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Top-notch experts to assess impact of Urban Heat Island effects

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The impact of Urban Heat Island (UHI) effects on Hong Kong and other cities was explored at the Second Workshop on Earth Observation in Urban Planning and Management, which was organized by the Department of Land Surveying and Geo-Informatics (LSGI) of The Hong Kong Polytechnic University (PolyU) from 20 to 21 May.

Leading experts in remote sensing, geographic information system (GIS) and urban climatology presented their latest findings, exchanged ideas and discussed various issues related to urban planning and management at this two-day workshop. Professor Tim Oke, who first put forward a theory to explain the formation of UHI in 1982, has also made a special trip from the University of British Columbia in Canada to attend this conference.

The UHI effect means an urban area is significantly warmer than its rural surroundings. The temperature difference is usually larger at night and in winter. There are several causes leading to UHI, according to Prof. Oke. These include high-rise buildings which block thermal radiation in the night, materials with thermal bulk properties such as asphalt and concrete, and the lack of vegetation in urban areas.

With its densely populated urban area, Hong Kong provides a typical example on the UHI effect. In studying the territory's UHI intensity last winter, PolyU LSGI Associate Professor Dr Janet Nichol and her research team have reviewed satellite images and collected ground data by making some 20 trips on special mobile vehicles in dusk and dawn. Each vehicle was equipped with two temperature sensors and a GPS receiver.

After analyzing the data, PolyU researchers found that there was an average temperature difference of 7 ° to 8 ° C between urban and rural areas in a winter night, and the maximum difference could be as high as 12 ° C. On a summer night the difference between



urban and rural areas was 5 ° to 6 ° C. Although in most cases the land was cooler than the sea at night, Kowloon and the northern part of the Hong Kong Island were much warmer. In summer the land is significantly warmer than the sea, offering the potential for cooling sea breezes. In both summer and winter the hottest urban area is Mong Kok, closely followed by Causeway Bay. The coolest area is the rural area around Ta Kwu Ling.

Dr Nichol said the large urban centre of Kowloon, with a population of over two million, is dominated by a strongly developed, regional scale urban boundary layer, and its urban canopy layer climate is reinforced by heating from both above and below. Reduced ventilation, high temperatures and the blocking of sea breezes by tall building on the newly reclaimed land, or the so called “ wall effect ” are contentious issues.

The UHI effect has the potential to directly influence the health and well-being of city dwellers. UHI is particularly damaging during a heat wave, as it deprives urban residents of the cool relief found in rural areas during the night. As a result, the relationship between UHI and public health has become a hot research topic in the US.

Another conference speaker Dr Dale Quattrochi, Senior Research Scientist of US National Aeronautics and Space Administration (NASA) Earth Science Department, said NASA and the US Centre for Disease Control and Prevention are jointly working on a project to use remote sensing data for estimating airborne particulate matter over the Atlanta, Georgia Metropolitan Area.

He said this project is known as the “ Health and Environment Linked for Information Exchange (HELIX-Atlanta). Its goal is to examine the feasibility of building an integrated electronic health and environmental data network in five counties of Metropolitan Atlanta. An additional challenge is estimating exposure to environmental hazards such as particulate matter with size less than or equal to 2.5 micrometers (PM2.5).

An evening field trip was also arranged during the two-day workshop for the participants to observe and experience first-hand the effects of UHI in Hong Kong.



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PRESS RELEASE

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香港理工大學

新聞稿

傳訊及公共事務處

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國際專家雲集理大探討城市熱島效應

由香港理工大學土地測量及地理資訊學系主辦的第二屆「地球觀測與城市規劃及管理」研討會於五月二十至二十一日在理大校園舉行，會議期間探討了「城市熱島效應」對香港和其他城市的影響。

來自遙感科學、地理信息系統及城市氣候學等不同領域的專家，於為期兩日的會議上發表他們最新的研究成果和交流經驗，並就城市規劃及管理相關的課題進行討論。而首位提出「城市熱島效應」理論的學術界權威、早於一九八二年已能解釋熱島效應成因的英屬哥倫比亞大學 Tim Oke 教授，亦專程由加拿大來港參加是次研討會。

城市熱島效應指市區中心的溫度比鄰近郊區為高，這現象在晚間及冬季尤其明顯，溫差亦較大。Tim Oke 教授指出，由於市區建築物高大和密集，阻擋了熱輻射於晚間釋放，而混凝土和柏油等建築物在日間吸收大量熱能後，在晚上釋放能量時又沒有植物吸收，令市區氣溫進一步上升，這些都是形成熱島效應的主要原因。

香港市區由於人口密集，更容易產生城市熱島效應。因此，理大土地測量及地理資訊學系副教授 Janet Nichol 博士及其領導的研究小組，於剛過去的冬季就本港考察了熱島效應強度。研究人員不但仔細分析衛星圖像，而且在黎明及傍晚時分驅車到二十多個不同地點搜集地面信息作詳細研究。這些搜集地面信息的車輛均配備兩個溫度探測器及一套全球衛星定位接收器。

理大研究人員發現，香港的市區及郊區在冬季晚間的溫度，平均相差攝氏七至八度，最高更錄得攝氏十二度的差別；在夏季晚間的溫度相差約攝氏五至六度。雖然大部分地面在晚間的氣溫比海洋低，但是九龍及香港北部則恰好相反。夏天時，地面的氣溫比海洋高，能為陸地帶來涼快的海風。數據顯示，無論在冬季或夏季，旺角都是香港最炎熱的地區，其次是銅鑼灣；而打鼓嶺則是最涼快的郊外地區。

Dr. Nichol 解釋，九龍市中心是一個高度發展的地區，人口逾二百萬，該區的樓宇密集，不但令新鮮空氣進不來，而且人為釋出的熱氣也無法排出去，令該區如罩在一個帳篷下。除了空氣不流通外，近年在填海區上興建的高樓大廈，猶如一道屏風，阻擋海風吹入，進一步加速該區溫度上升。

令人擔憂的是，城市熱島效應可能直接影響居民的健康和生活，尤其是遇到熱浪時，郊區冷空氣無法在晚間吹入市區，令熱島效應變本加厲。因此，城市熱島效應與公眾健康息息相關，這也成為美國學者紛紛探討的課題。

另一位出席會議的講者 Dale Quatrichi 博士，是來自美國太空總署地球科學部的高級科研人員，他表示美國太空總署已聯同美國疾病控制及預防中心開展了一項計劃，利用遙感數據，在喬治亞州亞特蘭大市上空，評估經由空氣散播的懸浮粒子含量。

這個名為「健康及環境資訊交換平台」的計劃，目的為研究在亞特蘭大市內五個城鎮裏建立一個綜合電子數據網絡的可行性，網絡會儲存與健康及環境相關的資料。同時，計劃還會評估接觸環境有害物質（如直徑小於或等於二點五微米的空氣懸浮粒子）對健康造成的影響。

理大於是次研討會期間亦舉辦一個晚間實地考察團，讓與會者有機會觀察及親身體驗香港的城市熱島效應。

（完）

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