Land cover classes and their surface temperature in ASTER and Landsat data

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Land surface temperature (LST) from satellite data is a challenging task due to the atmospheric absorption and diversification of earth surface emissivity. The analysis show that land surface temperature influenced by water content or vegetation condition. The combination of HDF Explorer and ArcGIS software was useful for automatically processing the pixel latitude, longitude and BT information from the ASTER HDF and Landsat imagery files. Forest areas with more moisture and water body have shown smaller temperature than settlements. The urban area refers to the phenomenon of higher atmospheric and surface temperatures occurring in urban areas than in the surrounding vegetation areas. A lookup table of effective temperature anomalies is constructed based on the brightness temperature (BT) to resolve the inconsistencies between infrared and BT variation. Here ASTER and Landsat data show similar behaviour for all land cover classes temperature. The results can be referred to similar areas of the world for LST retrieval or land surface process research, in particular under extreme bad weather conditions. So mitigation of the high temperature effects via the configuration of green spaces and sustainable designs of urban environments have become an issue of increasing concern under changing climate.

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Climate change, nutrient dynamics, vegetation isotopic N\(^{15}\) and socio-economic characteristics of selected wetlands in Southern Africa

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Assessments were carried out for six years on wetlands located in the Orange-Senqu River Basin (OSRB), the Foot-Hills Agro-Ecological Zone (AEZ) of Lesotho - (Ha-Matela- (HM)) and compared with an undisturbed wetlands (Khalong-la-lithunya (KHL)), in Mountains AEZ. Data were collected on climate, profile soil samples (1.50 m), hydrochemistry (sub-surface) and socio-economics of the inhabitants. Soil and water samples were analyzed for Ca, Mg, K, Na, N and P and micronutrients and vegetation isotopic N\(^{15}\). Results showed that higher base cations were observed in the groundwater of ORRB and HM, compared to KHL. The hydrochemistry of groundwater in ORRB and HM had elevated levels of phosphorus beyond the limits of the USEPA/NOAA (1988) compared to that in the KHL which was in the normal range. The results of the N\(^{15}\) isotope varied between -2.52 to -2.93‰ (KHL) compared to 2.00 to 6.18 ‰ (HM). Results of the d\(^13\)C showed that has significant negative values at KHL (i.e. -28.13 to -28‰) compared to HM (-11.77 to -12.72‰). Results of the socio-economic study showed that the livelihoods of most inhabitants were crop production (51.3%) and crop-livestock production (47.5%). Between 67-83% of the population living close to the wetlands believed that degradation of wetlands in the past 25 years was due to increase in human population (70%), house construction (72.5%), farming (67.5%), sand mining (73.8%) and aquaculture (80%). The study concludes that even after six years wetlands (OSRB and HM) have not returned to the status of an undisturbed wetlands (i.e. KHL) status indicated by high SOM and more negative N\(^{15}\) and d\(^13\)C values.

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