



Land Surface Temperature Retrieval from Landsat 8 TIRS - A Case Study of Istanbul.

Filiz Bektas Balcik and Emine Mujgan Ergene

Istanbul Technical University, Geomatics Engineering, Turkey (bektasfi@itu.edu.tr)

Land Surface Temperature (LST) is considered as one of the important parameter to determine negative human population influences like rapid urbanization, destruction of vegetated area, unplanned industrialization, climate change from local to global scale on earth surface. On February 11, 2013 Landsat 8 OLI was launched with two thermal infrared bands that is between $10.60\text{-}12.51\mu\text{m}$. This innovation on thermal sensors of Landsat 8 TIRS provide a good opportunity to calculate LST using different algorithms such as Split Window Algorithm (SW) and Mono Window Algorithm (MW) with the same TIRS bands. In this study, 21 October 2014 dated Landsat 8 OLI data was used to determine LST of Istanbul using mono window and split window algorithm. The population of the Istanbul was 3 million in the 1970s, 7.4 million in the 1990s, and around 13 million currently. As a result of rapid population growth and unplanned urban expansion in Istanbul, dramatic land cover changes have occurred especially within the past 65 years. Because of this reason it has huge importance to determine LST distribution of the city for sustainable management. Meteorological data used in the study include near- surface temperature and relative-humidity from 15 meteorological stations in Istanbul for the same date and hour of the Landsat 8 OLI sensor image provided (October 21, 10:30AM). The mean near-surface air temperature gathered from meteorological stations was used to verify the final retrieved LST results. The correlation coefficient between LST and the meteorological station derived near-surface temperature was calculated for accuracy verification. To determine the impact of urban components on LST, Index based built up index calculated using remote sensing data. The regression analysis was performed on the relationship between built-up land and LST using various regression models. The derived results were compared to examine the ability of the selected algorithms.