

Formation Mechanism, Process and Risk Evaluation System of Disaster Chain*

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Abstract

Though there have been different views on the disaster chain in the academic field, basically it can be summed up into two categories. One is the mass phenomenon of hazards caused by the triggering of a factor in the earth system; the other is a chain of series of secondary disaster caused by a hazard factors. Accordingly, the former is generally called hazard chain (disaster group), the latter is disaster chain. Disaster chain can be divided into two types, namely serials one and parallel one, and the former one is usually caused by the hazard chain.

From the perspective of disaster system theory, by analyzing the formation of disaster chain (including hazard chain and disaster chain), it can be found that the formation of the hazard chain mainly relates to physical hazard-formative environments, and the formation of disaster chain is closely related to physical hazard-formative environments and exposures. The evolution of hazard chain is the result of physical process changes of the earth system, while the change of the disaster chain is mainly the result of surface processes of the earth system, especially its geographic processes (including the physical geography and human geography).

Disaster chain risk assessment and multi-disaster risk assessment are fundamentally different. For the risk assessment of hazard chain, besides considering the probability of each hazard, probability of multiple hazards (including the phenomena of frequent occurrences of one hazard) shall be assessed in a certain spatial-temporal condition, then the risk is assessed by combining the vulnerability curve of each hazard. However, for risk assessment of disaster chain, in addition to the probability of the first hazard, possibility that lead to secondary hazard shall also be assessed in a certain spatial-temporal condition, then to assess the disaster chain risk according to the vulnerability curve of each hazard under background of disaster chain.

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Based on the understanding on the mechanism and process of formation of disaster chain (including hazard chain and disaster chain), we have assessed the freezing rain and snow disaster chain risk (disaster chain of multi-hazard) in southern China in 2008 and Wenchuan earthquake disaster chain risk (disaster chain that resulted from secondary disasters caused earthquake and debris flow and flush flood caused by heavy rains). It illustrated that this method can be promoted and applied in disaster risk assessment.

Existence of disaster chain risk is an important reason of undervaluation of some severe disasters assessment in the world. Therefore, enhancement of disaster chain risk assessment has a significant theoretical and practical value for large-scale disasters, as well as the scientific basis of foundation of integrated risk governance mode.

Key words: hazard chain, disaster chain, cause of disaster chain, risk assessment system and cases.