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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Estimation of the aerosol radiative forcing at ground level, overland, and in cloudless atmosphere, from METEOSAT-7 observation: method andfirst results" *by* T. Elias and J.-L. Roujean

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The title has been changed as advised.

1) We added the reference of Yu et al. [2006] for satellite-based estimates of DSSF.

Our method is innovative because the same product gathers four specifications: radiative impact 1) instantaneous; 2) of aerosols; 3) over land; 4) at ground level.

- Most methods delivering high temporal and spatial resolution aerosol radiative impacts make the analysis of satellite observation over ocean and not over land.

- Most studies on estimate of surface radiation budget from geostationary satellite observations focus on cloud impacts because they are the strongest modulators of the atmospheric radiative transfer, and because upwelling and downwelling parameters can be linearly related with a good precision.

- Most recent publications on geostationary satellite estimates of surface radiation budget generally use SEVIRI data sets which have enhanced instrumental capabilities to detect aerosol impacts.

For example, the GEWEX/SRB project uses climatological data for defining aerosol properties, HelioSat project uses monthly 10 km resolution global maps of atmospheric scattering also defined on climatological basis.

The 1st sentence of last paragraph of the introduction section has been modified to emphasize this point.

2) Treatment of biomass burning event and urban pollution impact are proposed in the paper, and two sites are considered in order to sample varying surface cover types. Preliminary tests on the validity of the method on several hundreds of pixel images were successful but no systematic validation of the method could be performed at a regional scale. This study will be done as soon as the geoland partner provides product images. In particular desert dust over desert is reckoned as being almost undetectable in visible wavelengths from space due to compensation between up-scattering and absorption by aerosols. Tests have to be performed over ground-based stations located in North Africa to check our method.

3)

- CERES was first launched in 1997 for the Tropical Rainfall Measuring Mission, on a polar orbiting satellite, then the temporal resolution is not better than the day as all pixels are not covered once a day, similarly with the ERBE instruments launched since 1984 on the polar orbiting ERBS satellite and on the NOAA-9 and NOAA-10 platforms.

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- Spectral broad band instruments (like CERES, ERBE and GERB) can deliver radiation budget at TOA and not at ground level because spectrum width does not allow atmospheric correction.

- GERB associated to SEVIRI can provide important information about the aerosol radiative impacts at both surface and TOA but only since 2005 while our method allows to provide results before 2005.

- Spatial resolution of 40 km (e.g. GERB) impedes validation by ground-based pyranometers.

4) Since precision increases as the temporal resolution degrades, it is expected that the uncertainty on our results is larger than with other methods. Therefore, our result of 5-10 % accuracy on instantaneous result is satisfying in regards to, e.g. the objective of GEWEX/SRB to reach the precision of 10 Wm-2 or 5% on monthly-derived products.

Legend of x-axis changed to regular date in Figures 4, 6 and 7.

'field measurement campaign' added to SAFARI2000.

Interactive comment on Atmos. Chem. Phys. Discuss., 7, 13503, 2007.