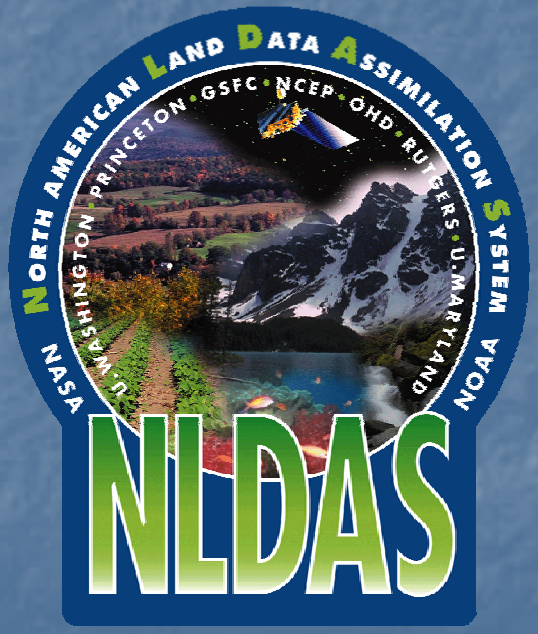
Bias Correction of NARR Downward Shortwave Radiation Fluxes Using GOES Data



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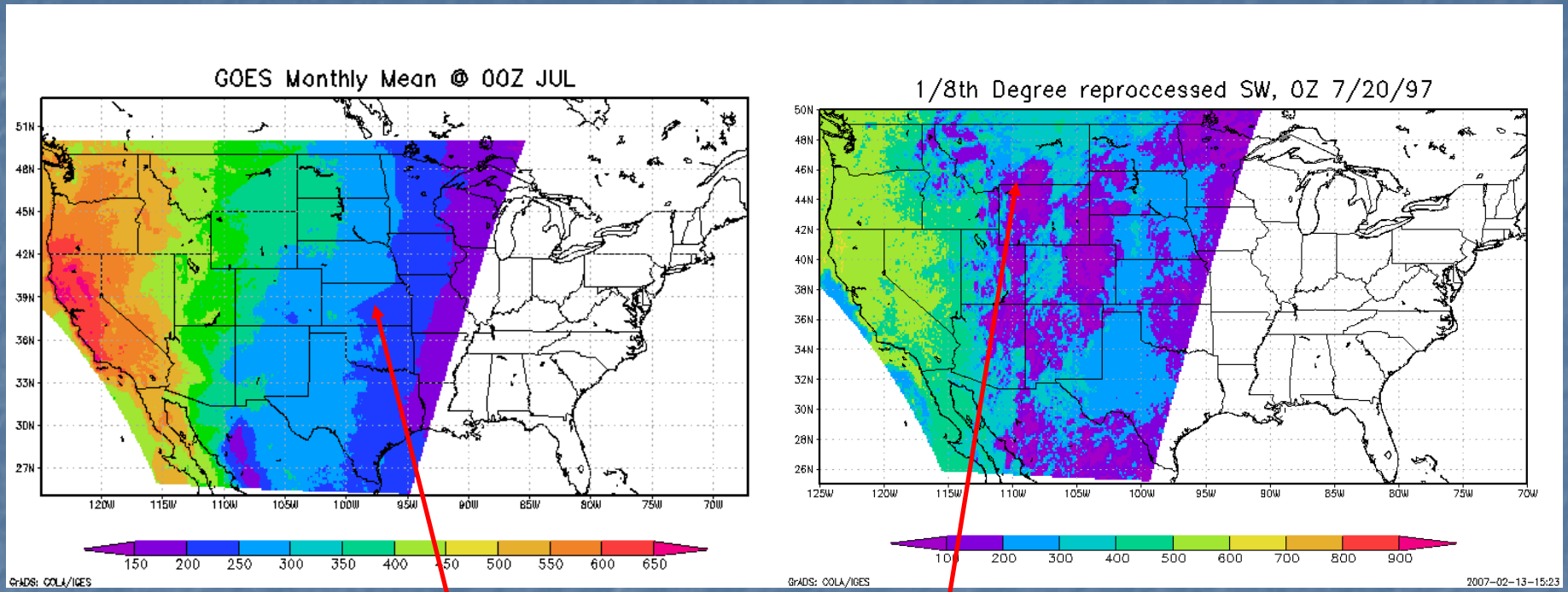
Methodology

