VEXAS: the VISTA EXtension to Auxiliary Surveys

Data Release 1. The Southern Galactic Hemisphere

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Abstract

This document describes the first public data release of the VISTA EXtension to Auxiliary Surveys (VEXAS: Spiniello & Agnello, 2019, A&A, 630, hereafter S19), comprising seven cross-matched multi-wavelength photometric catalogues, where each object has a match in at least two different surveys.

The final aim of VEXAS is to build a uniform, large spatial coverage in the multi-wavelength sky (from X-ray to radio) and thus to provide the astronomical community with reference magnitudes and colours for various scientific uses: object classification (e.g. quasars, galaxies, and stars; high-z galaxies, white dwarfs); photometric redshifts of large galaxy samples; searches of exotic objects (e.g. extremely red objects and lensed quasars).

As of October 2019, the VEXAS catalogue is the widest and deepest public optical-to-IR photometric and spectroscopic database in the Southern Hemisphere.

Overview of Observations

In this first data release, covering the Southern Galactic Hemisphere (SGH), we cross-matched the two main extragalactic surveys on the Visible and Infrared Survey Telescope for Astronomy (VISTA, Emerson et al., 2006): the VISTA Hemisphere Survey (VHS, McMahon et al., 2013) and the VISTA Kilo Degree Infrared Galaxy Survey (VIKING, Sutherland et al., 2012), with many of the most successful wide-sky photometric surveys in the optical (the Dark Energy Survey, DES, Abbott et al., 2018; the Panoramic Survey Telescope & Rapid Response System DR1, PanSTARRS1, Chambers et al., 2016; and SkyMapper Southern Sky Survey, Wolf et al., 2018), in the infrared (the Wide-Infrared Survey Explorer, WISE, Wright et al., 2010), in the X-ray (ROSAT All Sky Survey, Boller et al., 2014, 2016; The XMM-Newton Serendipitous Survey, Watson et al., 2001) and in the radio domain (SUMSS, Bock et al., 1999). We also provide a match with spectroscopic data from the Sloan Digital Sky Survey Data Release 14 (Abolfathi et al., 2018) and the 6 degrees Field Galaxy Survey, 6dFGS Data Release 3 (Jones et al., 2009)

The core requirement is a reliable photometry in more than one band. This condition, together with the detection in at least two surveys (via cross-match), should minimize, if not completely eliminate, the number of spurious detections in the final catalogues.

Finally, for this VEXAS-DR1 we only consider objects below the Galactic plane, b<-20 deg. This is the area where wide-field weak-lensing cosmological experiments overlap; it covers a hemisphere with narrower previous coverage, and also includes the well-studied Stripe-82 area of the SDSS. Comparable operations at b>20 deg are planned for the second release of VEXAS.

Queries on the VISTA Surveys

The baseline near-IR tables were built by querying the VIKING-DR3 and the VHS-DR6 from the VISTA Science Archive website directly. To ensure that only objects with reliable photometry in at least one band are retrieved, we imposed the following criteria on the Petrosian magnitudes and their uncertainties:

$$
\begin{aligned}
&(\Delta\mathrm{Ks} < 0.3 \text{ AND } 8 < \mathrm{Ks}) \quad \text{OR} \\
&(\Delta\mathrm{H} < 0.3 \text{ AND } 8 < \mathrm{H}) \quad \text{OR} \\
&(\Delta\mathrm{J} < 0.3 \text{ AND } 8 < \mathrm{J})
\end{aligned} \tag{1}
$$

The target depths (in Vega magnitudes) are J=20.6, H=19.8, Ks=18.5 on the 120-second integrations and somewhat shallower (~0.4-0.6 dex) for the images of 60 seconds integration time per band.

We note that the VHS-DR6, from the VSA database, differs from the latest release through the ESO archive (VHS-DR4), as visible from Figure 1, which also provides the total number of objects retrieved for each band and in total.

The VEXAS catalog tables assembled based on this master near-IR table.

