XMM-LSS
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The XXLN and XXLS catalogues

Preliminary release for internal use

L.Chiappetti[1]

INAF, IASF Milano, via Bassini 15, I-20133 Milano, Italy

Abstract. I report on the construction of the first X-ray *catalogues* from the XXL, released for internal use, and based on the recent reclassification of good and bad fields. They include all fields observed so far and processed with Xamin 3.3 which produced a sensible results, and represent a viable starting point for future work. No multiwave catalogue is yet ready at this stage, but a substantial quantity of material for it has been collected already. *A draft version of this report was issued before the Bonn meeting, with section 4 missing. This final version is updated also in the other sections in line with the situation of the database at end September 2013.*

Key words: *LSS; XXL*

1. Introduction

In the last year the XXL database has been subject to several updates, and hopefully has reached a fairly stable state for what concerns the X-ray pointings (processed with Xamin 3.3), and also related non-X-ray data. In particular the flagging of good and bad fields has been recently rearranged and finalized. Since such flagging is prerequisite for the removal of overlaps between adjacent fields, this has allowed to generate X-ray only *catalogues*, analogous to what was recently published as the `2XLSSd` catalogue (Chiappetti et al., 2013), using the earlier Xamin 3.2 on the XXM-LSS 11 deg^2.

This report should give people of the XXL collaboration the information needed to understand the content of the two catalogues (`XXLN` in the northern area and `XXLS` in the southern area), which, I repeat, are X-ray only, and with a layout similar to `2XLSSd`. Generation of multiwave catalogues (`XXLNOPT` and `XXLSOPT`) may follow in an analogous way (or in a different one) from existing datasets.

Note that `XXLN` contains the reprocessing (3.3) of the XMM-LSS fields used for `2XLSSd` (3.2), therefore a part of this report is dedicated to a comparison in more detail than in the preliminary Report XI (Chiappetti , 2013).

Since there is not yet a standard LaTeX template for XXL reports, I continue using the XMM-LSS template. However the report will be made public on the XXL wiki, as well as in the XMM-LSS Milan report repository.

The database tables released in the Milan database to the "xxl" workgroup (i.e. the general collaboration) are listed in Table 1.

Note that in the PDF version of this report links like this are active URLs giving access to the original web pages via the browser of your choice.

1.1. Preliminary information

I will first of all recall some quick background information mainly for the benefit of XXL members which are not familiar with XMM-LSS "historical" features.

- `XXLN` and `XXLS` , as `2XLSSd`, are what I term a *catalogue* i.e. are technically SQL `VIEW`s which provide access to a selected subset of columns (or functions thereof) for a selected subset of X-ray sources (the main points are that duplicate sources in overlapping adjacent fields *have been removed*, and that sources which are *spurious*, i.e. have detection likelihood $ML < 15$ in both energy bands, have also been removed).
- XXL tables `north33` and `south33`, which contain all X-ray sources processed with Xamin 3.3 (from all fields, be they XXL proper or older XMM-LSS or BCS ones or archival, reobservations or whatever), are *physical tables.*
- A `VIEW` relies on an underlying *physical table* which contains all the X-ray detections, spurious and not spurious, before overlap removal. The physical table underlying `XXLN` is `north33`, and the one underlying `XXLS` is `south33` (for `2XLSSd` it was `jan11`).
- The overlap removal procedure relies on the knowledge of which fields are flagged bad (the new flags range from 0=good to 3=very bad, see 2.1.2). In each pair of duplicated sources, if one has a better flag and the other one a worse flag, the better one is unconditionally preferred. If they are flagged equally, the one with the

Band/item	Northern area	Southern area	Ref
X-ray			
Pointing list	`xxlpointings`	`xxlpointings`	2.1
Soft-band physical	`north33b`	`south33b`	2.2
Hard-band physical	`north33cd`	`south33cd`	2.2
Band-merged physical	`north33`	`south33`	2.3
Soft-band catalogue	`XXLNB`	`XXLSB`	2.5
Hard-band catalogue	`XXLNCD`	`XXLSCD`	2.5
Band-merged catalogue	`XXLN`	`XXLS`	2.5
Non-X-ray			
Optical photometry	`w1t7` (CFHTLS T007+ABC)	`bcsru` (BCS Rutgers) `bcslmu` (BCS LMU)	3.1
(with) zphot	`zt7` (CFHTLS Terapix) `cfhtlens` (CFHTLens)	`bcsru` `bcslmu`	3.2
Optical spectroscopy	`marseillespec` `gamaall`	`marseillespec`	3.3
UV	`galexgr6` `omsuss`	`galexgr6`	3.4
NIR	`ukidssdr10` `wircam` (+ CFHTLS)		3.5
IR	`swiredr6`	`ssdf2v8`	3.6
External catalogues			3.7
USNO A2.0	`usno`	`usno`	
SIMBAD	`simbad`	`simbad`	
NED	`ned`	`ned`	

Table 1. Database tables included in current release, grouped by category and sky area

smallest off-axis angle is preferred. *This is similar but not identical to the* `2XLSSd` *case, which used a simpler boolean 0—1 flag.*

- Note that the overlap removal procedure in the XMM-LSS area might give different results than before (i.e. for `2XLSSd`) for various reasons, including that there are now XXL fields overlapping with Report XI).

  Other reasons include the fact that `2XLSSd` (`jan11`) and XXL have been processed starting from the same X-ray data (full exposures, unlike `2XLSS` 10 ks), but using different versions (resp. 3.2 and 3.3) of the Xamin pipeline. This may result in *different source detections* and, even for the "same" source in *different positions* and different parameters.

  Additionally the astrometric corrections are generally different, although usually consistent (`2XLSSd` uses CFHTLS T004, `XXLN` uses CFHTLS T007), which may result in *further differences of the corrected positions.*
- Although the X-ray fields in the XMM-LSS area are the same, they are *named differently*, which is described in 2.1.1.

