# SENSITIVITY AND UNCERTAINTY ANALYSES OF IMPACTS OF CLIMATE CHANGE ON AIR QUALITY

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## INTRODUCTION

Climate change is forecast to affect ambient temperatures, precipitation frequency and stagnation conditions, all of which impact regional air quality. An issue of primary importance for policy-makers is how well currently planned control strategies for improving air quality that are based on the current climate will work under future global climate change scenarios.

The US EPA's Regional Air Quality Modeling System, CMAQ, with DDM-3D are used to investigate sensitivities of ozone and $PM_{2.5}$ to emissions for current and future scenarios. Sensitivities are predicted to change slightly in response to climate change. In many cases, mass per ton sensitivities to $NO_x$ and $SO_2$ controls are predicted to be greater in the future due to both the lower emissions as well as climate, suggesting that current control strategies based on reducing such emissions will continue to be effective in decreasing ozone and $PM_{2.5}$ levels. Impacts of climate uncertainties on regional air quality predictions are investigated using multiple climate futures in order to evaluate the robustness of currently planned emission controls under impacts of climate change.

## RESULTS

The results show that planned controls for decreasing regional ozone and $PM_{2.5}$ will continue to be effective in the future under the extreme climate scenarios. However, the impact of climate uncertainties may be substantial in some urban areas and should be included in assessing future air quality and emission control requirements. In the second part of this study, development of chemical data assimilation in Chemical Transport Models (CTMs) will be discussed. Data assimilation will be implemented in multiple existing CTMs using satellite platforms and ground-level measurement data. The results are expected to improve performance of existing CTMs and provide better results for policy-making.