Parameter	S5P operational algorithm	QA4ECV algorithm
Slant columns		
Fitting interval 1	328.5–359 nm	
Fitting interval 2	328.5–346 nm ($N_{s,\,BrO}$ fixed by fit in interval 1)	
Absorption cross sections	HCHO, Meller and Moortgat (2000), 298 K NO_2, Vandaele et al. (1998), 220 K Ozone, Serdyuchenko et al. (2014), 223 + 243 K BrO, Fleischmann et al. (2004), 223 K	
O_2-O_2, Thalman et al. (2013), 293 K		
Ring effect	Ring cross section based on the technique outlined by Chance and Spurr (1997), defined as I_{rrs}/I_{elas}, where I_{rrs} and I_{elas} are the intensities for inelastic (rotational Raman scattering) and elastic scattering processes.	
Non-linear O_3 absorption effect	Two pseudo-cross sections from the Taylor expansion of the ozone slant column into wavelength and the O_3 vertical optical depth (Puķīte et al., 2010).	
Slit function	One slit function per binned spectrum as a function of wavelength (Pre Flight Model, TROPOMI ISRF Calibration Key Data v1.0.0)	Fit of a prescribed function shape to determine the ISRF during wavelength calibration plus online convolution of cross sections.
Polynomial	Fifth order	
Intensity offset correction	Linear offset ($1/I_0$)	
Iterative spike removal	Not activated	Activated. Tolerance factor 5 (see Sect. 2.2.1)
Reference spectrum I_0	Daily solar irradiance	Daily average of radiances, per row, selected in a remote region.
Air mass factors		
Altitude-dependent AMFs	VLIDORT, 340 nm, 6-D AMF look-up table	
Treatment of partly cloudy scenes	IPA, no correction for f_{eff} <10 %	
Aerosols	No explicit correction	
A priori profile shapes	TM5-MP 1° × 1°, daily forecast (NRT) or reprocessed (offline)	
Correction of surface pressure	Yes (Eq. 10)	
Surface albedo	OMI-based monthly minimum LER (update of Kleipool et al., 2008)	
Digital elevation map	GMTED2010 (Danielson et al., 2011)	
Cloud product	S5P operational cloud product, treating clouds as Lambertian reflectors (OCRA/ROCINN-CRB; Loyola et al., 2018)	OMI operational cloud algorithm, treating clouds as Lambertian reflectors (O_2-O_2; Veefkind et al., 2016)
Background correction		
Correction equation	$N_{v,0} = N_{v,0,CTM}$	$N_{v,0} = \frac{M_0}{M} N_{v,0,CTM}$ (see Sect. 2.2.3)