We would like to thank Dr. Ham for pointing to this useful additional references regarding calibration issues with the visible SEVIRI channels.

In fact, we have previously studied the impact of calibration biases on the aerosol product over land. Jolivet et al. (2009) made a vicarious calibration of the visible channel, centered at 0.635µm, of the SEVIRI sensor aboard MSG.
The method uses the Rayleigh scattering by molecules to estimate the deviation on the radiances measured by SEVIRI. The Rayleigh scattering radiance can be exactly calculated and compared to the Top Of the Atmosphere (TOA) SEVIRI measured Rayleigh scattering radiance. The TOA measured radiance is previously corrected from the gaseous absorption and the aerosol scattering contributions. Three areas above oceans were selected where aerosol load is minimal and the surface contribution is low (open ocean). The three areas were chosen to cover different viewing zenith angles (VZA).
A ratio Ak was calculated, defined as the ratio between the measured and the estimated reflectance of a Rayleigh atmosphere computed using a Successive Order of Scattering radiative transfer code (Lenoble et al., 2007). For the two months of SEVIRI data used (March and July 2006), and VZA lower than 60°, the Ak value was found between 0.91 and 0.95 corresponding to an underestimation of about 6% of the SEVIRI radiances in the visible channel centered at 635nm.

Following that study, we applied a correction of 6% on the radiances of the visible channel of SEVIRI and evaluated the impact on the aerosol optical thickness (AOT) retrieved over land. Considering the same three months that in our paper, a comparison between SEVIRI AOT at 635nm with a correction of the calibration coefficient and AERONET AOT at 675nm has been done. The purpose of this study was to evaluate the effect only on the European AERONET stations and not to process all the SEVIRI disk
The results indicated an increase of the slope of the linear regression of 8% and a stagnation of the intercept. The correlation coefficient did not vary significantly. The RMSE increased around 8% and 9%. However, the bias was doubled and the relative error increased by 11%.
The effect on the AOT of the correction of the calibration coefficient was an improvement of the slope but led to a greater dispersion which could be due to an inconsistent calibration of other channels used in the retrievals.

Even if no specific studies using Rayleigh vicarious method have been done for Meteosat-9, we applied the same correction of 6% on two months in 2009, July and August, which correspond to the Meteosat-9 version, and the results are different than the three months of 2006.
In this case, the slope and intercept decreases and the rmse, the bias and the relative error also decrease. Only the correlation coefficient stay constant. Again, this points out that official calibration coefficients of the different SEVIRI sensors could be further improved.

Similarly, the differences between MODIS and SEVIRI AOT, could be linked to the underestimation of radiances in the visible channel.

Finally it is important to bear in mind that consistency of calibration between the various channels is critical for the quality of derived aerosol products. Indeed, the choice of the aerosol model is not a linear process in our SEVIRI algorithm and changing one channel radiance impacts the aerosol ground reflectance and the surface reflectance for this channel, which in turn, modifies the relative spectral variation of the aerosol and surface signal across all channels used for the retrievals. This could for instance explain that correction on the 0.6 micrometer channels could improve the slope of correlation but degrade the RMSE because it introduces inconsistent spectral variation which eventually translates into variable aerosol models.

To summarize, different validation studies of the 0.6 micrometer channel calibration coefficient

(Ham and Sohn, 2010; Doelling et al., 2004; Jolivet et al., 2009) found similar results pointing to a same value of about 6-7% low bias for Meteosat-8. Our simple sensitivity showed a clear impact of calibration on our product since taking into account the calibration correction on SEVIRI radiances, allowed us to improve the linear regression but deteriorate the bias and relative error.
Degradation of the relative error and dispersion could be a consequence of inconsistent calibration between the various channels if only the 0.6 micrometer channel is corrected. Therefore, it is critical for the future that improved and consistent calibration coefficients of the visible channels be made available. At this stage we preferred to keep the official coefficients delivered by Eumetsat to prevent introducing more problems due to inconsistent calibration of other channels. Clearly, there is ample space for improvement on this side.

To respond to the comment made by Dr Ham, we have introduced the following paragraph in the concluding section (p 3174 – line 25) :
"*Differences observed and discussed here between SEVIRI, MODIS and AERONET AOT could also partly be caused by calibration issues with SEVIRI channels. Different validation studies of the 0.6 micrometer channel calibration coefficient (Ham and Sohn, 2010; Doelling et al., 2004; Jolivet et al., 2009) have found similar results pointing to a same value of about 6-7% low bias for Meteosat-8. A simple sensitivity test demonstrated (not shown here) a clear impact of calibration on our product. Taking into account the calibration correction on SEVIRI radiances, allowed us to improve the linear regression coefficient on one hand but deteriorated the bias and relative error on the other hand. Degradation of the relative error and dispersion could be a consequence of inconsistent calibration between the various channels if only the 0.6 micrometer channel is corrected. Therefore, it is critical for the future that improved and consistent calibration coefficients of the visible and near-infrared channels be made available. At this stage we preferred to keep the official coefficients delivered by Eumetsat to prevent introducing more problems due to inconsistent calibration of other channels. Clearly, there is ample space for improvement on this side.*"