ESO Phase 3 Data Release Description

Data Collection	<GAIAESO/batch_10516>
Release Number	<4.0>
Data Provider	<G.Gilmore, S.Randich>
Date	<03.12.2020>

Introduction

Gaia-ESO is a large public spectroscopic survey[1] carried out with FLAMES on the VLT between 2012 and 2018. The Survey targeted $\geq 10^5$ stars (in total 115,000 were observed) to systematically cover all major components of the Milky Way, from halo to star-forming regions in order to provide the first homogeneous overview of the distributions of kinematics and elemental abundances. These measurements by themselves have the power to revolutionise knowledge of Galactic and stellar evolution: when combined with *Gaia* astrometry the survey will quantify the formation history and evolution of young, mature and ancient Galactic populations. With well-defined samples, Gaia-ESO has surveyed the bulge, thick and thin discs and halo components, and open star clusters of all ages and masses. The UVES and Giraffe spectra allow us to quantify individual elemental abundances in each star; yield precise radial velocities for a 4-D kinematic phase-space; map kinematic gradients and abundance - phase-space structure throughout the Galaxy; follow the formation, evolution and, dissolution of open clusters as they populate the disc, and provide a legacy dataset that adds enormous value to the *Gaia* mission and on-going ESO imaging surveys. Joined exploitation of Gaia-ESO spectroscopy and Gaia astrometry has successfully started and 149 papers with "Gaia-ESO" in the title have been published, earning to date 3700 citations. 250 papers have been published with “Gaia-ESO” in the abstract, the other 100 being analyses external to the Gaia-ESO team. All Survey spectra have been processed and analysed, with the final homogenisation of advanced products underway, due for completion in Spring 2021. Overall, the Survey has met and delivered its top-level aims. In this data release (DR4.0) we deliver the set of stacked spectra for stars observed by the Survey, subject to minor selection criteria. The subsequent release (DR4.1) will shortly deliver an additional, small complement of spectra along with the catalogue of radial velocities, and the final release in the first half of 2021 (DR4.2) will deliver the complete final catalogue of results, including stellar atmospheric parameters and chemical abundances. The Gaia-ESO Survey motivation and strategy along with the Giraffe data processing will be described in the forthcoming paper by Gilmore et al. (2021, in prep.), while the survey implementation, open cluster survey and the legacy will be described in Randich et al. (2021, in prep.).

Overview of Observations

This release of the Gaia-ESO Survey (GES)[2] covers the complete set of observations obtained by the Survey. The observations were made in the period 31.12.2011-26.01.2018. These include Milky Way (MW) field observations, Open Cluster observations, and calibration observations of different targets, such as radial velocity standard stars, benchmark stars, globular clusters, COROT red giants and

1 . ESO programmes 188.B-3002, 193.B-0936 described in 2012Msngr.147...25G
2 . ESO programme 188.B-3002(A,B,C,D,E,F,G,H,I,J,K,L,M,N,O,P,Q,R,S,T,U,V,W)

more. The type of sample targeted in a field is designated with a 'GES_TYPE" descriptor, which may be found in the primary header of the FITS spectra. The "GES_FLD" descriptor gives a more specific description of the field, such as the cluster name. The "GES_TYPE" and "GES_FLD" keywords make it easier to pick out samples of interest, but some level of contamination by interlopers is to be expected (for example, MW field stars in a field designated as open cluster). See below for further information on the cluster target selection process in particular, and see Stonkute et al. 2016 for further information on the selection function for the field. Also included are complementary observations extracted from the ESO archive and processed with the GES pipelines. These encompass mostly cluster observations retrieved to benefit calibrations and science, as well as some bulge observations. These archival observations span a wider range of dates (31.01.2003-11.07.2012) than the GES observations and are denoted by use of the prefix 'AR' rather than 'GE' in the GES_TYPE header keyword of the spectra. See Table 1 for a list of "GES_TYPE"s and the corresponding field types. Figure 1 shows the location of all the Gaia-ESO fields on the sky.

The MW targets survey the Bulge, Halo, Thick Disc and Thin Disc populations of the Milky Way. Three primary instrumental setups were used for these observations: UVES 580 for brighter objects and Giraffe HR10 and HR21 for fainter ones.

For the Bulge survey observations of K giants were carried out for the brighter objects (GK stars) using UVES 580, otherwise Giraffe HR10 and/or HR21 were used. For the Halo/Thick disc survey, the primary targets are F+G stars, where bluer fainter F stars probe the halo, and brighter F/G stars probe the thick disc. The outer thick disc is probed using distant F/G stars, as well as K giants to sample the far outer disc. For the solar neighbourhood, G stars were observed using UVES 580 only.

Table 1: The list of GES_TYPE header keywords used within the Survey to denote the observation and field types, and their definitions.

