

# Supplementary Materials of “Impacts of 3D aerosol, cloud, and water vapor variations on the recent brightening during the South Asian monsoon season”

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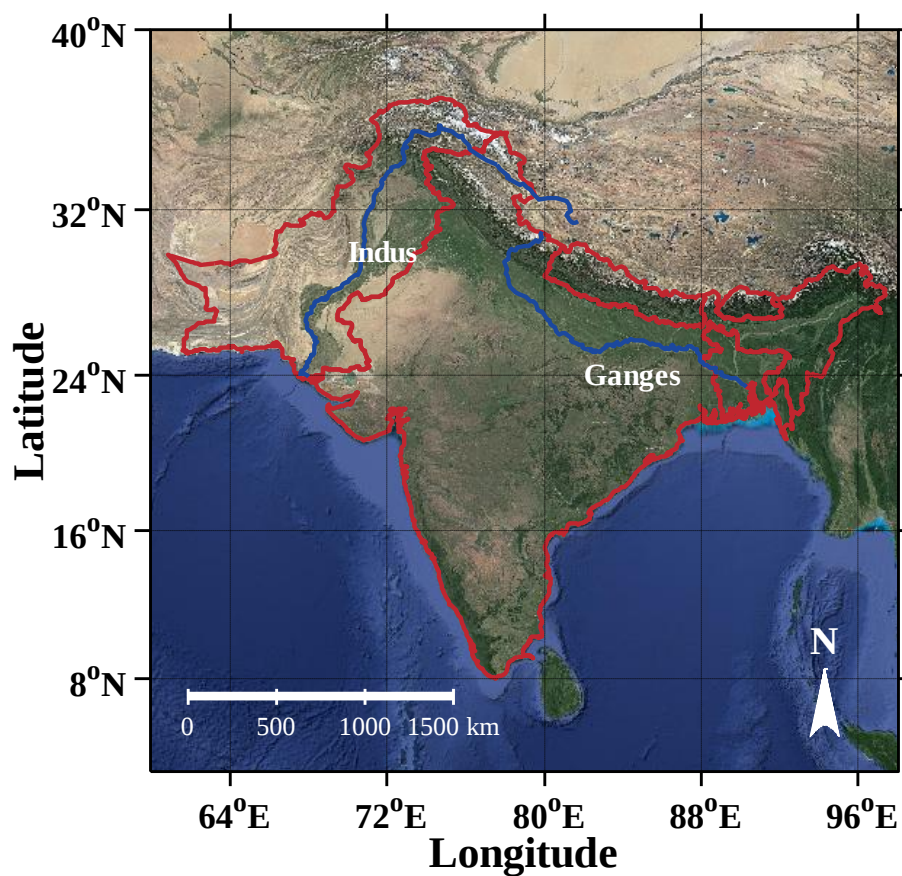
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**Supplementary Table S1.** Observations used in the analysis along with their sources and spatial resolutions.

| Sensor   | Spatial Resolution | Products                            | Parameter                                                                         |
|----------|--------------------|-------------------------------------|-----------------------------------------------------------------------------------|
| CloudSat | 1.3 × 1.7 km       | 2B-CLDCLASS R04                     | Cloud fraction; cloud top/base height                                             |
|          |                    | 2B-CWC-RO R04                       | Cloud water content, particle effective radius, and particle number concentration |
|          |                    | 2B-FLXHR R04                        | Vertical heating rate; SW/LW radiative fluxes                                     |
| CALIPSO  | 5 × 5 km           | Level 2 Aerosol Layer V3            | Aerosol optical depth; vertical feature mask                                      |
|          |                    | Level 2 Aerosol Profile V3          | Extinction coefficient 532 nm                                                     |
| MODIS    | 1° × 1°            | Level 3 MYD08_M3 006                | Aerosol optical depth                                                             |
| ECMWF    | 1.3 × 1.7 km       | ECMWF-AUX R04                       | Pressure; temperature; relative humidity                                          |
| CERES    | 20 × 20 km         | Level 2 Single Scanner Footprint 4A | SW radiation at TOA and surface                                                   |



**Supplementary Figure S1.** Terrain map during the monsoon season in South Asia and the surrounding regions. The blue line indicates rivers; the study region is within the red line.



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