1.2. Chronology of ingestion

The detailed log of all ingestion and operations in the various database tables is available in detail on `http://sax.iasf-milano.inaf.it/~lucio/XXL/WebAux/Logs/`.

A sketchy list of main operations is presented on the XXL wiki under "Data Products".

Here I provide an intermediate-level chronology (mainly for my use, as my own journals and scripts are grouped according to "ingestion sessions").

- The original ("ingest 1") session (Sep 2011) was for X-ray data from 10 N fields and 30 S fields
- The "ingest 2" session (Oct 2011) added 21 more N X-ray fields
- The "ingest 3" session (Nov 2012) added 22 further N X-ray fields. Before this stage I loaded also CFHTLS T006 data and used it for a preliminary astrometric correction. All this is obsoleted by following developments (but a vestigial `w1t6` table remains)

  Also before this time the photometric data from the Rutgers analysis of BCS were loaded for the first time and used for astrometric correction of existing S fields.
- The "ingest 4" session (Jan 2013) added 43 further N X-ray fields. Soon after this session the ds9 region files (loaded as *data products*) were replaced in bulk (previously a single set was supplied, afterwards separate sets per-band). This session was supplemented by the ingestion of CFHTLS T007 data (both the main photometric table and the two tables with alternate photometric redshifts), which from this moment onwards was chosen as reference catalogue for astrometric corrections in the northern area.
- The "ingest 5" session (Mar 2013) added 138 N fields including the Xamin 3.3 reprocessing of the XMM-LSS area, and was supplemented by "5bis" (26 pointings including the SXDS area and some archival data)

and "5ter" (replacement of the 3 SXDS "z" pointings). This session was completed updating the CFHTLS tables, and in particular adding our old photometry from the ABC fields (located at the north just outside the CFHTLS W1 area), which covers some XMM-LSS fields included in this session.
- The "ingest 6" session (Mar 2013) was an equivalent bulky ingestion of 159 S X-ray fields. At this time I ingested also the BCS data from the LMU analysis (which includes both photometry and photometric redshifts in the same input files), and updated the BCS/Rutgers table (both for new sources, and adding the photometric redshift columns originally not loaded).
- After this I gradually ingested data from the OM SUSS and UKIDSS in the north, then GALEX in both areas, then SWIRE and SSDF respectively in the N and S areas, then from external sources like USNO, SIMBAD and NED, and finally experimented integration with the Marseille spectroscopic database.
- The "ingest 7" session (Jun 2013) included further 146 fields in both N and S areas, and was supplemented by addition or replacement of 8 pointings (either missing or wrong), by the re-ingestion of all ds9 region files (most of the previous ones were incorrectly truncated), by the ingestion of newer categories of *data products* (event files and segmentation maps) and by the correction of the "bandid=0" issue (see 2.3). This session was completed updating the CFHTLS tables, the BCS tables and all other pre-existing non-X-ray tables.
- Finally the new official bad field flags were supplied, which allowed to perform overlap removal and catalogue generation
- *In September I updated the Marseille spectroscopy table, added the WIRCam one, and inserted* `Xlsspointer` *in* `XXLN`.

2. X-ray data

X-ray data include the `north33`* and `south33`* physical table families (both single-band, see 2.2, and band-merged, see 2.3), the `XXLN` and `XXLS` catalogues (2.5), and the auxiliary table `xxlpointings` with the list of pointings (2.1).

In addition to `north33` and `south33`, a clone view (`north33`dup and `south33`dup) is provided for each, to allow correlating a table with itself (typically to find X-ray neighbours to a given X-ray source).

2.1. The `xxlpointings` table

The auxiliary database table `xxlpointings` was loaded from an ASCII file generated by Florian Pacaud and available on the XXL wiki with name XXLpnt.lst. They list *all* (622) XXL pointings (even the few not ingested in the database because the XAMIN results were deemed too poor) in both the N and S area, and provide information like the coordinates, dates, exposure times and quality flags (see 2.1.2).

Since the full data is available in both places, I do not provide here a complete listing, but just (in Tables 2 and 3) the list of fields with the vales of the flags described in 2.1.2 (and the indication of the few fields not ingested in the database).

Table `xxlpointings` has correlation tables with `north33`, `south33`, `XXLN` and `XXLS`, labelled "on FieldName", which allows interested people to query X-ray sources on detailed quality flags or other pointing characteristics (remember however that all sources in a pointing share the same value !).

2.1.1. Field position and naming

XXL uses a naming convention which is different from the naive one used for XMM-LSS., Namely field names are of the form XXL*xmmm-ppc*, where

- *x* is either n or s for northern or southern fields,
- *mmm* is the mosaic identifier,
- *pp* is the pointing number inside the mosaic,
- and *c* is the optional repeat code.

The mosaic identifier groups pointing scheduled together using the newer ESA pointing strategy, or is a *pseudo-mosaic* number. Proper N mosaics are 001, 011, 031-32, 052-53, 073-74, 094-96, 115-116 and 129. Pseudo-mosaic 000 groups all XMM-LSS (B and G) fields, 998 groups SXDS ("Subaru") fields and 999 groups archival or pointed observations.

Proper S mosaics are 001, 020-21, 031, 041, 053, 070 and 078. Pseudo-mosaic 000 is the original BCS deep area, while 996-998 are the BCS shallow pointings and 999 again groups archival or pointed observations.

For differences with the XMM-LSS naming refer to Report XI (section 1.2 and Table 1 therein).

Repeat codes are a sequence letter (a,b,c,d,e) indicating repeated observation of the same nominal pointings (this usually occurs because the earlier pointings were bad and repeated in a later AO, but may cover the case of a pointing split in two consecutive revolutions). Non-repeated pointings may use unsystematically either the "a" repeat code or a null repeat code.

The special code "z" indicates that all or some (those not too bad) of the repeated pointings have been combined during the analysis in a single, longer exposure in order to improve the quality.