GES_TYPE prefix	**Observation type**
GE	Observed by GES
AR	ESO archive observation
GES_TYPE[3]	**Field type**
*_MW	Milky Way programme field
*_MW_BL	Milky Way programme field: bulge field
*_CL	Open Cluster programme field
*_SD_BM	Standard field[4]: FGKM benchmark stars
*_SD_BC	Standard field: Cool benchmark stars
*_SD_BW	Standard field: Warm benchmark stars
*_SD_CR	Standard field: CoRoT field

3 In the following list, '*' denotes either of the strings 'GE' or 'AR', which complete the GES_TYPE keyword.

4 Standard fields are observed/extracted from the ESO archive for calibration purposes

*_SD_K2	Standard field: Kepler (K2) field (C3)
*_SD_GC	Standard field: globular cluster
*_SD_MC	Standard field: miscellaneous[5]
*_SD_OC	Standard field: calibrating open clusters
*_SD_PC	Standard field: peculiar star templates
*_SD_RV	Standard field: radial velocity standards
*_SD_TL	Standard field: telluric standards

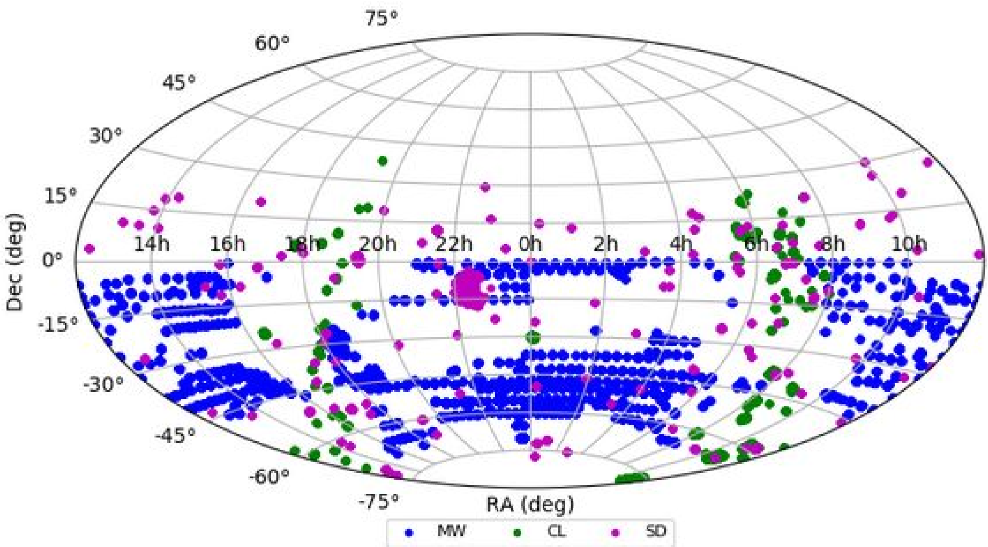


Figure 1: The sky distribution of Gaia-ESO Survey observed fields for all observations broken down by field-type: Milky Way fields (MW), clusters (CL), standards and calibration fields (SD). The clump of SD fields around 22h, -10 deg includes the Kepler 2 fields introduced in July 2016.

The Standard fields included in this release are: calibration observations of stars in the globular clusters M12, M15, M2, NGC104, NGC1261, NGC1851, NGC1904, NGC2808, NGC362, NGC4372, NGC4590, NGC4833, NGC5927 and NGC6752 which meet our selection threshold for inclusion (see **Data Quality** section); calibrating open clusters observed in a range of setups to aid in inter-setup calibration (Berkeley 32, M67, Melotte 71, NGC2243, NGC2420, NGC2477, NGC3532, NGC6253, NGC6553); an expanded set of *Gaia* benchmark stars that includes warm and cool benchmarks targeted to aid in the homogenisation of hot and cool stellar samples; COROT giants and Kepler (K2) targets which have asteroseismic results available

[5] Stars which no longer meet the definition criteria of their original classification (e.g. BM) and which may otherwise contaminate the selection functions of the observing programmes have been reclassified as miscellaneous.

(Worley et al 2020, submitted), and radial velocity standards.

The open cluster survey aims to cover the age-metallicity-distance-mass parameter space. Depending on the stellar spectral type, open cluster stars are observed with different Giraffe gratings (HR03/5A/6/9B/14A/15N), and two UVES settings (UVES520 and UVES580). In 2016, the Giraffe HR04 grating was also introduced for the very hot stars. This data release includes spectra for 61 science open clusters observed by Gaia-ESO (25 Ori, Assc50, Blanco1, Berkeley 21, Berkeley 25, Berkeley 30, Berkeley 31, Berkeley 32, Berkeley 36, Berkeley 39, Berkeley 44, Berkeley 73, Berkeley 75, Berkeley 81, Chamaeleon I, Collinder 197, Cz24, Cz30, ESO92_05, Haf10, IC2391, IC2602, IC4665, Loden165, NGC2141, NGC2158, NGC2232, NGC2243, NGC2244, NGC2264, NGC2355, NGC2420, NGC2425, NG2451, NGC2516, NGC2547, NGC3293, NGC3532, NGC3766, NGC4815, NGC6005, NGC6067, NGC6259, NGC6281, NGC6405, NGC6530, NGC6633, NGC6649, NGC6705, NGC6709, NGC6802, Pismis 15, Pismis 18, rho Ophiucus, Ruprecht 134, Trumpler 14, Trumpler 20, Trumpler 23, Trumpler 5, gamma 2 Velorum, lam Ori). Archival observations are included for additional clusters.

