

Title : Spatial Topographic Changes of Phetchabun basin Using Digital Elevation Model and Interferometric Synthetic Aperture Radar Techniques

Author(s) : 1. Thitima Wongthibet

Student ID : 640510422

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Advisor(s) : 1. Assistant Professor Dr. Pichawut Manopkawe
2. Assistant Professor Dr. Chanida Suwanprasit

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ABSTRACT

Phetchabun province represents a region of fault-block mountains and a large basin in the middle. The evolution of tectonics and the difference in lithology and climate make the region more complicated in terms of the geomorphology of Phetchabun province. This study analyzes the spatial and temporal changes in the Phetchabun Basin using the slope, concavity, channel steepness indices, and the distribution of knickpoints across five major watersheds in Phetchabun. The results show that the highest slope values in the eastern part of the central area and the basin, whereas the northern and southern areas exhibit significantly lower values. The maximum channel steepness index (k_{sn}) is $259.04 m^{0.9}$ in the eastern part of the northern study area, followed by $238.60 m^{0.9}$ in the central basin and $202.33 m^{0.9}$ in the western part of the central zone. The concavity index in the eastern and western parts of the central zone exhibits the most significant variations, similar to the density of knickpoints in the middle of the basin, suggesting that the higher uplift occurs in the middle and western parts of the central area. It is related to surface changes detected using Interferometric Synthetic Aperture Radar (InSAR), which reveals subsidence and uplift in the central part of the basin. The subsidence values range from -0.046 to -0.006 m, while the highest uplift reaches 0.037 m. In the southern study area, the subsidence is more pronounced, with a maximum of -0.221 m, compared to -0.105 m in the central and northern parts of the basin. Regarding lithology, the central area comprises sedimentary rocks from the Korat Group, which exhibit moderate weathering rates. In contrast, the southern part of the study area contains intrusive igneous rocks and limestone with high precipitation, resulting in higher weathering rates and significant subsidence. It is related to surface changes in the southern part of the study area, where subsidence is greater than in the central and northern parts of the basin. These findings highlight the significant role of geological factors in controlling geomorphic evolution. Furthermore, the results are linked to surface changes observed using InSAR techniques.

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