

TS1: Please note that funding information should be part of this section according to our standards. Therefore this information has been added. Please confirm or provide a corrected version. Please note that the financial support section cannot be deleted.

Please use the following for “Financial support”. Thanks.

Financial support. Z.-C. Zeng is supported by subcontract funds from the Jet Propulsion Lab (Sponsor Award Number: 1658775). A part of this research has been supported by the National Aeronautics and Space Administration (grant no. 80NM0018D0004).

After careful proofreading, we have the following changes to make:

- (1) Figures 1(b): In the y-axis labels, the units for radiance should be ($\text{W}/\text{m}^2/\text{sr}/\text{cm}^{-1}$), or ($\text{W m}^{-2} \text{sr}^{-1} (\text{cm}^{-1})^{-1}$).
- (2) Page 3, line 62: low earth orbit -> low earth orbiting
- (3) Page 6, line 28: uncertainties in their retrieval -> uncertainties in the retrieval
- (4) Page 6, line 64: to that reflected -> by that reflected
- (5) Page 6, line 95: Fine mode -> Fine-mode
- (6) Page 11, line 9 : change in the state vector -> change in the state vector, d_i ,
- (7) Page 11, line 12: $\hat{\mathbf{S}}^{-1}$ -> $\hat{\mathbf{S}}$
- (8) Page 11, line 14: At convergence, $\hat{\mathbf{S}}^{-1}$ can be estimated as follows -> At convergence, $\hat{\mathbf{S}}$ can be estimated as follows
- (9) Page 11, line 27: unity vector -> unit vector
- (10) Page 12, line 9: 5 h -> five hours
- (11) Page 12, line 14: 1 h -> one hour
- (12) Page 13, line 7: bands partly due to -> bands, partly due to
- (13) Page 14, line 32: The XCO_2 and XCH_4 differences are mostly -> The XCO_2 and XCH_4 differences are in the range of