Normally, the faint cluster members ([pre-]main sequence or turn-off stars) are observed using Giraffe, while for the brighter stars (typically evolved giants or bright [pre-]main sequence cluster candidates) UVES parallels are employed. Limiting magnitudes for cool stars (later than A-type) are V=16.5 and V=19 mag for UVES and Giraffe respectively. Different magnitude ranges are covered in clusters where hot stars are observed with the blue gratings. An overlap in magnitude between the Giraffe and UVES samples is present normally and a number of stars were observed with both instruments for inter-calibration purposes.

Within each cluster, the target selection procedure was implemented slightly differently between Giraffe and UVES, but uniformly across clusters. Namely, for Giraffe, with which we aim to observe unbiased and inclusive samples, cluster candidates are selected on the basis of photometry. We used proper motions and other membership indicators (like e.g., X-ray emission) only to define the photometric sequences and the spatial extent of the clusters. In general, we did not use proper motions to select the targets, although in some cases they were employed to discard secure non-members. For UVES, with which we aim to target more secure cluster members, we instead employed membership information from the literature (e.g., v_{rad}, Li, Hα), when available. More details on the target selection within clusters can be found in Bragaglia et al. (2021, to be submitted). For both MW and open clusters the range of observations are restricted to $+10° \geq$ Dec $\geq -60°$ whenever possible to minimise airmass limits (in practice a few target clusters are outside of this range). Figure 2 shows the seeing distribution, for the combined MW and CL dataset. Figure 3 shows instead the range of observing conditions during which the observations were taken.

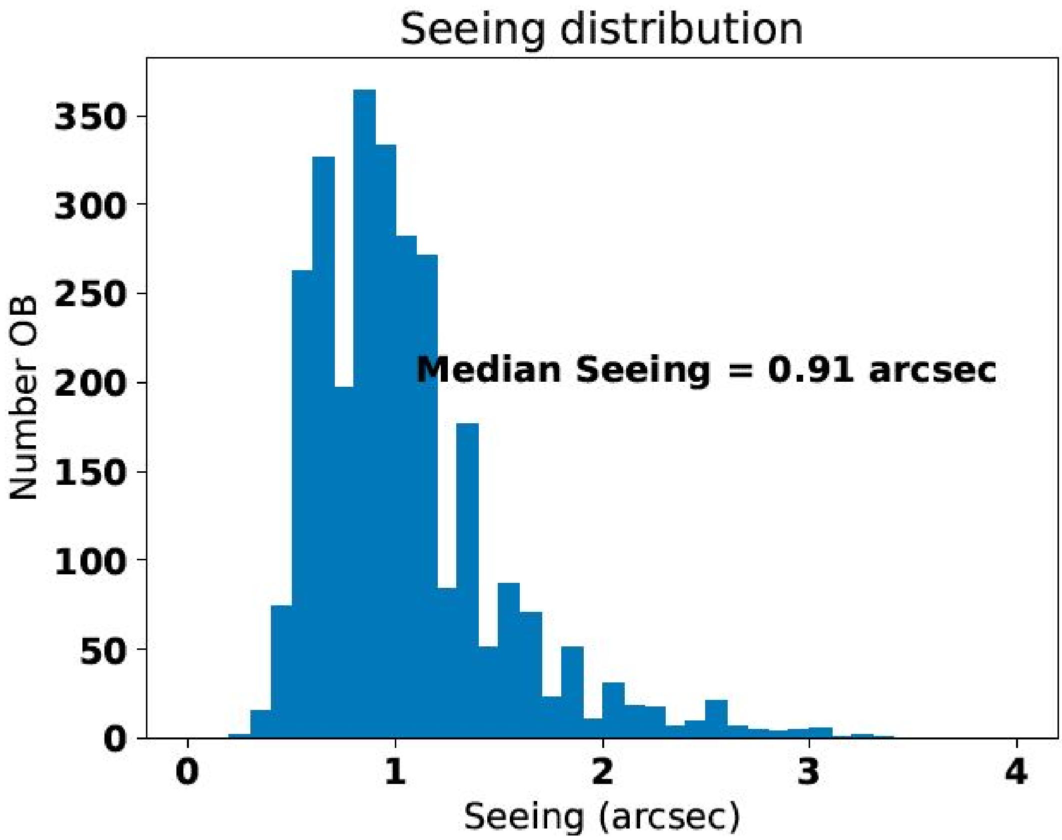


Figure 2: The distribution of the seeing for the Gaia-ESO Survey OBs (simultaneous in GIRAFFE/UVES).

