

# Effects of cloud amount on the night sky brightness

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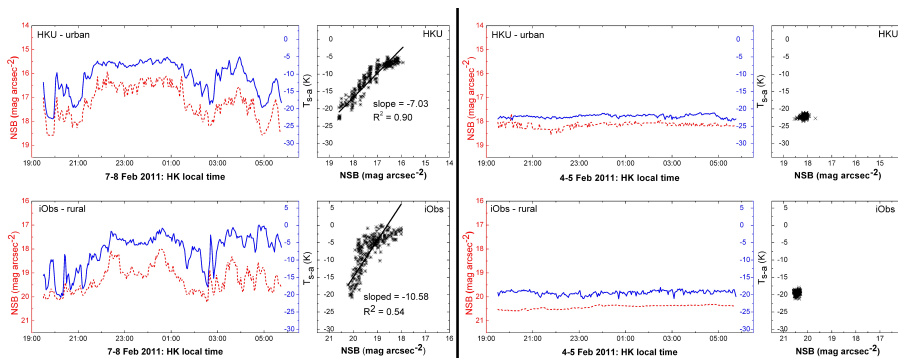
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**Abstract.** The cloud amount and the night sky brightness (NSB) were observed simultaneously and continuously from more than 320 hours of observations in an urban and a rural station in Hong Kong. The cloud amount strongly affect the NSB observed, with effects up to 3 mag in a single night. Night skies were generally brighter during overcast, with strong correlation observed in 63% / 45% of nights in urban / rural sites. This project is supported by the Environment and Conservation Fund of the Hong Kong SAR government (ECF 10/2009, ECF 1/2007).

**Keywords.** Measurement: night sky brightness, light pollution, atmospheric effects, moon.

Simultaneous cloud and NSB (taken with Sky Quality Meters - Lens Ethernet) observations were collected in two locations of the Hong Kong Night Sky Monitoring Network (Please refer to the contribution by Pun et al. in this volume), one urban (*HKU*) and one rural (*iObs*) since November 2010. The amount of cloud were estimated from a device (Boltwood Cloud Sensor II) which measures the temperature difference  $T_{s-a}$  (bigger  $T_{s-a}$  represents larger cloud amount) between the ground and sky in the infrared. The NSB data taken on moonless nights with contribution from artificial lightings removed. On nights where a large variation of the cloud amount (*blue*) was observed (Figure 1 *left*), a similar trend was present for the NSB measurements (*red*). The slope of the correlation was usually lower in the rural sites, indicating a smaller change in the NSB for a similar change in the cloud amount. Moreover, such correlation could be observed more frequently in the urban (63%) versus the rural site (45%). In the contrary, if the amount of cloud stayed steady, then the observed NSB was also nearly constant (Figure 1 *right*).



**Figure 1.** Variations of NSB (*red*) and cloud amount (*blue*) during two simultaneous observation runs, where large (*left*) and no variation (*right*) of cloud amount are observed.

For details, please refer to the project website: <http://nightsky.physics.hku.hk>