***Assessment of watershed Tectonics Using Geomorphologic Characteristics in the TecDEM Model, Roodak Basin in North East Tehran***

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Extended Abstract

Introduction

Identification of active tectonic areas, especially in convergent zone are very important because of their potential risks. Nowadays, there are several algorithms that are used for tectonic analysis; one of them is TecDEM that is used in this research. In this study, using Remote sensing techniques, geomorphometric analysis and fieldwork were conducted to analyze morphometric and geomorphologic characteristics of Roodak basin in northeast region of Tehran in the TecDEM model within Matlab software. This model used new indices such as Skewness and Kurtosis of hypsometry diagram, concavity and steepness indices and finally Isobase Map. The obtained results from this calculation represent morphotectonic changes on the watershed. The results in the TecDEM model in comparison with field studies. The obtained evidence through Garmabdar Geodynamic station data shows accuracy of the model at Description and Analysis neotectonic terms area.

Methodology (Materials and methods or Data and methods)

To investigate active tectonics in the study area, through geological map (Tehran, MarzanAbad, Baladeh, Fasham) of the area the faults zones was diagnosed. Then, evidence of active tectonics in the basin was studied by regional presence. The data analysis of Garmabdar geodynamic permanent station was used based on the data from 5 years (2006 to 2010). Then, through a Kartosat2.5 meter resolution satellite image approximate range of Roodak basin and sub basins were specified. Finally, to extract Roodak basin and sub-basins and calculate the indices, we used ArcGIS and TecDEM software by Digital Elevation Model (DEM). To investigate active tectonics in the study area, through geological map (Tehran, MarzanAbad, Baladeh, Fasham) of the area the faults zones was diagnosed. Then, evidence of active tectonics in the basin was studied by regional presence. The data analysis of Garmabdar geodynamic permanent station was used based on the data from 5 years (2006 to 2010). Then, through a Kartosat2.5 meter resolution satellite image approximate range of Roodak basin and sub basins were specified. Finally, to extract Roodak basin and sub-basins and calculate the indices, we used ArcGIS and TecDEM software by Digital Elevation Model (DEM).

Results and Discussion

The values obtained from indices and field study and analysis of Garmabdar geodynamic station show that Roodak Basin is in early stage. The observations represented lack of sediment on some areas, fractured rocks by fault, steep slopes, narrow valleys and high mountains, high potential of mass movement in the basin. These were to some extent consistent with calculated tectonic indices. Thus, the TecDEM is a powerful tool to understand the nature of tectonic zones. Based on concavity and steepness and gradient slope river indices, fourth sub basin of Garmabdar basin has the highest rate of activity and Meygoon basin has the lowest rate of activity.

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Based on transverse topographic symmetry index, first and third sub basins show the maximum tilt. Furthermore, IsoBase map of the area confirms tectonic effects on topography changes and changes in the classification of stream basin. Hypsometry curves for all sub-basins show young terms in the Roodak Basin and its sub basins and fourth sub basins of Garmabdar has the most Convexity. Despite the difference in values of parameters, average values represent active tectonic regime in the basin. Accommodation of field study, library studies and geodynamic data with model results demonstrate the proper use of this model in tectonic analysis. Especially in relation to the areas that may not be possible to field study.

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Conclusion

Roodak basin of geological division is part of Alborz-Azarbaijan seismotectonic.  This basin is also in southern highland of central Alborz and much of it is green tuff of Karaj Formation.  In terms of hydrology this basin is part of the Jajrood basin and the eastern branch of Jajrood River flows in that. The river originates from the highlands of Basatk and after passing through the Darbandsar and Shemshak, Meygoon and Fasham with Another branch is connected to Nika, Lalani Ruteh water tributaries  called Jajrood. Ahar River from south and Amameh River from north are attached to it and create eastern Jajrood River. In this study, using remote sensing techniques, Geomorphometry analysis and fieldwork analyzed morphometric and geomorphologic characteristics for Roodak basin in northeast of Tehran in the TecDEM model within Matlab software. The analysis results of structural elements extracted by longitudinal profile of the river, flow directions, basin morphology, slope change, IsoBase map, geomorphic indices and Skewness and Kurtosis of hypsometry diagram is resulting from the interaction of tectonic forces. This represents morphotectonic changes on the watershed. The results of the TecDEM model in comparison with field studies and obtained evidence through Garmabdar Geodynamic station data show accuracy of model at Description and Analysis neotectonic. Thus, the TecDEM is a powerful tool to understand the nature of tectonic zones.

Keywords: Morphotectonic Roodak Basin TecDEM Model tectonic activity tectonic geomorphology