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Surface response at the landscape scale: observations and controlling feedbacks

B. Gioli (1), F. Miglietta (1), C. Van Heerwaarden (2), and J. Vila de Arellano (2)
(1) IBIMET CNR, Italy, (2) WUR University, The Netherlands

Regional scale studies aimed at assessing energy and carbon exchange between the surface and the atmosphere are important for improving current understanding of integrated response of ecosystems to water availability and atmospheric forcing. At this landscape scale, the planetary boundary layer (PBL) plays a crucial role as mediator between the surface fluxes and the atmosphere. Bi-directional feedbacks exist in the coupled surface – PBL – troposphere system, resulting in close relations between PBL development, tropospheric air entrainment, and surface fluxes.
Observing such interactions requires the capability of measuring surface and atmospheric characteristics and their spatial and temporal variability. Observations made within the CarboEurope Regional Experiment, including the use of multiple small aircraft, radio soundings, tall tower and surface flux measurements, will be presented and interpreted trough a one-dimensional modelling framework.
Some of the results highlight that the influence of PBL development and entrainment processes through land–atmosphere feedback mechanisms has to be taken into account when studying surface response, and has to be properly represented in modelling frameworks at regional and global scales.