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Landscape evolution of the graben of Puerto Vallarta (west-central Mexico) using the analysis of landforms and stream long profiles

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Abstract

Faulting in extensional settings of continents produces rapid changes on Earth's surface where rivers respond to tectonics by setting the pace of incision and conditioning the evolution of hillslopes. Thus, the analysis of landforms and stream long profiles are useful tools that can provide information about the tectonic activity in the landscape. The west-central portion of Mexico is a region that is mostly dominated by an extensional tectonics initiated in the Miocene and continuing in the Quaternary, where there has also been a vast emission of volcanic products. Of particular importance is the graben of Puerto Vallarta which was formed during the extensional activity that opened the Gulf of California in the Miocene. Nevertheless, the geomorphology and landscape evolution of this structure has not been studied in detail. In this research are studied the rivers, landforms and topography of Puerto Vallarta graben in order to assess its evolution, focusing on the evidences of its initial phase of formation. The geomorphological map elaborated in this study reveals the presence of lava flows and volcanic structures in the eastern sector of the graben. Here it is proposed that this volcanism occurred during the formation of the graben in the Miocene, nevertheless, radiometric dating of lavas is still required to determine the precise timing of this event. Analysis of stream long profiles