

Discontinuity

In a very broad acceptance, discontinuity is what separates two neighbouring and different spatial sets. One can distinguish the elementary discontinuity, built on a single indicator, which is a useful but frail indication, from the structural discontinuity, superposition of numerous converging elementary discontinuities measured on basis of a coherent set of indicators. The latter may be defined as the spatial form of transition between two neighbouring systems.

Discontinuity may be qualified as a border when there is appropriation of spaces and "juridical" acknowledgement of the limit. The term barrier is used whenever the discontinuity is associated with a significant perturbation of flows; the barrier may have an observable physical trace (wall, ditch...), but it is not always the case.

Discontinuities may be described in function of their elementary forms. On a given observation level, a distinction is made between the linear discontinuity, in which the limit is reduced to a single threshold, and the areal discontinuity, transition area comprised between two thresholds (an apparition threshold and an extinction threshold for example). It is important to observe the spatial organisation of discontinuities: linear, annular or chaotic organisations of discontinuities on the map will not have the same implications in terms of future of spatial systems. Spatially organised discontinuities generally offer better resistance in the course of time. Other interactions between discontinuities and future of the system may be observed. In the absence of a barrier, for example, neighbourhood differences will tend to self-regulate: beyond some intensity, it becomes more profitable to go across the discontinuity. Reciprocally, the presence of barriers may lead to divergent evolutions of spaces, and even to formation of new autonomous systems (allopatric speciation).

Some consider discontinuity as the application to space of the notion of crisis. The geographical discontinuity indeed presents in space the same properties as the crisis does in time. From the standpoint of an observer moving in space, it is a "catastrophe" which occurs in a weak place, under the effect of a catalyser. Its apparition very often results from internal system processes (endogenous discontinuities) more than from external perturbations (exogenous discontinuities). The latter sometimes capture all attention, and, by looking at discontinuity from the narrow point of view (the most local observation level), one risks to omit what is essential: it is the case in the classical example of forest/savannah discontinuity, which is locally determined by the soil composition, but which, fundamentally, owes its existence to the precipitations regime. This shows the need to endeavour to study the heart of spatial systems... It is not possible however to oppose system analysis to discontinuities analysis, even without taking margins into account, be it only because the sudden apparition of internal discontinuities, or, in other terms, of new forms of spatial organisation of local heterogeneity inside a spatial system, may contribute to making it unstable, to making it split up into autonomous systems. This shows that analysis of discontinuities is fundamental in geography, notably in order to identify (delineate) spatial systems.

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