Data Description for Sciencehub Research Effort:

Simulating Lightning NOX Production in CMAQ: Evolution of Scientific Updates

1. The Monthly\_Sum…csv files, there are 4 fields:
* month (for the year marked as the file name)
* “NO”: the column total lightning NO (LTNO) for hNLDN
* “NOb”: the column total lightning NO (LTNO) for mNLDN
* “NOp”: the column total lightning NO (LTNO) for pNLDN
1. NLDNstrike\_RC…CSV files are used to derive the relationship between convective precipitation and lightning flashes, the fields are:
* Year
* Month
* nldn\_strike: total monthly lightning flashes
* rc\_tot: tot monthly convective rainfall
1. The LTNG\_COLUMN\_NO\_\*July.gz.tar files, which contain model produced daily lightning NO column for each model case over the space and these files are in IOAPI format with the following header information:

dimensions:

 TSTEP = UNLIMITED ; // (24 currently)

 DATE-TIME = 2 ;

 LAY = 1 ;

 VAR = 1 ;

 ROW = 299 ;

 COL = 459 ;

variables:

 int TFLAG(TSTEP, VAR, DATE-TIME) ;

 TFLAG:units = "<YYYYDDD,HHMMSS>" ;

 TFLAG:long\_name = "TFLAG " ;

 TFLAG:var\_desc = "Timestep-valid flags: (1) YYYYDDD or (2) HHMMSS

 " ;

 float NO(TSTEP, LAY, ROW, COL) ;

 NO:long\_name = "NO " ;

 NO:units = "mol/s " ;

 NO:var\_desc = "Column NO produced from lightning

 " ;

// global attributes:

 :IOAPI\_VERSION = "$Id: @(#) ioapi library version 3.1 $

 " ;

 :EXEC\_ID = "CCTM\_ckLTNG

 " ;

 :FTYPE = 1 ;

 :CDATE = 2016140 ;

 :CTIME = 184003 ;

 :WDATE = 2016140 ;

 :WTIME = 184003 ;

 :SDATE = 2011182 ;

 :STIME = 10000 ;

 :TSTEP = 10000 ;

:NTHIK = 1 ;

 :NCOLS = 459 ;

 :NROWS = 299 ;

 :NLAYS = 1 ;

 :NVARS = 1 ;

 :GDTYP = 2 ;

 :P\_ALP = 33. ;

 :P\_BET = 45. ;

 :P\_GAM = -97. ;

 :XCENT = -97. ;

 :YCENT = 40. ;

 :XORIG = -2556000. ;

 :YORIG = -1728000. ;

 :XCELL = 12000. ;

 :YCELL = 12000. ;

 :VGTYP = 7 ;

 :VGTOP = 5000.f ;

 :VGLVLS = 1.f, 0.9975f ;

 :GDNAM = "WRF\_CMAQ\_2WAY " ;

 :UPNAM = "LTNG\_INIT " ;

 :VAR-LIST = "NO " ;

 :FILEDESC = "Gridded lightning NO production from CMAQ

 /from/ LTNG\_INIT /Vers

ion/ CMAQ