- Aims to remove bias in NARR downward shortwave radiation fluxes
- Generate monthly mean diurnal cycle for both NARR and GOES hourly fields and create a ratio-based bias correction for NARR following Methodology of Berg et al., 2003 JGR:

$$SW\downarrow_{Corrected} = \frac{SW\downarrow_{GOESMEAN}}{SW\downarrow_{NARRMEAN}} \times SW\downarrow_{NARR}$$

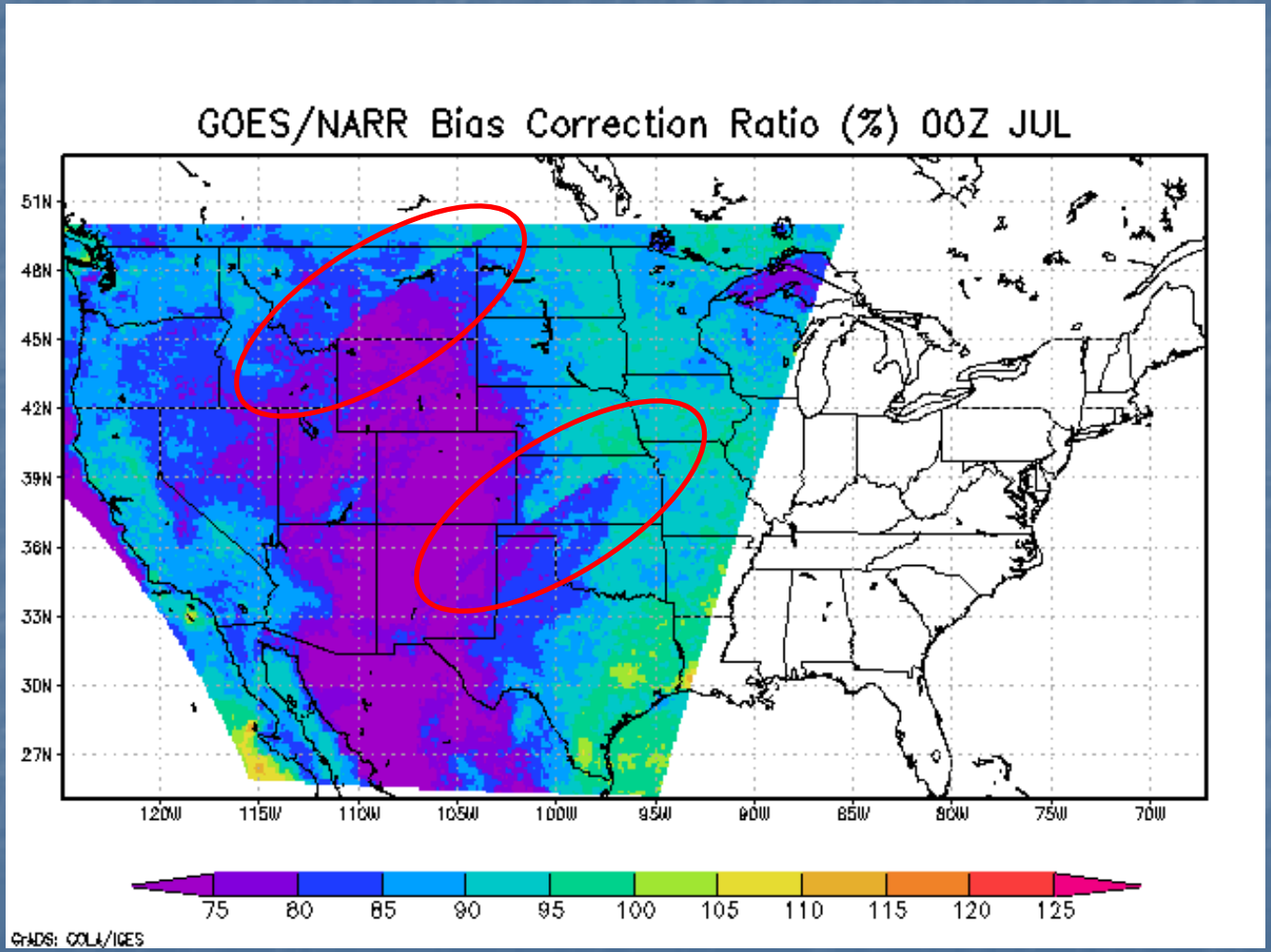
Error found in GOES Product



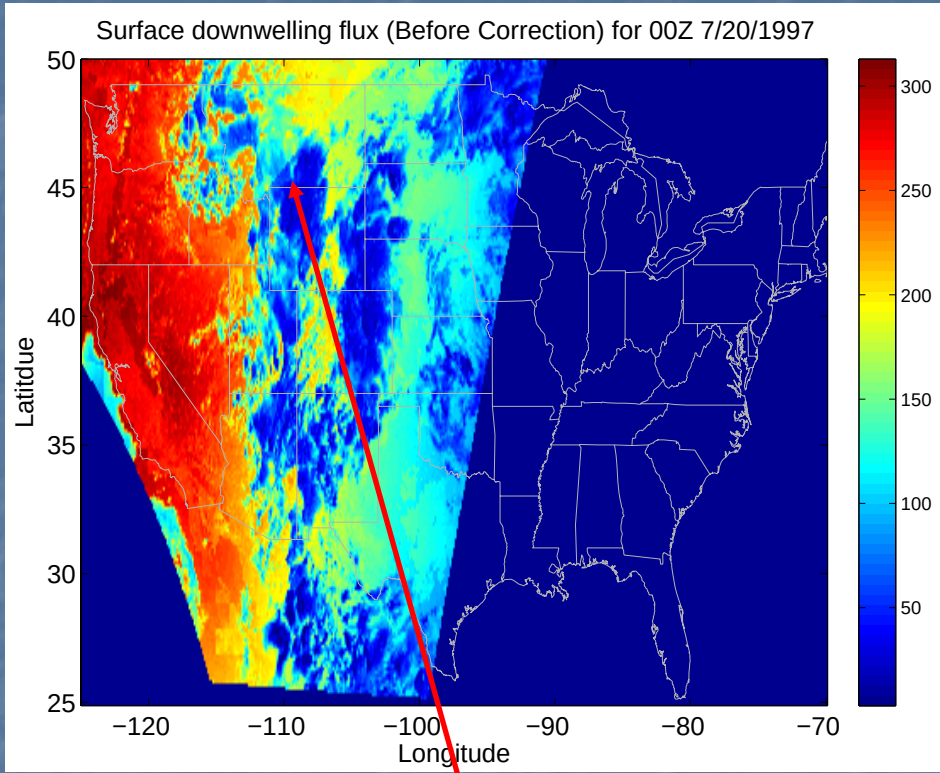
- From R. Pinker:

