

**Memorandum for:** The Record

**From:** Andrew Wald, Slawomir Blonski, Changyong Cao,  
VIIRS SDR team

NOAA/NESDIS/STAR

**Subject:** VIIRS Single-gain Band Saturation in Native  
Resolution before Aggregation [CCR-2014-007]

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## 1. Summary

This memo documents the actions taken by the VIIRS SDR team to close action item CCR 2014-007. An email from Christie Best [NJO Program Office] dated Oct 26, 2016, describes the requirements, and reads in part:

“Since 2014, STAR has reported inaccurate data due to pixel saturation being received from specific VIIRS bands. CCR 2014-007 commissioned a study, resulting in asking for another study that was never done. In recent meetings with STAR we [h]ave come to a resolution to close this CCR and open a new one. However, to close this CCR there is an action to the SDR team which is as follows:

All agreed that 2014-007 needs to be closed with the recommendation for STAR to update the SDR documentation reflecting **that the reported radiometric value and the saturation quality flag** for specific **single-gain** bands may be inaccurate because of **undetected saturation of some native resolution pixels prior to aggregation**. The SDR documentation needing update may or may not include: ATBD, External SDR User Guide, CLASS Read Me File, and possibly the System Maintenance Manual.”

To close this CCR, the following documents were amended to include discussion of the flagging issue:

- 1) VIIRS Radiometric Calibration ATBD
- 2) CLASS Readme file
- 3) JPSS Algorithm Specification Volume II: Data Dictionary for VIIRS RDR/SDR 474-00448-02-06-B0200
- 4) 474-00448-04-06\_JPSS-SRSPF-Vol-IV-Part-6\_H\_VIIRS-RDR-SDR.xml

The Joint Polar Satellite System (JPSS) Common Data Format Control Book – External Volume III - SDR/TDR Formats, a relevant document here, is a Block 1 document and scheduled to become obsolete in March 2017, and therefore was not amended. Andy Wald amended the first two documents, Rosalie Marley amended the last two,

The change, in all of these documents, is to add a caveat or a table entry saying that unaggregated pixels in any single-gain band may be saturated, but if the final aggregated pixel is unsaturated, there is no flag to indicate any saturation issues. Therefore any affected pixels will underestimate the total radiance of the aggregated pixel. All I band channels are single-gain. The single-gain M bands are: M6, M8-M12, M14-M16. Updating the documentation is the only action taken-no action was taken to flag these pixels in the metadata. The added text is:

“In all single-gain bands, unaggregated pixels may be saturated, but if the final aggregated pixel is unsaturated, there is no flag to indicate any saturation issues. Therefore any affected pixels will underestimate the total radiance of the aggregated pixel. See e.g.

[http://www.star.nesdis.noaa.gov/smcd/spb/nsun/snpp/VIIRS/VIIRS\\_SDR\\_Users\\_guide.pdf](http://www.star.nesdis.noaa.gov/smcd/spb/nsun/snpp/VIIRS/VIIRS_SDR_Users_guide.pdf) page 8 for illustration of pixel aggregation.” Note this effect is independent of radiance error due to saturation foldover.”

The changes in each document are:

- 1) VIIRS SDR Release: Validated Data Quality

[http://www.nsof.class.noaa.gov/notification/pdfs/VIIRS\\_SDR\\_Validated\\_Release\\_README\\_CLASS\\_cc\\_rev1\\_SDR\\_rm.pdf](http://www.nsof.class.noaa.gov/notification/pdfs/VIIRS_SDR_Validated_Release_README_CLASS_cc_rev1_SDR_rm.pdf)

The above text is appended to the list of caveats on page 2:

- 2) VIIRS Radiometric ATBD 474-00027

[http://www.star.nesdis.noaa.gov/jpss/documents/ATBD/D0001-M01-S01-003\\_JPSS\\_ATBD\\_VIIRS-SDR\\_C.pdf](http://www.star.nesdis.noaa.gov/jpss/documents/ATBD/D0001-M01-S01-003_JPSS_ATBD_VIIRS-SDR_C.pdf)

The table on page 115 lists a number of quality flags including “Some Saturated then aggregated” for dual gain bands. There is no quality flag for the single gain saturation issue considered here, so it cannot be put in this table. Therefore the text caveat is placed just below this table.

- 3) VIIRS External Users Guide NOAA Technical Report 142

[http://www.star.nesdis.noaa.gov/smcd/spb/nsun/snpp/VIIRS/VIIRS\\_SDR\\_Users\\_guide.pdf](http://www.star.nesdis.noaa.gov/smcd/spb/nsun/snpp/VIIRS/VIIRS_SDR_Users_guide.pdf)

Table 4 on page 19 shows the same quality flags as the previous document. The text caveat is added just below this table.

- 4) JPSS Algorithm Specification Volume II: Data Dictionary for VIIRS RDR/SDR 474-00448-02-06-B0200

In section 6.2.21-1 [M6 subsection] to section 6.2.61-1 [M16 subsection] for single-gain M-bands only, the line with left-hand-side reading “Saturated Pixel- Indicates the level of pixel saturation” has a note “not implemented” in the right-most column

In section 6.3.2 VIIRS I-Band SDR Product Profile- Quality Flags, in subsections for every I band, the line with left-hand-side reading “Saturated Pixel- Indicates the level of pixel saturation” has a note “not implemented” in the right-most column.

### **Acknowledgements**

We would like to thank Christie Best for noting the required action and Rosalie Marley [VIIRS JAM with Algorithm Management Project] for invaluable help.

### **References**

[1] VIIRS SDR Release: Validated Data Quality

[http://www.nsof.class.noaa.gov/notification/pdfs/VIIRS\\_SDR\\_Validated\\_Release\\_README\\_CLASS\\_cc\\_rev1\\_SDR\\_rm.pdf](http://www.nsof.class.noaa.gov/notification/pdfs/VIIRS_SDR_Validated_Release_README_CLASS_cc_rev1_SDR_rm.pdf)

[2] VIIRS Radiometric ATBD

[http://www.star.nesdis.noaa.gov/jpss/documents/ATBD/D0001-M01-S01-003\\_JPSS\\_ATBD\\_VIIRS-SDR\\_C.pdf](http://www.star.nesdis.noaa.gov/jpss/documents/ATBD/D0001-M01-S01-003_JPSS_ATBD_VIIRS-SDR_C.pdf)

[3] VIIRS External Users Guide

[http://www.star.nesdis.noaa.gov/smcd/spb/nsun/snpp/VIIRS/VIIRS\\_SDR\\_Users\\_guide.pdf](http://www.star.nesdis.noaa.gov/smcd/spb/nsun/snpp/VIIRS/VIIRS_SDR_Users_guide.pdf)

[4] JPSS CDFCB-X Vol. III

[http://www.star.nesdis.noaa.gov/jpss/documents/CDFCB/GSFC\\_474-00001-03\\_CDFCB\\_External\\_Vol.3\\_SDR-TDR\\_Formats\\_Alt\\_doc\\_no\\_D34862-03.pdf](http://www.star.nesdis.noaa.gov/jpss/documents/CDFCB/GSFC_474-00001-03_CDFCB_External_Vol.3_SDR-TDR_Formats_Alt_doc_no_D34862-03.pdf)

[5] JPSS Algorithm Specification Volume II: Data Dictionary for VIIRS RDR/SDR 474-00448-02-06-B0200