

18- High-resolution map of light pollution

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Abstract

In 1976 Berry introduced simple model in order to estimate artificial night sky brightness caused by light emitted by cities. We presented an improved version of this model. We use high-resolution urbanization data. It allows to include in the model light emitted by buildings, roads, factories, airports etc. Moreover, the model includes shadowing effect, which is an important factor in mountainous areas.

We compared the resultant map to world atlas of artificial night sky brightness (Falchi et al. 2016) using observations available online via myskyatnight.com database. We compared maps of different places in Europe, for which the biggest number of measurements is available. In these places, analyse of proposed model and world atlas results shows that our model is closer to observed values of night sky brightness. As an example on Fig. 2 we present a comparison for neighbourhood of Toruń, Poland. Mean squared error MSE for world atlas is 0.11, whereas for our model it is 0.04. However, both maps face similar problems over high urbanized areas like Berlin.

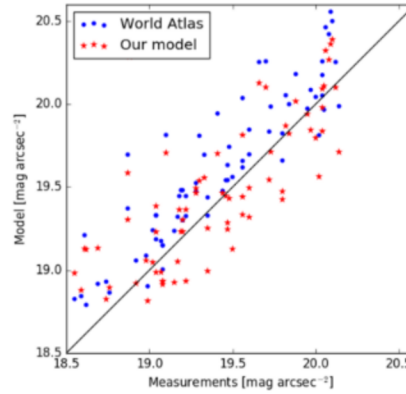


Fig. 1: Comparison of models for Toruń, Poland

In the presentation we present the newest version of the model. The model was used to calculate the map of night sky brightness. The resultant map covering Poland is available online at darksky.netzel.pl.

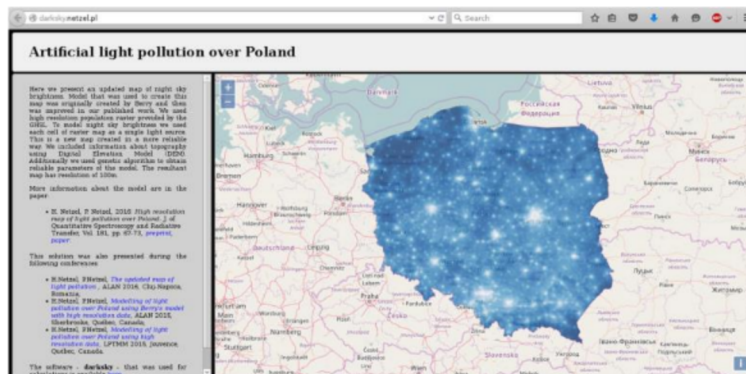


Fig. 2: Service with resultant map of light pollution over Poland