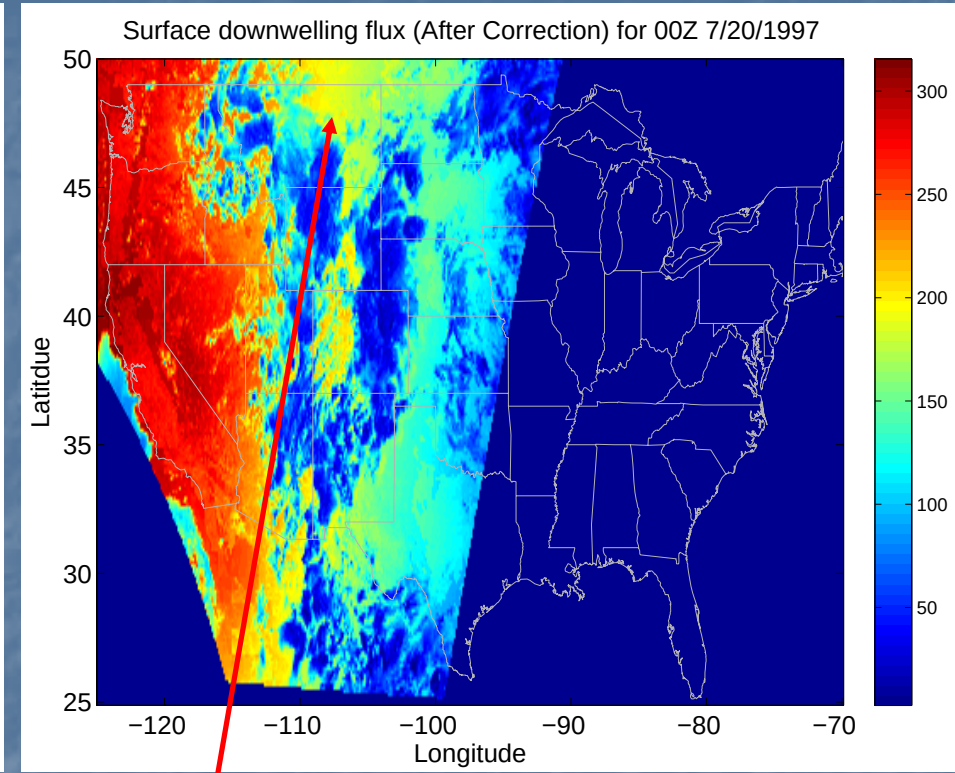
  The curved lines are artifacts generated when applying bidirectional corrections. The bidirectional correction factors (BiCF) are stored in a Look-Up-Table (LUT) as a function of DISCRETE satellite zenith angles (STA), solar zenith angles(SNA) and relative azimuth angles(RZA). Before, no interpolation was used when determining the corresponding BiCF for a given (STA, SNA, RZA).

