

## Supplement

Table S1: Summary of satellite AOD sources

| <b>Instrument</b> | <b>Satellite<br/>(Overpass Time)</b> | <b>Retrieval Algorithm</b>         | <b>Time Period<br/>Available</b> | <b>Time Period<br/>Used</b> | <b>Retrieval Spatial<br/>Resolution</b> | <b>Temporal<br/>Resolution</b>       |
|-------------------|--------------------------------------|------------------------------------|----------------------------------|-----------------------------|-----------------------------------------|--------------------------------------|
| MODIS             | Terra<br>(10:30)                     | C6.1 Dark Target<br>C6.1 Deep Blue | 2000-present                     |                             |                                         |                                      |
|                   | Aqua<br>(13:30)                      | C6.1 Dark Target<br>C6.1 Deep Blue | 2002-present                     | 2002-2019                   | 10km x 10km                             | Daily under<br>viable<br>conditions  |
|                   | Terra/Aqua<br>Combined               | MAIAC                              | 2000-present                     | 2000-2019                   | 1km x 1km                               |                                      |
| MISR              | Terra<br>(10:30)                     | MISRv23                            | Late 2000-<br>present            | 2001-2019                   | 4.4km x 4.4km                           | Weekly under<br>viable<br>conditions |
| SeaWiFS           | SeaStar<br>(12:00)                   | Deep Blue version 4                | Late 1997-2010                   | 1998-2010                   | 13.5km x 13.5 km                        | Daily under<br>viable<br>conditions  |
| VIIRS             | S-NPP<br>(13:30)                     | Dark Target<br>Deep Blue V1        | Late 2011-<br>present            | 2012-present                | 6km x 6km                               | Daily under<br>viable<br>conditions  |