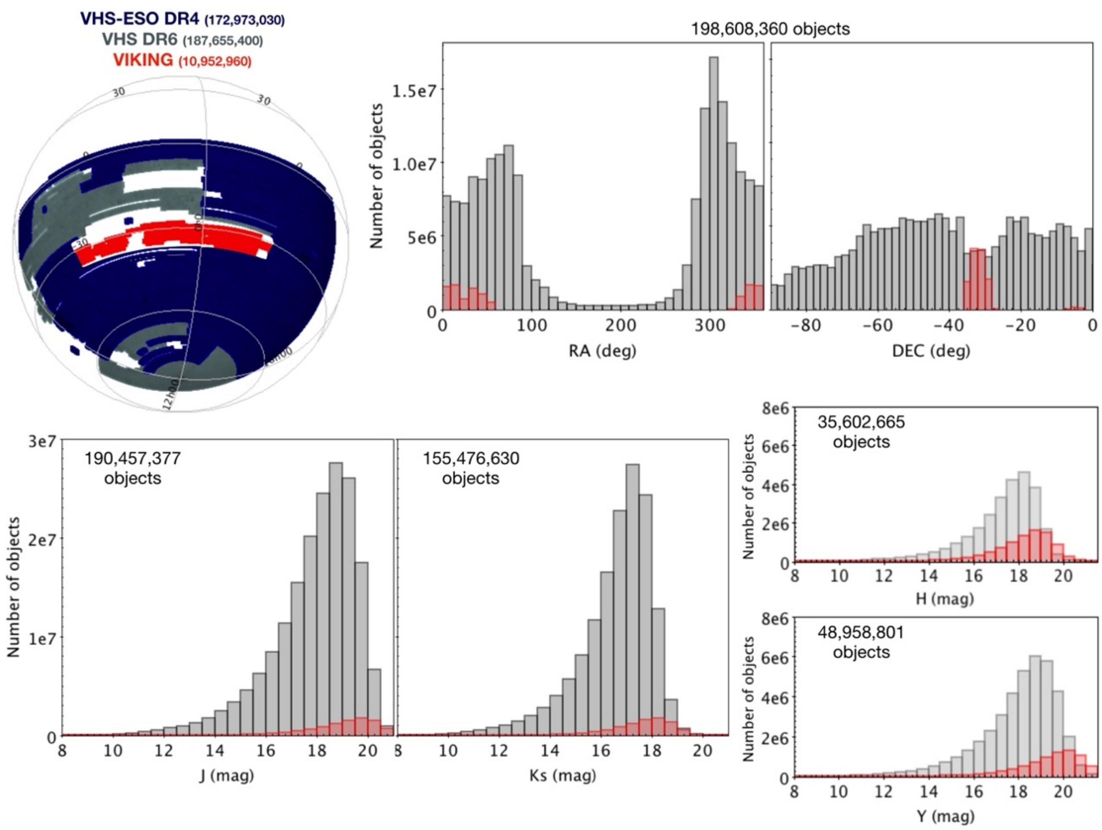

***Figure 1**: Left:* Sky view of the VISTA footprint (VHS in grey and VIKING in red) compared to the VHS-ESO DR4 (blue). *Right:* Histograms of RA and DEC for the VISTA Surveys that we used for this VEXAS-DR1. The total number of objects (unique sources from the VISTA Surveys) in the catalogue is shown above each histogram. *Bottom:* Distribution of Ks, J, H, and Y magnitudes of the input VISTA table (in the Vega reference system), with number of objects within the magnitude ranges of Eq.1 given in the top left corner of each panel. The VSH has a very broad coverage in J and Ks, but only observed H and Y in a few fields.

Release Content

In this VEXAS-DR1, we release seven tables. They are listed below, with the total number of unique sources from the VISTA Surveys contained in each of them. Their file format and structure are given in the ***Data Format*** section. We note that the uniqueness of the objects in the matched surveys is not a requirement. In fact, given the different image resolutions of the different surveys, it might likely happen that a single object in e.g. WISE or in the spectroscopic survey result in multiple matches with VISTA.

