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Assessment of surface layer parameters from routine meteorological measurements in the Pannonia region

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In this paper, assessment of surface layer parameters (SLP) is discussed, including roughness length, friction velocity, kinematic heat flux, Monin-Obukov length scale (L), etc., through the determination of energy and particle exchange from routine weather observations. Air temperature, total cloud cover, albedo and soil state (or soil moisture, if available) will be used in the calculation of net radiation and sensible heat flux (Holstlag, 1984; Nyren and Gryning, 1999; Foken, 2008). Alternatively, one can use the balance between incoming shortwave and outgoing longwave radiation, parameterized with the low, middle and high level cloud amount, respectively, to obtain net radiation (Stull, 1988). Differences for each method will be investigated.

10 m wind measurement and universal function (after Businger and Dyer, 1974) and effective roughness length (using wind gust data after Verkaik, 1999) and roughness length (which is a function of stability, Kramm, 1989) will be used for the calculation of friction velocity and Monin-Obukhov length scale. Universal functions will be modified for stable case (Beljaars and Holstlag, 1994), and for the free convection case (Steeneveld, Holtslag, Debruin, 2004). Variation of different roughness lengths and universal functions, for different classes of stability will be discussed.

SLP obtained from profile measurements, reanalysis or from direct flux measurements, respectively, will be compared.

PBL height obtained from SLP (as described Steeneveld, van de Wiel and Holstlag, 2006, for stable case and Gryning and Batchvarova, 1991, or Seibert, Bayrich, Gryning, Joffre, Rasmussen and Tercief, 2004, for unstable case) will be compared to those determined from radiosoundings (Szeged, Hungary) and from the ECMWF reanalysis, respectively.

Standard meteorological data set and energy budget component measurements from agro- meteorological observatory of Debrecen and EU6 NitroEurope site of Bugac (Hungary) are used for development and tested of methodology. Data set from AWS measurements near Novi Sad are also investigated.