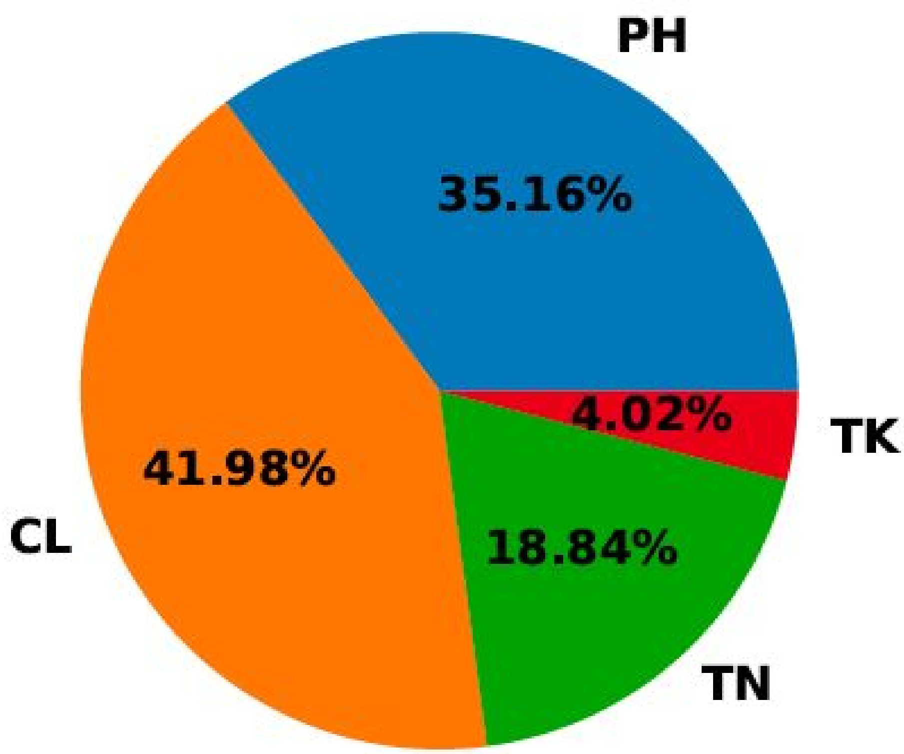


Figure 3: Percentages of the observing time during which the following observing conditions were experienced: PH = Photometric, CL = Clear, TN = Thin cirrus cloud, TK = Thick cirrus cloud. The percentage of observing time lost during the period due to bad weather was 13.6%, technical problems, 3.5% and target of opportunity (ToO) observations, 2.5%.

The primary source catalogue for the Milky Way field stars is VISTA imaging, ensuring excellent recent astrometry pre-Gaia DR2, and adding maximal value to the VISTA surveys.

Photometry for the open clusters mainly comes from the literature and 2MASS. Astrometry is from 2MASS.

Release Content

THE SPECTRA

The observations in this data release are summarised in Table 2. The total number of submitted data files is 190200 (size: 31.75 GB uncompressed) comprising spectra of 114500 unique targets. Included in this sample are 7143 ESO archive spectra, reduced and analysed within GES by the GES pipelines. Figure 4 presents the histograms of the *J* magnitudes of the targets included in this release.

Table 2: Summary of observations and spectra for DR4.0 (covering the full observation period of GES, from 31/12/2011-26/01/2018.)

Field Type[6]	Instrument	Grating	Spectral Range (Å)	Resolving Power (R)	No. Objects	No. Spectra	Median SNR	No. Objects per field type
MW	Giraffe	HR10	5339-5488	21500	50299	50299	13.4	
		HR21	8484-9001	18000	59123	59123	33.0	
	UVES	580	4771-6785	50000	3604	7208	48.4	63723
SD	Giraffe	HR10	5339-5619	21500	4981	4981	43.7	
		HR15N	6470-6750	19200	4358	4358	73.0	
		HR21	8484-9001	18000	6324	6471	82.8	
		HR9B	5143 - 5356	31750	251	251	93.4	
		HR3	4033-4201	31400	16	16	313.5	
		HR5A	4540-4587	20250	16	16	392.9	
		HR6	4538-4759	24300	16	16	412.7	
		HR14A	6308-6701	18000	215	215	48.8	

6 See Table 1 for a more detailed breakdown of the field types, denoted by the 'GES_TYPE' keyword.

	UVES	520	4140-6210	50000	134	268	36.0	
	UVES	580	4771-6785	50000	1043	2108	72.4	8820
CL	Giraffe	HR10	5339-5619	21500	481	481	56.3	
		HR15N	6470-6790	19200	36180	36200	38.7	
		HR21	8484-9001	18000	480	480	60.0	
		HR9B	5143 - 5356	31750	3510	3526	27.5	
		HR3	4033-4201	31400	2180	2235	43.7	
		HR4	4188-4392	24000	1242	1283	64.3	
		HR5A	4540-4587	20250	2091	2147	51.7	
		HR6	4538-4759	24300	2075	2131	55.3	
		HR14A	6308-6701	18000	2082	2137	79.6	
	UVES	520	4140-6210	50000	328	666	147.5	
	UVES	580	4771-6785	50000	1784	3584	75.8	41976

