

Spatial Correlations of Land Cover Changes, Surface Temperature and NDVI in Arid Regions: A Case Study in Kashgar City, China

*Ayisulitan Maimaitiali¹, Abudureheman taiwaikuli², Ayishainmuguli Abulati³, Akihiko Kondoh⁴

1. Graduate school of science ,Chiba University, 2. School of Science and Technology, Geology Division, University of Camerino, Italy, 3. Kashgar Meteorological Agency, 4. Center for Environmental Remote Sensing, Chiba University

Land surface temperature (LST) is one of the important parameters in the physics of land surface processes from local to global scales. Researches on urban LST have increased and mitigations only focused on the big cities already developed. In contrast, there are few attentions to developing cities with large populations. Kashgar city is one of the typical city in arid regions, and is located in north-west China, south-west of Xinjiang Uyghur Province of China. Population reaches more than 506,640 in 2014. With increasing population, expansion of urban area has accelerated temperature rise in Kashgar city. Originally, a high temperature in the area is inherent in continental arid climate combined with increasing anthropogenic activities, urbanisation, resulted from impacts on the local environment changes, such as local warming. For these reasons, local government have to need to measurements to adopt local climate change but it is difficult to know how and when to adopt. Therefore the main objective of this study is first, to investigate land use/cover changes (LUCC) of Kashgar city by using multi-temporal satellite remote sensing data, through an objective-based image classification method by the eCognition. Land use changes are studied based on change detection method. Second, calculated NDVI as the ratio between measured reflectance in red (R) and near-infrared (NIR) spectral bands of Landsat images, to examine the relationship between LST and greenness. Third, to produce LST map applied the mono-window algorithm by using the thermal band of Landsat data. Finally, validation of satellite-derived LST using local meteorological data. Results from the LUCC and change detection shows that an increase in impervious surface areas was significant, while an area of cultivated land and natural vegetation decreased rapidly. The surface of Kashgar city is mainly dominated by bare land, built-up land and marble surface material. This area showed very high temperature. The changes in LUCC were found to have led to a variation in surface temperature, as well as a spatial distribution pattern of the local warming. In addition, the results from the higher value of Moran's index of a city center, where built up rooftops and marble surface. The NDVI and LST results will provide helpful information for local governments with development guidelines and policy decisions.

Keywords: Arid Region , Kashgar City, LST