The solar data released have been reduced using version 2.2.2 of the ESPRESSO Data Reduction Software (DRS). Details about the reduction and the obtained data are given in the following paper: Dumusque et al. 2020, arXiv:2009.01945

Data available in file harpn_sun_release_timeseries_2015-2018.csv

GROUP	NAME	DESCRIPTION	UNIT	TYPE
OBS	FILENAME	Name of the observation	-	STRING
	COORDINATES	Sun coordinates	hms / dms	STRING
	DATE_BJD	Barycentric Julian Date minus 2400000	days	FLOAT
	TEXP	Exposure time	sec	FLOAT
	AIRMASS	Sun airmass	-	FLOAT
	SN_ORDER_10	Signal to noise in order 10	-	FLOAT
	SN_ORDER_20	Signal to noise in order 20	-	FLOAT
	SN_ORDER_30	Signal to noise in order 30	-	FLOAT
	SN_ORDER_40	Signal to noise in order 40	-	FLOAT
	SN_ORDER_50	Signal to noise in order 50	-	FLOAT
	SN_ORDER_60	Signal to noise in order 60	-	FLOAT
	OBS_QUALITY	Quality flag to assess the observation's quality (no clouds, no calima). Data with values >= 0.99 are all excellent. See section 2.3 in Collier-Cameron et al. (2019) for more information.	-	FLOAT
	DRS_QUALITY	Quality flag of the data reduction software (true for good, false for bad)	-	BOOLEAN

RVs	RV_RAW	RV of the Sun in the barycentric rest frame	m/s	FLOAT
	RV	RV of the Sun in the heliocentric rest frame, corrected for differential extinction. This value is obtained by substracting BERV_BARY_TO_HELIO and RV_DIFF_EXTINCTION to RV_RAW	m/s	FLOAT
	RV_ERR	RV error	m/s	FLOAT

ACTIVITY	RHK	Log(R'hk) calcium activity index	dex	FLOAT
	RHK_ERR	Log(R'hk) calcium activity index error	dex	FLOAT
	SMW	S Mount Wilson calcium activity index		FLOAT
	SMW_ERR	S Mount Wilson calcium activity index error		FLOAT
	BIS_SPAN	Bisector span of the CCF	m/s	FLOAT
	BIS_SPAN_ERR	Bisector span error of the CCF	m/s	FLOAT
	FWHM_RAW	Raw FWHM of the CCF	m/s	FLOAT
	FWHM	FWHM of the CCF, corrected for the solar ecliptic obliquity and Earth orbit eccentricity. See section 3.2 in Collier-Cameron et al. (2019) for more information	m/s	FLOAT
	FWHM_ERR	FWHM error of the CCF	m/s	FLOAT
	CONTRAST_RAW	Raw contrast of the CCF	%	FLOAT
	CONTRAST	the CCF is conserved. See section 3.2 in Collier-Cameron et al. (2019) for more information	%	FLOAT
	CONTRAST_ERR	Contrast error of the CCF	%	FLOAT

CORRECTIONS	BERV	Barycentric Earth RV correction	m/s	FLOAT
	BERV_BARY_TO_HELIO	Correction to change from the barycentric to heliocentric rest frame. To change from the heliocentric to barycentric rest frame, just add this term to RV	m/s	FLOAT
	RV_DIFF_EXTINCTION	Estimation of the RV effect induced by differential extinction. See section 2.4 in Collier-Cameron et al. (2019) for more information. To include the effect of differential extinction, just add this value to RV	m/s	FLOAT

HARPS data reduction software products available

S2D spectrum

File name	r.HARPN.XXXX-XX-XXTXX:XX:XX.XXX_S2D_A.fits (and BLAZE_S2D.fits)
Description	The extracted echelle-order 1d spectra, corrected from the instrumental blaze, in the Earth rest-frame. These products are called S2D spectra due to their two dimensional shape. Note that if using the Python API or file download via the solar spectroscopy database through the DACE website to get a S2D spectrum, you will also get access to the BLAZE_S2D_A.fits file. The first and second table in the S2D_A.fits file contain the blaze-corrected extracted flux per pixel and corresponding error for each spectral order. The error corresponds to the photon-noise plus read-out noise of the detector added in quadrature, and divided by the blaze, so that the corresponding error can be directly used with the flux given in the first table of the FITS file. We note that the blaze is not corrected in the BLAZE_S2D_A.fits file. The third table corresponds to the quality of the pixels for each order, zero being good, and anything else being bad. Hot and bad pixels are flagged that way. Tables four and five are the wavelength solution in the vacuum and in air, and tables six and seven are the width of pixels in wavelength in the vacuum and in air, respectively. We note that all wavelengths are in Angstroms. Because of dispersion, the size of each pixel in Angstroms will change with wavelength, which implies that for a given order, the continuum of an S2D spectrum will show a significant slope. To correct for dispersion and thus get a flat continuum, the easiest is to divide the flux by the width of pixels in wavelength (divide table 1 by table six or seven, depending if you use the wavelength solution in the vacuum or the air).

S1D spectrum

File name	r.HARPN.XXXX-XX-XXTXX:XX:XX.XXX_S1D_A.fits
Description	The extracted merged-1d spectra, corrected from the instrumental blaze, in the Sun's rest-frame. These products are called S1D spectra. The only table in the FITS file includes the wavelength in the vacuum and in air for each point of the merged spectrum, its flux and the quality of the point, as defined in the first item above. We note that merged-1d spectra are interpolated on a grid constant in velocity space and not in wavelength space. The step between each point is 0.82 m/s, equivalent to the width of a pixel in velocity space.

CCF profile

File name	r.HARPN.XXXX-XX-XXTXX:XX:XX.XXX_CCF_A.fits
Description	The Cross Correlation Function (CCF) obtained by cross-correlating the S2D spectra with a synthetic mask optimised for the Sun. The first table in the FITS file gives the CCF measured for each echelle order, with a step of 0.82 m/s, in addition to the photon-noise weighted average CCF over all orders. Therefore, the table has the shape $N_{CCF} x (N_{ord}+1)$, where N_{CCF} is the number of points of the CCF and N_{ord} is the number of echelle orders, 69 for HARPS-N. The second table gives the photon noise errors, and the third table gives the quality of each point as defined in the description of the S1D spectrum.