Besides the field names (column `FieldName`), the database contains also a field number (column `field` or `Xfield`). Its use is discouraged, however a mapping between old and new field numbers has been implemented and is available on the XXL wiki.

I do not include here a full plot of the position of the fields on the sky, some were provided by me on the wiki

Table 2. The list of northern XXL pointings in name order.
Column 1 in each group is the new XXL field name; columns 2 is the `2XLSSd` field name where applicable; columns 3,4 and 5 are the `quality`, `survey` and `mosaic` flags and column 6 the resulting `badfield` flag. Pointings in gray colour are not in the database.

1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6
XXLn000-01a	B01	0	1	1	0	XXLn000-41b	B41b	0	1	2	2	XXLn000-90a	G10	0	1	1	0	XXLn052-06		3	1	1	3	XXLn096-06		0	1	1	0
XXLn000-02a	B02	0	1	1	0	XXLn000-41z		0	1	0	0	XXLn000-91a	G11	0	1	1	0	XXLn052-07		0	1	1	0	XXLn096-07		0	1	1	0
XXLn000-03a	B03	0	1	1	0	XXLn000-42a	B42a	2	1	4	3	XXLn000-92a	G12a	3	1	4	3	XXLn052-08		0	1	1	0	XXLn096-08		0	1	1	0
XXLn000-04a	B04a	0	1	3	2	XXLn000-42b	B42b	0	1	1	0	XXLn000-92b	G12b	0	1	1	0	XXLn052-09		0	1	1	0	XXLn096-09		0	1	1	0
XXLn000-04b	B04b	0	1	3	2	XXLn000-43a	B43	0	1	1	0	XXLn000-93a	G13	0	1	1	0	XXLn052-10		0	1	1	0	XXLn096-10		0	1	1	0
XXLn000-04c	B04c	0	1	2	2	XXLn000-44a	B44a	3	1	4	3	XXLn000-94a	G14	0	1	1	0	XXLn052-11		3	1	1	3	XXLn115-01		3	1	1	3
XXLn000-04z		0	1	0	0	XXLn000-44b	B44b	0	1	1	0	XXLn000-95a	G15	0	1	1	0	XXLn052-12		3	1	1	3	XXLn115-02		0	1	1	0
XXLn000-05a	B05	0	1	1	0	XXLn000-45a	B45a	3	1	4	3	XXLn000-96a	G16a	3	1	4	3	XXLn053-01a		1	1	4	3	XXLn115-03		0	1	1	0
XXLn000-06a	B06	0	1	1	0	XXLn000-45b	B45b	0	1	1	0	XXLn000-96b	G16b	0	1	1	0	XXLn053-01b		0	1	1	0	XXLn115-04a		3	1	4	3
XXLn000-07a	B07	0	1	1	0	XXLn000-46a	B46a	3	1	4	3	XXLn000-97a	G17	0	1	1	0	XXLn053-02		1	1	1	3	XXLn115-04b		0	1	1	0
XXLn000-08a	B08	0	1	1	0	XXLn000-46b	B46b	0	1	1	0	XXLn000-98a	G18	0	1	1	0	XXLn053-03a		1	1	4	3	XXLn115-05a		3	1	1	3
XXLn000-09a	B09	0	1	1	0	XXLn000-47a	B47a	3	1	4	3	XXLn000-99a	G19	0	1	1	0	XXLn053-03b		1	1	4	3	XXLn115-05b		0	1	1	0
XXLn000-10a	B10	0	1	1	0	XXLn000-47b	B47b	3	1	1	3	XXLn001-01		0	1	1	0	XXLn053-03c		1	1	4	3	XXLn115-06a		1	1	1	3
XXLn000-11a	B11	0	1	1	0	XXLn000-48a	B48	0	1	1	0	XXLn001-02		0	1	1	0	XXLn053-03d		1	1	3	3	XXLn115-06b		0	1	1	0
XXLn000-12a	B12	0	1	1	0	XXLn000-49a	B49	0	1	1	0	XXLn001-03		0	1	1	0	XXLn053-03e		0	1	2	2	XXLn115-07a		1	1	1	3
XXLn000-13a	B13a	3	1	4	3	XXLn000-50a	B50a	1	1	3	3	XXLn001-04		0	1	1	0	XXLn053-03z		0	1	0	0	XXLn115-07b		0	1	1	0
XXLn000-13b	B13b	3	1	4	3	XXLn000-50b	B50b	0	1	2	2	XXLn001-05		0	1	1	0	XXLn053-04		0	1	1	0	XXLn115-08a		1	1	1	3
XXLn000-13c	B13c	0	1	1	0	XXLn000-50z		0	1	0	0	XXLn001-06		0	1	1	0	XXLn053-05		0	1	1	0	XXLn115-08b		0	1	1	0
XXLn000-14a	B14	0	1	1	0	XXLn000-51a	B51	0	1	1	0	XXLn001-07		0	1	1	0	XXLn053-06		0	1	1	0	XXLn115-09a		1	1	1	3
XXLn000-15a	B15	0	1	1	0	XXLn000-52a	B52	0	1	1	0	XXLn001-08		0	1	1	0	XXLn053-07		0	1	1	0	XXLn115-09b		0	1	1	0
XXLn000-16a	B16	0	1	1	0	XXLn000-53a	B53	0	1	1	0	XXLn001-09		0	1	1	0	XXLn053-08		0	1	1	0	XXLn115-10a		1	1	1	3
XXLn000-17a	B17a	1	1	3	3	XXLn000-54a	B54	0	1	1	0	XXLn001-10		2	1	1	3	XXLn053-09		1	1	1	3	XXLn115-10b		3	1	1	3
XXLn000-17b	B17b	0	1	3	2	XXLn000-55a	B55a	0	1	3	2	XXLn011-01		0	1	1	0	XXLn053-10		0	1	1	0	XXLn116-01		3	1	1	3
XXLn000-17c	B17c	0	1	2	2	XXLn000-55b	B55b	0	1	2	2	XXLn011-02		0	1	1	0	XXLn073-01		0	1	1	0	XXLn116-02		0	1	1	0
XXLn000-17z		0	1	0	0	XXLn000-55z		0	1	0	0	XXLn011-03		0	1	1	0	XXLn073-02		0	1	1	0	XXLn116-03		0	1	1	0
XXLn000-18a	B18	0	1	1	0	XXLn000-56a	B56	0	1	1	0	XXLn011-04		0	1	1	0	XXLn073-03		0	1	1	0	XXLn116-04		0	1	1	0
