

Interactive comment on “Retrieving high-resolution surface solar radiation with cloud parameters derived by combining MODIS and MTSAT data” by W. Tang et al.

Anonymous Referee #2

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As well known, Incident shortwave radiation (ISR) at the surface is an essential parameter in the land surface radiation budget and in many land surface process models. This manuscript entitled “Retrieving high-resolution surface solar radiation with cloud parameters derived by combining MODIS and MTSAT data” presented an effective method to retrieve ISR with cloud parameters, including effective particle radius, liquid water path, and ice water path, by combining MODIS and MTSAT data. The retrieved ISR data were also compared with ground measurements and current satellite-derived ISR products. The paper is well written and organized. Overall, I feel the paper presents interesting scientific results as the retrieval algorithm is novel and the comparisons are extensive and valuable for knowing their overall accuracies using

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direct measurements. However, the manuscript is lacking in detail in a few areas (see comments below for details). Therefore, I would not recommend the paper for potential publication in ACP unless substantial improvements are made to address the following concerns.

Comments: 1. As mentioned in the manuscript, the major contributions of the authors are to present an effective method to retrieve high temporal resolution cloud parameters by establishing correlations between MODIS cloud products and MTSAT TOA radiance based on ANN, since the parameterization scheme has been reported in the previous studies presented by the authors. As it is well known, one obvious advantage to use satellite data for the mapping of surface or atmospheric parameters is the fact that it is available at least regionally, potentially even on a global level. Although the authors compared the retrieved high temporal resolution cloud parameters with the MODIS “TRUE values”, the mapping of high temporal resolution cloud parameters were not displayed in the context. I would suggest the authors to present some retrieved results of high temporal resolution cloud parameters. 2. The authors simply concluded that the overestimation in the proposed scheme might be attributed to the underestimation of the cloud water path. I think extra sensitive analysis are needed in Section 3.2. How the cloud parameters influence the retrieval accuracy ? 3. The spatial resolution of ISCCP-FD product is about 280 km, while the spatial resolutions the GLASS and the retrieval results based on the proposed method are 5 km. Will different spatial resolutions affect the evaluation results? Minors: 1. Page 35203, Line 13: “But their spatial resolutions (> 100 km) are too coarse to meet the requirements of land surface processes studies and practical applications.” I think it should be “But their spatial resolutions (> 100 km) are too coarse to meet the requirements of land surface processes studies and practical applications very well.” 2. Page 35204, Line 23: “But it is difficult to directly derive cloud properties based on geostationary satellites due to their low spectral resolutions.” Quotations are needed for this expression. 3. Page 35204, Line 23: I think “As well-known, the largest certainties. . .” should be “As well-known, the larger uncertainties . . .” 4. Page 35205, Line 3: “MODIS and high

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temporal resolution radiance data of all MTSAT channels” should be “MODIS and high temporal resolution TOA radiance data of all MTSAT channels” 5. Page 35205, Line 3: I think the authors used to MTSAT-1r data. It should be described clearly here. 6. Page 35205, Line 20-25: Specific references should be included in the context.

Interactive comment on Atmos. Chem. Phys. Discuss., 15, 35201, 2015.

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