

Comment for manuscript amt-2021-289 on behalf of one of the reviewers.

Dear authors,

one of the reviewers communicated with me and sent some follow-up comments regarding the revised version of your manuscript. I post them here in the public discussion because they seem appropriate for the manuscript's public record. I encourage you to post a point-by-point response when making edits for the final version of the paper.

Thank you,  
Sebastian Schmidt (editor)

Comment by reviewer in response to the revised version, and also in response to AC3 (<https://doi.org/10.5194/amt-2021-289-AC3>)

## **Response**

### **Reviewer**

The authors could have done more to address my initial feedback, addressing the following clarification comments would be greatly appreciated.

It is still unclear to me if the paper is a validation paper of the NOAA STAR TOA SW flux product and if so the dataset and version number should be properly cited.

### **Authors**

The paper is about the development of methodology to derive TOA SW fluxes at NOAA STAR. This product is a starting point for deriving surface SW fluxes when using the “indirect approach”. There is also a need to know how well the proposed methodology is working. Therefore, the evaluation of the methodology against best available estimates of TOA fluxes is an important element of the paper. The TOA reflected SW flux is produced together with the surface downward SW flux and archived at the NOAA Comprehensive Large Array-data Stewardship System (CLASS) at [avl.class.noaa.gov](http://avl.class.noaa.gov) as archived at the NOAA Comprehensive Large Array-data Stewardship System (CLASS) at [avl.class.noaa.gov](http://avl.class.noaa.gov). It is an end-product just like the surface flux. Since the TOA and surface fluxes are generated together in the same process by the same algorithm the product/algorithm version numbers are the same.

It is an intermediate product and as such, versions have the same labeling as the final product, namely, the surface SW fluxes.

The method for estimating the TOA broadband albedo developed in the effort documented in the paper has been applied in an algorithm that is used by NOAA to operationally generate the level 2 (L2) reflected shortwave radiation at TOA product since the launch of GOES 16 in November 2016. This product is archived and can be freely downloaded from, the NOAA Comprehensive Large Array-data Stewardship System (CLASS) at [avl.class.noaa.gov](http://avl.class.noaa.gov), in the "GOES-R Series ABI Products (GRABIPRD)" category under the name of "Reflected Shortwave

Radiation: TOA". The algorithm/product version number is version 1, revision 0 (v01r00). For the ABI clear-sky mask (cloud mask) and cloud optical depth are also v01r00.

#### **Reviewer**

If the GOES SW TOA flux product is being produced by NOAA it should be cited. If it is not, then it should also be stated in the text. If this is an algorithm paper of a potential NOAA product that is in development that should be clearly stated.

#### **Authors**

Answered to previous comment. It is not a potential product. This is an existing product.

#### **Reviewer**

3.1 Satellite data for GOES-16 and GOES17: datasets are used in papers I expect the product name, version number and location should be given. I find section 3.1 completely lacking in this regard. First of all, I searched for <https://www.bou.class.noaa.gov/> and the site could not be found. I do not know if this is the GOES L1b radiance data, since the product name was not given in the text.

#### **Authors**

Web site addresses are frequently changed. Before submitting a paper or revisions, we always verify addresses we provide. At the time of submission, the links we provided did work. Please keep in mind that the review process of this manuscript took about **seven months**, increasing the chance for address change. The current address is:

<https://www.avl.class.noaa.gov/saa/products/welcome>

It has been updated now.

All the requested information is provided in Table 6. We felt that there is no need to repeat it in the text.

We suggest that the reader uses the keyword "class data noaa" to search with google.

And chose the "[NOAA's Comprehensive Large Array-data Stewardship System](#)".

Under that web-page, and in the search bar list it is clear that there is a "GOES-R Series ABI Products GRABIPRD (partially restricted L1b and L2+ Data Products)"

#### **Reviewer**

The text mentions that "The CODC data are not always available from CLASS".

Could the authors provide the name and version of the product of the cloud retrievals used in this study. Lastly the GOES based TOA flux dataset or product promoted in this paper is not cited in the paper.

