

## ***Interactive comment on* “Simulation of SEVIRI infrared channels: a case study from the Eyjafjallajökull April/May 2010 eruption” by A. Kylling et al.**

### **Anonymous Referee #3**

Received and published: 26 December 2012

This paper presents a model-based method to study the possible errors in the detection of volcanic ash cloud during the Eyjafjallajökull eruption. The ash cloud inputs are determined using simulations of the FLEXPART dispersion model, ice and water cloud comes from ECMWF simulations and radiative transfer simulation are done using the 3D radiative transfer model MYSTIC. Simulated BT differences are then used to study ash detection difficulties: separation of ash and cloud layers is analyzed and parallax effects due tilted view are showed.

This kind of approach can be undeniably very helpful to understand remote sensing er-

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rors. However, I was disappointed by the simulated results that are obtained. They appear quite different from the measurement (Figure 6 and 7). Can the authors develop the analyzes concerning the reasons of these discrepancies and do some sensitivity studies to explain why ash seems to be much more easily detectable in the simulation.

Authors want to simulate realistic scene. This is done for the ash volcanic plume with is describe with 25 size classes but several others parameters appear to be set constant over the whole domain without justification or sensitivity analysis. These parameters are the water and ice cloud particle size, the water vapor profile, the surface emissivity. Some sensitivity studies concerning these parameters would be valuable and maybe give answer to some to the previous remarks.

In several places in the text, authors give as explanation the differences in spatial resolution. It can be interesting and easier for comparison to degrade the measured or the simulated images in order to have for both the same spatial resolution and extension.

Specific comments:

P 7788 l.25, technical reasons are mentioned, can the authors developed a little, why it is not possible to have horizontally varying cross section. Is it molecular cross section ?

P 7789, Figure 2: To illustrate the fact that ash optical properties variations are smooth over the SEVERI channels, can the authors add some examples of it in Figure 2.

P. 7792, l28-29. I do not understand the explanation. Why do not compare the same area ? it would be more significant.

P 7793: To complete the analysis, in addition to Table 1, it would be interesting to have also the maps of the BT differences with the locations A, B, C and D reported. This points should also be reported in Figure 7.

P 7795: In this paragraph, the authors discuss about the use of a fixed size distribution shape. In their example, they said that with a gamma distribution the near vent signal

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is not detectable. I'm wondering if the chosen size distribution is appropriate or if with another one the ash detection will work better. To answer this question, can the authors add the used gamma distribution in Figure 9.

P7796, l.2 : As mentioned in other comments, as sun is not present, shadow effects is maybe not appropriate, parallax effects would indeed be better.

P 7796, l27: add a reference for the TIPA and correct the word "approximation".

P 7797, l. 13: separated instead of seperated

in several places in the text, left and /or right panels should be replace by top panel (p.7790, l24; p. 7791, l. 6; p.7791, l.26; p. 7792, l. 26, p 7793, line 24 )

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