Hydrology and Earth System Sciences, 2(1), *137* (1998) © EGS

Comment on the paper 'Towards a rational definition of potential evaporation' by J.P. Lhomme

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In a recent paper, Lhomme (1997) proposes a more 'rational definition of potential evaporation'. Arguing that such a definition must be based on the criteria that it establishes an upper limit to evaporation in a given environment and be readily calculated from measured input data, he proposes the use of the Penman-Monteith equation with the surface resistance taken as zero. Since such a definition is dependent on the specific characteristics of any individual surface, Lhomme suggests the further definition of a reference potential evaporation measured over an extent of short green grass completely shading the ground.

While it is important that the term 'potential evaporation' conveys a common understanding which is shared by those involved in operational hydrology, irrigation and research, we believe that this understanding is not aided by precise definition. The concept of potential evaporation is commonly extended to situations ranging from the evaporation from a lake to that from a highly heterogeneous terrain. None of the definitions reviewed by Lhomme adequately cover this range of understanding because the concept, as generally held, is inexact. This fundamental point ensures that no definition is truly satisfactory to everyone.

Our argument is that it is impossible to impose an exact definition on an inexact concept and, therefore, further attempts to do so are fruitless. Moreover, such attempts are also unnecessary. A common, although imprecise, understanding of potential evaporation already exists and is based on the general idea provided by Lhomme's first criterion (i.e. that it establishes an upper limit to evaporation in a given environment). When employed in this way, the term is extremely useful as a conceptual tool (in much the same way as field capacity is to soil physicists) and further qualification does not improve its utility. Rejection of the term by the scientific community, on the grounds of its imprecision, would, therefore, be self-defeating.

A number of concepts exist which seek to express an upper limit on evaporation under specialised circumstances. As argued above, the scope of each is too narrow to be used as a generic definition of potential evaporation but, nevertheless, all can be of great use under the circumstances for which they were developed. If we reserve the term 'potential evaporation' for the general use described above, then, to avoid confusion, it is necessary to provide names for these concepts. We suggest the following :

1. Penman potential evaporation
   Penman (1948)
2. Reference crop evaporation
   FAO modified Penman (Doorenbos and Pruitt, 1977)
3. Reference transpiration
   Penman-Monteith equation with a surface resistance of 70 $s\ m^{-1}$ (Allen *et al.*, 1994)

This list is not thought to be absolute and other definitions could be added (e.g. a Priestley-Taylor evaporation). Moreover, the special case of the Penman-Monteith equation with zero surface resistance has been left without a name. We propose that this simply be called 'Wet surface evaporation'. A further definition of 'open water evaporation' could be made as a special case, depending on the particular circumstances in which it is required.

In conclusion, we believe the term 'potential evaporation' should be retained for those occasions when the precision offered by a definition is not required, realising that its interpretation is dependent on context. When more precise communication is necessary, then, depending on the application, one of the above definitions is suggested.

References

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