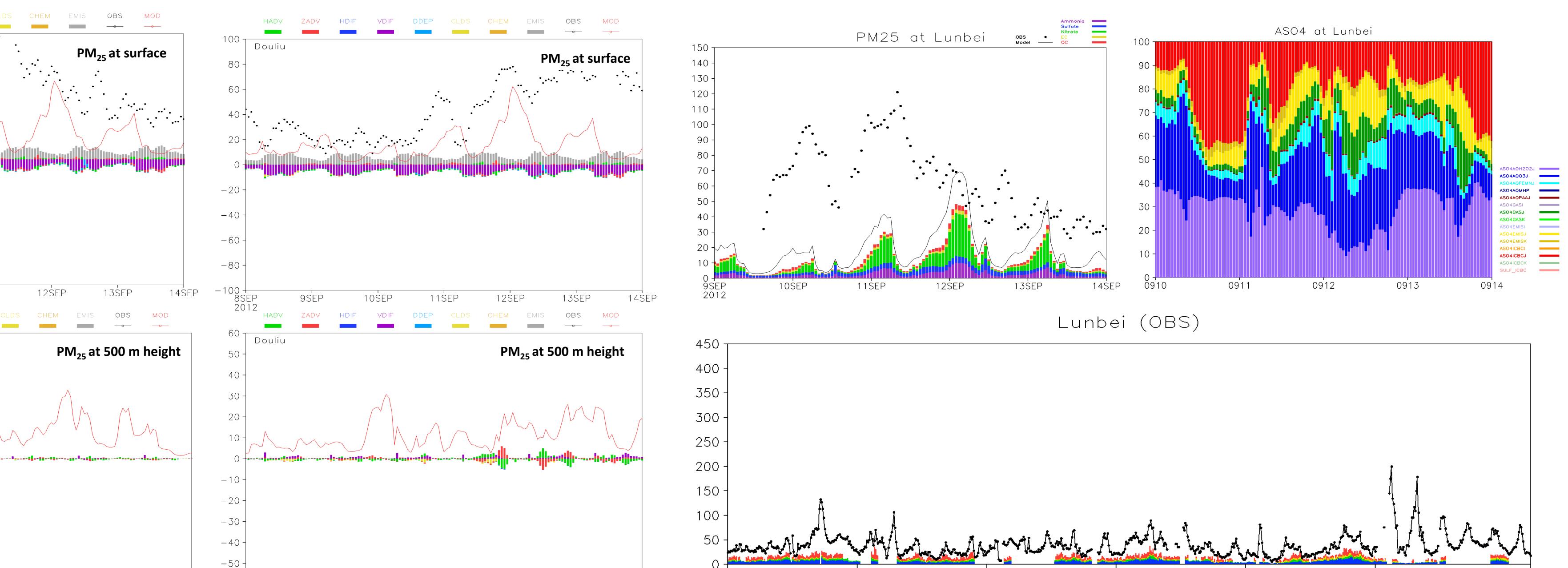
Maliao Industry



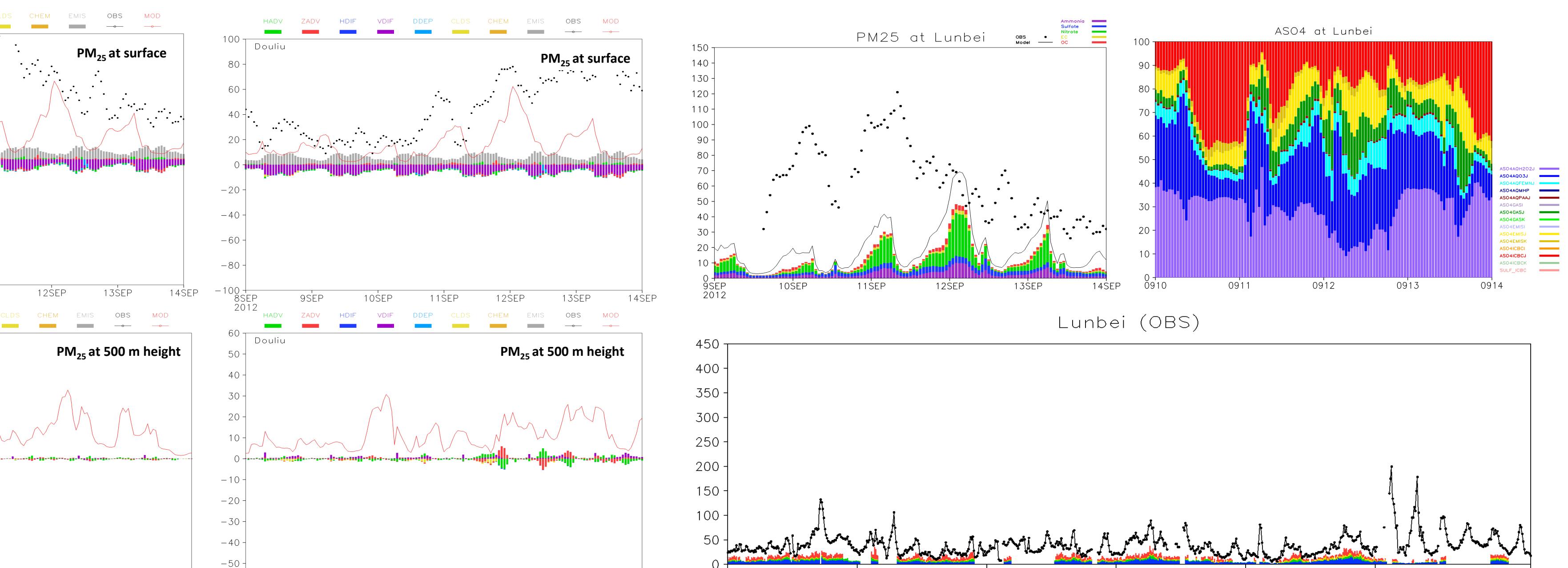
Evaluation at Lunbei station



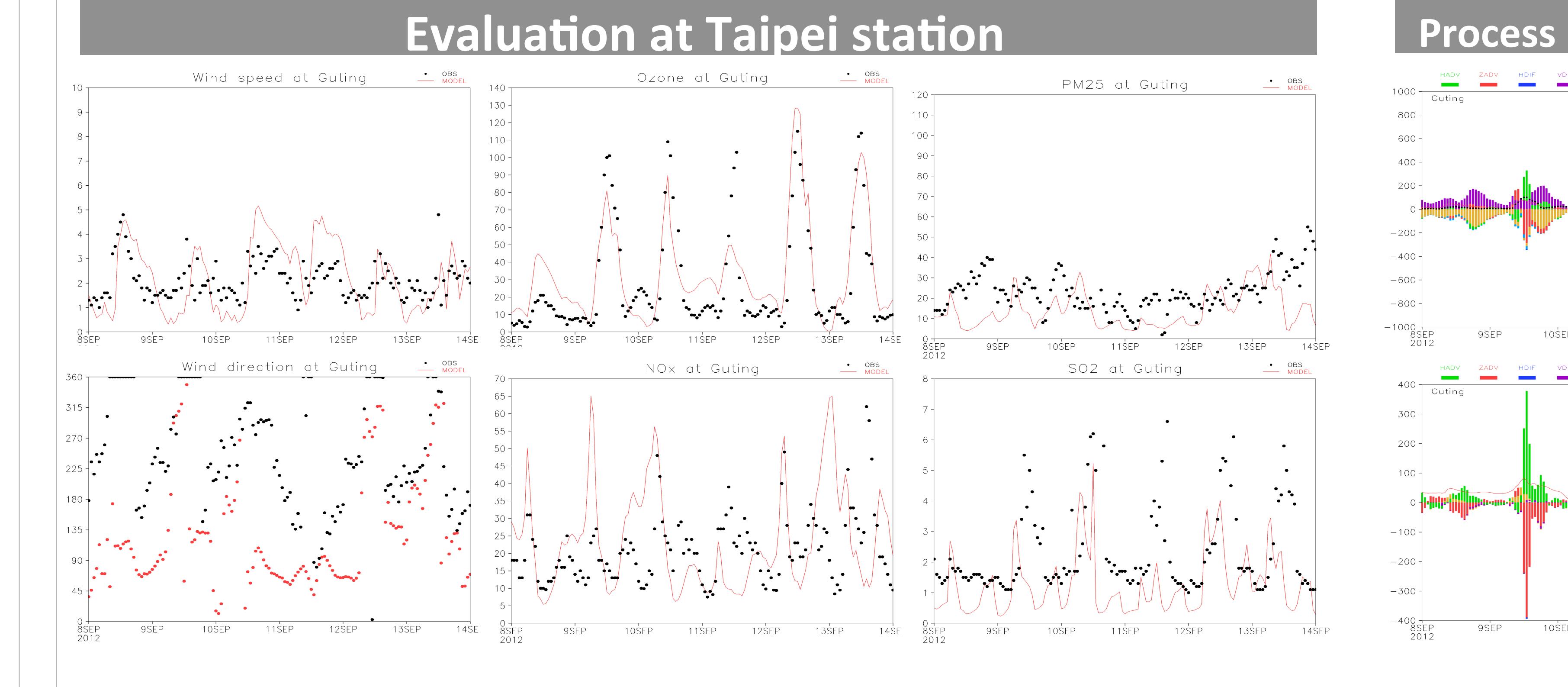
Process Analysis of PM₂₅



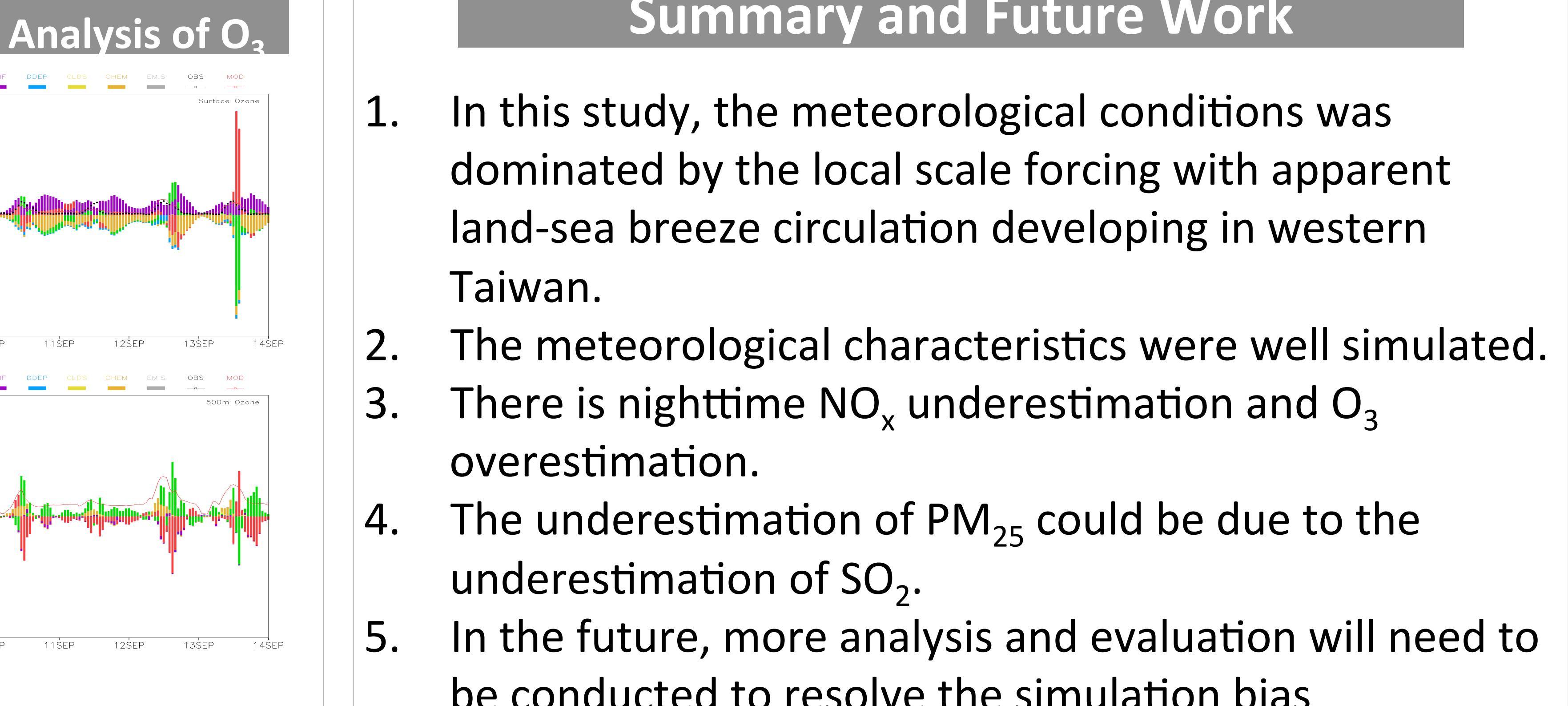
Component of PM₂₅ and sulfate tracking



Evaluation at Taipei station



Process Analysis of O₃



Summary and Future Work

1. In this study, the meteorological conditions was dominated by the local scale forcing with apparent land-sea breeze circulation developing in western Taiwan.
2. The meteorological characteristics were well simulated.
3. There is nighttime NO_x underestimation and O₃ overestimation.
4. The underestimation of PM₂₅ could be due to the underestimation of SO₂.
5. In the future, more analysis and evaluation will need to be conducted to resolve the simulation bias