



ZENTRALANSTALT FÜR METEOROLOGIE UND GEODYNAMIK

**ANALYSE DER  
ATMOSPHERISCHEN GRENZSCHICHT IN WIEN  
WÄHREND ZWEIER SOMMERSMOG - EPISODEN  
MIT DEM WINDFELDMODELL TAMOSW UND  
GRENZSCHICHTPARAMETRISIERUNG**

**Mag. Kathrin Baumann**

**im Auftrag  
des Magistrats der Stadt Wien  
MA 22-Umweltschutz**

**MA 22 -254/00**

**6930/99-U**

**März 2000**

**Abstract**

Knowledge of the spatial (horizontal and vertical) distribution and the temporal evolution of characteristics of the planetary boundary layer is essential for the investigation of the meteorological conditions for high ozone concentrations.

With a new model package of the Central Institute for Meteorology and Geodynamics, consisting of the diagnostic wind-field model TAMOSW and a meteorological pre-processor, smog scenarios can be investigated based on wind-fields, horizontal fields and vertical cross-sections of temperature, humidity and global radiation and based on deduced boundary layer parameters (e.g. sensible heat flux, friction velocity and mixing height).

Two summer smog episodes in Vienna are simulated. The urban heat island, the distortion of the wind flow at the hills of the Viennese Woods and the formation of a stagnation zone are some of the phenomena, which are found in the model results.

Temperature and wind fields are input to the mixing height calculation. Spatial variations of the mixing heights are found within the urban area especially at night, which can be explained by topographical effects and the impact of the city itself. The mixing height evolution has a significant influence on the formation and destruction of ozone, as is shown based on ozone measurements of the station Exelberg and the POP field campaign.

**Keywords:** diagnostic wind-field model, boundary layer parametrization, summer smog, ozone, urban boundary layer, convective mixing height, nocturnal boundary layer, heat island, local scale wind field, topographical effects