

Multi-temporal Soil Erosion Severity Modelling over South Africa with Multi-Sensor Earth Observation Data

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Accelerated soil erosion is the principal cause of soil degradation across the world. In Africa, it is seen as a serious problem creating negative impacts on agricultural production, infrastructure and water quality. Specifically in South Africa, soil erosion is a major environmental problem confronting land and water resources. The process is often accelerated by human activities e.g. by the clearing of vegetation, soil tillage or overgrazing. It is imperative, therefore, that a soil erosion monitoring system for the South Africa region is in place in order to understand the magnitude of, and be able to respond to, the increasing number of demands on this renewable resource.

In this paper, a simple model to estimate regional-scale soil erosion severity is employed, and an operational methodology for monitoring water runoff and soil erosion severity using multi-sensor and multi-temporal remote sensing data in a GIS framework, is presented. The severity estimates of this study are also compared with general data on the severity of soil erosion over South Africa and with measured rates of soil loss at different locations over the area of study. The results show that the measured rates and the estimated erosion severity values are in agreement. They also show that, over the last years, erosion severity is increasing in large parts of the region at an alarming rate, and that mitigation measures are needed to reverse the negative effects of uncontrolled socio-economic practices.