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## Reactive nitrogen in Mexico City and its relation to ozone-precursor sensitivity: results from photochemical models

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**Abstract.** We use results of a 3-D photochemistry/transport model for ozone formation in Mexico City during events in 1997 to investigate ambient concentrations of reactive nitrogen in relation to ozone-precursor sensitivity. Previous results from other locations suggest that ratios such as  $O_3/NO_y$  and  $H_2O_2/HNO_3$  might provide measurement-based indicators for  $NO_x$ -sensitive or VOC-sensitive conditions. Mexico City presents a different environment due to its high concentrations of VOC and high level of pollutants in general. The model predicts a correlation between PAN and  $O_3$  with relatively high PAN/ $O_3$  (0.07), which is still lower than measured values. The model PAN is comparable with results from a model for Paris but much higher than were found in Nashville in both models and measurements. The difference is due in part to the lower temperature in Mexico City relative to Nashville. Model  $HNO_3$  in Mexico City is unusually low for an urban area and PAN/ $HNO_3$  is very high, probably due to the high ratio of reactivity-weighted VOC to  $NO_x$ . The model predicts that VOC-sensitive chemistry in Mexico is associated with high  $NO_x$ ,  $NO_y$  and  $NO_x/NO_y$  and with low  $O_3/NO_y$  and  $H_2O_2/HNO_3$ , suggesting that these indicators work well for Mexico City. The relation between ozone-precursor sensitivity and either  $O_3/NO_2$  or  $O_3/HNO_3$  is more ambiguous. VOC-sensitive conditions are associated with higher  $O_3/HNO_3$  than would be found in  $NO_x$ -sensitive conditions, but model  $O_3/HNO_3$  associated with both  $NO_x$ -sensitive and VOC-sensitive chemistry is higher in Mexico than in other cities. The model predicts a mixed pattern of ozone-precursor sensitivity in Mexico City, with VOC-sensitive conditions in the morning and  $NO_x$ -sensitive in the afternoon, in contrast to results from other models for more recent events that predicted strongly VOC-sensitive conditions throughout the day. The difference in predicted ozone-precursor sensitivity is most likely due to different emission rates and to changes in emissions over time. The model with mixed sensitivity predicts much lower ambient  $NO_x$  and  $NO_x/NO_y$  than the strongly VOC-sensitive model.

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