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Estimate of the roughness length and displacement height from sonic anemometers

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The aim of this work is to define a procedure to determine the roughness length and the displacement height from measurements of a single-level sonic anemometer for operative purposes. The measurements were collected in eight micrometeorological stations deployed by the Italian Agency for the Environmental Protection (ARPA) in the Lazio region. The similarity theory was applied at the measurements of the rural and semi-rural sites to derive the roughness length for different angular sectors. The displacement height was also determined in the urban site. The plausibility of the obtained values was checked by considering the surroundings of the tower and by recalculation of the wind using a different set of measurements. From the statistic of the roughness length in each station a table was derived to be used in the meteorological processor of the air pollution forecast model.