

Estimating the Changes of Land Surface Temperature in the Area of Can Tho City, Vietnam from 1990 to 2013 Using Landsat TM/ETM+/TIRS Data

Pham The Hung¹

¹*Faculty of Natural Resources and Environment, Dong Thap University,
783, Pham Huu Lau, Cao Lanh, Dong Thap, Vietnam, pthung@dthu.edu.vn*

Abstract: Land surface temperature (LST) is an extremely important factor in climate change studies. The knowledge about LST is essential for a range of issues and themes in Earth sciences central to urban climatology, hydrology, global environment changes, and human-environment interactions. Can Tho is the fifth largest city in Vietnam, and the largest city in the Mekong Delta. In recent years, with the high rate of urbanization as well as the changes in land use, Can Tho city have been faced to the effect of “urban heat island”, whereby urban areas have higher temperature than surrounding regions (Seto and Kaufmann, 2009). Therefore, studying about changes of LST in Can Tho city using multi-temporal remote sensing data will provide effective information for urban planning and management. In this study, various methods, viz., the single-channel algorithm developed by Jiménez-Muñoz and Sobrino (2003), and the mono-window algorithm developed by Qin et al. (2001) have been used to retrieve LSTs. Three scene of images from Landsat 5 TM (6th April, 1989), Landsat 7 ETM+ (5th April, 2003), and Landsat 8 or LDCM TIRS (27th June, 2013), covering the whole of Can Tho city, were processed to obtain maps of LST in three different years. The information from thermal bands in these Landsat images is necessary input data for procedure of extracting surface temperature. Firstly, the digital number or brightness value will be converted to spectral radiance. Then, the spectral radiance will be computed to the brightness temperature of the thermal band at the satellite level. Finally, the LST will be calibrated by using information from LC/LU that were classified by Landsat visible and NIR bands. A comparison between the LSTs retrieved from thermal bands and the in situ measurements of surface temperature taken at meteorological stations in the area of Can Tho city. The results indicate that the LST is quite increase depend on the types of LC/LU because of the climate change and the urbanization.

Keyword: Land surface temperature, Can Tho city, Thermal band, TM/ETM+/TIRS