Answers to Editor Review (2017-05-04)

Dear Mr Eastbrook,

Thank you for taking the time to thoroughly check the manuscript.

Comment 1 (FCDR): confusion about the software referred to came up to a major mistake on my side: the link to the github repository is wrong. I apologize for this. The FCDR (Fundamental Climate Data Record) software serves a completely different purpose: the definition and implementation of a specific file format writer for harmonized level 1 and 2 climate data records. The link to the source repository has been corrected in the manuscript.

I have also added a short description of the software components to the introduction section. This should clarify which tools implement the functionality described in the manuscript.

Comment 2 (Version): the title of the manuscript has been changed to include a version number. The (correct) github repository contains 9 public releases that have been used for operational processing. We have not considered assigning dois to the code yet. I can discuss this in the project team, if assigning a doi is required for the successful publication of the manuscript. If so, we will use a project-conforming approach to register the releases.

Comment 3 (Manual): a manual for the MMD version 1.2 has been uploaded as publication supplement.

With best regards,

Tom Block

Answers to referee 1 (2017-10-25)

Dear referee,

we like to thank you for the exhaustive and precise review and summary of the

manuscript submitted. We apologize for the grammatical oddities that have slipped

through our internal review process - these are corrected in the final manuscript.

Replies to your comments/requests:

"Page 8, Table 1: Please make the distinction between the results shown in the last

two rows of this table more obvious by changing the first columns entries to "Time Axis

Method (section 4.1)" and "Full Access Method (standard approach)"."

This has been updated, we agree that your suggested text clarifies the content of this

rather complex table.

"Page 12, lines 20-21: Please describe the z-dimension/matchup index more thoroughly. Is this a representation of time? Or time difference? Or something else?"

The text has been udated to describe this z-dimension in more detail:
The final MMD contains for each sensor input variable a three dimensional dataset where the x and y dimensions are the extensions of the extraction window and the z-dimension is the matchup index, i.e. a linear index that counts from 0 to the number of matchups (minus one) that have been detected for the time interval. Thus, each z-layer in an MMD-file contains all data associated to a single sensor/sensor matchup.

I hope that this describes the dimension clearly enough.

Thank you very much, with best regards,

Thomas Block

Answers to referee 2 (2018-05-01)

Dear referee,

first, we like to thank you for the positive and exhaustive review of the manuscript submitted.
Please find below answers and comments on your remarks:

Context of matchup-processing:

Agreed that it is useful to clarify this. We are well familiar with the Felyx project, which started during the first phase of the SST-CCI project, when the initial implementation of the MMS predecessor system was already running operationally. We analysed the requirements of Felyx and concluded that for sensor harmonisation the screening functionality and the data-throughput do not match our project needs. We will follow your suggestion and mention Felyx in the introduction.

Type of data:

Agreed .The MMS version described in the publication has been designed to operate on L1/L2 data of polar orbiting satellites. These can be either granules or full orbit files; the requirement is that the data follows a time trajectory (i.e. is acquired at consecutive time intervals along an orbit geometry). Naturally, this is not fulfilled when using aggregated data as L3 or L4 since the timing information is collapsed to an interval. Since submitting the paper a year ago, we have extended the system to also operate on geostationary and in-situ data. We will follow your suggestion and clarify this in the introduction.

Section 4.1:

Agreed: Re-reading the introduction to this section after a long time the description is not clear enough. The following section has been added to Chapter 4:

"For each satellite data product accessible to the MMS system a corresponding metadata record is stored in the database. The metadata record contains information about the data file location, the sensor, the acquisition time, the bounding geometry of the acquisition, the orbit nadir trajectory, an ascending/descending node flag and the ground-segment data processor version.

This data record has been designed to optimise database storage volume (and hence access performance) while keeping sufficient information to operate the matchup system."

Also, we have re-phrased the first sentence to:

"The satellite metadata stored in the database has been constructed in a way that allows detecting overlapping regions possibly containing matchups without the need to open the associated satellite data products."

I hope this clarifies your question.

Section 5:

The MMS detects and extracts any matching pair of pixels within the time and space constraints. This – as you stated – can result in multiple associations of a single pixel. We have implemented mechanisms to optionally reduce these associations to one-to-one matches – either using the closest pair in space or time – whichever is required by the scientific context. We have not elaborated this in the text because our focus is on the novel quick and parallelized detection algorithm.

Agreed: We will add a short note to the text that elaborates this possibility.

Section 8 and 9:

Agreed. Yes, you are absolutely right. The current MMS system (~ one year after writing the paper) can handle SST in-situ data of various sources for validation. We have scheduled extension to support Aeronet and GRUAN data in 2018 – making the MMS even more flexible. We felt that this is beyond the scope of the current paper. If interested, please have a look at other project publications with a focus on validation, e.g.:

https://www.researchgate.net/publication/322905535_Optimal_Estimation_of_Sea_Surface_Temperature_from_AMSR-E

All other remarks and suggestion stated in your review will be considered in the text and corresponding sections re-phrased to be more precise.

Thank you for your effort and valuable contribution,

Tom Block