

Review of "The WGLC global gridded lightning climatology and timeseries" by Kaplan and Hong-Kiu Lau.

General comment

This article presents an open-access and freely available global gridded dataset of lightning stokes density (WGLC) at monthly and at 0.5° and 5 arc-minute spatial resolution for the period between 2010-2020. The dataset is based on the WWLLN data detected during that period and it is corrected by the relative detection efficiency reported by the network. The dataset was compared and validated using two ground-base detecting network (ALDN and NLDN) and using the lightning flash dataset provided by a spaceborne remote sensing (LIS/OTD).

The WGLC dataset intended to fulfill a need of a continuously updated high quality global lightning timeseries and climatology for scientific studies. These studies include the quantification of the effects of lightning on the earth system and the understanding of the hazards that the lightning represent.

The data presented is novelty given that it presents a global and long-term dataset of lightning stroke density with high spatial resolution. The method used to develop the dataset is based on the method presented by Hutchins et al. (2012). Although the method does not correct the overall absolute detection efficiency of the network, it allows to correct the areas with less network coverage providing a uniform global level of performance. The method used is adequately described and the citations are appropriated. Therefore, the article supports the develop of the dataset.

Specific comment

The WGLC dataset is compared with three datasets obtained by different independent detection systems to perform an evaluation of the quality and accuracy of the WGLC dataset. The WGLC data is compared with the stroke count data from Alaska Lightning Detection Network (ALDN), the gridded NLDN (National Lightning Detection Network) dataset contains monthly mean cloud-to-ground flash rates and the gridded flash dataset LIS/OTD 0.5° high resolution monthly climatology (HRMC). The results show that WGLC presents a similar spatial and seasonal pattern reported by the other detection systems, showing the quality of the dataset to capture the main features of global lightning distribution.

However, on the evaluation it was not take into account that each dataset counts different lightning features. WWLLN and ALDN detected cloud-to-ground and cloud-to-cloud strokes while the dataset of the NLDN used contains cloud-to-ground flash and the HRMC dataset is the monthly flash rate detected by LIS/OTD.

Given that a flash is defined as a group of strokes that accomplish certain space and time criteria, it is not possible to compare these two lightning features (stroke and flash) without further discussion. For instance, different studies have showed that WWLLN is capable of detect more than one stroke per flash detected by LIS (Rudlosky and Shea, 2013; Burgesser,

2017). Therefore, this can lead to an overestimation on the quality of the WGLC. This need to be discuss by the authors.

Hutchins, M. L., R. H. Holzworth, J. B. Brundell, and C. J. Rodger, Relative Detection Earthciency of the World Wide Lightning Location Network, Radio Science, 2012RS005049, 2012

Rudlosky, S. D. and D. T. Shea, Evaluating WWLLN performance relative to TRMM/LIS, Geophys. Res. Lett., Vol. 40, 1-5, doi:10.1002/grl.50428, 2013

Burgesser, R. E., Assessment of the World Wide Lightning Location Network (WWLLN) detection efficiency by comparison to the Lightning Imaging Sensor (LIS), Q. J. R. Meteorol. Soc. 143: 2809–2817, October 2017 A DOI:10.1002/qj.3129