#### **Authors**

This comment was placed now under Table 6. At the early stages of the CLASS archive, not all the needed information was available so it had to be imported from NOAA/STAR. Since, the archive was augmented.

## Reviewer

3.2 Reference data from CERES: This section is completely confusing. Some of the figures were used from CERES SSF L2 and for fig. 9 the CERES FLASHflux level 2. Again, the edition numbers were not cited. I believe it was CERES SSF L2 Edition4 and FLASHflux Version 4A. This is extremely important if someone wanted to recreate the results in the future when the CERES project may have moved on to Edition 5.

## Authors

CERES SSF version 4a and FlashFlux version 3c data were used

## Reviewer

I was disappointed that only a few overpasses were validated in the paper and here is the response from the authors. "The ABI is at 5 min intervals. However, we want to compare four products simultaneously. It is hard to find cases when all of the GOES-16, GOES-17, CERES/Terra and CERES/Aqua have overlap in time and that the overlap is large enough to compare all of them." For me, there is no stipulation that they need to be validated simultaneously in order to have a robust validation matched dataset.

## Authors

Indeed, it is difficult to convey in a paper of this type how much effort went into the evaluation during the entire process. As mentioned, at early stages, NOAA was downloading ("grabbing") data for short periods of time (about a week) for testing. These data were shared with us. Before the next download, such data are discarded to make space for a new set. It is not reasonable to ask for the version of such data. It also does not make sense to show results from these experiments since there is no way that interested parties could replicate such results. Therefore, we had to wait till there was a product that all parties can download (CLASS).  
The Reviewer says: "For me, there is no stipulation that they need to be validated simultaneously in order to have a robust validation matched dataset."

This is a matter of opinion. From our experience, users that may be interested to use data from both satellites, want to know how the two satellites compare. Also, what if one satellite fails and after using data from GOES-16 they want to switch to GOES-17? Our approach was to anticipate such requests from users.

## Reviewer

I looked at the ESMF re-gridding web site, there are multiple grid type options. Could the gridding algorithm just be simply detailed in the text.  
The point of the paper is that the CERES and GOES surface types could be a factor. The Su et al. 2015 ADM type are more a function of NDVI over land and not strictly dependent on IGBP type and that NDVI allows for seasonal variability, whereas the GOES (this paper) has a static surface type categories not allowing for seasonal variation of interannual variability.

### **Authors**

The ESMF re-gridding program is a complicated package. Information on grid type and remapping has been given in the original response. We have mentioned that "For large arrays, it is more efficient to remap the unconstructed grid to the curvilinear tri-polar grid."

The ESMF website gives a detailed description of how-to re-grid from one type to the other. We felt that an interested user will have to go back to that package and not to rely on a brief summary.

### **Reviewer**

Line 389. The "ground truth", namely, the CERES observations are also undergoing adjustments and recalibration, is misleading. The CERES SSF L2 TOA flux observations have been using consistent algorithms and instrument calibration across a CERES edition (not FLASHflux). That is a new edition is reprocessed from the beginning of record with consistent algorithms and calibration. That is why citing datasets is so important.

### **Authors**

There is no contradiction here. We agree that "a new edition is reprocessed from the beginning of record with consistent algorithms and calibration." When this happens, the older version is removed (in our experience). There is a possibility to encounter difficulty if results are based on a version that is no more accessible to the public. We now cite the data set used.

### **Reviewer**

In the abstract the last sentence states: A satisfactory agreement between the fluxes was observed for both clear and cloudy conditions and possible reasons for differences have been identified." Satisfactory agreement is a relative term. I believe that the authors need to describe who their users are and that the level of agreement is sufficient for their applications.

### **Authors**

We can add that the agreement is as shown in Table 6. The Reviewer writes: "I believe that the authors need to describe who their users are and that the level of agreement is sufficient for their applications." We do not know who the users are. It is up to the users to decide if the agreement reported is sufficient for their use.