

Correction of the Himawari-8 AHI's Sensitivity Trend

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Meteorological Satellite Center
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The Japan Meteorological Agency (JMA) plans to update the Himawari Standard Data (HSD) format, which includes the latest calibration coefficients with sensor sensitivity trends taken into account. Fig. 1 shows these trends for the Himawari-8 Advanced Himawari Imager (AHI-8) visible and near-infrared (VNIR) bands (i.e., Bands 1 to 6) as derived from solar diffuser observations. Degradations of approximately 0.5% per year are observed in the trends of Bands 1 to 4.

For evaluation of these trends, the sensor sensitivity correction coefficient D can be defined as

$$D = \frac{\widehat{m}_{yyyy}}{\widehat{m}_{2015}} \quad (1),$$

where \widehat{m}_{yyyy} is the average calibration slope for all detectors of each band as derived from four solar diffuser observations conducted on 7 and 22 May and on 7 and 22 June yyyy, while \widehat{m}_{2015} is the average calibration slope for 2015 as derived in the same way, though Himawari-8 was not yet operational at the time.

Multiplying the slope (no. 8 in the #5 calibration information block for HSD format) and intercept (no. 9 in the #5 calibration information block for HSD format) for 2015 by the sensor sensitivity correction coefficient D gives the corrected slope and intercept. The results are shown in Tables 1 and 2. Fig. 2 also shows the corrected sensor sensitivity trends. The degradations seen in the trends of Bands 1 to 4 in Fig. 1 are appropriately corrected.

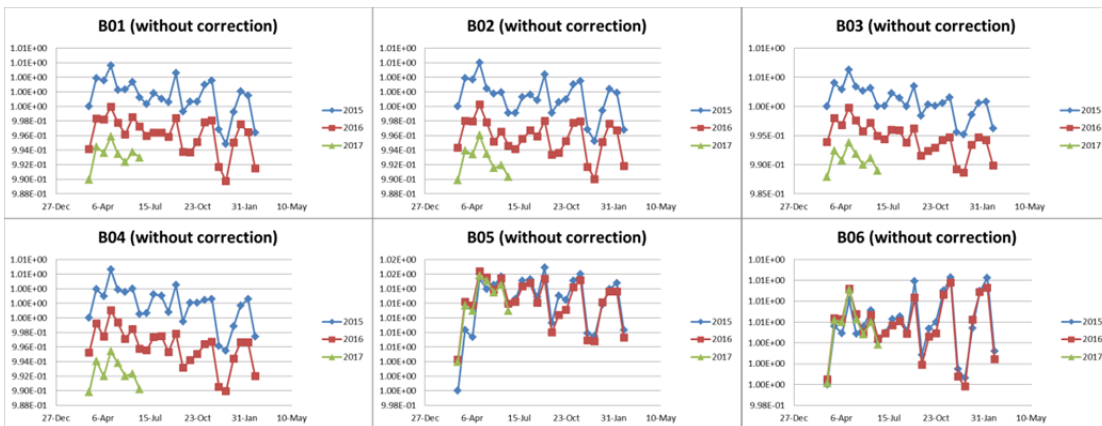


Fig. 1 Himawari-8 sensor sensitivity trends

Time-series representations of sensor sensitivity (inverse of calibration slope) as derived from AHI-8 solar diffuser observations. Values are averaged over the detectors and normalized with the first observation made on 7 March 2015. The range of the x axis is from 7 March to 22 February.

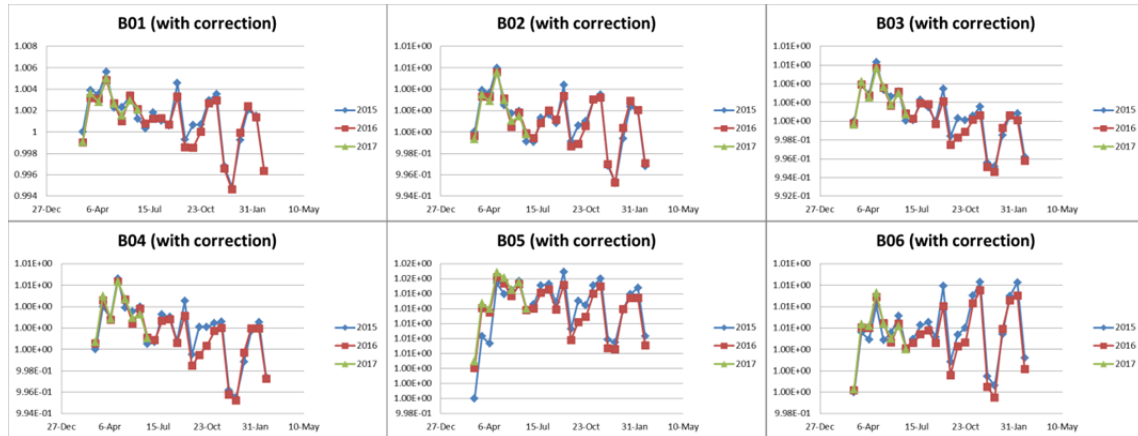


Fig. 2 Himawari-8 corrected sensor sensitivity trends

As per Fig. 1 but with correction of sensor sensitivity trends

Table 1 Slope of digital count – radiance conversion equation (Himawari-8)
 The latest data will be included in no. 12 of visible, near-infrared bands (Bands 1 – 6) in the #5 calibration information block for HSD format.

Band/Year	2015	2016	2017
B01	0.37735835	0.37920237	0.38083577
B02	0.35410388	0.35598556	0.35748863
B03	0.30549747	0.30731905	0.30913652
B04	0.18197547	0.18294331	0.18397175
B05	0.04537718	0.04536906	0.04542336
B06	0.01406841	0.01406430	0.01407068

Table 2 Intercept of digital count – radiance conversion equation (Himawari-8)
The latest data will be included in no. 13 of visible, near-infrared bands (Bands 1 – 6) in the #5 calibration information block for HSD format.

Band/Year	2015	2016	2017
B01	-7.54716706	-7.58404731	-7.61671534
B02	-7.08207765	-7.11971124	-7.14977261
B03	-6.10994941	-6.14638096	-6.18273038
B04	-3.63950941	-3.65886614	-3.67943502
B05	-0.90754353	-0.90738115	-0.90846722
B06	-0.28136824	-0.28128597	-0.28141362