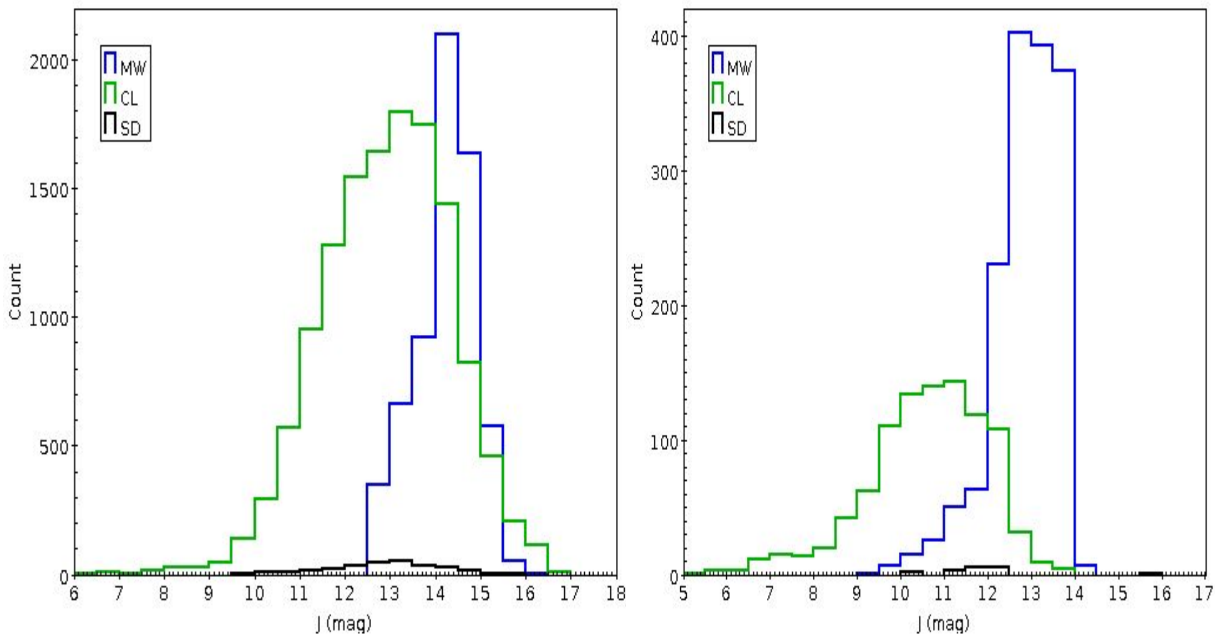


Figure 4: Histogram of magnitudes of targets (JVISTA for MW fields, J2MASS for clusters.) Left-hand panel: GIRAFFE; right-hand panel: UVES.

Release Notes

Data Reduction and Calibration

The standard Gaia-ESO observing procedure is to divide each observing block into

three exposures (except for Giraffe HR21 which is normally divided into two). Two of these are long exposures which are then co-added to eliminate residual cosmic rays, and one is a short exposure (of a few seconds), which is taken for the purpose of obtaining a simultaneous arc lamp spectrum (SIMCAL) with Giraffe for the wavelength calibration. Spectra from the short exposures are not co-added when creating the final spectra.
Departures from this observing pattern exist – in the case, for example, of periods of poor seeing when additional exposures of a field have been obtained with the aim of increasing the signal-to-noise ratio (SNR). Conversely, during occasional periods of exceptionally good seeing, only one exposure of a field may be taken.

Multi-epoch exposures are defined to be those composed of individual exposures originating from more than one night. A night is defined as the 24-hour period from noon-noon local time (16:00-16:00 UT).

Reduction Pipeline: Giraffe

The Giraffe spectra were reduced by a pipeline that was specially written at the Cambridge Astronomical Survey Unit (CASU). It performs all of the following steps:

- *Bias correction and 2D flat fielding.* The latter is done using test dome flats that are taken periodically as part of the instrumental health checks. Although these are not dispersed flat fields and, of course, flat fields are wavelength dependent, using these does take out a large amount of the pixel-to-pixel variation. (Unfortunately dispersed flat fields without the fibre feed in the light path are not available);
- *Localisation and tracing of the fibre spectra using fibre flat field images.* The optimal extraction profile fits are also done at this point;
- *Extraction of arc spectra, identification of arc lines and wavelength-solution calculation;*
- *Removal of scattered light, extraction and wavelength calibration of object spectra.* The spectra are wavelength calibrated using the arc solution and also shifted to the solar rest frame. For all but the HR21 setting the SIMCAL lamp spectra are used to define a correction to the wavelength solution that is also applied here. For HR21 a similar correction is applied using a subset of well-studied night-sky lines;
- *Sky correction using combined sky fibres from the field.* For all but HR21 the combined sky spectrum is used as is and is subtracted from each object spectrum. For HR21, the sky spectrum is scaled by the relative fluxes of the sky lines to ensure cleaner sky removal;
- *Repeat exposures of the same objects are stacked and cosmic rays are removed.* These are then normalised by the fibre flat field to remove the large-scale wavelength-dependent variation in each fibre.

Reduction Pipeline: UVES

The UVES data were reduced at INAF-Arcetri, using the public ESO FLAMES-UVES pipeline (version 5.5.2) for the standard steps of the data reduction process (e.g., bias subtraction, flat-fielding and wavelength calibration) and a pipeline written at INAF-Arcetri for the sky-subtraction, barycentric correction, co-addition. Details of the reduction process can be found in Sacco et al. 2014, A&A 565, 113). In the most recent data releases, a module has been introduced to improve the wavelength calibration that is performed using exposures of a Th-Ar lamp taken in daytime. Specifically, the zero point of the wavelength solution is corrected using some sky lines[7].

