

may be substantial (20–50%), and this is a most significant effect to be considered when measuring changes in light pollution!. The variations with solar cycle are of similar size ($\approx 50\%$) and correlated to the solar 10.7 cm flux.

There are indirect temporal variations caused by the passage of Milky Way and the zodiacal light, which may introduce spurious variations in measurements taken at different hours or days. Some change in scattered light intensity will also occur by the diurnal motion of these extended light sources.

There is a slight annual variation of zodiacal light, by about $\pm 10\%$ at high ecliptic latitudes, due to the Earth's orbital motion within the interplanetary dust cloud.

4.4. BRIGHTNESS OF THE NIGHT SKY

Measurements of dark night sky brightness at different observatories lead to best values of typically 22 mag/square arcsec in V, 23 mag/square arcsec ($\approx 100 S_{10}$) in B. The spectrum of the night sky is dominated by strong airglow lines e.g. at 557.7 nm [OI], 589 nm [NaI], 630 nm [OI] and OH emission at longer wavelengths. Comparatively dark spectral bands are from 380 nm to 400 nm, 450 nm to 520 nm, 640 nm to 710 nm, and around 820 nm. If a choice has to be made, try to protect these bands!

4.5. RECOMMENDATIONS FOR LIGHT POLLUTION MEASUREMENTS

Therefore, if one wants to avoid mixing up natural changes with man-made increases in monitoring of light pollution, the following measures are recommended:

- Perform measurements at preselected, known positions on the sky, document all relevant coordinates, avoid stars or correct for them.
- Measurements should cover a sufficiently long interval (several hours per night/ several nights) to be free of “random” airglow variations within a night and from night to night.
- Measurements should cover a substantial fraction of the solar 11-year cycle or, at least, take the effect of solar activity into account when comparing measurements from different years.

5. FIELD SURVEY OF OUTDOOR LIGHTING IN JAPAN

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The Illuminating Engineering Institute of Japan conducted a field survey concerning the outdoor lighting in 1995, in various areas of the country. The aim of the survey was to find which types of luminaires in existing lighting installations are wasting the greatest amount of upward flux into the sky. The survey was conducted in six of the seven zones, proposed in an earlier draft of the guide of the CIE, i.e. E1, E2a, E3a, E3b, E4a and E4b. On the basis of the results of the survey, the proportion of the upward flux per 100 hectares was compared separately for eight types of luminaires, such as the luminaires for traffic roads, residential areas, decorative (shopping) streets, projectors, luminous signs, etc. As a result, it was found that the major sources of the upward flux were the luminaires for decorative streets and luminous signs and to be improved their photometric characteristics.

6. BILATERAL AGREEMENTS ON LIMITS TO OUTDOOR LIGHTING; THE NEW CIE RECOMMENDATIONS, THEIR ORIGIN AND IMPLICATIONS

D. A. Schreuder

Summary

Sky glow presents itself as a background luminance over the sky, against which the astronomical objects are to be observed. The interference of astronomical observations is caused by the resulting reduction in luminance contrast. The glow is caused by non-directional scatter of light by particles in space and in the atmosphere. Part of the light, and part of the particles are natural, and part is man-made. The '(natural) background radiation' is defined as the radiation (luminance) resulting from the scatter of natural light by natural particles. For earth-bound observatories, the background luminance is the limit for sky glow. It is customary to express the sky glow (from man-made sources) as a percentage of the natural background luminance.