TABLE NAME	Number of unique sources in VISTA
VEXAS-AllWISE3	126'372'293
VEXAS-DESW	37'615'619
VEXAS-PS1W	24'693'386
VEXAS-SMW	20'331'041
VEXAS-SPEC	347'076
VEXAS-21cm	77'338
VEXAS-XRAY	2'871

The VISTA+AllWISE3 main table

The AllWISE Source Catalogue (Cutri et al., 2013), used for this VEXAS release, includes ~747 million objects over the whole sky, with median angular resolution of 6.1, 6.4, 6.5, and 12.0 arcseconds respectively for the four bands 3.4 μm (hereafter W1), 4.6 μm (W2), 12 μm (W3) and 22 μm (W4).
Firstly, we cross-matched the master VISTA table (split in VHS and VIKING) with AllWISE, requiring a match within 10 arcsec directly from the VISTA science Archive, and retrieving the SLAVEOBJID to identify the WISE corresponding source. Secondly, we perform a further match with a smaller matching radius of 3 arcsec, retrieving this time also the WISE magnitudes and their associated errors. The result of such a match is provided in this data release (table: VEXAS-AllWISE3). The choice of 3 arcsec is a compromise between the resolution of WISE (~6 arcsec) and minimizing as much as possible the presence of spurious cross-matches between different sources with ghosts and artefacts.
We note that a single object in WISE can be associated to multiple SOURCEID_VISTA, since the image resolution of WISE is much worse of that of VISTA. This is, for instance, the case for strong gravitationally lensed quasars. When a quasar is strongly lensed by a galaxy, it results in multiple images of the same source, often separated only by few arcseconds. In this case, depending on the resolution of the survey, all the multiple quasar images and the deflector can be blended together and result in only one source in the catalogue or each component of the system can be associated to a different catalogue source (see S19 for more details).

For all the further cross-matches that will be described in the following, we use the VEXAS-AllWISE3 table as a starting point, unless otherwise specified.
Finally, in this table, we also include 2MASS magnitudes (J, H, Ks) when available. These were queried directly from the NASA/IPAC Infrared Science Archive, together with the AllWISE catalogue.

Match with optical surveys

In order to maximize wavelength coverage and reach a wide mapping of the Southern Sky, we selected three of the most successful wide-field, multi-band optical photometric surveys: the Dark Energy Survey (hereafter DES), the Panoramic Survey Telescope and Rapid Response System 1 (hereafter PS1) and the SkyMapper Southern Sky Survey (hereafter SM).

For this work we retrieved the latest public releases (DES-DR1, PS1-DR2, SkyMapper-DR1) and cross-matched them onto the final VEXAS-ALLWISE3 table introduced in Section 1.2. The only requirement is a lower limit on the *i*-band magnitude (i>8.0). For the DES and SkyMapper tables, we also required that a matching AllWISE source exists, without any further criteria on AllWISE magnitudes.

Three tables have been created, one for each optical survey, and are described in detail in the ***Release Content*** and ***Data Format*** Sections. Their sky footprint is shown in Figure 2 below, also including the coverage of the VISTA and AllWISE catalogues.