The main steps are summarized below.

The reduction is performed in a semi-automatic way, following a reduction cascade. Relevant raw data, including both calibration and science frames, are selected and inserted into the reduction path.

All acquired data are pipeline-reduced using the best possible master calibration products, which are produced starting from the best available day-time calibration frames. After quality checks, these are applied to the reduction of science data. The standard reduction steps followed are:

- *Bias subtraction*;
- *Flat-fielding;*
- *Tracing of the spectral order position*;
- *Wavelength calibration*;
- *Optimal extraction of science spectra* (spectra are de-convolved for fibre cross talk and intra-order background is subtracted);
- *Spectra are corrected for differences in fibre transparency*;
- *The orders are merged*;
- *The sky spectrum from the fibre allocated to the sky is subtracted from the target spectra.* This step is performed both on the individual orders, and on the merged spectra. When more than one fibre is allocated to the sky, the median of the sky spectra is subtracted;
- *Both single order and merged spectra are shifted to a Heliocentric reference system*;
- *Both single order and merged spectra of the same target are co-added*;
- *A median SNR ratio across the whole spectrum is calculated, for both CCDs*;
- *All co-added spectra are flagged for binarity*;
- *Final quality checks are performed on the spectra* (see **Data Quality** section);

Post-processing

The normalisation applied to the spectra depends on the particular science goal of the analysis. The choice of continuum level in particular is an individual one which is left as a scientific choice for the end user. As we did in the first release, we deliver here non-normalised spectra to ensure that no valuable information is lost from the spectra.

For the UVES echelle spectra, we have merged the spectral orders and deliver only the merged spectra.

Data Quality

Spectra - general

[7] A more detailed description of the improvements to the UVES wavelength calibration will be provided in the release document accompanying the next release, DR4.1.

The quality array ('QUAL') delivered along with the spectra in the data files codes data values as good quality (0) or bad quality (1). These code values are derived from weight maps where a value of '1' represents a bad pixel.

The distribution of the SNR values for the UVES and GIRAFFE spectra is shown in Figure 5.

Further quality control that is applied to the spectra is described below.

Quality Control: Giraffe spectra

QC on the Giraffe data is carried out as part of the spectral template fitting which then assigns a basic classification.
The main criteria defining this classification are:

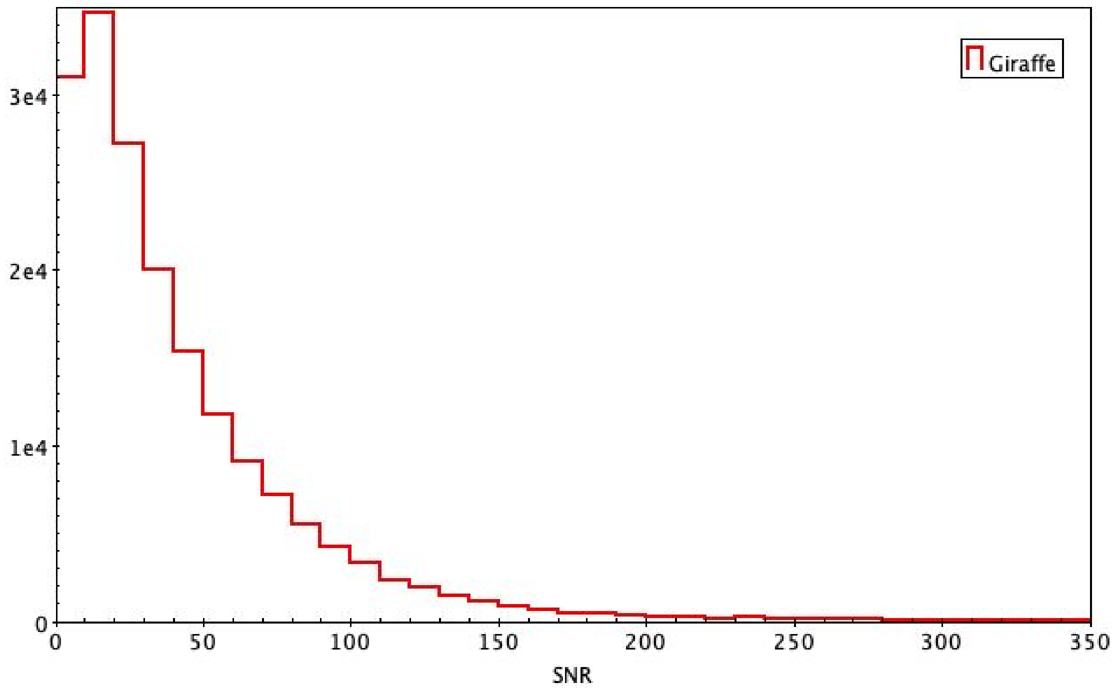
- the χ^2 of the fit;
- the SNR (calculated per pixel);
- the χ^2 of the pure continuum fit; and
- the distance to the best fit template.