XXLn000-19a	B19	0	1	1	0	XXLn000-57a	B57	0	1	1	0	XXLn011-05		0	1	1	0	XXLn073-04		0	1	1	0	XXLn116-05		0	1	1	0
XXLn000-20a	B20	0	1	1	0	XXLn000-58a	B58a	0	1	4	2	XXLn011-06		0	1	1	0	XXLn073-05		0	1	1	0	XXLn116-06		0	1	1	0
XXLn000-21a	B21	0	1	1	0	XXLn000-58b	B58b	0	1	1	0	XXLn011-07		0	1	1	0	XXLn073-06		0	1	1	0	XXLn116-07		0	1	1	0
XXLn000-22a	B22a	3	1	3	3	XXLn000-59a	B59	0	1	1	0	XXLn011-08		0	1	1	0	XXLn073-07		0	1	1	0	XXLn116-08		0	1	1	0
XXLn000-22b	B22b	0	1	2	2	XXLn000-60a	B60	0	1	1	0	XXLn011-09		0	1	1	0	XXLn073-08		0	1	1	0	XXLn116-09		0	1	1	0
XXLn000-22z		0	1	0	0	XXLn000-61a	B61a	1	1	3	3	XXLn011-10		3	1	1	3	XXLn073-09		2	1	1	3	XXLn116-10		2	1	1	3
XXLn000-23a	B23	0	1	1	0	XXLn000-61b	B61b	0	1	2	2	XXLn031-01		0	1	1	0	XXLn073-10		0	1	1	0	XXLn116-11		3	1	1	3
XXLn000-24a	B24	0	1	1	0	XXLn000-61z		0	1	0	0	XXLn031-02		0	1	1	0	XXLn074-01		0	1	1	0	XXLn129-01		0	1	1	0
XXLn000-25a	B25	0	1	1	0	XXLn000-62a	B62	0	1	1	0	XXLn031-03		0	1	1	0	XXLn074-02		0	1	1	0	XXLn129-02		0	1	1	0
XXLn000-26a	B26	0	1	1	0	XXLn000-63a	B63	0	1	1	0	XXLn031-04		0	1	1	0	XXLn074-03		0	1	1	0	XXLn129-03		0	1	1	0
XXLn000-27a	B27	0	1	1	0	XXLn000-64a	B64	0	1	1	0	XXLn031-05		0	1	1	0	XXLn074-04		0	1	1	0	XXLn998-01a		0	1	3	2
XXLn000-28a	B28	0	1	1	0	XXLn000-65a	B65	0	1	1	0	XXLn031-06		0	1	1	0	XXLn074-05		0	1	1	0	XXLn998-01b		0	1	2	2
XXLn000-29a	B29	0	1	1	0	XXLn000-66a	B66	0	1	1	0	XXLn031-07		0	1	1	0	XXLn074-06		0	1	1	0	XXLn998-01z	S01	0	1	0	0
XXLn000-30a	B30	0	1	1	0	XXLn000-67a	B67a	0	1	3	2	XXLn031-08		0	1	1	0	XXLn074-07		0	1	1	0	XXLn998-02a	S02	0	1	1	0
XXLn000-31a	B31	0	1	1	0	XXLn000-67b	B67b	0	1	2	2	XXLn031-09		0	1	1	0	XXLn074-08		0	1	1	0	XXLn998-03a		0	1	2	2
XXLn000-32a	B32a	3	1	4	3	XXLn000-67z		0	1	0	0	XXLn031-10		0	1	1	0	XXLn074-09		0	1	1	0	XXLn998-03b		0	1	3	2
XXLn000-32b	B32b	0	1	1	0	XXLn000-68a	B68a	1	1	4	3	XXLn031-11		0	1	1	0	XXLn074-10		1	1	1	3	XXLn998-03z	S03	0	1	0	0
XXLn000-33a	B33	0	1	1	0	XXLn000-68b	B68b	0	1	1	0	XXLn031-12		0	1	1	0	XXLn074-11		3	1	1	3	XXLn998-04a		0	1	3	2
XXLn000-34a	B34	0	1	1	0	XXLn000-69a	B69	0	1	1	0	XXLn032-01		0	1	1	0	XXLn094-01		0	1	1	0	XXLn998-04b		0	1	2	2
XXLn000-35a	B35a	3	1	4	3	XXLn000-70a	B70a	0	1	3	2	XXLn032-02		0	1	1	0	XXLn094-02		0	1	1	0	XXLn998-04z	S04	0	1	0	0
XXLn000-35b		0	1	3	2	XXLn000-70b	B70b	0	1	2	2	XXLn032-03		0	1	1	0	XXLn094-03		0	1	1	0	XXLn998-05a	S05	0	1	1	0
XXLn000-35c	B35b	0	1	2	2	XXLn000-70z		0	1	0	0	XXLn032-04		0	1	1	0	XXLn094-04		0	1	1	0	XXLn998-06a	S06	0	1	1	0
XXLn000-35z		0	1	0	0	XXLn000-71a	B71	0	1	1	0	XXLn032-05		0	1	1	0	XXLn094-05		0	1	1	0	XXLn998-07a	S07	0	1	1	0
XXLn000-36a	B36a	0	1	3	2	XXLn000-72a	B72	0	1	1	0	XXLn032-06		0	1	1	0	XXLn094-06		0	1	1	0	XXLn999-01		0	1	1	0
XXLn000-36b	B36b	0	1	2	2	XXLn000-81a	G01	0	1	1	0	XXLn032-07		0	1	1	0	XXLn094-07		0	1	1	0	XXLn999-02		0	0	1	1
XXLn000-36z		0	1	0	0	XXLn000-82a	G02	0	1	1	0	XXLn032-08		0	1	1	0	XXLn094-08		0	1	1	0	XXLn999-03		0	1	1	0
XXLn000-37a	B37a	0	1	3	2	XXLn000-83a	G03	0	1	1	0	XXLn032-09		0	1	1	0	XXLn094-09		0	1	1	0	XXLn999-04		0	0	1	1
XXLn000-37b	B37b	0	1	2	2	XXLn000-84a	G04	0	1	1	0	XXLn032-10		3	1	1	3	XXLn095-01		0	1	1	0	XXLn999-05		0	1	1	0
XXLn000-37z		0	1	0	0	XXLn000-85a	G05	0	1	1	0	XXLn052-01		0	1	1	0	XXLn096-01		0	1	1	0	XXLn999-06		0	1	1	0
XXLn000-38a	B38	0	1	1	0	XXLn000-86a	G06	0	1	1	0	XXLn052-02		0	1	1	0	XXLn096-02		0	1	1	0	XXLn999-07		0	0	1	1
XXLn000-39a	B39	0	1	1	0	XXLn000-87a	G07	0	1	1	0	XXLn052-03		0	1	1	0	XXLn096-03		0	1	1	0	XXLn999-08		0	1	1	0
XXLn000-40a	B40	0	1	1	0	XXLn000-88a	G08	0	1	1	0	XXLn052-04		0	1	1	0	XXLn096-04		0	1	1	0	XXLn999-09		0	0	1	1
XXLn000-41a	B41a	0	1	3	2	XXLn000-89a	G09	0	1	1	0	XXLn052-05		3	1	1	3	XXLn096-05		0	1	1	0						

