

Modification of VIIRS Sensor Data Record Operational Code for Consistency of Data Product Limits

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The Visible Infrared Imaging Radiometer Suite (VIIRS) sensor onboard Suomi National Polar-orbiting Partnership (SNPP) has 22 bands spanning the visible and infrared wavelengths from 0.4 to 12.5 μm . The bands consist of 14 reflective solar bands (RSB), 7 thermal emissive bands (TEB), and a day night band. The sensor data record (SDR) product contains geolocated and calibrated radiances measured by the RSB and TEB as well as quality flags and derived products such as brightness temperature and reflectance. SDR products are used to generate 22 environmental data records (EDR) including active fire, ocean color, and sea surface temperature. The active fire team reported an inconsistency in the way radiance limits and derived products limits are generated. The quality flags are also independently determined for radiance limits and derived product limits. This paper focuses on operational code modifications to address the inconsistent radiance and derived product limits and quality flag determination algorithm.

In addition to algorithm code modifications, we defined new radiance limits and expanded the range of the EBBT LUT. Plots of the expanded I5 and M14 curves are shown in Figure 1. The new LUT has a maximum radiance sampling interval ($\Delta\text{radiance}$) of 0.005 $\text{W}/\text{m}^2\text{-ster-um}$ and brightness temperature sampling interval (ΔBT) of 0.0025 K for each band. After implementation of all the changes to ADL Mx8.5, an RDR with inconsistent products and flagging was reprocessed. In the base Mx8.5 run, the M15 band SDR at September 2, 2014, 12:05Z has 5 pixels with calculated radiance of 20.5. One of the pixels is saturated while the other four pixels have quality flag set to 65, which is equivalent to both “radiance out-of-range” and “pixel quality poor”. The brightness temperatures of the four non-saturated pixels range from 361.5 K to 366.8 K. With the updated limits and code, the saturated pixel stays saturated and the other four pixels have radiances corresponding to the brightness temperatures with no quality flags set. The higher radiance limits have turned the four poor quality pixels into useable data with consistent radiance/brightness temperature values.

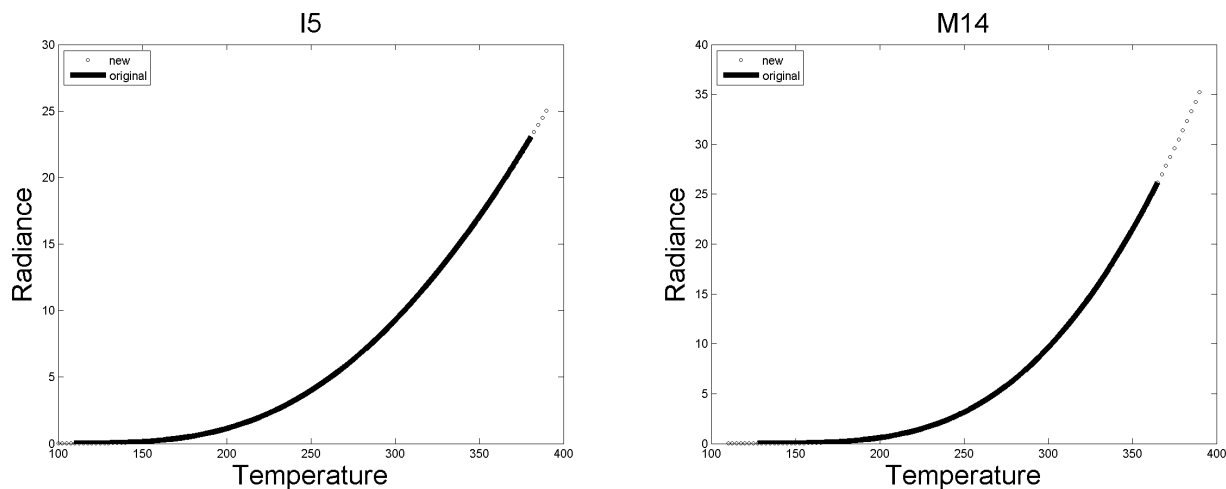


Figure 1. Expanded radiance vs. brightness temperature curves for I5 and M14.