Blick Software Suite

Version 1.7

Processor Release Note
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1 Release overview

General	
Operational from	December 2019
Predecessor version	1.5
Compatible with files from predecessor?	
Raw data (L0)	YES
Operation file	YES
Calibration file	YES
Processing setup file	NO

2 Major changes

These are the main changes between Blick Software Versions (BSS) v1.5 and v1.7:

C1 Included instrument sensitivity in spectral fitting for wavelength change.

C2 Add entry "Data product status" to L2 files.

C3 Improved the merging of L2Fit data into L2 data avoiding holes in the full data base.

C4 Applied a linearization for the offset term in the linear fitting to speed up the retrieval.

C5 Adapted BlickP to work on compressed files.

C6 The average signal is added to the output of L2 files. This parameter gives a quick look of the signal level and also allows a correct evaluation of the smoothing polynomials used in the spectral fitting, since they have been scaled by this value.

C7 The option to apply successive fitting is added. This technique allows to enter results from a different fitting process into the current spectral fitting.

C8 Adapted BlickP to work with high speed measurements.

For details we refer to the manual (*Cede* [1]).

3 Impact on operational data

3.1 Comparison approach

In the following two subsections, a comparison between v1.5 and v1.7 processed L2 data for 14 datasets is performed in terms of:

- absolute difference in Dobson Units (DU): v1.7 - v1.5

- relative difference in %: (v1.7 - v1.5) / v1.5

As illustrated in the overview plot (Figure 1), the differences are not normally distributed, wherefore values for absolute and relative differences are reported as median, 5% quantile, and 95% quantile. Moreover, the same evaluation is performed for each of the 14 sites individually to illustrate instrument-specific differences.
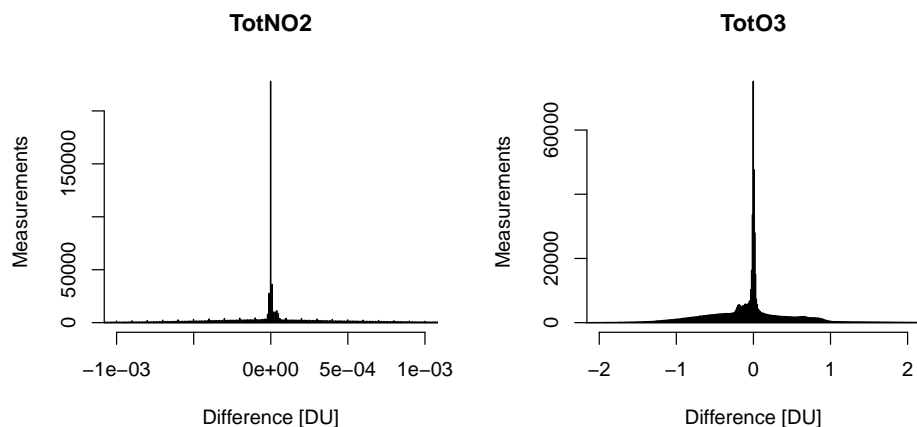
3.2 Direct sun total column NO$_2$

The following comparison refers to retrieval code 'nvs0' for direct sun NO$_2$. Using the subset of high quality data (flag=0,10) for 14 sites, leads to 836 470 individual NO$_2$ measurements to be compared. Table 1 summarizes the overall differences for NO$_2$. On median, there is no difference in the total column amounts (TC),

|	ΔTC[DU]	ΔTC[%]	Δwrms[]	Δwrms[%]
Median	0.000	0.000	0	0.000
Q5	-0.001	-0.253	0	-0.714
Q95	0.001	0.430	0.2e-4	6.499

Table 1: Summary of NO$_2$ for absolute differences in total column [DU], relative differences in total column [%], relative differences in wrms [%], reported as median, 5% quantile, and 95% quantile (top,middle,bottom).

and measured uncertainty weighted root mean squared (wrms). The inner 90% of relative differences range for -0.25 to +0.43% change in the total columns. The absolute values range from -0.001 to 0.001 DU, and varies between the sites. Figure 2 illustrates the station-wise evaluation.

Figure 1: Absolute Differences for NO_2 (left) and O_3 (right).

Figure 2: Boxplot of station-wise differences for NO_2 (left) and O_3 (right), evaluated for 5% (q5) and 95% (q95) quantile for each of the 14 sites. Shown are the median as a horizontal bar, the interquartile range (25–75%) in boxes, whiskers for +/- 1.5 times interquartile range, and outliers in solid circles.
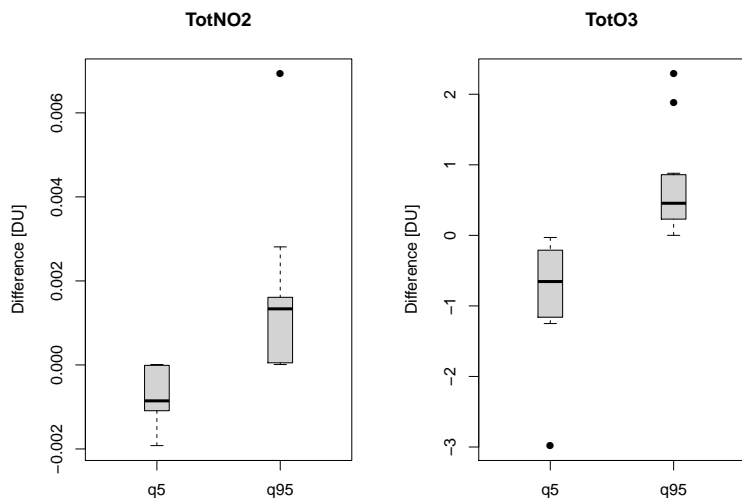
3.3 Direct sun total column O_3

The following comparison refers to retrieval code 'out0' for direct sun O_3. Using the subset of high quality data (flag=0,10) for 14 sites leads to 738 238 individual O_3 measurements to be compared. Table 2 summarizes the overall differences for O_3. On median, there is no difference in the total column amounts (VC). However,

	$\Delta TC[DU]$	$\Delta TC[\%]$	$\Delta wrms[]$	$\Delta wrms[\%]$
Median	0.00	0.00	-1.7e-4	-3.21
Q5	-0.97	-0.32	-7.0e-4	-12.00
Q95	0.85	0.32	0	0.01

Table 2: Summary of O_3 for absolute differences in total column [DU], relative differences in total column [%], relative differences in wrms [%], reported as median, 5% quantile, and 95% quantile (top,middle,bottom).

there is a positive impact on the wrms, being smaller with v1.7. The inner 90% of relative differences range for -0.3 to +0.3% change in the total columns. The absolute values range from -0.97 to + 0.85 DU, and varies between the sites. Figure 2 illustrates the station-wise evaluation.

4 Summary

The change from processing version v1.5 to v1.7 shows similar changes in the total columns for NO_2 and O_3 of approximately +/- 0.3%. This change is motstly related to C1 (Sec. 2), where its improvements are visible in particular the decreased wrms of O3.

v1.7 requires a new processing setup file if data want to be processed locally, which can be downloaded from `https://www.pandonia-global-network.org/home/documents/software/`.

5 Applicable Documents

[1] A. Cede. *Manual for Blick Software Suite Version 17*, 2019. URL `https://www.pandonia-global-network.org/wp-content/uploads/2019/11/BlickSoftwareSuite_Manual_v1-7.pdf`.