Impacts on Bias Correction



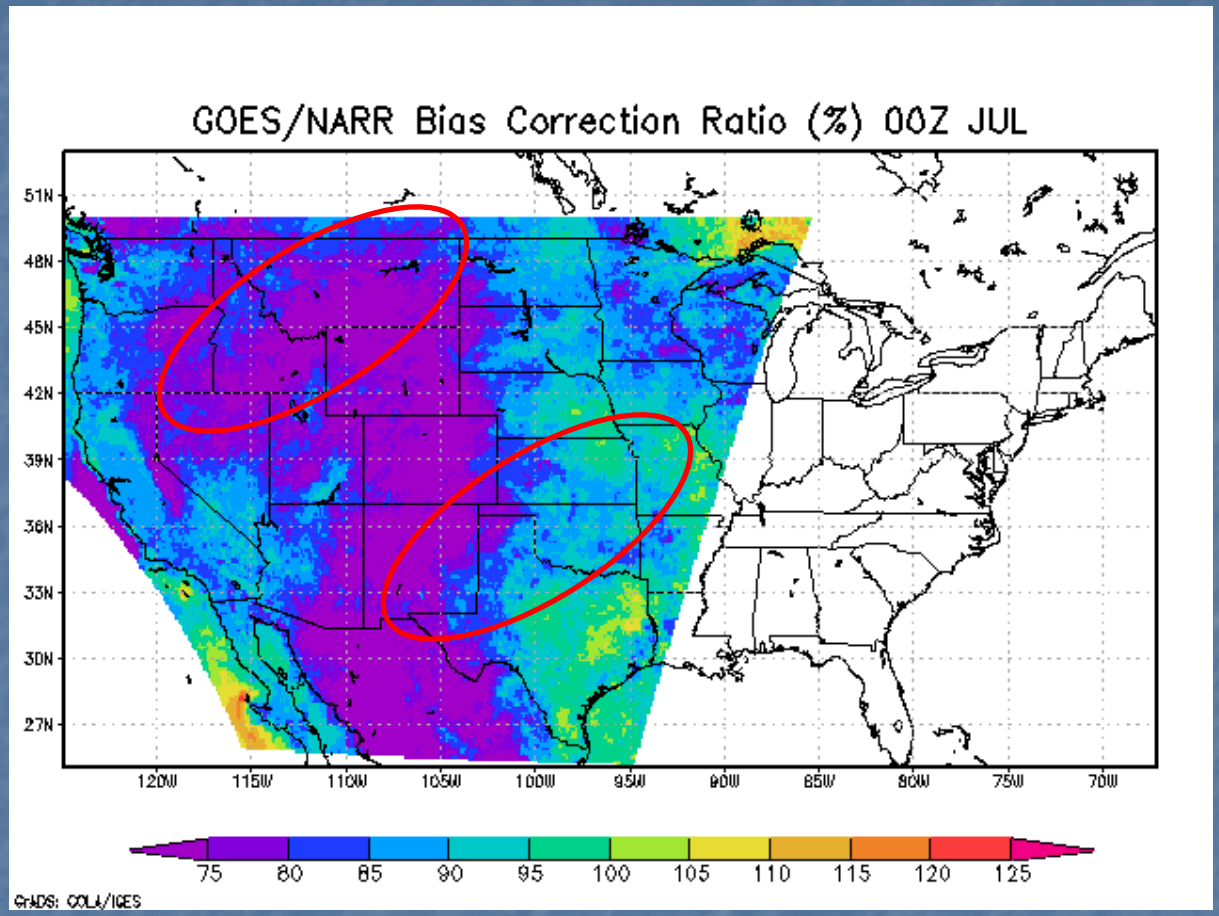
New GOES Product





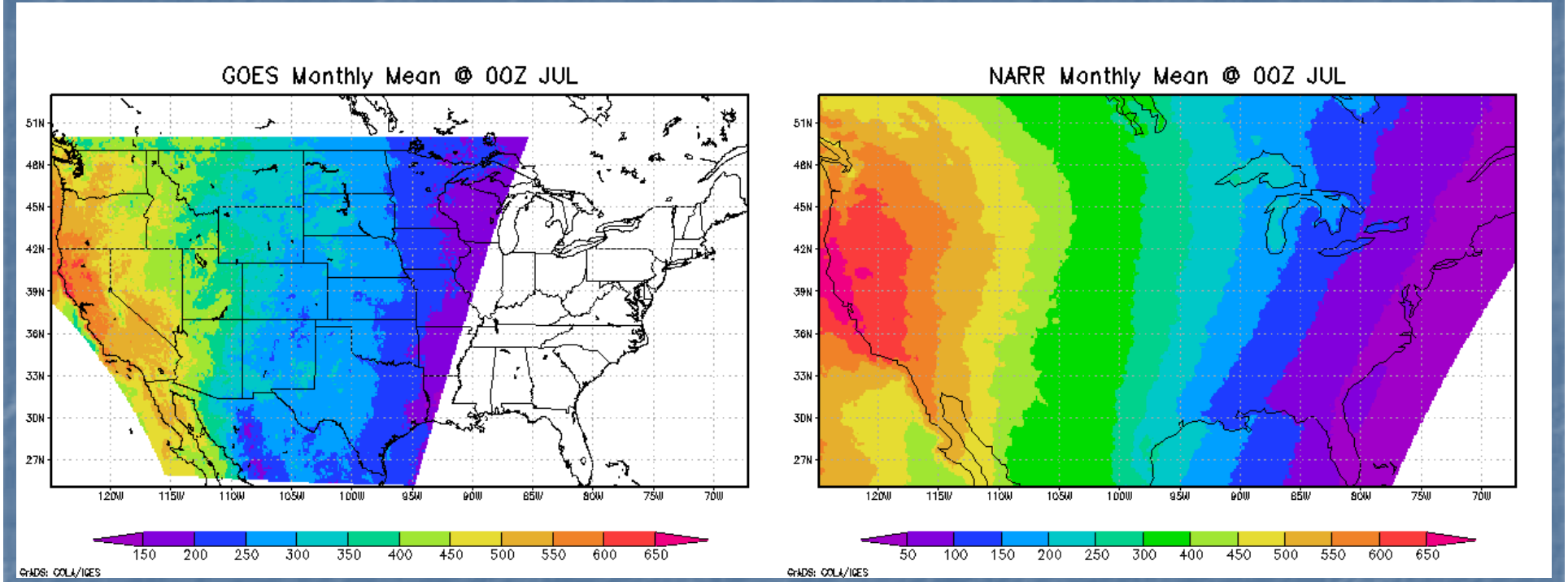
- Reprocessed product from UMD shows improvement (Satellite angles now interpolated in time). Images provided by R. Pinker