in the announcement of the various ingestion steps, and another set of figures is provided on the wiki by Florian Pacaud. *However section 4 contains a plot limited to the LSS area, i.e. Fig. 1.*

2.1.2. Bad field classification

The new bad field classification has been devised by Florian Pacaud and is based on the combination of three different criteria, which correspond to separate flags in `xxlpointings`.

The `quality` flag assumes values 0 if the observation is good, 1 if the exposure is too low, 2 if the background is too high, and 3 if both of last conditions are verified.

The `survey` flag assumes value 1 for pointings belonging to the XXL proper, and 0 for other pointed observations (archival independent of XXL, or deep follow-up pointings).

Table 3. Same as Table 2 but for southern pointings.

1	2	3	4	5	6
XXLs000-01a		3	1	4	3
XXLs000-01b		0	1	1	0
XXLs000-02a		3	1	4	3
XXLs000-02b		0	1	1	0
XXLs000-03a		3	1	4	3
XXLs000-03b		0	1	1	0
XXLs000-04a		0	1	3	2
XXLs000-04b		3	1	4	3
XXLs000-04c		0	1	2	2
XXLs000-04z		0	1	0	0
XXLs000-05a		1	1	3	3
XXLs000-05b		0	1	2	2
XXLs000-05z		0	1	0	0
XXLs000-06a		0	1	3	2
XXLs000-06b		0	1	2	2
XXLs000-06z		0	1	0	0
XXLs000-07a		3	1	4	3
XXLs000-07b		0	1	1	0
XXLs000-08a		0	1	1	0
XXLs000-09a		0	1	3	2
XXLs000-09b		0	1	2	2
XXLs000-09z		0	1	0	0
XXLs000-10a		0	1	1	0
XXLs000-11a		0	1	1	0
XXLs000-12a		0	1	1	0
XXLs000-13a		0	1	3	2
XXLs000-13b		0	1	2	2
XXLs000-13z		0	1	0	0
XXLs000-14a		0	1	1	0
XXLs000-15a		0	1	1	0
XXLs000-16a		0	1	3	2
XXLs000-16b		0	1	2	2
XXLs000-16z		0	1	0	0
XXLs000-17a		0	1	1	0
XXLs000-18a		0	1	1	0
XXLs000-19a		0	1	1	0
XXLs000-20a		0	1	1	0
XXLs000-21a		0	1	2	2
XXLs000-21b		0	1	3	2
XXLs000-21z		0	1	0	0
XXLs000-22a		0	1	1	0
XXLs000-23a		0	1	3	2
XXLs000-23b		1	1	4	3
XXLs000-23c		0	1	2	2
XXLs000-23z		0	1	0	0
XXLs000-24a		0	1	1	0
XXLs000-25a		0	1	2	2
XXLs000-25b		0	1	3	2
XXLs000-25z		0	1	0	0
XXLs000-26a		0	1	1	0
XXLs000-27a		0	1	3	2
XXLs000-27b		0	1	2	2
XXLs000-27z		0	1	0	0
XXLs000-28a		0	1	1	0
XXLs000-29a		0	1	1	0
XXLs000-30a		0	1	1	0
XXLs000-31a		0	1	1	0
XXLs000-32a		0	1	3	2
XXLs000-32b		0	1	2	2
XXLs000-32z		0	1	0	0
XXLs000-33a		0	1	1	0
XXLs000-34a		0	1	1	0
XXLs000-35a		3	1	4	3
XXLs000-35b		0	1	1	0
XXLs000-36a		0	1	1	0
XXLs000-37a		0	1	1	0
XXLs000-38a		0	1	1	0
XXLs000-39a		0	1	2	2
XXLs000-39b		1	1	3	3
XXLs000-39z		0	1	0	0
XXLs000-40a		0	1	1	0
XXLs000-41a		0	1	1	0
XXLs000-42a		1	1	3	3
XXLs000-42b		0	1	2	2
XXLs000-42z		0	1	0	0
XXLs001-01		2	1	1	3
XXLs001-02		0	1	1	0
XXLs001-03		0	1	1	0
XXLs001-04		0	1	1	0
XXLs001-05		0	1	1	0
XXLs001-06		0	1	1	0
XXLs001-07		0	1	1	0
XXLs001-08		0	1	1	0
XXLs001-09		0	1	1	0
XXLs001-10		0	1	1	0
XXLs020-01		2	1	1	3
XXLs020-02		2	1	1	3
XXLs020-03		0	1	1	0
XXLs020-04		0	1	1	0
XXLs020-05		0	1	1	0
XXLs020-06		0	1	1	0
XXLs020-07		0	1	1	0
XXLs020-08		0	1	1	0
XXLs020-09		0	1	1	0
XXLs020-10		0	1	1	0
XXLs021-01		3	1	1	3
XXLs021-02		0	1	1	0
XXLs021-03		0	1	1	0
XXLs021-04		2	1	1	3
XXLs021-05		0	1	1	0
XXLs021-06		0	1	1	0
XXLs021-07		0	1	1	0
XXLs021-08		0	1	1	0
XXLs021-09		0	1	1	0
XXLs021-10		1	1	1	3
XXLs031-01		1	1	1	3
XXLs031-02		0	1	1	0
XXLs031-03		0	1	1	0
XXLs031-04		0	1	1	0
XXLs031-05		0	1	1	0
XXLs031-06		0	1	1	0
XXLs031-07		0	1	1	0
XXLs031-08		0	1	1	0
XXLs031-09		0	1	1	0
XXLs031-10		0	1	1	0
XXLs041-01		0	1	1	0
XXLs041-02		0	1	1	0
XXLs041-03		0	1	1	0
XXLs041-04		0	1	1	0
XXLs041-05		0	1	1	0
XXLs041-06		0	1	1	0
XXLs041-07		0	1	1	0
XXLs041-08		0	1	1	0
XXLs041-09		0	1	1	0
XXLs041-10		0	1	1	0
XXLs053-01		0	1	1	0
XXLs053-02		0	1	1	0
XXLs053-03		0	1	1	0
XXLs053-04		0	1	1	0
XXLs053-05		0	1	1	0
XXLs053-06		0	1	1	0
XXLs053-07		0	1	1	0
XXLs053-08		0	1	1	0
XXLs053-09		0	1	1	0
XXLs053-10		0	1	1	0
XXLs070-01		1	1	4	3
XXLs070-01b		0	1	3	2
XXLs070-01c		0	1	2	2
XXLs070-01z		0	1	0	0
XXLs070-02		1	1	4	3
XXLs070-02b		0	1	2	2
XXLs070-02c		0	1	3	2
XXLs070-02z		0	1	0	0
XXLs070-03		3	1	4	3