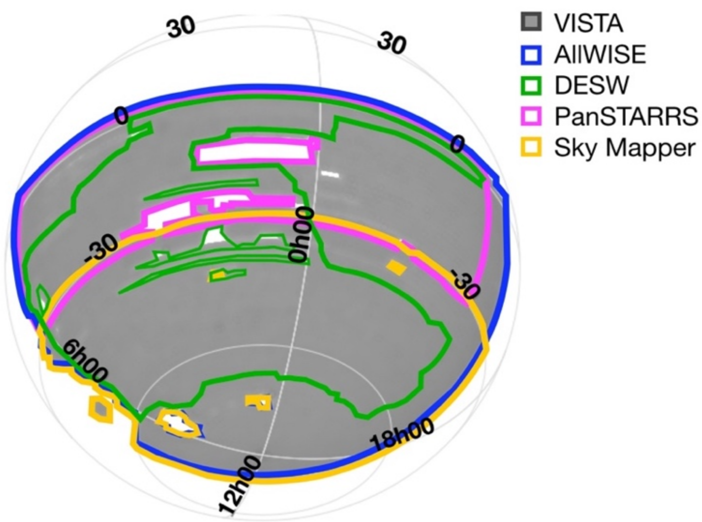

Figure 2: Sky view of the VEXAS plus optical table footprints, plotted over the VISTA catalogue footprint (grey)

Extragalactic objects

As an ancillary by-product, in S19, we also produced a table of objects with extragalactic colours in the VISTA footprint.

We do so by requiring:

$$W1 - W2 > 0.2 + \sqrt{\delta W1^2 + \delta W2^2} \tag{2}$$

on the WISE magnitudes (in the Vega system). This colour-cut excludes most stellar objects, which have W1-W2~0. It generalizes the exponential cut-offs proposed by Assef et al. (2013) to isolate AGN candidates, which had a more demanding threshold (W1-W2>0.7) and was incomplete with respect to quasars at redshifts z>2. Our colour cut also retains most galaxies at z<2 (which have W1-W2~0.35). We note that we consider only the first two WISE bands since the sensitivity in W3 and W4 is signifi-

cantly impacted by Earth-shine noise. A fraction of contaminants includes brown dwarfs and white dwarfs with an IR excess, which can be further skimmed if optical and NIR magnitudes from ground-based surveys are used. In general, more refined separations of galaxies, stars, and quasars can be performed if multi-band coverage is available (e.g. through optical-to-NIR colours). However, this is currently possible only for a part of the SGH.
This table, although not directly contained in this ESO-DR1, can be reproduced starting from the VEXAS-AllWISE table and applying the cuts described by Equation 2.

Spectroscopic matches

In multi-band objects classification and discovery, the lack of spectroscopic information is a common issue. This holds especially in the SGH, where (at present) spectroscopic surveys are affected by depth, footprint, and preselection effects. However, part of the existing spectroscopic surveys does overlap with our VEXAS footprint. For this reason, in S19, we performed a spectroscopic cross-match between the final VISTA table and two of the most used all-sky spectroscopic surveys, the SDSS DR14 (Abolfathi et al., 2018) and the 6dFGS DR3 (Jones et al., 2009). We then join these tables together, releasing the VEXAS-SPEC table which contains all the objects identified in VEXAS-AllWISE3 that have also a spectroscopic match from one or both of the above cited spectroscopic sample.
Finally, in the spectroscopic table we provide the ID of the objects targeted by SuperCosmos, BOSS, EBOSS and ELODIE to facilitate further, more specific cross-matches. As an additional service to the stellar community, we also provide for all the ELODIE targets, useful physical quantities such as surface gravity, effective temperature, Fe/H and metallicity. A detailed description of each column contained in the table is provided in the ***Data Format*** Section.

Match at other wavelengths

To further extend the wavelength coverage of VEXAS, we also performed a cross-match with surveys in the radio and X-ray domains. In this case as well we required the existence of a match in the AllWISE catalogue for each object in order to eliminate spurious detections. However, we note that, given the poorer resolution of the matched surveys at these wavelengths, we kept the WISE matching radius to 10 arcsec rather than restricting it to 3 arcsec (as done in the optical).
In the radio domain, we retrieved 21cm detection data from the Sydney University Molonglo Sky Survey (SUMSS) and performed the matches with AllWISE and VISTA ourselves.
For the X-rays, instead, we retrieved the catalogues presented by Salvato et al. (2018), who performed a match of sources from the ROSAT all-sky survey (RASS) and the XMM-Newton with the AllWISE Source Catalogue, taking into account magnitudes and number densities of the sources. In fact, given the large uncertainties in the positional errors of ROSAT/2RXS and XMM (see Fig.1 in Salvato et al., 2018), they avoided making a too simplistic cross-match using coordinates only, and identified counterparts using a Bayesian approach, also based on the W1 and W2 magnitudes from AllWISE.

