

## Reply to comments by Anonymous Referee #1

On the manuscript Interactive comment on “A method for the spectral analysis and identification of Fog, Haze and Dust storm using MODIS data” by Qinghua Su et al., submitted to Atmospheric Measurement Techniques.

We thank the referee for the constructive comments that we have tried to accommodate in the text. Detailed answers to the comments are given below (bold: referee comment, regular font: author’s response).

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**In this paper the authors selected three extreme events of fog, haze and dust storm and developed a methodology to distinguish between those three phenomena. Validation with ground data reveals that the method is promising. Overall, the main idea of the paper is interesting; however, the manuscript per se is not good and does not meet the standards of AMT. Therefore, I suggest to reject this paper due to the major issues mentioned below.**

**1. The paper suffers from language issues. At almost every sentence there is at least one grammatical error and at some points the manuscript is hard to follow. Unfortunately, at its current format the paper would not be accepted for publication not only in AMT but also in the majority of serious scientific journals.**

**Answer:** Thank you very much for your pertinent criticism on this article. We apologize for the problems in the previous work. We have made serious modifications to the problems you raised, for example, we have commissioned a professional organization to help us polish the language, seriously amended the nonstandard expression, modified the images with the quality problems, and we still very welcome you have more suggestions.

**2. The authors selected only three case studies which impairs the robustness of their results. I have the feeling that the method works under the specific conditions for which it was developed but it is not sure if it can be used in other cases or on an operational basis. Land albedo changes from time to time and the method might not be applicable in other cases. What about mixed cases where fog and dust exist at the same time?**

**Answer:** Thank you for pointing out possible problems in the robustness of methods. We have considered this problem, too. But because of the complexity of the effects of three extreme weather phenomena on radiation, it is difficult to determine the recognition algorithm by the radiative transfer equation. It is relatively simple to analyze the radiation difference between the three extreme weather phenomena and the spectral difference between them and the cloud or land surface. As you have mentioned, the surface type is complex, and the albedo of the surface is constantly

changing. It's hard to find enough cases to analyze all the possible problems. In order to ensure the robustness of the algorithm, here we have chosen a larger area for analysis with the support of surface observation data. Each study area has reached over hundreds of thousands of square kilometers. In this area, it contains basically all possible surface types, all possible types of clouds and extreme weather phenomena of varying degrees.

The purpose of our work is to achieve the distinction between different extreme weather phenomena. The construction of the algorithm is also an analysis of different extreme weather phenomena put together. Unfortunately, we have not found two or more extreme weather phenomena mixed cases. However, when we do the application, we do not know in advance what extreme weather conditions are. The algorithm can automatically identify what kind of extreme weather phenomenon exists in the image.

**3. I disagree that dust storm should be considered as an extreme weather phenomenon. It is rather the result of specific weather types and synoptic transport than a weather phenomenon.**

**Answer:** We agree with your definition of extreme weather. In this article, we mainly consider the strong effects of these three weather on the radiation and the impact on people and ecological environment.

**4. The quality of the images remains low and the captions are poor.**

**Answer:** Thank you for pointing out the problem of image quality. We have changed the image with the problems.

**5. I have the feeling reading the paper that the method is not properly described. How did the authors decide to select the specific bands and indexes? Is there a theoretical basis? In that case there should be previous studies; however, there is not a single reference in the text.**

**Answer:** Thank you for pointing out the problems we have in the description of the theoretical basis for method. We have increased the expression of the material composition and effects on the radiation of three extreme weather phenomena, which are the basis for our selection of band and index. **(Page 5, Lines 6-20)**