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Can we deal with soil moisture spatial distribution as a critical point phenomenon?

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A physical system is subject to a phase change process when it shows a discontinuous change of a macroscopic feature of the system under a continuous change of a system's state variable.

For certain properties of physical systems subject to phase transition it is possible to observe a scale-invariant behaviour in the point of coexistence of the phases that is defined in that special case "critical point".

Continuous change of soil moisture at a site (microscopic scale) leads to a change of some orders of magnitude of the hydraulic conductivity with the onset of lateral redistribution mechanisms and the switch at the macroscopic scale from local to non-local control (see Grayson et al. 1997): the unorganized structure of the spatial pattern of soil moisture turns to an organized one.

In analogy to the percolation theory (Stauffer and Aharony, 1991), we have developed an algorithm for the study of soil moisture maps in order to verify the critical point behaviour.

We have already studied the relation between the occupation probability of the soil moisture maps and the normalized size of the largest cluster. Studies on the behaviour of the system under changing grid scales are in progress.