Release Notes

All matches were performed with the "*Tool for OPerations on Catalogues And Tables" (TOPCAT*, Taylor, 2005) using the `Join - Pair Match'. Unless otherwise specified, we used the `Sky' Matching algorithm with a maximum tolerance of 3 arcsec. We note that all the magnitudes in the tables are provided in their native system of reference (AB for the optical surveys and Vega for VISTA and AllWISE).

Known Issues

Footprints of the VEXAS-AllWISE tiles

Given the uneven sky coverage of the full VEXAS-AllWISE catalogue and the way the single-tile tables are built, the sky coverage (SKYQDEG) and the footprint provided in the header using the four vertices of a geodesic convex polygon (FPRAi, FPDEi) have to be interpreted as a good approximation of the actual real footprint covered by the data. We ensure however that 90% of the catalogue sources are indeed contained into the defined polygon.

Chromatic effects

We warn that the offset values between VISTA Source detections and those in optical surveys are computed directly from the catalog tables, and therefore do not account for chromatic effects, such as Atmospheric Differential Refraction, which are non-negligible (Agnello & Spiniello 2019). DR2 will provide ADR-corrected offsets.

Surveys depth

This DR1 relies on matches with AllWISE, which can affect the survey depth except for SkyMapper. Forced photometry on unWISE is planned for future releases.

Negative magnitudes in the Y and J VISTA bands

We caution the users that few thousand objects have negative (values that range between -30 and -1) Y and J magnitudes in the VISTA tables. We are not sure what exactly can cause this not physical numbers, but since we notice that the coordinates of such systems are spread over a small patch on the sky, we speculate that this might be a single tile-problem with the zero-point calibration. However, since the other magnitudes for these objects are reliable, we did not remove them from the final catalog.

Data Format

Files Types

This release contains seven multi-band catalogues, all given in the FITS format. The VEXAS-AllWISE table is released as multi-tile table made of 120 catalogue files, while all the other tables are instead released as single-file catalogue (monolithic).
In general, each table contains always the source ID from one or more surveys, FK5 J2000.0 coordinates and magnitudes in various bands with associated errors. The tables are linked together using the SOURCEID_VISTA (unique identifier of the merged detection in VHS or VIKING) to identify the same objects in different tables (UCD: meta.id;meta.main)

Catalogue Columns

The following tables list the columns that are present in each of the catalogue, with their unit and a short description of the content they represent.

TABLE 1: VEXAS-AllWISE3

NAME	UNIT	DESCRIPTION
SOURCEID_VISTA		UID of this merged detection as assigned by merge algorithm
RA2000	degrees	FK5 J2000.0 Right Ascension
DEC2000	degrees	FK5 J2000.0 Declination
SLAVEOBJID_WISE		The unique ID of the neighbour in calSource (=sourceID) for the 10arcsec match
ID_WISE		AllWISE ID for the 3 arcsec match
RA_WISE	degrees	Celestial Right Ascension for AllWISE
DEC_WISE	degrees	Celestial Declination for AllWISE
Y_VISTA	mag (Vega)	Magnitude in Y-band from VISTA
EY_VISTA	mag (Vega)	Magnitude error in Y-band from VISTA
J_VISTA	mag (Vega)	Magnitude in J-band from VISTA
EJ_VISTA	mag (Vega)	Magnitude error in J-band from VISTA
H_VISTA	mag (Vega)	Magnitude in H-band from VISTA
EH_VISTA	mag (Vega)	Magnitude error in H-band from VISTA
Ks_VISTA	mag (Vega)	Magnitude in Ks-band from VISTA
EKs_VISTA	mag (Vega)	Magnitude error in Ks-band from VISTA
PSTAR_VISTA		Probability that the source is a star from VISTA
EVB_VISTA		The galactic dust extinction value measured from the Schlegel maps (Schlegel et al. 1998)
W1mag	mag (Vega)	Magnitude w1mpro from AllWISE (3.4 μm)
E_W1mag	mag (Vega)	Magnitude error w1sigmpro from AllWISE
W2mag	mag (Vega)	Magnitude w2mpro from AllWISE (4.6 μm)
E_W2mag	mag (Vega)	Magnitude error w2sigmpro from AllWISE
W3mag	mag (Vega)	Magnitude w3mpro from AllWISE (12 μm)
E_W3mag	mag (Vega)	Magnitude error w3sigmpro from AllWISE
W4mag	mag (Vega)	Magnitude w4mpro from AllWISE (22 μm)
E_W4mag	mag (Vega)	Magnitude error w4sigmpro from AllWISE
Jmag	mag (Vega)	Magnitude in the J-band from 2MASS
E_Jmag	mag (Vega)	Magnitude error in the J-band from 2MASS
Hmag	mag (Vega)	Magnitude in the H-band from 2MASS
E_Hmag	mag (Vega)	Magnitude error in the H-band from 2MASS
Ksmag	mag (Vega)	Magnitude in the Ks-band from 2MASS
E_Ksmag	mag (Vega)	Magnitude error in the Ks-band from 2MASS

