

## 5.031 Modelling air pollution in the Pearl River Delta Region of China.

Early Career Scientist

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Abstract:

The Pearl River Delta (PRD) in southern China, often referred to as “the factory of the world”, has high emissions of volatile organic compounds and is one of the fastest growing economic areas within China.

Like the North China Plain and the Yangtze River Delta, rapid economic growth has led to poor air

quality dominated by high ozone and PM<sub>2.5</sub> levels. However, the difference in emissions, location and

terrain causes atmospheric composition to differ substantially between these three regions.

We use the state-of-art UKCA (UK chemistry and aerosol) model to simulate the atmospheric chemical

environment in these regions of China, focussing on six megacities. Our results show clear seasonal

and diurnal cycles of pollutants, with low O<sub>3</sub> and very high NO<sub>2</sub> concentrations in winter but relatively

high O<sub>3</sub> in summer. They also show the very low O<sub>3</sub> (< 1ppb) and extremely high NO<sub>2</sub> (> 300ppb)

concentrations in winter in Beijing. Diurnal cycles for six megacities across China show a strong NorthSouth gradient with the highest levels of O<sub>3</sub> in Hong Kong. The second highest levels of isoprene are

found in the vicinity of Hong Kong in winter months but isoprene levels here are the lowest in summer.

In addition, diurnal cycles of PM<sub>1</sub>, PM<sub>10</sub> and NO<sub>2</sub> show a single peak at about 7 am in these locations

and the highest PM<sub>1</sub> is found in Shijiazhuang in winter (>180 ug/m<sup>3</sup>). Since huge differences exist in

the simulated atmospheric environment in these economic regions, we explore how different emission

controls are needed to effectively mitigate the air pollution impacts.