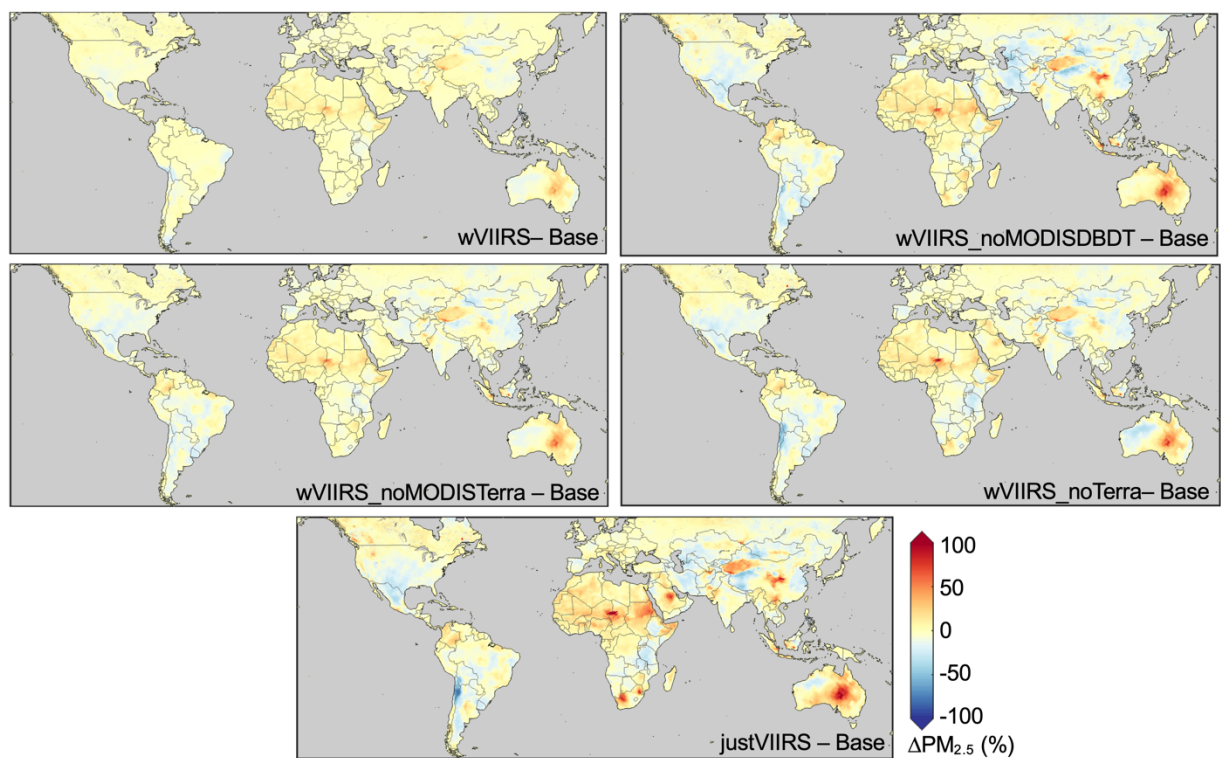


Fig S1: The percent difference between the 2012-2019 mean geophysical PM<sub>2.5</sub> concentrations ( $\mu\text{g}/\text{m}^3$ ) for each scenario from Table 1 and the Base scenario. Grey indicates missing data or water.

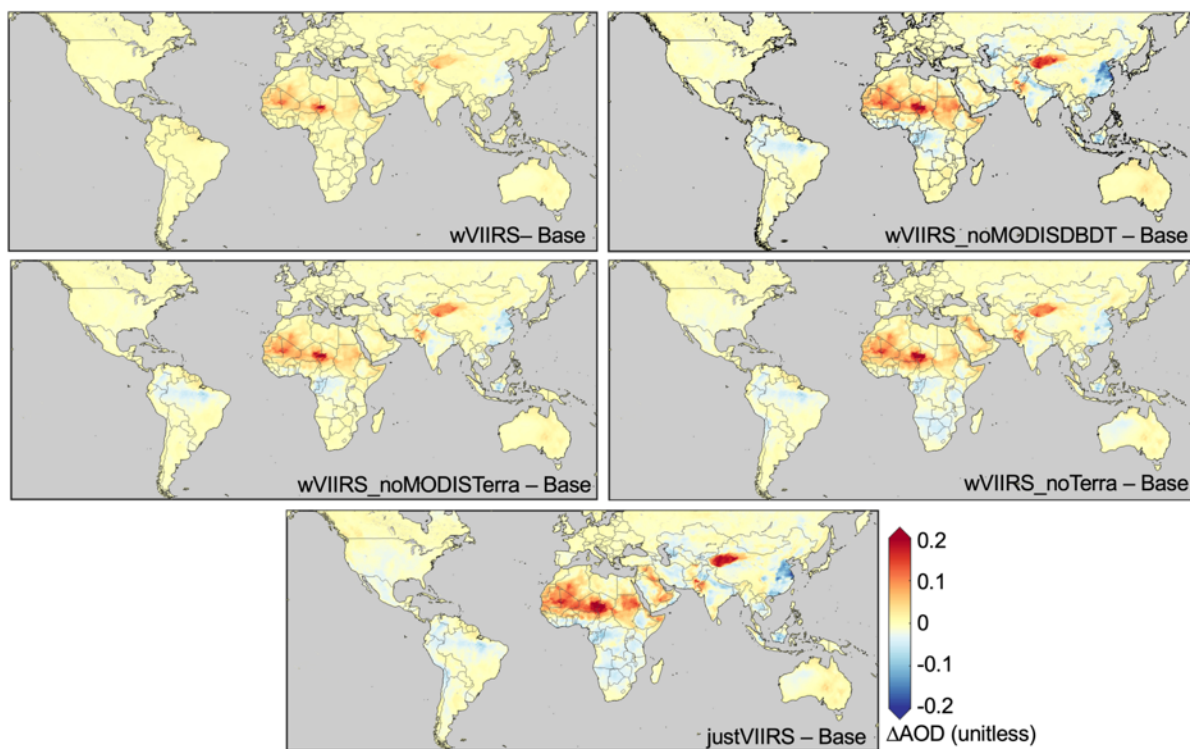


Fig S2: The difference between the 2012-2019 mean combined AOD (unitless) for each scenario from Table 1 and the Base scenario. Grey indicates missing data or water.