TABLE 2: VEXAS-DESW

NAME	**UNIT**	**DESCRIPTION**
SOURCEID_VISTA		UID of the merged detection in VISTA
Coadd_object_id_DES		Unique ID in DES
SLAVEOBJID_WISE		The unique ID of the neighbour in calSource (=sourceID) for the 10arcsec match
ID_WISE		AllWISE ID for the 3 arcsec match
RA_DES	degrees	FK5 J2000.0 Right Ascension in DES
DEC_DES	degrees	FK5 J2000.0 Declination in DES

Mag_auto_g_DES	mag (AB)	Magnitude in the *g*-band from DES
Magerr_auto_g_DES	mag (AB)	Magnitude error in the *g*-band from DES
Mag_auto_r_DES	mag (AB)	Magnitude in the *r*-band from DES
Magerr_auto_r_DES	mag (AB)	Magnitude error in the *r*-band from DES
Mag_auto_i_DES	mag (AB)	Magnitude in the *i*-band from DES
Magerr_auto_i_DES	mag (AB)	Magnitude error in the *i*-band from DES
Mag_auto_z_DES	mag (AB)	Magnitude in the *z*-band from DES
Magerr_auto_z_DES	mag (AB)	Magnitude error in the *z*-band from DES
Mag_auto_y_DES	mag (AB)	Magnitude in the *y*-band from DES
Magerr_auto_y_DES	mag (AB)	Magnitude error in the *y*-band from DES
spread_model_i_DES		Stellarity indicator in the *i*-band as defined by the Dark Energy Survey collaboration
spreaderr_model_i_DES		Error on the stellarity indicator
wavg_mag_psf_i_DES	mag (AB)	Weighted-average of PSF magnitude in *i*-band
wavg_magerr_psf_i_DES	mag (AB)	Error on wavg_mag_psf_i_DES