XXLs070-03b		0	1	2	2
XXLs070-03c		0	1	3	2
XXLs070-03z		0	1	0	0
XXLs070-04		0	1	1	0
XXLs070-05		0	1	1	0
XXLs070-06		0	1	1	0
XXLs070-07		0	1	1	0
XXLs070-08		0	1	1	0
XXLs070-09		0	1	1	0
XXLs070-10		0	1	1	0
XXLs078-01		0	1	1	0
XXLs078-02		0	1	1	0
XXLs078-03		0	1	1	0
XXLs078-04		2	1	1	3
XXLs078-05		0	1	1	0
XXLs078-06		0	1	1	0
XXLs078-07		0	1	1	0
XXLs078-08		0	1	1	0
XXLs078-09		0	1	1	0
XXLs078-10		0	1	1	0
XXLs996-01		0	1	1	0
XXLs996-02		2	1	3	3
XXLs996-02b		0	1	2	2
XXLs996-02z		0	1	0	0
XXLs996-03		1	1	3	3
XXLs996-03b		0	1	2	2
XXLs996-03z		0	1	0	0
XXLs996-04		1	1	4	3
XXLs996-04b		0	1	1	0
XXLs996-05		3	1	4	3
XXLs996-05b		0	1	1	0
XXLs996-06		1	1	3	3
XXLs996-06b		0	1	2	2
XXLs996-06z		0	1	0	0
XXLs996-07		1	1	4	3
XXLs996-07b		0	1	1	0
XXLs996-08		1	1	4	3
XXLs996-08b		0	1	1	0
XXLs996-09		0	1	3	2
XXLs996-09b		0	1	2	2
XXLs996-09z		0	1	0	0
XXLs996-10		3	1	4	3
XXLs996-10b		0	1	1	0
XXLs996-11		0	1	3	2
XXLs996-11b		0	1	2	2
XXLs996-11z		0	1	0	0
XXLs996-12		0	1	3	2
XXLs996-12b		0	1	2	2
XXLs996-12z		0	1	0	0
XXLs996-13		0	1	3	2
XXLs996-13b		0	1	2	2
XXLs996-13z		0	1	0	0
XXLs996-14		0	1	3	2
XXLs996-14b		0	1	2	2
XXLs996-14z		0	1	0	0
XXLs996-15		0	1	3	2
XXLs996-15b		0	1	2	2
XXLs996-15z		0	1	0	0
XXLs996-16		0	1	3	2
XXLs996-16b		0	1	2	2
XXLs996-16z		0	1	0	0
XXLs996-17		0	1	3	2
XXLs996-17b		0	1	2	2
XXLs996-17z		0	1	0	0
XXLs996-18		0	1	3	2
XXLs996-18b		0	1	2	2
XXLs996-18z		0	1	0	0
XXLs996-19		0	1	3	2
XXLs996-19b		0	1	2	2
XXLs996-19z		0	1	0	0
XXLs997-01		3	1	3	3
XXLs997-01b		0	1	2	2
XXLs997-01z		0	1	0	0
XXLs997-02		0	1	3	2
XXLs997-02b		0	1	2	2
XXLs997-02z		0	1	0	0
XXLs997-03		0	1	3	2
XXLs997-03b		0	1	2	2
XXLs997-03z		0	1	0	0
XXLs997-04		1	1	2	3
XXLs997-04b		3	1	3	3
XXLs997-04z		0	1	0	0
XXLs997-05		0	1	3	2
XXLs997-05b		0	1	2	2
XXLs997-05z		0	1	0	0
XXLs997-06		0	1	3	2
XXLs997-06b		0	1	2	2
XXLs997-06z		0	1	0	0
XXLs997-07		0	1	3	2
XXLs997-07b		0	1	2	2
XXLs997-07z		0	1	0	0
XXLs997-08		0	1	3	2
XXLs997-08b		0	1	2	2
XXLs997-08z		0	1	0	0
XXLs997-09		0	1	3	2
XXLs997-09b		0	1	2	2
XXLs997-09z		0	1	0	0
XXLs997-10		0	1	3	2
XXLs997-10b		0	1	2	2
XXLs997-10z		0	1	0	0
XXLs997-11		0	1	3	2
XXLs997-11b		0	1	2	2
XXLs997-11z		0	1	0	0
XXLs997-12		0	1	3	2
XXLs997-12b		0	1	2	2
XXLs997-12z		0	1	0	0
XXLs997-13		0	1	3	2
XXLs997-13b		0	1	2	2
XXLs997-13z		0	1	0	0
XXLs997-14		0	1	3	2
XXLs997-14b		0	1	2	2
XXLs997-14z		0	1	0	0
XXLs997-15		0	1	3	2
XXLs997-15b		0	1	2	2
XXLs997-15z		0	1	0	0
XXLs997-16		0	1	3	2
XXLs997-16b		0	1	2	2
XXLs997-16z		0	1	0	0
XXLs997-17		0	1	3	2
XXLs997-17b		0	1	2	2
XXLs997-17z		0	1	0	0
XXLs997-18		0	1	2	2
XXLs997-18b		0	1	3	2
XXLs997-18z		0	1	0	0
XXLs997-19		1	1	3	3
XXLs997-19b		0	1	2	2
XXLs997-19z		0	1	0	0
XXLs998-01		0	1	2	2
XXLs998-01b		0	1	3	2
XXLs998-01z		0	1	0	0
XXLs998-02		0	1	3	2
XXLs998-02b		0	1	2	2
XXLs998-02z		0	1	0	0
XXLs998-03		0	1	3	2
XXLs998-03b		0	1	2	2
XXLs998-03z		0	1	0	0
XXLs998-04		1	1	3	3
XXLs998-04b		0	1	2	2
XXLs998-04z		0	1	0	0
XXLs998-05		0	1	3	2
XXLs998-05b		0	1	2	2
XXLs998-05z		0	1	0	0
XXLs998-06		0	1	3	2
XXLs998-06b		0	1	2	2
XXLs998-06z		0	1	0	0
XXLs998-07		0	1	3	2
XXLs998-07b		0	1	2	2
XXLs998-07z		0	1	0	0
XXLs998-08		0	1	3	2
XXLs998-08b		0	1	2	2
XXLs998-08z		0	1	0	0
XXLs998-09		0	1	3	2
XXLs998-09b		0	1	2	2
XXLs998-09z		0	1	0	0
XXLs998-10		0	1	3	2
XXLs998-10b		0	1	2	2
XXLs998-10z		0	1	0	0
XXLs998-11		0	1	3	2
XXLs998-11b		0	1	2	2
XXLs998-11z		0	1	0	0
XXLs998-12		0	1	3	2
XXLs998-12b		0	1	2	2
XXLs998-12z		0	1	0	0
XXLs998-13		0	1	3	2
XXLs998-13b		0	1	2	2
XXLs998-13z		0	1	0	0
XXLs998-14		0	1	2	2
XXLs998-14b		0	1	3	2
XXLs998-14z		0	1	0	0
XXLs998-15		0	1	2	2
XXLs998-15b		1	1	3	3
XXLs998-15z		0	1	0	0
XXLs998-16		0	1	3	2
XXLs998-16b		0	1	2	2
XXLs998-16z		0	1	0	0
XXLs998-17		0	1	1	0
XXLs998-17b		3	1	4	3
XXLs998-18		1	1	3	3
XXLs998-18b		0	1	2	2
XXLs998-18z		0	1	0	0
XXLs998-19		3	1	4	3
XXLs998-19b		0	1	1	0
XXLs999-01		0	0	1	1
XXLs999-02		0	1	1	0