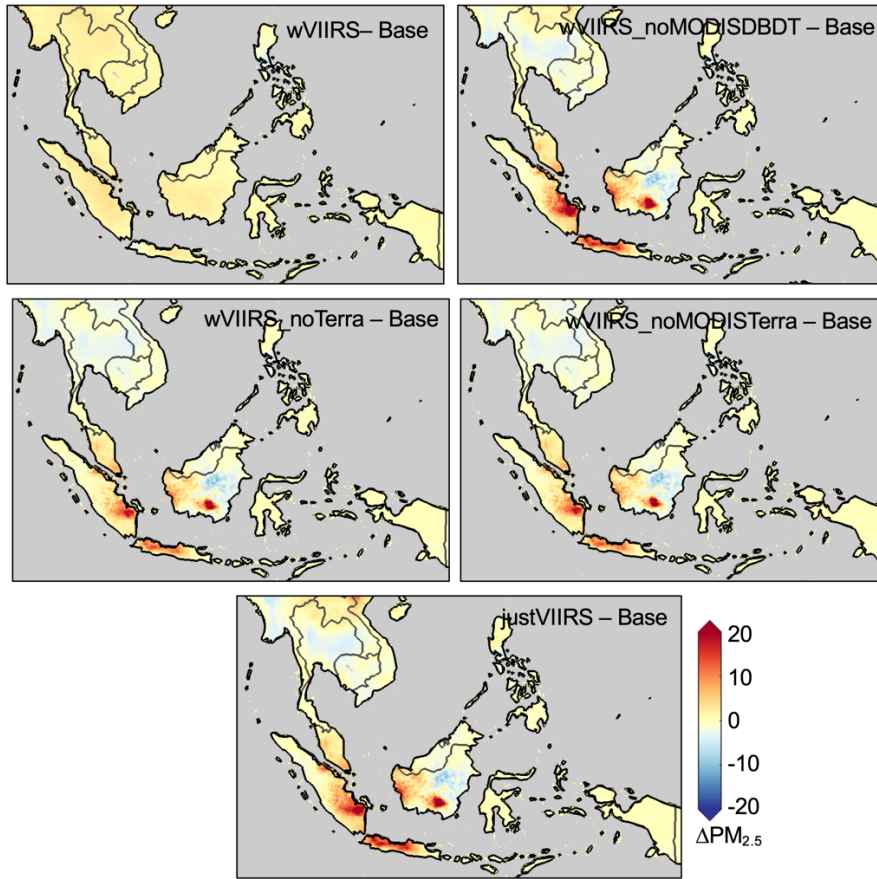


Fig. S3: The difference in the 2012-2019 mean geophysical  $PM_{2.5}$  concentrations ( $\mu g/m^3$ ) between each scenario from Table 1 and the Base scenario over Indonesia. Grey indicates missing data or water.

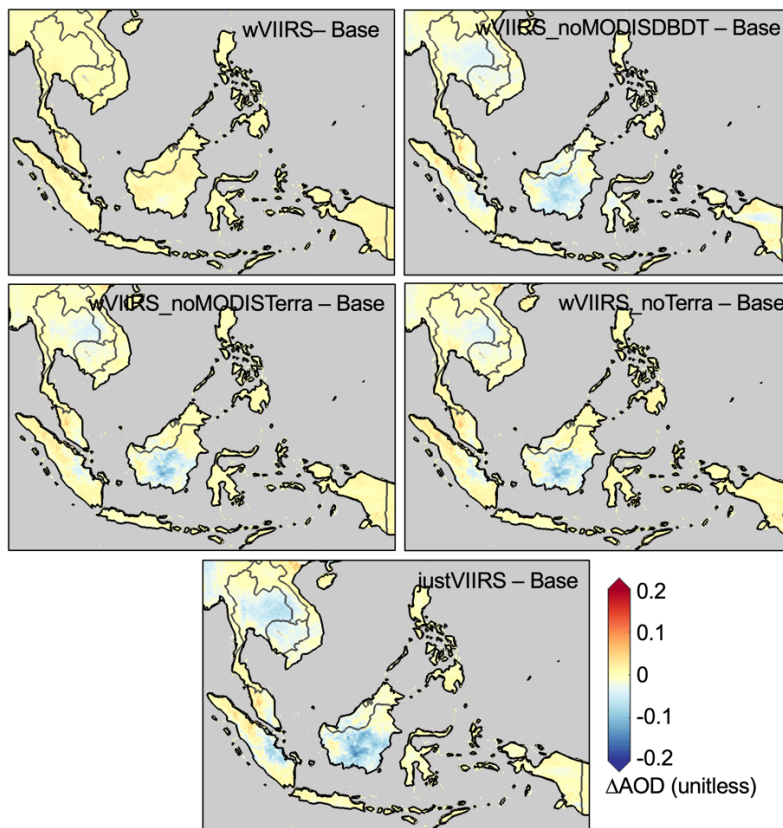


Fig. S4: The difference between the 2012-2019 mean combined AOD (unitless) for each scenario from Table 1 and the Base scenario over Indonesia. Grey indicates missing data or water.

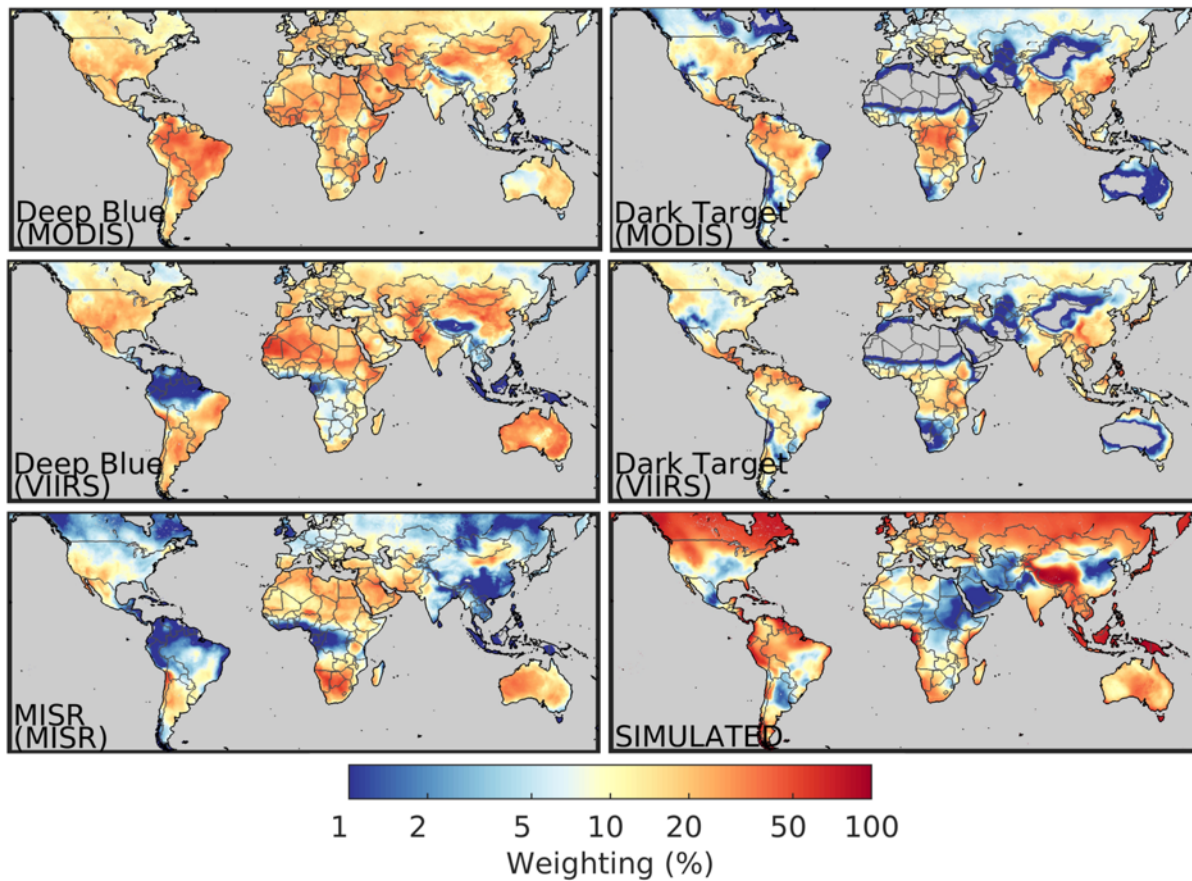


Fig S5: Mean contribution of each AOD source to the wVIIRS scenario for 2012–2019. The retrieval algorithm name is given in the lower left of each panel, with the instrument name in parentheses. In this figure, Dark Target and Deep Blue MODIS correspond to Terra-based retrievals only. Gray denotes missing data or water.

