Atmos. Meas. Tech. Discuss.,
doi:10.5194/amt-2016-265-RC3, 2016

Atmospheric Measurement Techniques Discussions
Open Access
EGU

Interactive comment on "Marine boundary layer cloud property retrievals from high–resolution ASTER observations: Case studies and comparison with Terra–MODIS" *by* Frank Werner et al.

Anonymous Referee #3

Received and published: 16 September 2016

General

The paper addresses an important research question on the applicability / validity of 1D radiative transfer calculations for high spatial resolution cloud property retrievals. Thereto the authors adapt an existing retrieval scheme for large pixels from MODIS to small pixels from ASTER.

This paper fits well into AMT. The scale dependence of cloud property retrievals is very important question and the research is very relevant for interpretation of satellite cloud retrievals.

Printer-friendly version

Discussion paper

The paper is well-written, contains important results based on solid work, and will probably lead to future papers on the same topic. The number of figures is large, and could possibly be reduced. The paper can be accepted when the following comments are taken into account.

Main comments:

(1) The complication of atmospheric absorption in the wide VNIR band of ASTER (channel 3) is hardly discussed. Atmospheric correction has a much stronger effect for ASTER due to its broad VNIR band than for MODIS. In the broad VNIR channel of ASTER, the O2 A-band absorption and H2O band absorption play a large role. Please describe how you correct for these atmospheric absorption bands. The correction will depend on cloud height: the lower the cloud, the more correction is needed. Please show the sensitivity of the correction to cloud height. Please show the atmospheric absorption spectrum together with the spectral response function of the instrument bands in Figure 1.

(2) Can you already give conclusions on 3D effects seen in cloud retrievals from ASTER?

Minor and textual comments:

Abstract:

l. 8, l. 10, etc.: symbols with subscripts lead to too heavy notation. Please shorten where possible.

\gamma is a strange symbol for reflectance. Please use R or \rho.

l. 13: There are too many details in the abstract.

l. 20 ff: So is 1D retrieval good enough at these small scales? This is an important finding.

Are there biases due to 3D RT for fully cloud covered pixels ? The effect of broken

clouds on biases in reff is well known for 1D RT clouds. (E.g. Wolters et al., JGR, vol. 115, D10214, doi:10.1029/2009JD012205, 2010).

Section 1: At the end of the introduction, please briefly outline the setup of the paper.

l.101: in this spectral range oxygen and H2O absorption might be a problem

l. 118-120: These solar spectrum references are pretty old. Why not use a modern composite synthetic solar spectrum, like Gueymard (Solar Energy, 2004)?

l. 142: Please remove the brackets. This occurs at many places in paper.

l. 312: This correction will depend on cloud top height.

l. 386: what is the reason of this difference?

l. 396-398: what is the physical reason that the ASTER observation is brighter?

l. 704-705: Absorption by O2 and H2O in the VNIR band does not only affect above-cloud correction, but also the cloud reflectance itself due to multiple scattering and absorption inside the clouds.

Figure 2: what kind of scene is this ? what about cloudiness ? please also give the gray scale image of the scene.

Figure 5: Caption: is the solar azimuth also the viewing – solar azimuth difference, which is the relevant quantity? What is the scale factor?

Figure 6: how large is this scene?

Figure 7: please refer to the previous figure.

Interactive comment on Atmos. Meas. Tech. Discuss., doi:10.5194/amt-2016-265, 2016.