



Discussing Aspects of the Concept of "Advective Flow" Used in Meteorology and Agrometeorology

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The concept of “advection” is a concept connected to horizontal transport of energy and mass by parcels of air in convective flow systems. It is a concept mainly used in the field of “meteorology”, and the concept is given a definition in “International meteorological vocabulary” published by WMO. This concept is also used in other fields of science, especially by biologists. Because “environmental fluid mechanics” should contain contributions from several different fields of science, it is of importance that the specialists from the different branches of scientific research of environmental phenomena understand each other. The main intention of this presentation is to make the concept of “advection” more clear for different groups. It is also a way of advertizing the need for general conceptual discussions in the fields of science.

The definition of “advection” given by WMO is presented and the concepts of divergence and convergence of air are described. The concept of turbulent flow systems is then briefly connected to this concept; and the concepts of “oasis effect” and “clothline effect” are also discussed.

Equations containing energy balance in the close vicinity of the ground are presented and the advective components in these equations are discussed. Following this, the physical content of the Penman-equation and the Penman-Monteith-equation of potential and actual evaporation are shortly presented and discussed (Advection is not contained in these equations). The paper then presents and discusses the content of an empirical statistical formula, derived by determining “potential evaporation” using measurements from pan evaporimeters. In this case, an “advection term” appears and is connected to the “oasis-effect” of the evaporimeter.

The difference in scope when describing weather by “empirical statistical equations” or by equations derived by fluid dynamical concepts is discussed as well. The possibilities of including advection terms in operational use in weather systems of agrometeorology of local spatial and temporal scale are discussed. Finally, ideas for modifying the definition given by WMO on “advective flow systems” are presented.