New Bias Correction Ratio



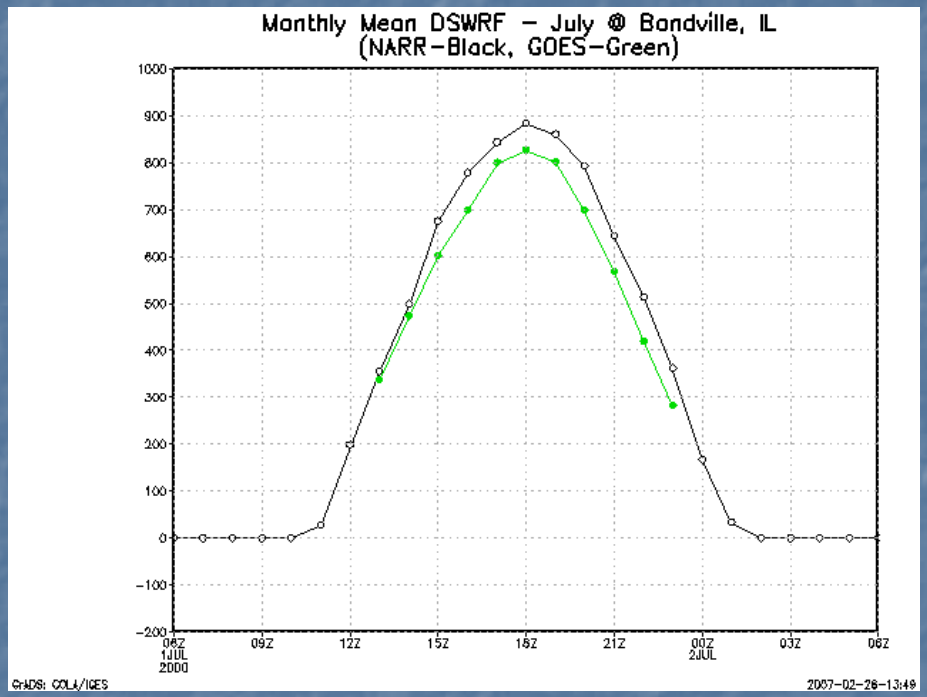
- Testing reveals the new product produces better bias correction ratio. (Note only one month used in producing this image).

