

# CLASSIFICATION OF AIR POLLUTION REGIMES IN THE MISSOURI REGION

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## ABSTRACT

High levels of ground level ozone have been linked to large-scale weather patterns both at the surface and in the upper atmosphere. For this reason, the main focus of this study was to analyze the atmospheric conditions that are associated with high concentrations of ground level ozone in Missouri. This information can be useful for air pollution forecasting in the state of Missouri and for air pollution modeling. Knowing the conditions favorable for the formation of ground level ozone could also provide a basis for pollution control and mitigation in Missouri.

The main objective was accomplished in three steps. First, an Air Quality Index for ground level ozone in Missouri was created to help locate times when high ozone concentrations took place. Next, mixing heights, transport wind speeds, and ventilation rates were analyzed to determine their contributions to these high ozone concentrations. Finally, surface and 500mb weather features were examined for each high pollution day to locate patterns at both levels.

Mixing heights over Missouri were found to be fairly constant, while transport wind speeds and ventilation rates were found to be highly variable. Using just the transport wind speed offered a better indicator of high ozone days than using just the mixing height. Ventilation rate calculations were found to be highly dependent on the transport wind speed in the mixing layer. At the local level, ventilation rates were a reasonable indicator of when high ozone days would occur, while on the synoptic scale, ventilation rates were not as reliable at indicating high ozone days. At the surface, seven categories were found to be related to high ozone concentrations in Missouri, while at 500mb, four categories were found.