

IAF SYMPOSIUM ON INTEGRATED APPLICATIONS (B5)
Tools and Technology in Support of Integrated Applications (1)

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URBAN HEAT ISLAND MODELING AND ANALYSIS USING LAND SURFACE TEMPERATURE
RADIANCE DATA IN NEIGHBORHOODS OF DUBAI UAE THROUGH RADIANCE CALIBRATED
THERMAL REMOTE SENSING TECHNIQUES INTEGRATING WITH GEOGRAPHICAL
INFORMATION SYSTEM

Abstract

The thermal climatic and weather variance between the urban area and its surroundings is defined as the Urban Heat Island (UHI). It represents the thermal character of the atmosphere and Land in urban areas compared to non-urbanized surrounding areas. Urban Heat Island is resulted from (1) urban sprawl and (2) anthropogenic activities. The first is changing the land cover since urban sprawl erases the natural ground, by replacing the natural surface materials by non-porous built up surfaces. The second is because of transport and industrial accomplishments which resulted in disparity of surface atmospheric energy balance by trapping incoming solar radiation during the day and the reradiate it at night. Urban Heat Island can be marked by in situ quantification of the air temperature in the city or by using remote sensing techniques; this study has much importance considering the present climate changes, fast growing urban infrastructure development and population growth resulting in various health and economic hazards. In this study I have used the Radiance calibrated Thermal remote sensing data and integrated it with GIS Techniques and tools which includes information about the overlying atmosphere and the surface heat radiation flux properties. Land surface temperature radiance data for 3 different time periods were analyzed i.e. during the months of August 2018, December 2018 and March 2019 for Mapping UHI LST OF Greens and International city neighborhoods in Dubai UAE. The analysis was carried out by modeling Radiance calibrated Thermal Remote sensing Data, Aerial Images with Advanced Geographical Information System (GIS) Model builder and Geoprocessing tools. Remote sensing dataset used includes Modis: MOD11A2 v006 MODIS/Terra Land Surface Temperature/Emissivity 8-Day L3 Global 1 km SIN Grid, Landsat 8 OLI (Operational Land Imager) and TIRS (Thermal Infrared Sensor) dataset (30cms resolution) , radiance calibrated Land Surface temperature and Albedo rate (Landsat 8 OLI/TITS C1 LEVEL1 AND 2 Data, GIS Data used are 2D and 3d vector and raster data for the various topographical and network features which includes Neighborhood Boundary, Building Multipatches Shapefiles with variable heights, Solar incidence data, Road network data sets with segment details, Building pavements and extended Topographical 3d data used in this analysis include DEM, DTM etc. these datasets was modeled and geo processed in ArcGIS Platform, The results from this study helped in analyzing how different topographical features react with the heat island in terms of different spatio temporal situations at both International City and Greens in Dubai, UAE.