The spectrum is marked as UNKNOWN instead of STAR when the continuum-only fit is better or almost as good as the template fit. The χ^2 and/or distance to the best-fit template are higher than a certain SNR-dependent threshold.
The reduced spectra then undergo a visual inspection for any remaining artifacts, and if detected, these artifacts are corrected before release of the spectra for analysis.

Quality Control: UVES spectra

Quality control (QC) on the UVES data is performed in three steps:

- Check on the quality of the calibration frame by comparing the QC parameters, which are given as output by the ESO pipeline, with the typical values published on the ESO website. This approach allows us to verify the instrument stability (e.g. the stability of the bias frame or the precision of the wavelength calibration);
- Visual inspection of the final spectra aimed at discovering artifacts or other anomalies (e.g., in the wavelength calibration). If this analysis identifies anomalies in one or more spectra, the whole workflow, since fibre allocation, is investigated. Once the problem is identified, the reduction is performed again to improve the quality of the spectra;
- Selection of SNR thresholds. (The SNR is the median value and is quoted per pixel.)



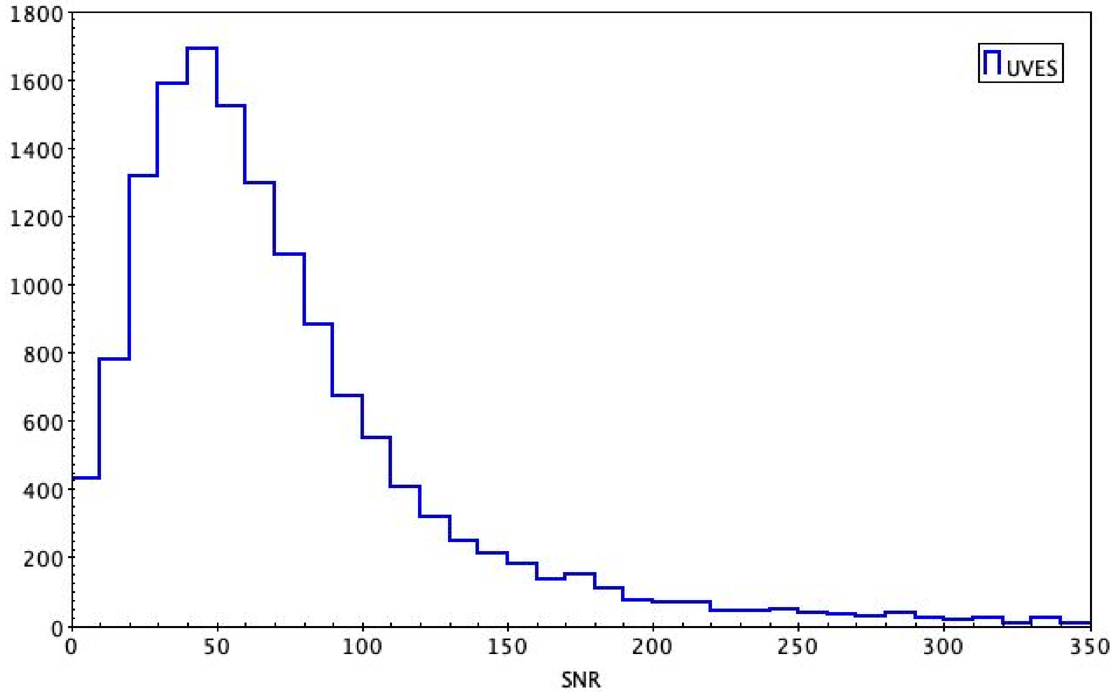


Figure 5: SNR distributions for the released spectra (DR4.0; equivalent to internal Data Release 6 of Gaia-ESO); GIRAFFE and UVES are shown in the upper and lower panels, respectively.

Quality Criteria

The spectra included in this data release satisfy the following key criteria:

1. Observed and/or processed as part of the Gaia-ESO Survey[8];
2. They are not characterized by obvious reduction issues: spectra suffering from such defects were deprecated during the final analysis cycle.
3. They have all undergone an internal cycle of analysis (the GES iDR6), even if the resulting parameters are not yet released because the work on the final catalogue is ongoing.
4. The pipeline-determined signal-to-noise ratio is not less than two for all the spectra included in the release (SNR>=2).
5. UVES spectra have matching upper and lower CCD spectra available. (This prevents those cases where one of the upper/lower pair of spectra gets thrown out for low SNR and the other spectrum of the pair is also low-SNR but above the SNR threshold.)

