

# Red is the new Black

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Images of the night sky above Glacier National Park in the USA and above Berlin. In cities, clouds scatter artificial light back down towards the ground, drastically increasing the sky brightness. In natural areas, clouds make the sky darker. Credit: Left photo: © Ray Stinson, Glacier National Park, USA; right photo: © Christopher Kyba, Berlin, Germany. [Click for a larger image.](#)

(Phys.org) -- The colour of night-time skyglow may be about to undergo a radical change worldwide, according to scientists of the Freie Universität Berlin and the Leibniz Institute of Freshwater Ecology and Inland Fisheries. They predict that with increasing use of LED street lamps, the colour of the night sky will become bluer. To track this change, the researchers developed a prototype measurement device, and used it to show that the sky currently contains far more red light on cloudy nights compared to clear nights. Their report, entitled "Red is the New Black", is published in the journal *Monthly Notices of the Royal Astronomical Society*.

Christopher Kyba, physicist at the Freie Universität and lead author of the study, explains that innovations in lighting technology will result in changes in the colour of streetlights. "The current worldwide trend of

replacing gas discharge lamps with solid state lighting, such as LEDs, will affect the radiance and spectrum of urban skyglow." In order to understand the potential impacts of this change on ecology, it will be essential to monitor the [sky](#) over the long term.

The scientists used the new instrument to study how clouds affect sky brightness in urban areas. "For almost all of evolutionary history, clouds made the night sky darker, just like they do in daytime", said Franz Hölker, ecologist at the Leibniz-Institute of Freshwater Ecology and Inland Fisheries, study author, and leader of the project "Verlust der Nacht" (Loss of the Night). In areas with artificial [light](#) the effect of clouds is now reversed, and the size of the effect depends on colour. The researchers found that in Berlin the blue portion of skyglow is 7 times more radiant on cloudy nights than on clear, and 18 times more for the red part.

In the visual range used by most animals, the authors say that cloudy skies are now thousands of times more radiant near cities than they were throughout most of history. They expect that the addition of this extra light affects predatory-prey relationships where the predator hunts using vision, for example between owls and mice.

The sky is blue in daytime because the cloud free atmosphere is very good at scattering short wavelength light. The scientists therefore express concern that unless special care is taken in design and implementation, a switch to whiter LED lights could make the sky much brighter on clear nights. They suggest that cities that have decided to change to solid state lighting should purchase lamps that emit no upward light, and use "warm white" lights with as little blue light as possible.

The research was funded by two interdisciplinary projects, MILIEU and "Verlust der Nacht". The "Verlust der Nacht" project, funded by the German Ministry of Education and Research (BMBF), is specifically

devoted to quantifying light pollution and investigating its impact on humans and the environment.

**More information:** The new work appears in "Red is the new Black: how the colour of urban skyglow varies with cloud cover", C. C. M. Kyba, T. Ruhtz, J. Fischer, F. Hölker, *Monthly Notices of the Royal Astronomical Society*, in press. The paper can be seen at [onlinelibrary.wiley.com/doi/10 ... 012.21559.x/abstract](https://onlinelibrary.wiley.com/doi/10.1093/mnras/stw281) and on Christopher Kyba's home page at [userpage.fu-berlin.de/~kyba/pu ... is the new black.pdf](http://userpage.fu-berlin.de/~kyba/publications/red_black.pdf)

Provided by Royal Astronomical Society

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