



Determination of land surface temperature by using Landsat 8 TIRS: A case study in Erzurum, Turkey

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The use of satellite imagery in climate change and environmental studies has increased exponentially in accordance with rapid advancement in satellite technology. Apart from the studies such as determination of potential geothermal zones, volcanology, evaluation of geological structures and lithological units, the research on the effects of urban heat islands is also a crucial topic in climate change studies. Land surface temperature can be calculated by using the thermal bands of satellite images. Landsat 8 satellite launched on February 11th in 2013 carries 2 different sensors which are OLI (Operational Land Imager) and TIRS (Thermal Infrared Sensor) having 12 bit radiometric resolution. In this study, land surface temperature of the urban area and its surrounding in Erzurum was calculated by using the satellite data which was acquired from the Landsat 8 Path/Row 172/32 on July 25th in 2014. Considering the surface emissivity and brightness values, the land surface temperature was evaluated in the study area. In order to validate the predicted land surface temperature values, in-situ land surface temperature measurements which were acquired from the stations of the General Directorate of State Meteorological Service in the city of Erzurum and in the districts Uzundere, İspir, Oltu, Tortum and Hınıs were considered. According to the comparisons, the maximum temperature difference was obtained to be 6.45°C in the Tortum station and the minimum temperature difference was observed to be 1.86°C in the Uzundere station. Additionally, by applying supervised classification on the Landsat 8 imagery, the land-use classes were obtained and the temperature differences observed according to the land-use were also investigated.