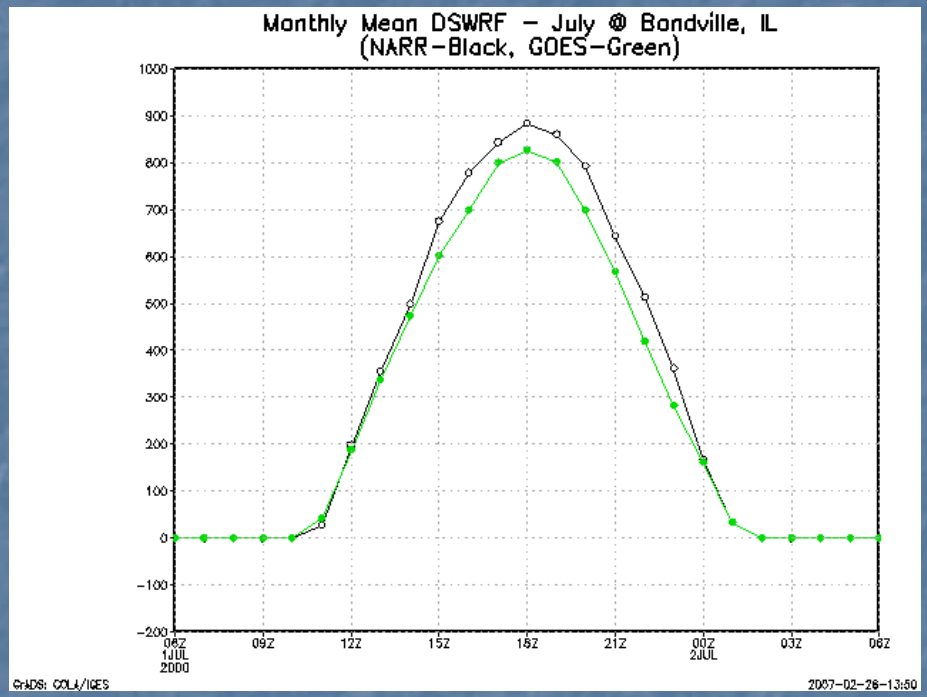
Creation of Bias Correction Ratios



- 1/8th degree GOES product not defined for low zenith angles and poleward of 50N and east of 70W

