406

# TESTING PHYSICS AND CHEMISTRY SENSITIVITIES IN THE U.S. EPA COMMUNITY MULTISCALE AIR QUALITY MODELING SYSTEM (CMAQ)

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CMAQ was used to simulate urban and regional tropospheric conditions in the southeastern U.S. over 14 days in July 1999 with horizontal grid spacings of 32km, 8km, and 2km. Vertical mixing solutions were varied away from the default CMAQ K-theory configuration, first using the asymmetric convective mixing (ACM) solution of Pleim and Xiu, and then with a Kz lower limit of 0.02 in place of the regional average default value of 1.0. Chemistry perturbations involved substituting two older mechanisms, the CB4 of Gery et al. and three variants of Stockwell et al.'s RADM2, for the newer SAPRC99 of Carter. The modeling series included full emissions runs and three control strategies of 50% NOX, or 50% VOC, or a combined 75% NOX and 25% VOC control for each ensemble member. Control cases were compared model-to-model and full emissions cases were evaluated against observations at the SOS and SEARCH chemistry super sites in Nashville, TN (Cornelia Fort Airpark) and Atlanta, GA (Jefferson Street). In addition, several of the indicator species ratios suggested in recent years by Sillman, Kleinman et al., Tonnesen, et al., and others for characterizing a photochemical regime's degree of O3 production sensitivity to NOX or VOC control were tested in the control ensembles. Preliminary results show that while the models can demonstrate substantial O3 sensitivity to changes in these physics and chemistry parameters, changes in their relative O3 response to precursor controls is highly varied and complex and cannot be predicted from model performance in the full emissions cases.