A note on object identifiers

Definition of the 'OBJECT' keyword

The ESO 'OBJECT' spectral header keyword corresponds to the 'CNAME' keyword used within the GES project. At the start of GES, no comprehensive photometric input catalogue was available that covered the full range of targets (refer to Figure 4. for the magnitude distribution of targets). Without a consistent source for object identifiers, the CNAMEs were defined based on the coordinates of the target in the earliest component spectrum of the stack. This system has worked well for the majority of sources, but has led to some discrepancies in object identifiers. High-proper-motion stars, including the benchmark stars, have been most affected. The coordinates for these stars may change significantly between observations, depending on the time separation. This has led in some cases to different CNAME values being assigned to the same star across subsequent releases. Additionally, with different input catalogues and slightly different input coordinates being used for the brighter UVES targets compared to the generally fainter Giraffe targets, in some cases the same star could be assigned a different CNAME in each instrumental setup within the same release, and these have had to be merged later. In earlier releases there were a few cases where observation fields overlapped and two observations of a spectrum for an object were not merged together because of slightly differing CNAMEs. The field definitions were standardised in internal Data Release 4 (iDR4) so as not to overlap, and efforts were made to standardise the CNAME object identifiers going forward, and any remaining duplicate object spectra were merged in iDR6 (upon which the current release is based). Some CNAMEs have been found to have changed in this release, perhaps because the intensive quality control of the spectra for the final analysis cycle meant many individual component frames of the stacked spectra were deprecated, thus changing the source of the coordinates used for the CNAME. Note that iDR6 was prepared before the release of Gaia DR2.

Release plan for objects affected

In this release (DR4.0), the objects for which the 'OBJECT' value is in conflict with already published spectra have been excluded. The number of objects affected that

[8] Includes relevant ESO archival spectra selected for complementarity to science or calibration goals of the Survey and processed as part of the Gaia-ESO Survey. Does not include FLAMES Solar Atlas spectra which were used for calibration purposes within the Survey. The solar spectra may be downloaded from the ESO website at:
https://www.eso.org/observing/dfo/quality/UVES/pipeline/FLAMES_solar_spectrum.html

are excluded from the current release is approximately 600. The spectra for these objects will soon be published (early 2021) in a subsequent release, DR4.1.

Known issues

There are no known issues with the data products contained in this release.

Previous Releases

The previous release was number 3.1. The changes in the present release are as follows:

1. A larger set of spectra is released here. This release (DR4.0) comprises the majority of the stacked, per-object spectra that were produced by the final release of the Gaia-ESO Survey (corresponding to internal data release 6 - iDR6), subject to a very minor SNR threshold of 2, plus the exclusions based on object identifier inconsistencies listed above. The number of spectra released has increased from approximately 44,000 in DR3.1 to more than 190,000 in DR4.0. The number of objects has increased from approximately 25,000 to more than 114,000.
2. The timeframe of the observations included has increased. In the previous release (DR3), a subsample of the spectra obtained up to 20 July 2014 was included. DR4.0 includes spectra observed up until the end of January 2018 (the last observations of the Survey).
3. The SNR and other selection criteria used for DR3 and DR3.1 have been relaxed or removed in this release, DR4.0. Spectra included are subject only to an SNR selection threshold of 2. An additional criterion that remains is to keep only the UVES spectra that have matching upper and lower CCD spectra available (see ***Quality Criteria*** above).
4. The spectra released here have been reduced with approximately the same versions of the GIRAFFE and UVES pipelines as were used in the previous release (DR3.1). However, UVES wavelength calibration has been improved as noted in the Section ***Reduction Pipeline: UVES***.
5. The current release contains only spectra, as per the last release DR3.1. A catalogue was delivered in DR3: we will deliver a catalogue of radial velocities shortly in the next release (DR4.1) and the full, final catalogue in the subsequent release, later in 2021.

Data Format

Files Types

The files provided for this release are in the format as specified in issue 5 of document GEN-SPE-ESO-33000-5335. This consists of a FITS file with a primary header unit containing no data and a binary FITS table extension containing the data. The header cards in the header unit of each extension contain the information requested in the above document.[9] The wavelength array (WAVE), spectrum (FLUX), error array (ERR) and quality array (QUAL) are each provided in a single cell of the one row contained in the binary table.

The objects in each file have a name which is derived from the object's equatorial coordinates. This is formed by splicing the RA (in hours, minutes and seconds to two decimal places) and Declination (in degrees, minutes and seconds to one decimal place) as integers with the declination sign in the middle. Thus an object at 3h40m21.767s and -31°20'32.71" will have the name 03402177-3120327 (the cname).

The name of the file is of the form <prefix>_<cname>_<expmode>_<version>.fits, or <prefix>_<cname>_<expmode>_<index>_<version>.fits. The value of <prefix> is either 'gir3' (Giraffe) ,'uvl3' (UVES lower) , or 'uvu3' (UVES upper) for GES-observed spectra. For archival spectra, the prefix is 'gar3' (Giraffe), 'url3' (UVES lower), or 'uru3' (UVES upper). The value of <expmode> is derived from the central wavelength and grating for the instrument, e.g. H875.7. The value of the <index> suffix is an integer assigned to distinguish each individual exposure spectrum for the unstacked benchmark spectra (all spectra without an <index> are stacked from the available spectra). The value of <version> denotes the GES internal data release version of the spectrum.

Acknowledgements

Please use the following statement in your articles when using these data:
Based on data products from observations made with ESO Telescopes at the La Silla Paranal Observatory under programme ID 188.B-3002.

[9] Please note that the SPEC_RES keyword in the primary header denotes the spectral resolving power, λ/Δλ, rather than the FWHM resolution.