EMS Annual Meeting Abstracts,
Vol. 6, EMS2009-205, 2009
9th EMS / 9th ECAM
© Author(s) 2009

9th EMS Annual Meeting
9th European Conference on Applications of Meteorology
High resolution meteorology
- applications and services

Modelling of the Wind Profile, effect of boundary-layer height, baroclinicity, Brunt-Vaisala frequency and surface roughness

S.-E. Gryning (1) and E. Batchvarova (2)

(1) National Laboratory for Sustainable Energy, Risoe DTU, Roskilde, Denmark (sveg@risoe.dtu.dk), (2) National Institute of Meteorology and Hydrology, Sofia, Bulgaria (ekaterina.batchvarova@meteo.bg)

Analysis of meteorological measurements from tall masts in a rural as well as an urban area shows that the height of the boundary layer influences the wind profile even in the lowest hundreds of meters. A parameterization of the wind profile for the entire boundary layer is formulated with emphasis on the lowest 200-300 meters. Input to the wind profile parameterisation requires - in addition to the usual surface layer scaling parameters such as friction velocity, roughness length and the Obukhov stability scale - the boundary layer height and baroclinicity. The baroclinicy controls the gradient of the wind profile at the top of the boundary layer and influences the wind profile even inside the boundary layer. Additionally the influence on the wind profile of the Brunt-Vaisala frequency above the boundary layer is introduced. A length scale is introduced for the entire boundary layer, and its dependence on surface roughness, boundary layer height and baroclinicity is discussed.