

Interactive comment on “Automatic Quality Control of the Meteosat First Generation Measurements” by Freek Liefhebber et al.

Freek Liefhebber et al.

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Referee 1

[GENERAL COMMENT]: The manuscript by Liefhebber et al. describes an automatic quality control procedure for the data provided by the first generation of Meteosat satellites, which have been in orbit between 1981 and 2017. Exploration of these data sets for climate analysis has not been the main purpose of the data collection at the time when this data was acquired, so no particular attention had been paid to the requirements related to climate data, e.g., the documentation of data anomalies. The manuscripts describes methods to automatically detect so-called ‘anomalies’ in these geostationary satellite data; these anomalies should not be used in retrieval systems

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when deriving thematic climate data records from the satellite data. Multiple typical anomalies have been identified, each of them is individually detected. For three of the typical anomalies, details of the detection algorithm are presented in this manuscript, while no in depth information is provided for the detection of other anomalies. The manuscript is clearly structured, well written and contains relevant information. I am recommending publishing this manuscript in AMT after my minor revisions are incorporated.

[ANSWER]: Thank you very much for the positive comments.

[SPECIFIC COMMENTS] [COMMENT #1] It would be most useful if the information on the anomalies detected in the satellite data would be accessible to users to avoid using anomalous satellite data when creating a climate data record. Please provide a list / a data base of the problematic satellite slots, e.g., as a supplement to this manuscript.

[ANSWER]: EUMETSAT is currently undertaking an image reprocessing of the MVIRI images to produce new level 1.5 data in NetCDF format, which will be utilising the anomaly detection database. In the new level 1.5 files, there will be quality flags for users to identify anomalous images or data points and details on the anomalies.

Specific comments Please add the information on the satellite slots and channels (if appropriate) to all figures depicting satellite data, i.e., Figs. 2, 3,4, 5, 7, 8, 9, 10.

We will add the information where appropriate, according to the following table:

Figure filename channel

2 left METEOSAT3-MVIRI-MTP15-NA-NA-19900816133000 WV

2 right METEOSAT2-MVIRI-MTP10-NA-NA-19840215160000 IR

3, left METEOSAT4-MVIRI-MTP10-NA-NA-19911216110000 WV

3, center METEOSAT2-MVIRI-MTP10-NA-NA-19831016120000 WV

3, right METEOSAT2-MVIRI-MTP10-NA-NA-19810817223000 WV

4 left METEOSAT4-MVIRI-MTP10-NA-NA-19900415003000 WV

4 right METEOSAT5-MVIRI-MTP10-NA-NA-20060317213000 WV

5 left METEOSAT2-MVIRI-MTP10-NA-NA-19810817223000 WV

5 right METEOSAT4-MVIRI-MTP10-NA-NA-19901015013000 WV

7 left METEOSAT7-MVIRI-MTP15-NA-NA-20130717210000 WV

7 center METEOSAT7-MVIRI-MTP15-NA-NA-19991016003000 VIS

7 right METEOSAT4-MVIRI-MTP10-NA-NA-19900415003000 WV

8 left METEOSAT5-MVIRI-MTP10-NA-NA19961015300000 WV

8 center METEOSAT5-MVIRI-MTP10-NA-NA19961016000000 WV

8 right METEOSAT5-MVIRI-MTP10-NA-NA19961016300000 WV

9 METEOSAT5-MVIRI-MTP10-NA-NA19961016000000 WV

10 around METEOSAT5-MVIRI-MTP10-NA-NA-19960515120000 IR

[COMMENT #2] Page 1, line 17: Please change 'solar irradiation' to 'surface solar irradiance'.

[ANSWER]: Will be changed to 'surface solar irradiance'.

[COMMENT #3] Page 3, line 5 ff: Please add the information on the time it takes for the satellite to finish the forward scan.

[ANSWR] It takes 25 minutes to complete the forward scan. This information will be added to the document.

COMMENT #4] Also it might be of interest to the reader to have an idea on the overall size of the data set, so maybe the total size of the data set can be added in this section

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as well (it should be a pretty impressive data amount).

