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Hypsometric integral analysis of the southeast African landscape

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We use a new method of landscape analysis to investigate the effects that tectonics and lithology has had on southeast African topographic evolution.

The method uses the spatial distribution of hypsometric integral anomalies at different scales to distinguish between the major influences affecting a region's topography. The hypsometric integral of a basin reflects the sum of major corrosive and resistive forces on that particular basin and is calculated as the percentage of rock between the basin's maximum and minimum points of elevation. By comparing the hypsometric integral of sub-basins of different scales within a single basin we can detect spatial correlations with variations in a region's lithology, tectonics and/or climate.

As an example, we use this technique to examine the unusual topography of south-east Africa between the Drakensburg Escarpment and the Indian Ocean. A number of models of landscape evolution have been proposed for this area to account for the incised valleys and flat ridges typical of the region. Using the method outlined above, we find that in this region there has been non-uniform, possibly flexural, uplift superimposed on large and small (but not intermediate) scale lithological variations. Thus, we show that hypsometric integral analysis is useful tool with which to examine the relative role that tectonics, lithology and climate has on a landscape.