



## **Three dimensional mean radiant temperature estimations through airborne LiDAR and thermal Infrared images in urban area**

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Urban heat island effect has a strong impact on urban thermal environment and outdoor thermal comfort. Although satellite remote sensing can easily show the information of geographic, there is still no accurate and fast to estimate the complex characteristic of the distribution of urban radiation due to the low resolution images and the lack of the information about the vertical surfaces. Therefore, satellite remote sensing cannot provide adequate information about the biometeorology in urban. And this limited the possibility to describe the temporal and spatial distribution of the outdoor thermal comfort.

In order to solve the important issues, the research presents an innovative approach. By using the high resolution airborne LiDAR technology combined with thermal infrared remote sensing, and conducted the surface measurement simultaneously to observe the urban thermal environment. Take the Banqiao district in New Taipei City as a case, which is in high development. In the part of aerial survey, airborne LiDAR sensors can be used to create a DSM (Digital Surface Model) in high resolution 1m\*1m per pixel with scanning imaging technique, so that the building heights, building area, form of planting, and tree crown can be obtained. In order to achieve the radiant heat of both the horizontal and vertical faces, this study took thermal images with resolution of 0.5m\*0.5m per pixel and with accuracy of 0.05 degrees. Furthermore, the temperature data of the surfaces of the ground and buildings can be obtained. By combining the three kinds of information through the latitude and longitude, the mean radiation temperature can be calculated and compared. Also the impact of urban development on the urban thermal environment and human physical thermal perception can be understood.