

Active Tectonics, Humans, and Civilization

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Extended Abstract

Introduction

Growth in our understanding of active tectonics and tectonic geomorphology during the past 25 years has made it clear that tectonic processes happen at a variety of scales relevant to human history. This fact has presented researchers with an important question that what is the impact of active dynamics of earth's crust in continental region on human societies in both our past and future. A review of published studies shows that there are two viewpoints about the relation between active tectonics and humans. Some of the researchers emphasize the dangers of active tectonics for human beings. The other group of researchers believe that tectonic is an important factor in the evolution of humans, civilization, and the formation of ancient complex cultures.

Methodology

The aim of this study is to review the important published articles, and to analyze the corresponding viewpoints. The methodology in this study is analytic.

Results and Discussion

Functional variables

Some of the researchers believe that tectonic activity is a creative agent in human evolution and cultural development. Based on this theory, the functional variables of creative tectonics include: landforms (Bailey et al. 1993, King et al. 2010, Bailey et al. 2010 a,b) – landuse (Bailey et al. 1993, King et al. 2010, Bailey et al. 2010 a,b) - topographic barriers (Bailey et al. 2010, King et al. 2006) – active tectonic coast line (Inman 1983, Bailey et al. 2010 a,b) –

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roughness of earth surface (Bailey et al. 2011) – hydrology (Shrifikia 1992, Force 2008, Jackson 2006) – underground dams (Nojavan 2001) – Impact of temporal factors on geomorphic spatial characters (Babajamali 2008) – road and accessibility (Ben avraham 2005, Force and Mcfadgen 2010, Hasanalian 1991) –of chemical anomalies in water, soil, rock, and biomass (Trifonov et al. 2005) – culture (Force 2010).

Ecologic influences of tectonism

Active tectonic movements can be divided into two categories: seismic movements and non-seismic movements. Non-seismic movements mainly lead to formation of various landforms, which eventually affects human ecology. Seismic movements affect cultural ecology by rupture in the surface and creation of sedimentary traps.

Hierarchy structures

Hierarchy structure is one of the fundamental characteristics of natural systems. For the first time, Horton (1945) used hierarchy structure for ordering in the basin. Schumme (1997), Frissell (1986), Klijen (1997), Naiman (1992), and Townsend (1996) used hierarchy structure to describe natural systems. Forces shows that Alp-Himalaya belt matches 13 ancient cultures. Based on this theory, two hierarchy structures can be suggested. One hierarchy system for fault thrust belts, and the other one for human societies. This hierarchy structure that contains four levels shows matching elements in system.

Temporal and spatial scales

Active tectonic emphasizes on time scale of active tectonic movements. Holocen tectonic movements include the movements between 10000 B.P. and the modern era. So temporal and spatial scale should be denoted before any study, because tectonic has different effects in different temporal scales. Therefore, there is a relationship between temporal and spatial scales of active tectonics and human civilization.

Conclusion

In comparing two different viewpoints, we suggest that each has its own epistemology. In the first viewpoint (tectonic as a destroying agent), the researcher studies the subject in a static state, while in the second viewpoint (tectonic as a creative agent) the subject is studied in a dynamic state considering the time element, i.e. replacing Boolean logic by fuzzy logic. It should also be noted that some of the natural phenomena are best described with Boolean logic and some of them with fuzzy logic. We also see that some of the phenomena are in both states. The Yin-Yang symbol is the best example for this subject. So it can concluded that while tectonic activity is destructive in the static state, it is creative in the dynamic state. In other word, as far as time parameter is concerned, we can have better understanding from constructive tectonic characteristic versus civilization and human societies.

In this case zone with active tectonics, direct or indirect lead to biological optimum

conditions. These areas can be the location of the collection of plants, animals and human societies and finally, civilization and cultural have been resulted.

Although we cannot ignore the dangers of earthquake, it is really important to consider the constrictive tectonic aspect for human societies which are superior to its destructive aspect.

Keywords: Active Tectonics, Civilization, Hierarchy Structures.

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