

Implementation and testing of WELD and automatic spectral rule-based classifications for Landsat ETM+ in South Africa

KJ Wessels¹, BP Salmon¹, F van den Bergh¹, K Steenkamp¹, W Kleynhans¹, D Swanepoel¹, L Kleyn², DP Roy³ and V Kovalsky²

¹Remote Sensing Research Unit, CSIR-Meraka, P.O. Box 395, Pretoria, South Africa

²South African National Space Agency (SANSA) Earth Observation, Pretoria, South Africa

³Geographic Information Science Center of Excellence, South Dakota State University, Brookings, South Dakota, USA

E-mail: kwessels@csir.co.za

Abstract

The Web-enabled Landsat Data (WELD) system was successfully installed in South Africa (SA) and used for pre-processing large amounts of Landsat ETM+ data to composited seasonal mosaics. In pursuit of automated land cover mapping, the overall objectives of the study was to determine how well the Automatic spectral rule-based classifier's (ASRC) spectral categories can be assigned to land cover classes using the official 2008 land cover map of KwaZulu-Natal province of SA. The ASRC is based on prior knowledge formalised into hierarchical rule sets which requires no training. A supervised random forest classifier was applied to ASRC spectral categories and the WELD-processed Landsat spectral bands for comparison. The ASRC resulted in classification accuracies of below 28% in every season and only 38% using all four seasonal composites. Using the Landsat spectral bands yielded classification accuracies above 70% for individual seasons and 77% using all four seasons together. The ASRC categories were unable to distinguish between distinct land cover classes such as, cultivation and forests, while the classification based on Landsat spectral bands did so with an accuracy of more than 80%.