1. BACKGROUND
Lightning nitrogen oxides (LNOx) are important because they indirectly influence our climate by controlling the concentration of ozone (O3) and hydroxyl radicals (OH) in the atmosphere [Huntrieser et al., 1998]. In support of the National Climate Assessment (NCA) program, satellite Lightning Imaging Sensor (LIS; Christian et al. [1999]; Cecil et al. [2014]) lightning optical data is used to directly estimate LNOx production over the southern portion of the conterminous US for the 16 year period 1998-2013.

2. RETRIEVAL METHOD
LIS measures a small fraction of flash energy from kth flash:

\[ \beta = \frac{Q_k}{E_k} \]

Flash LNOx Production:

\[ P_k = \frac{Y}{N_d} \left( \frac{Q_k}{\beta} \right) \left( \frac{N_o}{N_d} \right) \]

Yield: \( Y = 10^5 \) molecules / J

Fraction: \( \beta = 1.87 \times 10^{-19} \)

\( N_d \) = Avogadro’s constant

Total LNOx Production \( P_t \) in a Region:

\[ P_t = \sum_{k=1}^{N_o} P_k + \left( N_t - N_o \right) \left( \frac{1}{N_o} \sum_{k=1}^{N_o} P_k \right) \]

3. GEOGRAPHICAL VARIATIONS OF LNOx
Annual geographical variations of the total LNOx production \( P_t \) described in the previous section are provided below. The value of beta has been calibrated so that the mean LNOx production per flash in 1998 (the reference year) is 250 moles.

4. TREND OF SOUTHERN CONUS LNOx
The trend in the total LNOx (summed up across the entire southern CONUS region) and associated flash counts are provided here. LIS is regarded as a very stable instrument [Buechler et al., 2014], but note that there appears to be a downward trend in the LIS-inferred total LNOx production. Additionally, analyses are needed to insure that the trend is a real/natural occurrence.

5. REFERENCES

