

Environmental Research, Technology Demonstration and Conference Project

ECF Project:	ECF 2022-94
Project Title:	Environment and Conservation Fund - Development of a hybrid deep-learning - data assimilation framework for spatiotemporal NOx emission inversion
Principal Investigator:	Dr Lu Xingcheng, Department of Geography and Resource Management, The Chinese University of Hong Kong
Total Approved Grant:	\$495,000
Duration:	16/9/2023 to 15/9/2025
Project Status/Remarks:	To be commenced
Project Scope:	<p>The purpose of this project is to develop a feasible inverse method to improve the spatiotemporal NOx emission for the 3D chemical transport model (CTM). Existing inverse methods generally need to rely on satellite data, whose corrections are not always effective on cloudy days. Regardless of the cloud appearance, this newly proposed inverse framework will integrate ground observation data, data assimilation technique, and deep-learning technique for NOx emission correction. More advanced than others, the proposed method can also be applied to correct the diurnal profile of emission. The domain setting of this work will be the same as that of the PATH model of the Environmental Protection Department (EPD), hence, the corrected NOx emission can be directly implemented to improve the air quality forecast in Hong Kong. Recent evolutions (2015-2021) of NOx pollution characteristics will be investigated by using the updated emission in 3D CTM. Simulation results can provide solid scientific references for the policymakers to design long-term emission control plans and short-term de-spiking strategies for NOx and its related secondary pollutants (e.g., O3) in Greater Bay Area. With the implementation of an effective control policy, adverse health burdens caused by NOx are expected to decrease and local residents can thus benefit from this research.</p>
Summary of the Findings/ Outcomes:	To be available upon completion of the project