Atmos. Chem. Phys. Discuss., 10, C7483–C7486, 2010
www.atmos-chem-phys-discuss.net/10/C7483/2010/
© Author(s) 2010. This work is distributed under
the Creative Commons Attribute 3.0 License.

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Downscaling of METEOSAT SEVIRI 0.6 and 0.8 micron channel radiances utilizing the high-resolution visible channel" *by* H. M. Deneke and R. Roebling

H. M. Deneke and R. Roebling

hartwig.deneke@gmail.com

Received and published: 13 September 2010

First, we want to thank Sylvain Cros for his time taken to review our manuscript, and his thoughtful comments which helped us to improve the initial version. In the following, we will respond to each of the points raised by him:

SC 1: General motivation of this paper is fully understandable for researchers experienced in SEVIRI data use, but its formalization is not so clear. p.3 line 10 The need of higher spatial resolution for narrowband is well justified, but the interest of using narrow bands at 0.6 and 0.8μm for cloud properties estimation is ignored. p.4 line 1 The interest of using narrow bands at HRVIS resolution is mentioned but not justified.

P.17 line 25 In the conclusion, this interest is finally mentioned as "provides important additional information for the narrowband observations (...)" and examples of early detection of convective flux activity and the retrieval of land surface properties". Author should mention advantages of using narrow bands at 0.6 and 0.8μm in the first section by developing their own sentence "HRVIS channel is too broad for an accurate quantitative estimation of cloud properties" or simply add a reference such as Schmetz et al (2002),"An introduction to MSG" where operational objectives of 0.6 and 0.8 channels are clearly presented.

Reply: Actually, this point is made in the 4th paragraph of the introduction. To make this point more clearly, we have decided to rewrite this paragraph and move part of it up.

Original: There are two important drawbacks of the HRVIS channel: first, it covers only a subset of the field of view of the narrowband channels; second, its spectral response is too broad for an accurate quantitative estimation of cloud properties. While there is little to be done about the ïňĄrst point, the purpose of this paper is to overcome the second point.

Revision: 1. inserted after ... (e.g., AVHRR with 1.1x1.1 km2 or MODIS down to 0.25x0.25 km2): While SEVIRI does have a high-resolution visible channel (HRV) with a nadir resolution of 1x1 km2, it covers only a subset of the field of view of the narrowband channels, and its spectral response ranges from 0.4 to 1.1 micron, which is too broad for many applications such as the accuracte estimation of quantitative cloud properties or the early detection of convection. 2. inserted at the original location: In this paper, we want to demonstrate that the HRV channel contains important additional information on small scale variability which can be utilized together with the 0.6 and 0.8 micron channels for quantitative analysis.

SC 2. p.3 line 26 : Authors mentioned that Durr et al (2009) use the HRVIS channel the solar surface irradiance over the Alps due to the complex terrain." HRVIS channel

is an efficient tool that does not need such argument. Solar surface irradiance can be retrieved by HRVIS anywhere it is possible, not only over the Alps. Moreover, HRVIS channel resolution is still too low comparing to spatial scale of terrain complexity, snow coverage and mountain shadows for accurate surface solar radiation retrieval. Durr et al (2009) presented effectively good reasons to use HRVIS but this argument does not highlight the quality of HRVIS channel. Sentences in P.3 line 20 were sufficient.

Reply: We agree that the higher resolution is not the only reason/advantage for using the HRV channel in the Meteoswiss scheme used by Dürr et al(2009). Still, this article demonstrates that the higher resolution is beneficial. We have therefore modified the sentence as follows:

Original: For this reason, Durr et al. (2009) use the HRVIS channel to retrieve the solar surface irradiance over the Alps due to the complex terrain.

Revision: Dürr et al. (2009) conclude that the higher spatial resolution offered by the HRVIS channel has a beneficial effect on the quality on retrievals of solar surface irradiance over the Alps due to their complex terrain.

SC 3. p.5 line 27 HRVIS channel spectra is 0.4-1.1 micron rather than 0.3-1.1 micron. Reply: Corrected range to start at 0.4micron.

SC 4. p.8 line 14. In equation (3), reminding that x0 = (x0;y0) is perhaps mathematically not necessary but it can help for the understanding of the equation.

Reply: Indeed. ACPD style does not use arrows above vectors, which would have also helped to identify x0 as vector (and we missed the bold face), hence we have replaced "x0“ with "x0 = (x0, y0)“ to stress that this is a vector.

SC: 5. p.11 line 2: Please briefly justify that taking reflectance instead of radiance do not affect linear model described by equation (5).

Reply: Added the following sentence after Eq.5: Choosing reflectances instead of radiances only alters the fit coefficients as reflectance and radiance co-vary linearly

for a given solar zenith angle.

SC 6. p.13 line 15 Images taken at 12:00 UTC are used, because it corresponds to the maximum of solar radiation in Meteosat field of view. Authors should briefly mention that point.

Reply: Added the following sentence: Due to METEOSAT-9's sub-satellite point at 0.0deg W, this time slot corresponds to the maximum solar top-of-atmosphere irradiance for the entire SEVIRI field of view.

SC: 7. Figure 4 is slightly confusing. This paper is focused on the 3 VIS channels of MSG but the 1.6 micron IR channel is used at an interpolated high resolution. Then : -visual comparison between panel b and panel c is biased because authors want highlight result of their downscaling process but panel c includes influence of a simple trigono- metric interpolation process. -There is no visual comparison between 0.6 micron channel at LRES and downscaled at HRES as well as for 0.8 micron. Additional explanations from authors are welcomed to clarify the justification of using the RGB mode using 1.6 micron channel. Otherwise, authors are suggested to show narrow bands images before and after the downscaling process.

Reply: We understand the point made by the reviewer, but after internal discussions decided to keep Figure 4 as is. It is true that showing only the 0.6 and/or 0.8 channel in black and white would restrict the information to that gained by our downscaling scheme. However, visual impression is subjective, and presenting the B&W plots of HRES and LRES downscaled at HRES will not provide complementary information. Therefore we preferred to present the RGB composite. This composite is widely used in operational environments, due to its physical interpretability, and clearly shows the higher resolution patterns resulting from our downscaling scheme.

Interactive comment on Atmos. Chem. Phys. Discuss., 10, 10707, 2010.