Atmos. Meas. Tech. Discuss., 6, C2618–C2620, 2013
www.atmos-meas-tech-discuss.net/6/C2618/2013/

Atmospheric Measurement Techniques Discussions

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.

Anonymous Referee #2

Received and published: 17 September 2013

Kalman filter physical retrieval of geophysical parameters from high temporal resolution geostationary infrared radiances: the case of surface emissivity and temperature

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This paper presents the retrieval of land surface emissivity and temperature from geostationary satellites using a Kalman Filter technique. It is one of the few successful cases where high temporal resolution of geostationary satellites is explored as it should

be. The technique is applied to SEVIRI over several different surface type. Results are analyzed and interpreted. Overall, it is a well written paper. Only minor revisions are needed.

Detailed comments: 1. Page 6880, section 2.2, is there any particular reason σ-SEVIRI is used for radiative transfer calculation instead of RTTOV? 2. Page 6890, line 12-24, although I agree that Ts is the dominate factor of the radiance temporal variation, figure 4 does not necessarily support that. The authors might want to examine the ratio K(Ts)*dTs/dTb, where K(Ts) is the mean weighting function of Ts at time 1 and 2, dTs is the Ts difference between time 1 and 2, and dTb is the radiance difference between time 1 and 2. If for the time period under consideration the ratio is close to 1, Ts will be the major contribution to the radiance temporal variation. 3. Page 6891, equ. 26 and 27, the authors might want to consider adding an iteration equation (like equ 13 or 16) to show how the stochastic terms of emissivity and Ts is incorporated in the retrieval process. 4. Page 6891, line 16, please specify that the 10 different samples are from 10 different years. 5. Page 6892, equ 28 and 29, looks like the emissivity stochastic term is just a scaled emissivity background covariance matrix using f. What is the point of correlation matrix Ce? 6. Page 6894, line 5-12, what is the reason the retrieved SST colder than ECMWF analysis? Might worth a try of the Wu-Smith emissivity model? 7. Page 6896, line 10-14, while Equ. 30 can be used to evaluate the impact from atmospheric profiles, an direct evaluation would be to perform retrieval by changing the atmospheric profiles, then compare the retrieval. I would suggest to add this as a verification of the Equ. 30. 8. Page 6897, line 23-24, higher values? 9. Page 6898, line 8-10, I think what you want to say is a same soil moisture variation will result in more pronounced emissivity variation for desert sand because of the strong contrast of quarts absorption band near 8.6 Micron. However, for other surface types, there might be more pronounced soil moisture variation. Bottom line is that we don't know for sure if desert sand has the strongest emissivity temporal variation. 10. Page 6901, line 17-18, it is not easy to tell in figure 17 if biases exist in the morning and afternoon. A time series of difference (retrieval minus in situ) would be much easier to see that.

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