**Post-Review Adjustment Request**

Manuscript # amt-2020-466, by X. Sun et al.

18 May 2021

Dear AMT Editor:

We would like to request a post-review adjustment to our manuscript amt-2020-466, titled “Retrieval algorithm for eh column CO2 mixing ratio form pulsed multi-wavelength lidar measurements.” We would be extremely grateful if you can accommodate this final adjustment to the manuscript.

We had a mix-up in the variable descriptions for Equation (16) in the original manuscript which neither us nor the reviewers noticed earlier. While the formulas are correct, the indices for the last two elements in the matrix are backward.

The current text is the following:

$K=\frac{∂\left[F1\left(S\right) \right]}{∂S}|\_{S=S0}$. (16)

For the CO2 Sounder lidar, each term of the Jacobian can be derived as $k\_{i,1}=\frac{∂F(S)}{s\_{1}}\frac{1}{f0\left(λ\_{i}\right)}=\frac{1}{\left〈r\_{s}T\_{o}^{2}\right〉}$ , same for all $i=1,2,…N\_{1}$; $k\_{i,2}=-2OD\_{CO2\_{2}a}\left(λ\_{i}\right)$, one for each laser wavelength, $i=1,2,…N\_{1}$; $k\_{i,3}$, same as above but for water vapor; $k\_{i,4}≈\frac{T\_{CO2}^{2}\left(λ\_{i}+Δλ\right)-T\_{CO2}^{2}\left(λ\_{i}\right)}{Δλ}∙\frac{1}{\left〈T\_{CO2}^{2}\left(λ\_{i}\right)\right〉}$, with $Δλ=1 pm$ and $T\_{CO2}^{2}\left(λ\_{i}\right)$ given by Eq. (4); and $k\_{i,5}=\left(λ\_{i}-λ\_{c}\right)$, with $λ\_{c}$ the center wavelength of the CO2 line shape function.

They should really be:

$K=\frac{∂\left[F1\left(S\right) \right]}{∂S}|\_{S=S0}$. (16)

For the CO2 Sounder lidar, each term of the Jacobian can be derived as $k\_{i,1}=\frac{∂F(S)}{s\_{1}}\frac{1}{f0\left(λ\_{i}\right)}=\frac{1}{\left〈r\_{s}T\_{o}^{2}\right〉}$ , same for all $i=1,2,…N\_{1}$; $k\_{i,2}=-2OD\_{CO2\_{2}a}\left(λ\_{i}\right)$, , one for each laser wavelength, $i=1,2,…N\_{1}$; $k\_{i,3}$, same as above but for water vapor; $k\_{i,4}=\left(λ\_{i}-λ\_{c}\right)$, with $λ\_{c}$ the center wavelength of the CO2 line shape function;$ k\_{i,5}≈\frac{T\_{CO2}^{2}\left(λ\_{i}+Δλ\right)-T\_{CO2}^{2}\left(λ\_{i}\right)}{Δλ}∙\frac{1}{\left〈T\_{CO2}^{2}\left(λ\_{i}\right)\right〉}$, with $Δλ=1 pm$ (or the expected average Doppler shift) and $T\_{CO2}^{2}\left(λ\_{i}\right)$ given by Eq. (4).

Sincerely,

Xiaoli Sun

NASA GSFC, Code 698