

## ***Interactive comment on “Retrieval of aerosol optical depth over land based on a time series technique using MSG/SERVI data” by L. Mei et al.***

**Anonymous Referee #1**

Received and published: 15 March 2012

### General comments

The paper presents a novel method for aerosol optical depth retrieval from observations performed by the sensor Meteosat Second Generation – Spinning Enhanced Visible and Infrared Imagers (MSG/SEVIRI). Meteosat Second Generation – Spinning Enhanced Visible and Infrared Imagers (MSG/SEVIRI) provides high-temporary with multi-spectral dataset, however, there are not many Aerosol Optical Depth (AOD) retrieval method for such a good dataset, especially for 15 minutes AOD product. In the proposed method authors predefine six aerosol types (including both spherical and non-spherical types), solving a set of differential equations in the application to short wave radiation transfer reaching finally to a relationship between the ground surface reflectance and apparent reflectance.

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Although the plane parallel radiative transfer employed restricts the solar zenith angle range and the predefined aerosol types do not cover all the natural and anthropogenic sources (e.g. biomass burning) the results obtained for the aerosol optical depth retrieval and analysis show promising. I recommend acceptance after the suggested revision.

### Specific comments

1) Sensitivity study is needed for the analytical solution; 2) Equation (22) looks reasonable to decide the true aerosol type, however, are there any other constraints for obtaining the result? 3) Six predefined aerosol type were tested in the paper, some more explanations were needed in the Chapter 4.3, that is how much uncertainty caused by using wrong aerosol type? 4) Page 15 Line 19, how you can decide the biomass burning affected the retrieval result using FMF factor? Is there any more information to support this conclusion? 5) The quality of Fig. 1 and Fig. 3 should be improved. 6) Add a few citations from experimental campaigns and others depicting long-range correlations in the aerosol content

### Technical corrections

Page4031, Spelling mistake for the title, “MSG/SERVI” should be “MSG/SEVIRI”. Page4034 Line4, dark dense vegetation should be “Dark Dense Vegetation” Page 4035 Line9, deep blue should be “Deep Blue” Page 4035 Line14, is (BRDF) should be (BRDF) is Page4035 Line21, confused “ATSR data and the MISR algorithm”, may be the author want to express “ATSR and MISR data” Page4306 Line3-4, rewrite the sentence to make it more clear Page4036 Line8, delete “Aerosol Robotic Network” Page4306 Line10, change “depend” to “depends” Page4036 Line21, change “a” to “the” Page4306Line25, change “mid-infrared” to “mid-InfRared” Page4307 Line1, change “to the wide HRV band” to “to a wide HRV band” Page4307 Line3, delete “Some papers tried to retrieve AOD” Page4037 Line 19, add “section 3” Page4037 Line26-27, delete or rewrite the sentence, not clear Page4040 Line 20-21, add (BRF) behind

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“bidirectional reflectance factor”. Page4056 Table1, Govaerts et al., 2011 should be Govaerts et al., 2010

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Interactive comment on Atmos. Chem. Phys. Discuss., 12, 4031, 2012.