Atmospheric Measurement Techniques Discussions

Atmos. Meas. Tech. Discuss., referee comment RC1
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Comment on amt-2021-351

Anonymous Referee #1

Referee comment on "Remote sensing of solar surface radiation – a reflection of concepts, applications and input data based on experience with the effective cloud albedo" by Richard Müller and Uwe Pfeifroth, Atmos. Meas. Tech. Discuss., https://doi.org/10.5194/amt-2021-351-RC1, 2022

The authors provide an extensive overview about the CM-SAF CAL approach for retrieving the SSI from satellite measurements. In the introduction, the authors also mentioned other methods to derive the SSI and referred to many publications. Then the authors mainly explained the CM-SAF SSI algorithm with new development and ideas. It is amazing that the authors could include so many topics in one paper. The structure of the paper could be improved. Some subsections seem not at the right place. I think the paper fits the scopes of AMT and can be published after some corrections.

Specific comments

Line 57,

‘500 nm’ should be ‘500 m’

line 75

‘The value of satellite data is further increased due to the automation of ground based networks. ‘

Could you add an explanation for this sentence?

Paragraph from line 114.

The authors reviewed some SSI data sources. The KNMI CPP -SICCS data set is also available online. Actually the CM- SAF cloud properties are retrieved using the CPP algorithm and SICCS SSI products derived from the cloud properties. https://msgcpp.knmi.nl/.

In the end of section 1, I think it is better to include a few sentences to present an outline of the rest of the paper.

Line 145 please correct the typo ‘emmitted’

line 184 ‘many RTMs must be performed …’

Do you mean ‘many RTM calculations must be performed …’?

line 186 , ‘… recalcuation , whiis necessary from time …’

please correct the typo.

Line 196 ‘… using the DISORT solver (Stammes et al., 1988) …’

Please correct the author name, it should be ‘Stamnes’.

Line 197 ‘ … resulting from a adaptation of the Skartveit et al. (1998) …’

change ‘a’ to ‘an’

#Eq. 5 looks the same as Eq. 3, Is it needed here?

line 210 , ‘ ... hence almost all of the UV-A radiation reaching the top of …’

I think ‘UV-A’ should be changed to ‘UV-B’ according to the content of the sentence.

line 218 ‘ In contrast, cloud droplets and aerosols are leading to Mie scattering, …’

It is not accurate to include aerosols here. Because some aerosols particles are not spherical, Mie scattering is not a good approximation for aerosol scattering.

Please rewrite the sentence.

Line 223 ‘ The great majority of air molecules (N2 , O2 , CO2 , methane, noble and inert gases) are well mixed and uniformly distributed and do not affect the spatial and temporal distribution of solar surface irradiance. ’

Please rewrite this sentence. CO2 and methane could be well mixed vertically in the atmosphere but there are spatial and temporal variations. Of course the variations are small but they are not in the came category as O2 and N2. The sentence in line 223 could be misleading.

#Line 258 ‘ Is the change in the fluxes induced by a different viewing geometry for the same SAL or by the change in SAL induced by SZA, change in vegetation, different pixel size, calibration issues (ageing of channels, change of spectral response function), change of satellite instruments, and others. ‘

This sentence is not easy to read. Please rewrite it.

#Line 293

‘In brief, using the indirect approach means to be further away from the observations, to introduce further error sources by weak assumptions and to use simulations instead of observations directly.’

I think this statement is too negative about the indirect approach. I would write it

differently.

line 367

‘ … cloud transmission ist quite …’ correct the typo

section 6 ‘Forecasting and seamless prediction’

I do not see the authors mentioned anything about the seamless prediction. Could the authors add a short paragraph?

line 541.

Please add some comments about the ECMWF snow/ice forecast product.

Section 7.2.1 around line 600. The authors commented that the the error reduction by implementing the parallax correction is marginal. I think the authors look at the monthly mean or in a large area.

For a specific location having some small clouds, the parallax correction is important. Perhaps the authors could add some discussions on this case. Perhaps there are not much corrections for the SSI values but the SSI values have to be assigned at the right pixels.

7.2.3 Deep learning - …

I think this deep learning section does not belong to 7.2. It could be a new subsection, 7.3 or 7.4.

7.3.1 Ozone

The discussion of impact of ozone is only on the broadband SSI. Since the authors also discussed the spectral resolved irradiance, the readers may want to know the impact of ozone on the SSI in the UV wavelengths.

7.3.4. Aerosols

Could you comment on the CAMS aerosol forecast product?

Line 774 'The effective cloud albedo CAL, also reffered to as cloud index ore effective cloud fraction …'

I think the OMI SSI product using the effective cloud fraction and its references can be referred to . (https://www.temis.nl/ssi/).

Please correct the typos.