(a) MERRA-2 global AOD evaluation

- Instantaneous AERONET and CARSNET observations: AOD$_{440}$ and AOD$_{675}$
- Interpolation to instantaneous AOD$_{550}$
- Hourly mean AERONET and CARSNET AOD$_{550}$
- Site-to-site spatially and temporally collocated -MERRA-2 AOD$_{550}$ -AERONET AOD$_{550}$ -CARSNET AOD$_{550}$
- Global: MERRA-2 versus AERONET
- China: MERRA-2 versus CARSNET
- Evaluation analysis: global and regional scales and site-to-site

3-hourly MERRA-2 analyzed AOD$_{550}$ fields

(b) Global and regional AOD trends

- MERRA-2 monthly AOD$_{550}$ (0.5º × 0.625º)
- MODIS/Terra monthly AOD$_{550}$ (1º × 1º)
- MISR monthly AOD$_{555}$ (0.5º × 0.5º)
- Bilinear interpolation to MODIS/Terra grid (1º × 1º)
- Calculating deseasonalized AOD time series for each grid
- MERRA-2 meteorological field data
- PKU emission data
- Standardized monthly AOD and explanatory variables
- Identifying the main regional explanatory variables: stepwise MLR model
- Linear trend analysis during different time periods on global and regional scales
- Multi-collinearity test: VIF analysis
- Sliding-window trend analyses over the regions of interest
- Evaluation of the relative contribution of regional dominant factors: the LMG method
- PKU emission data

Evaluation of the relative contribution of regional dominant factors: the LMG method