TABLE 3: <u>VEXAS-PS1W</u>

NAME	UNIT	DESCRIPTION
SOURCEID_VISTA		UID of the merged detection in VISTA
objID_PS		Unique ID PanSTARRS1 (PS)
SLAVEOBJID_WISE		The unique ID of the neighbour in calSource (=sourceID) for the 10arcsec match
ID_WISE		AllWISE ID for the 3 arcsec match
RA_PS	degrees	FK5 J2000.0 Right Ascension in PS
DEC_ PS	degrees	FK5 J2000.0 Declination in PS
gpetMag_PS	mag (AB)	Petrosian magnitude in the *g*-band
gpetMagErr_PS	mag (AB)	Error on the Petrosian magnitude in the *g*-band
rpetMag_PS	mag (AB)	Petrosian magnitude in the r-band
rpetMagErr_PS	mag (AB)	Error on the Petrosian magnitude in the *r*-band
ipetMag_PS	mag (AB)	Petrosian magnitude in the *i*-band
ipetMagErr_PS	mag (AB)	Error on the Petrosian magnitude in the *i*-band
zpetMag_PS	mag (AB)	Petrosian magnitude in the *z*-band
zpetMagErr_PS	mag (AB)	Error on the Petrosian magnitude in the *z*-band
ypetMag_PS	mag (AB)	Petrosian magnitude in the *y*-band
ypetMagErr_PS	mag (AB)	Error on the Petrosian magnitude in the *y*-band
iPSFMag_PS	mag (AB)	PSF magnitude in the *i*-band
iPSFMagErr_PS	mag (AB)	Error on the PSF magnitude in *i*-band
ipsfLikelihood_PS		Likelihood that the *i*-band stack detection is best fit by a PSF (stellarity indicator)
Separation-VISTA-PS	arcsec	Distance between matched objects in VISTA and PS

TABLE 4: VEXAS-SMW

NAME	UNIT	DESCRIPTION
SOURCEID_VISTA		UID of the merged detection in VISTA
Object_ID_SM		Unique ID in Sky Mapper (SM)
SLAVEOBJID_WISE		The unique ID of the neighbour in calSource (=sourceID) for the 10arcsec match
ID_WISE		AllWISE ID for the 3 arcsec match
RA_SM	degrees	FK5 J2000.0 Right Ascension in SM
DEC_ SM	degrees	FK5 J2000.0 Declination in SM
u_petro_SM	mag (AB)	Petrosian magnitude in the *u*-band
E_u_petro_SM	mag (AB)	Error on the Petrosian magnitude in the *u*-band
v_petro_SM	mag (AB)	Petrosian magnitude in the *v*-band
E_v_petro_SM	mag (AB)	Error on the Petrosian magnitude in the *v*-band
g_petro_SM	mag (AB)	Petrosian magnitude in the *g*-band
E_g_petro_SM	mag (AB)	Error on the Petrosian magnitude in the *g*-band
r_petro_SM	mag (AB)	Petrosian magnitude in the *r*-band
E_r_petro_SM	mag (AB)	Error on the Petrosian magnitude in the *r*-band
i_petro_SM	mag (AB)	Petrosian magnitude in the *i*-band
E_i_petro_SM	mag (AB)	Error on the Petrosian magnitude in the *i*-band
z_petro_SM	mag (AB)	Petrosian magnitude in the *z*-band
E_z_petro_SM	mag (AB)	Error on the Petrosian magnitude in the *z*-band
Class_star_SM		Stellarity indicator from SkyMapper
ebmv_sfd_SM		The galactic extinction value E(B-V) measured from the Schlegel maps
Separation-VISTA-SM	arcsec	Distance between matched objects in VISTA and SM

TABLE 5: VEXAS-SPEC

NAME	UNIT	DESCRIPTION
SOURCEID_VISTA		UID of the merged detection in VISTA
ID_WISE		AllWISE ID for the 3 arcsec match
SPECOBJID_SDSS		ID of the SDSS Spectral table
SPECID_6dFGS		Spectroscopic ID from 6dFGS
TARGETID_6dFGS		Target ID from 6dFGS
BOSS_SPECOBJ_ID		ID of the BOSS Targets
EBOSS_TARGET_ID		ID of the EBOSS Targets
SURVEY		Survey where the object has been detected
RA_SDSS	degrees	FK5 J2000.0 Right Ascension in SDSS
DEC_ SDSS	degrees	FK5 J2000.0 Declination in SDSS
RA_6dFGS	degrees	FK5 J2000.0 Right Ascension in 6dFGS
DEC_ 6dFGS	degrees	FK5 J2000.0 Declination in 6dFGS
Z_SDSS		Redshift measurement from SDSS
Z_ERR_SDSS		Error on the redshift measurement from SDSS
ZWARNING_SDSS		Warning on the redshift measurement from SDSS
Z_6dFGS		Redshift estimation from 6dFGS
Z_HELIO_6dFGS		Redshift estimation from 6dFGS with Helio-