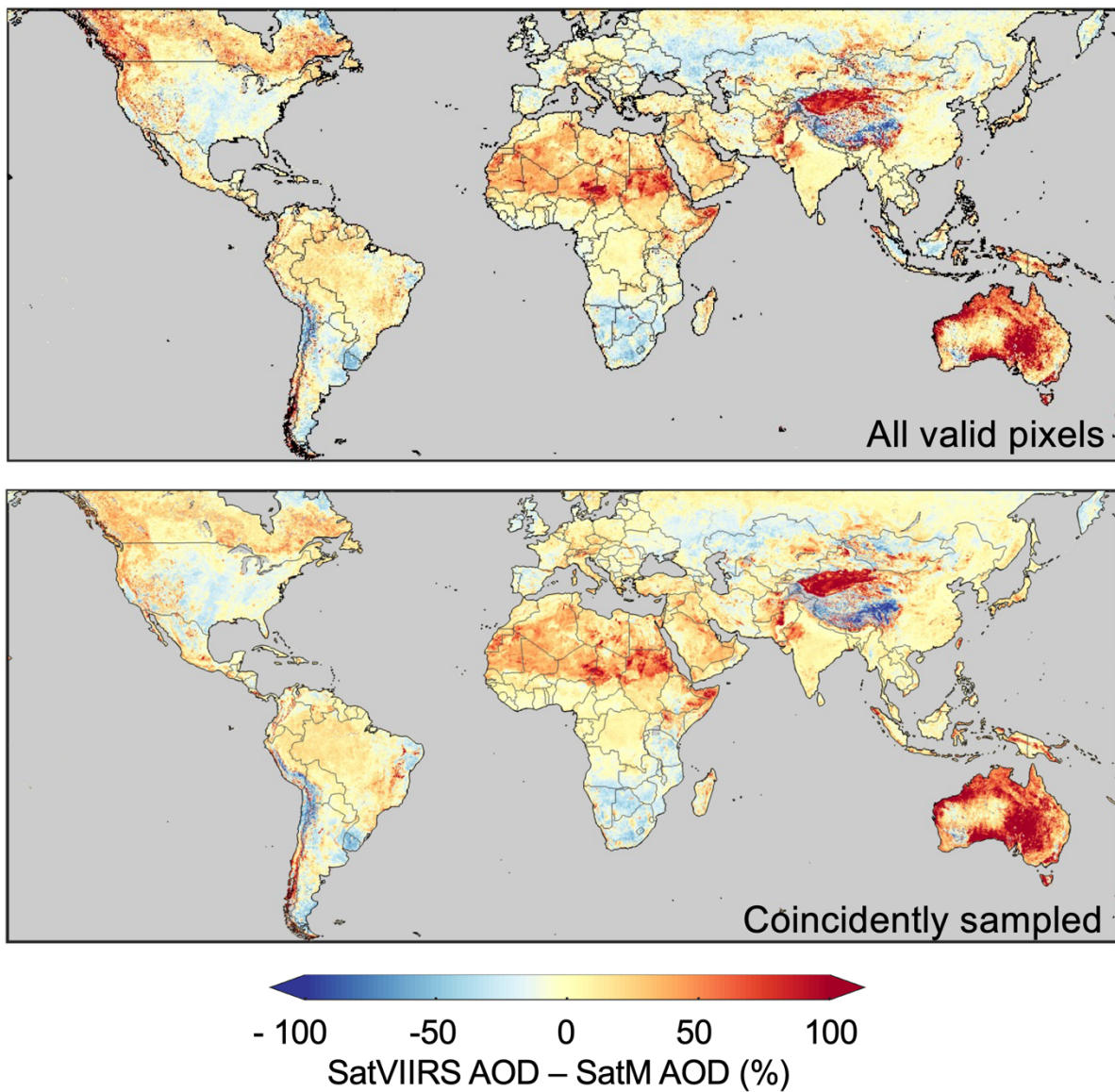


Fig. S6: Percent difference between the mean SatVIIRS AOD and the mean SatM AOD for 2012-2019. The SatVIIRS AOD includes VIIRS S-NPP Dark Target and Deep Blue, while SatM AOD includes MODIS Deep Blue and Dark Target from both Terra and Aqua, and MISR. For the top plot the means were calculated for all valid pixels and for the bottom plot the means only include coincidentally sampled pixels between all products. Grey indicates missing data or water.

