

## ***Interactive comment on “Cloud Detection over Snow and Ice with Oxygen A- and B-band Observations from the Earth Polychromatic Imaging Camera (EPIC)” by Yaping Zhou et al.***

### **Anonymous Referee #2**

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Zhou et al. described a cloud detection algorithm over snow and ice with oxygen A and B band. They have demonstrated that the new cloud mask algorithm is an improvement compared to the current EPIC cloud mask algorithm. They derived an analytic relationship between the double logarithm of the O<sub>2</sub> band ratios and the surface elevation and the zenith angles. They also showed the limit of the algorithm for optically thin clouds and low elevations. I think the paper is fit the topic of AMT.

### Specific comments

Page 8 lines 9-16. The authors described briefly the radiative transfer simulator for EPIC. Does the simulator have sphericity correction at the solar and viewing zenith

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Discussion paper



angles larger than 80 degree?

Page 8 lines 25-28.

Why the surface height in the simulations is from 0 to 15 km with 2.5 km increment? The surface height larger 9 km is not useful and the increment of 2.5 km is too large. The increment of 0.5 km would be a better option.

Page 9, lines 26 – 30 It is not clear how the coefficients were derived. Could you explain it in detail?

Page 10 lines 24-26 How did you select the snow/ice surfaces?

Page 12 lines 4-9 Please explain more details about the regression. How did you design the model to predict the median ...?

Page 12 lines 20 -21 What 'non-negligible uncertainties' do you mean here?

Fig. 1 I,j

The 'Fitted threshold' is not easy to understand. Do you mean the fitted A-band and B-band ratio? Do you use the simulated A-band ratio,  $m$ ,  $z$ , to derive the coefficients in Table1, then calculate the 'Fitted threshold' using these coefficients? Fig.1i,j shows that the fit is almost linear. Will it cause scatter if the coefficients are applied to other data not in the simulations? If the surface albedo is 0.6 or 0.9, could you get the same coefficients?

Fig.2 Since the algorithm also detects clouds over snow/ice on top of mountains, could you make a similar plot for surface height of 2.5 km or 5 km?

Fig. 3 How do you explain the scatter in the clear-sky plots?

Fig. 4 It seems that you have to use more digits in the colorbar for (a,b). For (d) please use integer in the colorbar.

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