Atmos. Meas. Tech. Discuss., 3, C613–C615, 2010
www.atmos-meas-tech-discuss.net/3/C613/2010/

Atmospheric Measurement Techniques Discussions

Interactive comment on "Speeding up the AOT retrieval procedure using RTT analytical solutions: FAR code" *by* I. L. Katsev et al.

Anonymous Referee #1

Received and published: 7 June 2010

This paper discusses a way to carry out fast radiative transfer calculations by a combination of a convenient simplification of the vertical structure of the atmosphere as well as by making use of approximations that significantly cut down the computational time. They present their results as an important contribution in reducing the processing time in the retrieval of aerosol optical thickness by eliminating the need of using precomputed look-up tables (LUT's) generated with rigorous radiative transfer calculations. Although the availability of a fast code useful for certain applications is a positive development, the accuracy achievable by the proposed code is inferior to that of radiative transfer codes currently used in the generation of the LUT's used by operational AOT algorithms. The authors do not present any compelling case for the need in improving the speed of current standard aerosol retrieval algorithms that use LUT's. The main purpose of aerosol retrieval algorithms is the derivation of an accurate measure of the

atmospheric aerosol load with the purpose of adequately accounting for the role of the atmospheric aerosol load in the radiative balance of the atmosphere and its potential climate effect. Thus, the fundamental goal is accuracy and not processing speed. Since existing algorithms (MODIS,MISR, MERIS, etc) that use the LUT approach are sufficiently fast to operate in a near-real time basis, it is difficult to justify the implementation of an alternate faster but less accurate way of doing the same thing. I would like to encourage the authors to change the focus of the paper and discuss the developed faster radiative transfer code as a convenient research tool that may be useful in a variety of applications where computational speed rather than accuracy is needed such as when used in conjunction with Chemical Transport Model (CTM) calculations. They should emphasize more the radiative transfer code rather than the aerosol inversion process.

Page 3:

What does 'our codes' mean. Refer to the institution or research center. . ..

Substitute 'services' with features. . .

'Slightly exceed errors', be more quantitative

'Stay much less. . . ', it is not clear what is meant

Page 5:

The authors introduce the parameter H as the vertical extent of Layer 1 but never addressed how it is determined.

Substitute 'ignorance' with neglecting (or ignoring)

Page 6:

How is w_aer determined?

Page 7:

Use. . .Because neither algorithm

How about NO2 absorption at 442.5?

Page 10: Give proper reference for the 'well known equation'. . ..[Chandrasekhar, 1960] The use of this equation to get rs at large visible wavelengths is questionable as the Lambertian approximation breaks down. Needs to provide accuracy estimates.

Page 13:

What does 'correctly enough' means? If the expression is an approximation, say it, describe the approximation, and state to what accuracy the suggested expression is supposed to work.

Page 18: MISR JPL and MODIS NASA are ambiguous ways to refer to these sensors. JPL is part of NASA.

Fig 8:

Retrieval comparisons to AERONET are far from satisfactory, especially 440 and 550. Need to provide statistical parameters of the comparison: correlation coefficient, intercepts. How does this accuracy compare to the accuracy needed for climate analysis?

Page 15:

15-20% error is too large a price to pay for reducing retrieval speed which is a non-problem.

Figure 15:

This figure depicts a comparison to AERONET 412 nm AOD. Aeronet does not measure AOT at that channel.

Interactive comment on Atmos. Meas. Tech. Discuss., 3, 1645, 2010.