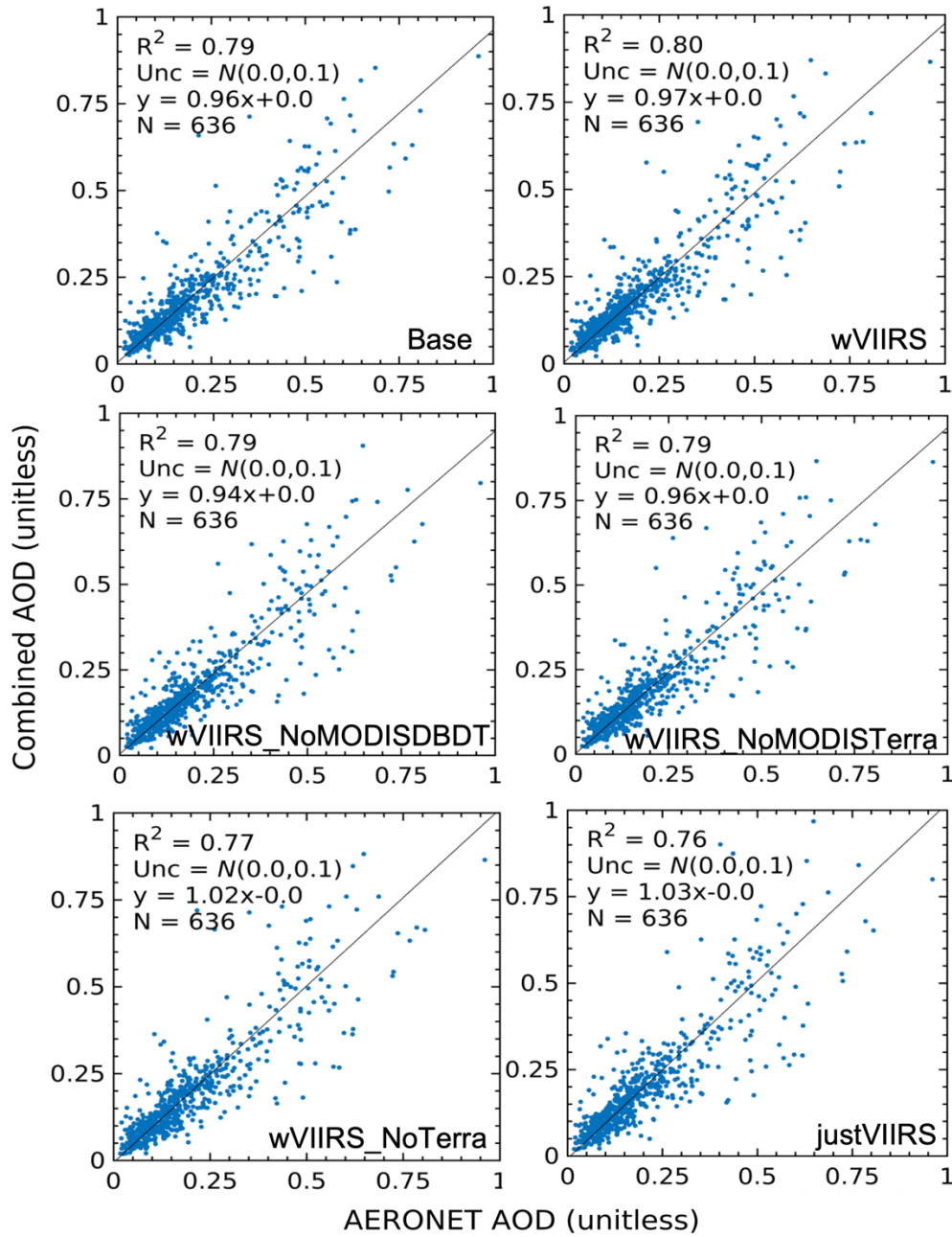


Fig. S7: Scatter plot of the monthly mean combined AOD estimates versus monthly mean AERONET AOD for 2015. Only sites with measurements for at least 80% of the month and elevation less than 3000 m were included in the analysis. Included on the plots are the coefficient of variation ( $R^2$ ), the normal distribution of uncertainty ( $N(\text{bias}, \text{variance})$ ), the line of best fit ( $y$ ), and the number of comparison points ( $N$ ).

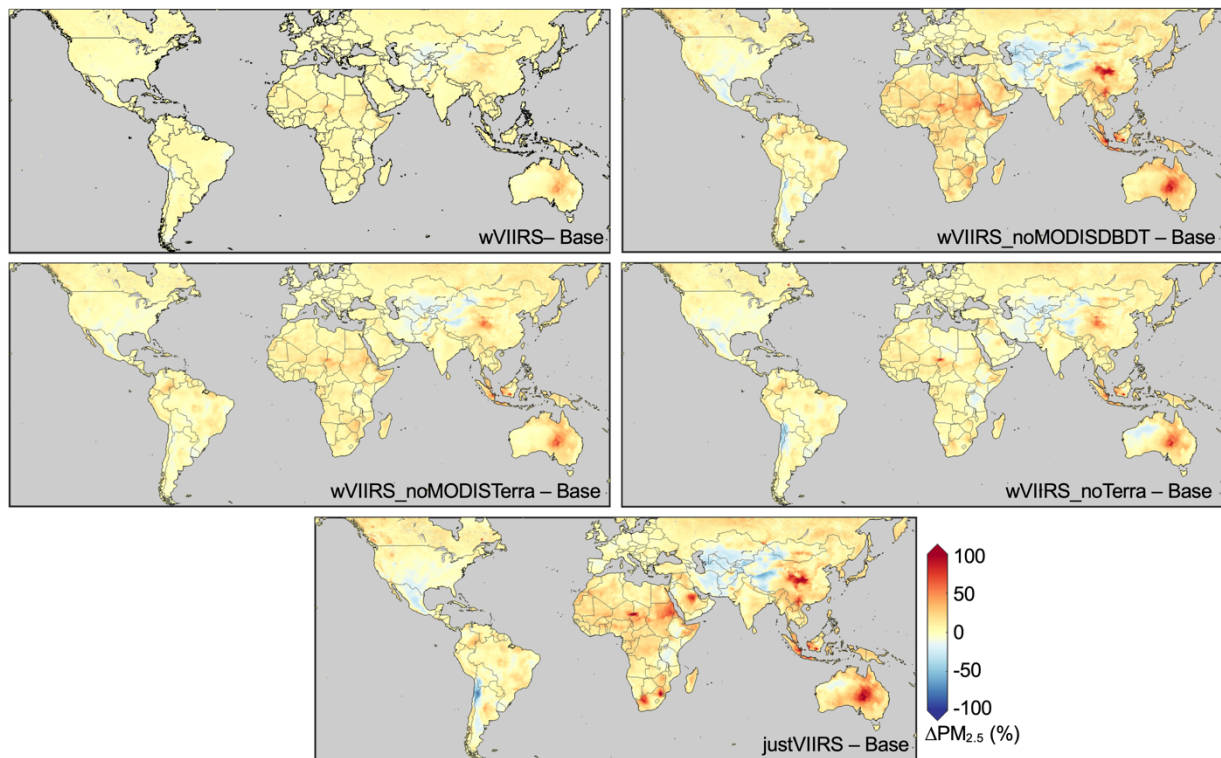


Fig. S8: The percent difference between the 2012-2019 mean hybrid PM<sub>2.5</sub> concentrations ( $\mu\text{g}/\text{m}^3$ ) for each scenario from Table 1 and the Base scenario. Grey indicates missing data or water.