





"Science in the Public Service" Forum and Lecture Series

區域性空氣污染和激光雷達的應用 Regional Air Pollution and LiDAR Application

22 Aug 2020

環境保護署

Environmental Protection Department

Three elements of air pollution -Emission, Chemical Transformation and Transportation



Air Quality Monitoring Station (AQMS)



General Station (on low-rise buildings)

Roadside Station



Spatial distribution of annual NO_2 concentrations (μ g/m³) in 2019





Air Quality Trends in Hong Kong – NO_x



Spatial distribution of annual $PM_{2.5}$ concentrations (μ g/m³) in 2019





Improvement of $PM_{2.5}$ in the Pearl River Delta Region (2003 – 2018)



Source: HKUST

Hours of Reduced Visibility



(Criteria: visibility below 8 kilometres, relative humidity < 95%, no fog, mist or precipitation) Source: HKO

Air Quality Trends in Hong Kong $-O_3$



Secondary Pollutants





Source: Internet

Hong Kong air quality is frequently affected by unfavorable weather conditions





日期/Date: 24.08.2019 香港時間/HK Time: 14:00 香港天文台 Hong Kong Observatory



AQMS monitoring data



Air Quality Model Simulation



Aug 24 1am – 25 1am O3 concentration at different heights



Lidar 激光雷達 - Applications



3D mapping

Vehicle Automation



Air quality measurement

Source: Internet

LiDAR 激光雷達 – Air Quality Measurement





Source: Internet

Air Quality Measurement Working Principles



Absorption of Light

Lidar











Source: Internet

Ozone LiDAR Pilot Project





Ozone LiDAR measurement on 24 Aug





3-D Air Pollution Monitoring Network Conceptual Layout







Indicative LiDAR coverage Cape D'Aguilar Supersite Station with Ozone LiDAR Pilot Project





- 1. Air Pollution / Air Pollutants $\rightarrow NO_2$, $SO_2 PM_{10}$, $PM_{2.5}$, Ozone.....
- 2. Local vs. Regional Pollution
- 3. Challenge: Regional Ozone Pollution
- 4. LiDAR System \rightarrow 3D monitoring for HK
- 5. Scientific Supports (e.g. Monitoring Data)

→ Effective Air Quality Improvement Measurements



Thanks