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Interactive comment on "Probabilistic approach to cloud and snow detection on AVHRR imagery" *by* J. P. Musial et al.

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Received and published: 19 November 2013

The provided comments and clarifications are fine with me with one major exception:

The following statement about the advantages of the PCM methodology is clearly not true:

"- Straightforward portability to other sensors which requires only the availability of spectral channels analogous to the AVHRR instrument and collocated training dataset."

The perception that the method should be directly applicable to AVHRR-like sensors (i.e., sensors having similar channels as the AVHRR instrument) is understandable but common experience shows that this is really not the case. Substantial efforts for adaptation is necessary even if the other sensor is AVHRR-like. The reason is that several channels are generally far from identical to the original AVHRR channels. This

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concerns in particular the two channels centered at 0.8 micron and 3.7 micron (e.g., channels 2 and 3b). Here, spectral response functions are most often substantially different for more modern sensors. The most extreme example is the 0.8 micron channel of AVHRR which is very broad in its spectral response. The corresponding channel in MODIS and AATSR is much more narrow and avoids completely water vapour absorption bands close to 0.94 micron. This has not only consequences for the effect of atmospheric absorption. You also have to take into account that in this spectral region the reflectance of Earth surfaces (in particularly vegetated surfaces) is actually changing rapidly with wavelength. Thus, you get a different reflectance because of both these effects. The same happens generally for the 3.7 micron channel. This channel is close to a CO_2 absorption band at 4.4 microns, thus a spectral response that includes parts of this absorption band will have large influence on the measurements. This is what happened for the corresponding channel for the SEVIRI sensor which is centered around 3.9 micron rather than at 3.7 micron. Thus, the original AVHRR-heritage tests based on the 3.7 micron channel could not really be applied but had to be redefined taking CO_2 absorption into account.

Thus, to apply PCM to another sensor will need adaptations and most likely completely recalculated PDFs. Thus, a repeated training procedure can probably not be avoided. In that sense, methods that are based on a more direct physical retrieval, making use of all individual spectral response information, would be preferred. But on the other hand, such methods have still to demonstrate their capability for the cloud screening task since they have so far been applied mostly for the retrieval of various cloud properties.

In conclusion: Remove the statement on the portability aspect or make it much more balanced and realistic.

Interactive comment on Atmos. Meas. Tech. Discuss., 6, 8445, 2013.

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