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## ***Interactive comment on “Cloud mask via cumulative discriminant analysis applied to satellite infrared observations: scientific basis and initial evaluation” by U. Amato et al.***

### **Anonymous Referee #2**

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The motivation of this study is clear and sound. It is important to more accurately identify clear and cloud scenes in the infrared observations. The initial results presented in this paper are encouraging, but I have some questions on the methodology. I recommend this manuscript be published if the authors can clarify several points and make the proper revisions. In addition, please correct the typos and arrange the figures according to the text in the manuscript.

1. Section 2 discussed the data used in the study: IASI1 and IASI-2. These data are from four days (17-18, November 2009 and 22-23 July 2007). This data is divided into 10 climatic zones covering data from January to December. How can one do this

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using four days of data? Please clarify this. 2. Silver standard is explained in section 2.1. Is the SEVIRI data treated as gold standard in this study? 3. The statement on Lines 315-323 is problematic. CMS cloud mask is used to validate that in CLAVR-x to show the uncertainty of the latter. One can not state that this result in turn shows the accuracy range of CMS cloud mask. 4. As the author stated, out of the nine statistics, W3 is the new one. However, W3 is based on the fact that most of the water droplets have a radius of 5 micrometers. This is not true. Cloud particle effective size has a large range of variability. Therefore, the ratio between BTs at 5 and 12 micronmeter may not be proper to use here. 5. Line 428: I think what you mean is “in cloudy sky condition, . . .” 6. In general, how are these nine statistics different from clear to cloudy conditions? This should be shown using the training dataset at the resolution of your instrument. 7. The derivation of cost function from the equation below Eq (3) to the one in Eq (4): this means only the larger error of the two errors will be considered during the minimization of cost function. As pointed out by the authors, this required clear and cloudy classes have approximately equal size. However, clear conditions occur much less frequent than cloudy conditions. Using this method, at the minimum of the cost function in Eq (4), E1 is not equal to E2, instead, it is one of them smaller or equal to the other. 8. When constructing the vector  $x$ , why not normalize each element so that they are all unitless and vary, say, between 0 and 1? Then you don't need to worry about the fact that once the unit changes the calculations need to be redone. 9. Line 940: “For sea ice . . . we empirically fixed the thresholds by visual inspection of the cumulative functions”. How and based on what kind of criteria is the visual correction applied to results? Is this related to the limitation of the method or to the limited training data points in this condition?

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Interactive comment on Atmos. Meas. Tech. Discuss., 7, 5601, 2014.

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