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Interactive comment on "Kalman filter physical retrieval of geophysical parameters from high temporal resolution geostationary infrared radiances: the case of surface emissivity and temperature" *by* G. Masiello et al.

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We thank the referee for the good appreciation of this paper and for the many suggestions to improve the paper.

Reply to comments

1. RTTOV considers a specular model alone for the radiance term, which is reflected

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from the surface back to the satellite. In contrast both Lambertian and specular reflections can be modeled with our sigma-SEVIRI. It is likely that RTTOV v11 now has both Lambertian and specular options, however this was not the case when we began to perform the study.

2. This calculation is now presented in Fig. 5 of the revised version. We confirm that the ratio has value close to 1 for the three SEVIRI atmospheric channels.

3. Actually, we have already shown these equations, they are just Eqs 16 to 19. There is no change in the notation therefore no confusion should arise. In the revised paper, for the benefit of the reader we have summarized at the end of this section the flow of operations needed to obtain the analysis update at time t and the forecast at time t+1.

4. Corrected in the revised paper

5. The referee is right. We use the correlation matrix, $\mathbf{C}_e$ to address the most general case which consider a scaling-vector (f-scaling changing along the diagonal). We have modified and clarified this part.

6. This is most likely a problem of the ECMWF analysis. Actually, within the ECMWF model, the skin temperature is not included within the state vector (personal communication by Marco Matricardi).

7. We have performed the calculation as suggested by the reviewer and we confirm that the poor impact of atmospheric parameters over the retrieved (T_s, ε). With a direct retrieval calculation the impact is normally on the third decimal digit, which is an effect a bit larger of that assessed in Tab. 3. However, with a direct calculation we have to consider the effect of random noise, which is filtered out with the use of Eq. 30.

8. Corrected within the revised version

9. Yes, we think that the strong contrast of quartz absorption at 8.6 micron has an important effect. For sure for other surface types we could have a bigger moisture variation, however for other surface types the emissivity at 8.6 μm is much closer to that of water than sand quartz, which could result in a smaller emissivity variation. A simple additive model tends to confirm what we say (see Masiello et al 2013). By the way we agree with the referee this is an issue which deserves more research.

10. We have modified Figure 17. Yes, the difference (retrieval minus in situ) will be shown in the revised paper.

Interactive comment on Atmos. Meas. Tech. Discuss., 6, 6873, 2013.

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