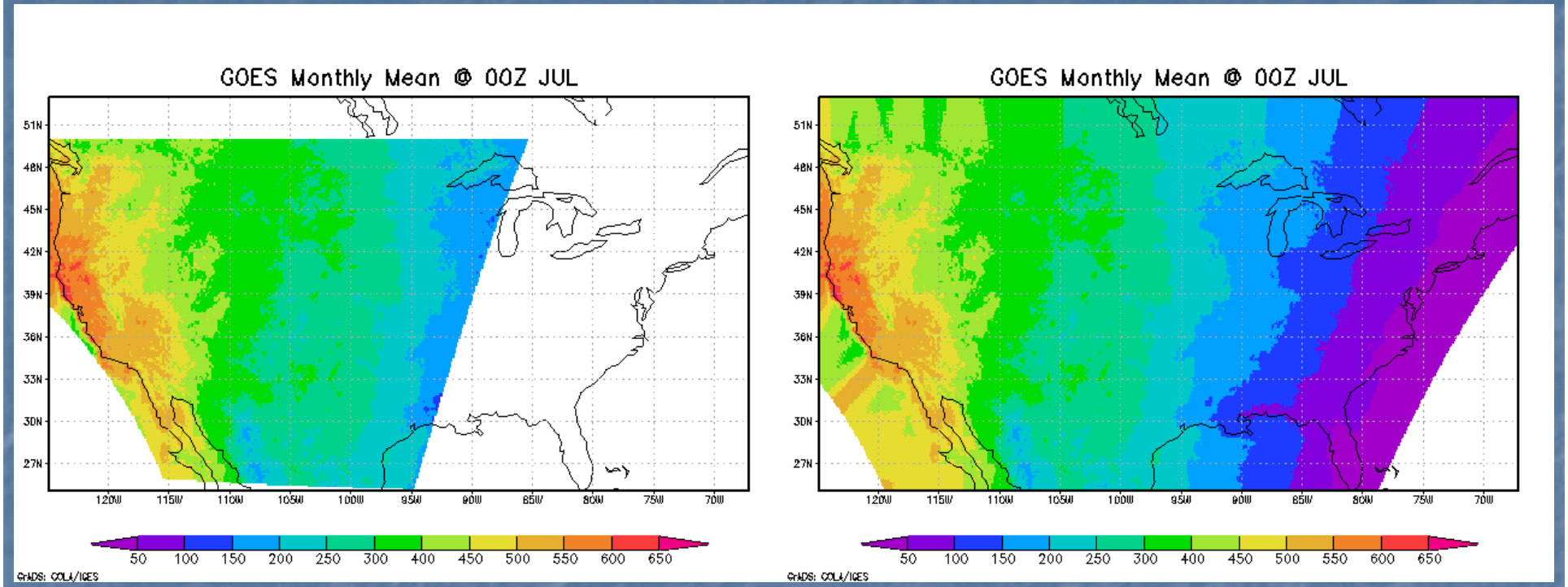
Creation of Bias Correction Ratios





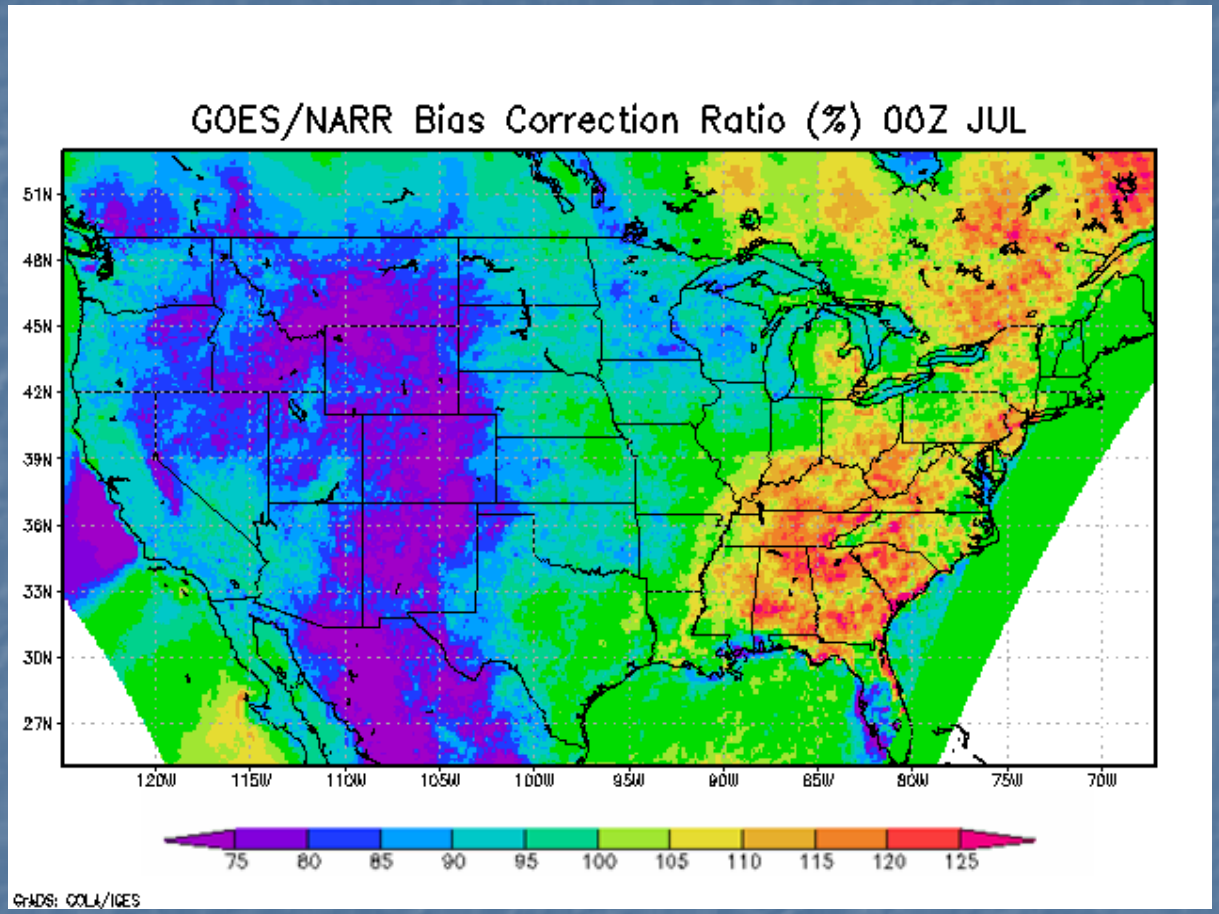
- Use zenith angle interpolation of mean fields to fill the gaps in areas located at low zenith angles

Creation of Bias Correction Ratios



- We can also extend data northward and eastward using neighbor search and zenith angle correction

Creation of Bias Correction Ratios



- Note: only one month used in producing this data