[ANSWER]: The size of all 1.0 files that were being processed is 47TB. This information will be provided in the document.

[COMMENT #5] Page 4, line 14: Consider starting a new paragraph after ‘. . . limited dataset.’, which begins with ‘The remainder of this section. . .’

[ANSWER]: The new paragraph will be inserted.

[COMMENT #6] Section 3.1 / Figure 1: The creation of the training-set needs to be more clearly described. My understanding is that as a first step, ‘[. . .] samples were randomly selected, but with several constraints [. . .]’ (p4, line 31); these samples (please specify the number of randomly selected samples) have been manually inspected ‘[. . .] to determine if it contains an anomaly.’ (page 5, line 9). To improve the quality of the training data set (Is it intended that that training data set only contains problematic satellite slots?) an ‘anomaly detection’-algorithm was applied to the training data set that either supports or falsifies the result from the manual inspection. The result of this ‘automatic anomaly detection’ is manually verified and, if an anomaly can be manually confirmed, this new case is “added to the training-set.” (page 5, line 26). It is not clear to me how this description transfers into Figure 1. Does ‘Ground truth’ corresponds to the training-set? From the ‘entire dataset’ (all satellite slots, I assume) a subset is randomly selected (first box) and manually inspected (the ‘subsetting’ as suggested by the arrow should occur only after the manual inspection, if I am not mistaken). To the ‘ground truth’ slots (the ‘training-set’?) the automatic anomaly detection as well as a manual verification is applied. In case the manual verification identifies an anomaly this slot is put back to the ‘Ground truth’ and tested again until the result has been verified.

[ANSWER]: Apologies for the confusion. Indeed, Figure 1 is not correct. The ‘Ground truth’ as described in the figure should indeed read as ‘training-set. We will change Figure 1 by replacing the description in the ‘Ground Truth’ box into ‘Training set’.

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[COMMENT #7] Please add a box representing the 'Training-set' to Figure 1 (maybe it even is the outcome of the 'verification result?'); add information on the size of the different subsets, i.e, the 'subset' to start the generation of the training set as well we the size of the training set. Also please clearly specify whether the training set contains only anomalies or not.

[ANSWER]: With respect to the 'Training set' in Figure 1, please see our answer directly above. We will add the size of the training set to the description. And also specify whether only anomalies are contained in the 'Training set'.

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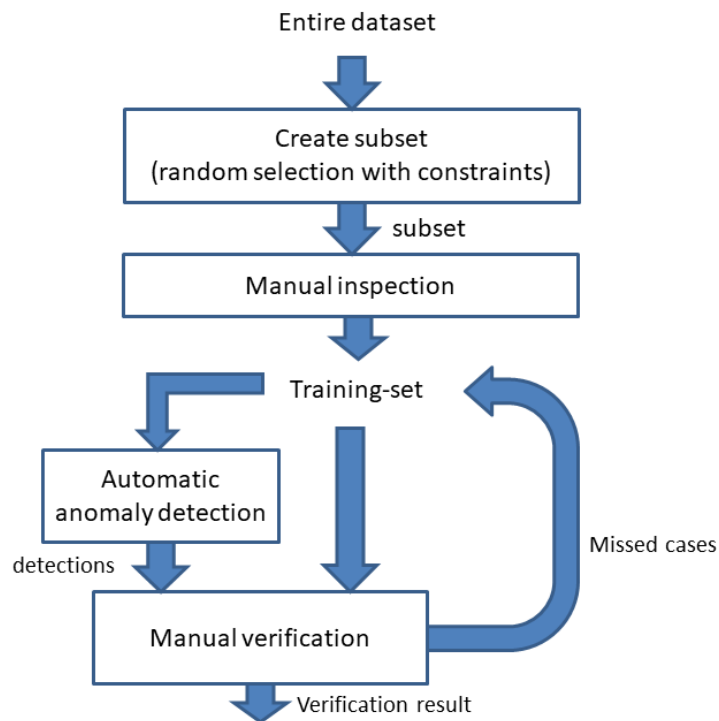


Fig. 1. Update Figure 1 (Training set issue)

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