		centric correction
QUALITY_6dFGS		redshift measurement quality: 4=good 1=bad (6=star)
CLASS_SDSS		Object classification from SDSS
SUBCLASS_SDSS		Object sub-classification from SDSS
SuperCOSMOS_class		Object classification from SuperCOSMOS
ELODIE_FILENAME		FILENAME of the ELODIE sources
ELODIE_OBJECT		Targets of ELODIE
TARGETTYPE		Type of target (science or standard)
ELODIE_SPTYPE		Stellar spectra type for ELODIE
ELODIE_BV		B-V for ELODIE stars
ELODIE_TEFF	deg.Celsius	Teff for ELODIE stars
ELODIE_LOGG		Log(gravity) for ELODIE stars
ELODIE_FEH		Fe/H for ELODIE stars
ELODIE_Z		Metallicity for ELODIE stars
ELODIE_Z_ERR		Error on metallicity for ELODIE stars

TABLE 6: VEXAS-21

NAME	UNIT	DESCRIPTION
SOURCEID_VISTA		UID of the merged detection in VISTA
SLAVEOBJID_WISE		The unique ID of the neighbour in calSource (=sourceID) for the 10arcsec match
ID_WISE		AllWISE ID for the 10 arcsec match
RA_SUMSS	degrees	Right Ascension for SUMSS
DEC_SUMSS	degrees	Celestial Declination for SUMSS
Sp	mJy	Peak brightness at 843MHz (in mJy.beam-1)
e_Sp	mJy	Uncertaintly on the peak brightness at 843MHz
St	mJy	Total flux density at 843MHz
e_St	mJy	Uncertainty on the total flux density at 843MHz
MajAxis	arcsec	Fitted major axis
MinAxis	arcsec	Fitted minor axis
PA	degrees	Fitted major axis position angle (N to E)
dMajAxis	arcsec	Fitted major axis after deconvolution
dMinAxis	arcsec	Fitted minor axis after deconvolution
dPA	degrees	Fitted major axis position angle
Mosaic		Mosaic in which the source appears
Nm		Number of mosaics with the source
Xpos	pixel	X-Position of the source on quoted mosaic
Ypos	pixel	Y-Position of the source on quoted mosaic

TABLE 7: VEXAS-XRAY

NAME	UNIT	DESCRIPTION
SOURCEID_VISTA		UID of the merged detection in VISTA
SLAVEOBJID_WISE		The unique ID of the neighbour in calSource (=sourceID) for the 10arcsec match
ID XMMSL2/2RXS		Unique ID Xray

ID_WISE		AllWISE ID for the 10 arcsec match
RA_Xray	degrees	Celestial Right Ascension for XRay Surveys
DEC_Xray	degrees	Celestial Declination for XRay Surveys
pany_Xray		Probability that there is a counterpart (p_any)
pi_Xray		Relative probability of the match (p_i)
FluxB8_XMMSL2	mW/m^2	XMMSL2 flux in band 8
FluxB7_XMMSL2	mW/m^2	XMMSL2 flux in band 7
FluxB6_XMMSL2	mW/m^2	XMMSL2 flux in band 6
e_FluxB8_XMMSL2	mW/m^2	XMMSL2 flux error in band 8
e_FluxB7_XMMSL2	mW/m^2	XMMSL2 flux error in band 7
e_FluxB6_XMMSL2	mW/m^2	XMMSL2 flux error in band 6
SrcFlux_2RXS	mW/m^2	2RXS flux computed as in Dwelly et al. (2017)

Acknowledgements

Users of data from this release should cite *Spiniello & Agnello, 2019, A&A, 630, A146* (full ADS link: https://ui.adsabs.harvard.edu/abs/2019A%26A...630A.146S, A&A link: http://www.aanda.org/10.1051/0004-6361/201936311/pdf)

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