



FACULTY OF SCIENCE
THE UNIVERSITY OF HONG KONG
香港大學 理學院

DEAN
Professor S Kwok
院長 郭新教授

FACULTY SECRETARY
Mrs. A O M Tsang
院務主任 曾謝露文女士

Press Release

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Measuring the Night Sky Brightness to understand the problem of Light Pollution in Hong Kong

Light pollution, caused by excess night time lighting, is quickly becoming a severe environmental problem worldwide. Researchers at the Department of Physics of The University of Hong Kong carried out the first comprehensive survey of the condition of light Pollution in Hong Kong, namely *A Survey of Light Pollution in Hong Kong*, in the past 15 months. Utilizing almost 2000 sets of night sky brightness data from over 200 different sites in Hong Kong, the study exposed the seriousness of the problem: the Hong Kong night sky is over 500 times brighter than a pristine night sky!

A direct consequence of light pollution is the reduction of brightness contrast of the night sky, leading to a diminishing number of stars visible. The night skies in the worst polluted areas such as Mongkok and Wanchai were over 500 times brighter than the darkest sites in Hong Kong such as eastern Sai Kung and southern Lantau. "At the city center, even on a cloudless and clear night sky, one can hardly see any stars. All that is left is a brightly-illuminated sky background. Famous constellations and the Milky Way were drowned by the city lightings," said Dr Jason Chun Shing PUN, Assistant Professor at the University of Hong Kong and the coordinator of the survey. "It is clear from this survey that we are in danger of losing this valuable natural treasure of the starry night sky for our further generations if nothing were done."

Using the night sky survey data collected, Dr Pun and his team compiled the first Light Pollution Map of Hong Kong. The map shows that urban night skies were on average 100 times brighter than the darkest rural sites, indicating that high population and thus high lighting densities in dense urban areas can cause severe light pollution. With the sprawling urbanization in Hong Kong, many of the currently darker sites are at risk. Moreover, the survey also showed that time is also an important determining factor of the night sky darkness. The team found that the sky after 11pm to be on average darker than the sky before 11pm. The difference was attributed to the turning off of the majority of public and private outdoor lighting throughout the city in late evenings. The full "Hong Kong Light Pollution Map" is available for the general public on the survey website: <http://nightsky.physics.hku.hk>.

This survey was supported by the Environment and Conservation Fund of the HKSAR Environmental Protection Department. Results of the survey will be submitted to the Environment Bureau in order to provide scientific data for the Government related to possible future legislations on usages of external lighting. The study would also be helpful for studies of the relations between night sky brightness and other astronomical, meteorological, and environmental factors. Dr Pun stressed, "In addition to legislation, I hope our society will choose not to abuse the use of outdoor lightings, and if they are truly needed, choose to use lighting with proper shielding to limit its effect to the environment."

HKU is currently planning to establish a more comprehensive night sky brightness monitoring network which is a series of automatic observing stations spread around urban and rural locations which can collect data automatically. This makes the continuous data collection at remote sites possible and extends the range and depth of the study.

Illustrations can be obtained by internet via http://www.hku.hk/science/news/press_release.html. For press enquiry, please contact Ms Cindy Chan, Communication Manager of Faculty of Science, at 2241 - 5286/6356 - 5626 or by email at cindycst@hku.hk.

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End

Figure Captions



Image 1: Excessive outdoor lightings in Hong Kong cause serious light pollution and energy wasted: clouds above buildings are illuminated.



Image 2: Night time photo of Hong Kong and the Pearl River Delta Region taken from the International Space Station. This shows that sky brightness is closely related to population. (Credit: NASA).



Image 3: 36 Sky Quality Meters were distributed to 200 secondary school students, campsite staff, and astronomy enthusiasts to measure the night sky brightness at multiple sites in Hong Kong for 15 months.



Image 4: The “Hong Kong Light Pollution Map” on Google Map. Dark and red icons represent the lightest and heaviest light-polluted sites respectively. Interactive online version is at <http://nightsky.physics.hku.hk/> (The use of the map is bound by the Google's Terms of Use.)



Image 5: To understand light pollution and promote dark sky protection, Dr Jason Chun Shing PUN and Mr SO Chu Wing of HKU physics department will keep on monitoring the night skies.

More Information on Light Pollution

About Light Pollution

Light Pollution is a form of environmental degradation. The wasteful light from outdoor manmade light sources emitted directly upwards or reflected from the ground can pollute the entire sky through scattering by clouds, fog, and pollutants like suspended particulates in the atmosphere. Thus the night sky brightness is an indicator of the level of light pollution. Light pollution not only rids us of the starry night sky, it also indicates a waste of electric energy and damages the natural and our living environment. Several environmental groups have recently organized activities to raise public awareness of light pollution. For example, Friends of the Earth (HK) and the International Year of Astronomy 2009 Hong Kong League will organize the **Dim It Brighten Up** event on June 21. This event hopes to provide the opportunity for the public to see the stars when city lights turned off.

About A Survey of Light Pollution in Hong Kong and Sky Quality Meter

The night sky brightness data of *A Survey of Light Pollution in Hong Kong* is measured by a portable and easy-to-use instrument called Sky Quality Meter (SQM). Imported from Canada, the SQM is a playing-card size device which instantly gives accurate sky brightness values. Started in March 2008, the data are taken with 36 SQMs collected by over 200 volunteers at more than 220 observing sites taken at designated time. Volunteers comprising secondary school students, campsite staff, and astronomy enthusiasts reported the data through the survey webpage. “We specifically invited secondary school students to participate in the survey so that they could get a taste of scientific research and learn to protect our night skies,” said Dr Pun, the coordinator of the survey.

About mag/arcsec²

The night sky brightness data in the Light Pollution Map are listed in units of **mag/arcsec²** (magnitude per arc second square), the astronomical unit of sky brightness. The brighter the sky, the smaller is the magnitude and vice versa. This unit is in logarithmic scale, meaning that 1 unit difference implies a brightness ratio of about 2.512 while difference of 5 magnitudes is defined to imply a brightness ratio of exactly 100. The brightest sites in Mongkok and Wanchai are at 13.2 mag/arcsec², while the average value for urban sites is 15.1 mag/arcsec², and the value for the darkest sites such as Shui Hau in southern Lantau and East Dam of the High Island Reservoir in eastern Sai Kung is 20.1 mag/arcsec².

About International Year of Astronomy 2009

The year has been designated the International Year of Astronomy 2009 (IYA2009) by the United Nation. *Dark Skies Awareness* is one of the cornerstone projects of IYA2009 which aims to raise the level of public knowledge about adverse impacts of excess artificial lighting on local environments and helps more people to appreciate the ongoing loss of a dark night sky for much of the world’s population. Research assistant Mr SO Chu Wing was invited by the *Dark Skies Awareness* working group in January 2009 to present some of the research findings and share the experience on collecting sky data in Hong Kong at the American Astronomical Society Meeting in the US. The Hong Kong survey has also been highlighted by the working group as a sample project for other countries <http://www.darkskiesawareness.org/lp-in-hk.php>.

Remark:

“A Survey of Light Pollution in Hong Kong” was funded by the Environment and Conservation Fund (Project ID: 2007-01) of the HKSAR Environmental Protection Department. It was organized by the Department of Physics of The University of Hong Kong and co-organizers were the Hong Kong Space Museum, the Sky Observers' Association (Hong Kong), Ho Koon Nature Education cum Astronomical Centre (Sponsored by Sik Sik Yuen), and The Camping Association of Hong Kong, China, Ltd.

The online interactive “Hong Kong Light Pollution Map” is available at <http://nightsky.physics.hku.hk/>.