OKLMA README
1) INTRODUCTION
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The OKLMA has operated in central Oklahoma since 2003, with the addition of 7 stations in southwest Oklahoma in the spring of 2012. It triangulates sources of VHF (60-66 MHz) radiation emitted by lightning (and any other sources) in 80 microsecond windows in space and time, which map out the three dimensional structure of lightning flashes. The OKLMA has been operated by National Oceanic and Atmospheric Administration / Office of Atmospheric Research / National Severe Storms Laboratory and OU/CIMMS staff. The OKLMA was installed with funding from Office of Naval Research Grant N00014-00-1-0525 and has since been funded in part by the National Oceanic and Atmospheric Administration National Severe Storms Laboratory, National Environmental Satellite, Data, and Information Service, and the National Science Foundation.

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2) METHODS
The method of data collection and performance is described in:
Thomas, R. J., Krehbiel, P. R., Rison, W., Hunyady, S. J., Winn, W. P., Hamlin, T., and Harlin, J. (2004), Accuracy of the Lightning Mapping Array, *J. Geophys. Res.*, 109, D14207, doi:10.1029/2004JD004549.

Chmielewski, V. C., and Bruning, E. C. (2016), Lightning Mapping Array flash detection performance with variable receiver thresholds, *J. Geophys. Res. Atmos.*, 121, 8600– 8614, doi:10.1002/2016JD025159.

Weiss, S. A., D. R. MacGorman, E. C. Bruning, and V. C. Chmielewski, 2018: Two Methods for Correcting Range-Dependent Limitations of Lightning Mapping Arrays. *J. Atmos. Oceanic Technol.*, **35**, 1273–1282, https://doi.org/10.1175/JTECH-D-17-0213.1.

Following the addition of the southwest cluster in 2012 (sensors: APUBORZ), two processing methods are used. Whenever possible, the OKLMA data was reprocessed to include any source found by each cluster of stations operating independently of each other. If this processing technique was used, the second header line of the file will contain "Clusters Processed Separately" after the other analysis arguments. If the number of stations in Line 12 of the file header is larger than the number of active stations in Line 13, stations from the central cluster were used to augment the southwest cluster solutions. These stations will be listed twice in the active stations list in Line 14. A description of the method change is described in:

Chmielewski, V. C., K. Calhoun, D. Kennedy, E. Bruning, J. Blair, and D. MacGorman, 2020: Improving Spatial coverage of Lightning Mapping Arrays (LMAs) for GLM validation. 2020 GLM Science Team Meeting.
https://goes-r.nsstc.nasa.gov/home/sites/default/files/2020-09/210_GLM2020_Chmielewski.pdf

The estimated flash detection range of the OKLMA when using this processing methodology is below.
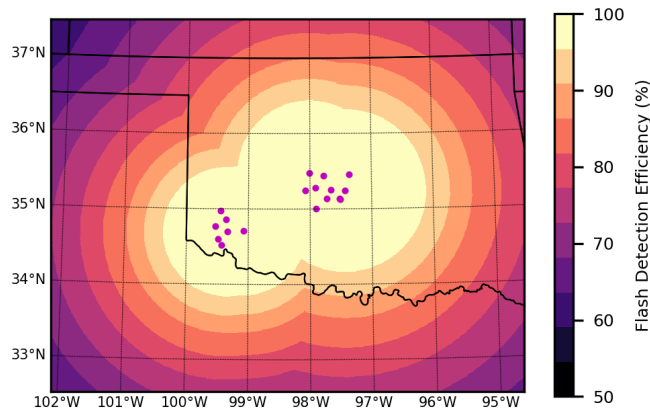


3) DATA INFORMATION

All data is stored in tabular, fixed-width formatted files compressed with gzip. Fixed width formatting described in each file header (ex. Line 59 in yr 2020 files). Each file contains 10 minutes of VHF events observed by the OKLMA and will be titled following either a LYLOUT_YYMMDD_HHMMSS_0600.dat.gz or OK_LMA_2002_2005_YYMMDD_HHMMSS_0600.dat.gz filename convention.

Each file has a series of header lines at the top of the file including analysis version, active stations, analysis criteria, summary information, creation date and formatting information. Data is preceded by by a "*** data ***" line.

** Column Names and Descriptions **

0: Time of VHF event
--UTC second of the day
1: lat
--decimal degrees
2: lon
--decimal degrees
3: altitude
--in meters above MSL
4: Reduced Chi^2
--Reduced chi^2 of the Marquart least squares solution for the VHF event
5: power
--emitting power of the VHF event in dBW
6: mask

--bitwise mask of the contributing stations to the VHF event solution in the order given by the Stations mask order line.

4) SHARING AND ACCESS
OKLMA data are currently publicly accessible via NSSL's THREDDS instance: https://data.nssl.noaa.gov/thredds/catalog/WRDD/OKLMA/catalog.html. The data are freely available; however, OKLMA's researchers request the dataset be cited with the URL above if it is used in published research.