The `mosaic` flag assumes one of the following values (the name might be misleading since it has nothing do with the ESA mosaic pointing strategy, but more with repetitions of a pointing (i.e. our a,b,…z repeat codes):

- 0 is for a combination of different exposure (”z” pointing); 81 cases
- 1 is for a single, not repeated pointing; 342 cases
- 2 is for the best pointing used in a z sequence; 81 cases
- 3 is for other pointings used in a z sequence; 83 cases
- 4 is for additional pointings; 35 cases

The `badfield` flag is built from a logical combination of the above and assumes the following values from best to worse:

- 0 best (and acceptable) observation at a given position
  $survey = 1$ && $quality = 0$ && $mosaic < 2$
- 1 deep/good observation not part of XXL proper
  $survey = 0$ && $quality = 0$
- 2 other acceptable XXL observation
  $survey = 1$ && $quality = 0$ && $mosaic > 1$
- 3 really bad pointings
  $quality > 0$

2.2. Single band tables

The first step of the ingestion adds a selection of the content of the XAMIN FITS (per-pointing) catalogues to the single band tables, namely `north33`b, `north33`cd, `south33`b and `south33`cd, where the "B" suffix indicates the soft band, and "CD" the hard band. Version 3.3 of XAMIN produces a catalogue also in the ultrasoft band ("A"), however I store this aside and do not use it at this stage for consistency with earlier catalogues.

