Atmos. Meas. Tech. Discuss., 8, C655–C657, 2015
www.atmos-meas-tech-discuss.net/8/C655/2015/

Atmospheric Measurement Techniques Discussions

Interactive comment on "OMI tropospheric NO₂ air mass factors over South America: effects of biomass burning aerosols" *by* P. Castellanos et al.

Anonymous Referee #1

Received and published: 11 April 2015

The paper by Castellanos et al. presents an important study of how the NO2 retrieval is affected by the implicit aerosol treatment in current satellite products, with a focus on biomass burning aerosols. The study has important implications for using satellite NO2 products. The paper is well within the scope of AMT. I have a few suggestions below.

The study is focused on cloud-free conditions. While there are good reasons to do so, as indicated by the authors, the choice largely limits the amount of usable pixels and affects its applications (for example, only 13000 or so of pixels can be used here, over a large domain in 3 seasons). Moreover, the effect of explicit versus implicit aerosol

Full Screen / Esc
Printer-friendly Version
Interactive Discussion
Discussion Paper

treatments on NO2 retrievals may be offset or enhanced, if there is a certain amount of clouds present at certain heights. Some discussions on these aspects would be appropriate. Also, the title of the paper should better reflect the cloud-free conditions being studied.

Implicit aerosol treatment is used also by other products (other instruments, other algorithms, and other species). It would be appropriate to point this out in the introduction.

DASAMAR-standard follows DOMINO to take the cloud parameters from OMCLDO2. However, the temperature and pressure profiles assumed in OMCLDO2 differ from DASAMAR. How will this inconsistency affect the cloud parameters used and the subsequent comparison between CP and aerosol height and between DASAMAR-standard NO2 and DASAMAR-aerosol NO2? Please discuss.

The paper discusses the effects of (CP – ALP), AOD, SSA and other factors on the difference between DASAMAR-standard and DASAMAR-aerosol NO2. Are these factors independent? For example, whether, and if so how, does (CP – ALP) depend on AOD and SSA? Focusing on the independent factors would reduce the dimension of complexity and lead to easier understanding of aerosol effects.

Abstract line 10-15: the sentence is too complex. Please separate, and highlight that only cloud-free conditions are considered here.

P2686, line 25. Aerosols can lead to higher or lower cloud pressures. See, for example, Figs. 5 and 6 of Lin et al. 2014.

P2700, line 20-22. The sentence is not clear.

P2700, line 26. How about the conversion of SSA to other wavelengths?

P2703, line 21-26. Please clarify that the uncertainty is for DISAMAR-standard.

P2705, line 11-15. The discussion on cloud pressure changes implies a cloudy case, otherwise it is meaningless to say cloud pressure increases/decreases. In addition,

AMTD
8, C655–C657, 2015

aerosols affect cloud fractions, and the resulting changes in cloud fraction in turn affect cloud pressure. Therefore, aerosols, no matter scattering or absorbing, can increase or decrease cloud pressure depending on aerosol heights, cloud heights and other factors (although in most time scattering aerosols increase CP and absorbing aerosols decrease CP). See, for example, Figs.5 and 6 of Lin et al. (2014).

P2708, line 7: computational constraint can be alleviated or solved by parallel code.

Interactive comment on Atmos. Meas. Tech. Discuss., 8, 2683, 2015.

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper