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Towards a definition of a horizontal scaling parameter in a heterogeneous landscape

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In 2002 Fiedler proposed (Geophy Res Abstracts 4) an additional scaling of the atmospheric boundary layer dependent on the heterogeneity of the underlying surface. Since that time many experimental results and also modelling studies, mainly LES simulations, have shown that the turbulent structure in the boundary layer is significantly influenced by the underlying surface on a horizontal scale of heterogeneities of 200 – 1000 m. The most important phenomena are secondary circulations, recently discussed in connection with the energy balance closure problem, and free convection situations. Both phenomena are discussed in relation to the spacing of heterogeneities, the Obukhov-length and Deardorff-velocity. Consequently the surface roughness and effective roughness must be discussed in a new light.