The ingestion procedure is nearly identical to the one used for `2XLSSd`, i.e. takes care of the extended (C1/C2) vs pointlike classification, and spurious source classification according to $ML < 15$ (the only difference is the handling of the pointing naming and numbering, but this is totally irrelevant for users).

2.3. Band merged tables

Also the band merging steps (between *two* bands) is identical to the one used for `2XLSSd`, i.e. uses a correlation radius of $10''$. Refer to section 3.3 of Chiappetti et al. (2013) for all details. In particular position errors and fluxes are computed at this stage, while astrometric correction is applied after this stage and back-propagated also to single band tables.

Concerning the *astrometric correction* (refer to section 3.2 of Chiappetti et al. (2013) for the procedure), this is based on table `w1t7` (i.e. CFHTLS T007 supplemented with our own ABC fields) for most pointings of the northern area, and on BCS (table `bcsru`) for most pointings of the southern area. A small number of pointings (16 in the northern area, of which 15 bad, and 12 in the southern area, of which 11 bad) could not be corrected because of the lack of objects. 1 pointing was corrected using the USNO catalogue (this is XXLn999-01, i.e. the Mira Ceti field, which is not covered neither by the CFHTLS nor by the ABC fields). For details on the actual correction offsets see the dedicated pages `http://sax.iasf-milano.inaf.it/~lucio/XXL/CFHTLS/Astro.report.html`. for the north area, and `http://sax.iasf-milano.inaf.it/~lucio/XXL/BCS/Astro/report.html`. for the south area. These pages contain also details on other experimental corrections (in general abandoned or not used because worse) using the USNO catalogue, CFHTLS T006 or BCS LMU.

The only *new* issue of some, though minor, relevance is the so-called "bandid=0". The merging procedure determines a "best band" which results in assigning database column `bandid` the values 2 (soft) or 3 (hard). For the XMM-LSS there were 9 cases in `jan11`, where `bandid` could not be assigned, but nobody cared about them because they were all flagged spurious and did not enter the `2XLSSd` catalogue.

For XXL the number of such cases is a bit larger (158 for `south33` and 105 for `north33`) but again most of them are flagged spurious and irrelevant. However 2 `north33` and 3 `south33` cases are *not* flagged spurious, because they are classified as soft extended sources, and extended sources are not spurious by definition.

The cause of the "bandid=0" is that (pointlike) detection likelihood is undefined in the original input XAMIN catalogues. This has the unpleasant effect that the coordinates in the merged table are also left undefined. However if the source is a soft extended one, there is a valid soft extended position available elsewhere in the database, and is just a matter of propagating it, which I now have done.

Only two of the southern cases survive the overlap removal procedure and find their way in `XXLS` (none in `XXLN`). It was much ado about (almost) nothing, but I had to check again all non-X-ray input datasets !

2.4. Overlap removal

The XXL has a significant number of overlaps among pointings. There is not only the case of adjacent pointings due to the regular spacing pattern of the surveys (slightly different for XMM-LSS and XXL proper, for SXDS and for BCS), but also the frequent repetition of pointings (because bad or too shallow) at the same nominal position but typically with different roll angles depending on the epoch (and the same applies to the combined "z-pointings"), and finally the few independent pointed observations at arbitrary positions. The choice of the detection to be considered, among the various ones available for what is presumably the same X-ray source, is termed "overlap removal" and uses a procedure analogous to the one described in section 3.4 of Chiappetti et al. (2013).

As already anticipated, the only difference is that now the bad field flag is not boolean but has a range of values.

We stress that the overlap removal procedure does not actually delete any source from the `north33` and `south33` physical tables, but just from the generalized correlation table (GCT) used to build the catalogues.

The north GCT starts with 17732 non-spurious sources (the south one with 18087), then 3196 entries are removed in the north, and 6221 in the south, leaving respectively 14136 and 11866 entries, the vast majority of which is in pointings flagged `badfield=0`. Incidentally I have kept aside so far non-public database tables with the indication of which sources were "removed" in association with which one "kept".

2.5. Catalogues

The catalogues `XXLN` and `XXLS` are views of a selection of columns based on the respective GCT. They are accompanied by single band catalogues `XXLNB`, `XXLNCD`, `XXLSB` and `XXLSCD`, and all catalogues have the same format as the `2XLSSd` family, with the columns listed in Tables A1 and A2 of Chiappetti et al. (2013).

There are only the following exceptions. Column `Xdeep` does not exist in any of the catalogues, and column `Xlsspointer` is present only in catalogues of the northern family `XXLN`. Moreover, it has a differemt meaning, i.e. it is the `Xseq` pointer into the `2XLSSd` catalogue. *This column was empty at the time of the draft release of this report, but has now been filled as described in section 4, and particularly 4.3.*

Concerning source naming consult section 3.5 of Chiappetti et al. (2013) for the IAU-compliant rules and note the following *provisional* arrangement, consistent with the naming convention for the XXL sources reported on the XXL wiki. The "official" band merged name `Xcatname` is currently generated as `XLSSU Jhhmmss.s-ddmmss`, using the `XLSSU` prefix registered for *unofficial use in advance of publication*. The prefix will later be replaced by `3XLSS`, which will mark the continuity with the XMM-LSS, indicate that it is a later release to `2XLSSd` and incidentally match XAMIN release 3.3. The unofficial single-band names `Bcatname` and `CDcatname` will continue to use unregistered names with prefix `3XLSSB` and `3XLSSCD`. The prefix is anyhow the same for the northern and southern area.

As for `2XLSSd` there is a very limited number of ambiguously merged cases which require the usage of an a or b suffix to the catalogue name. They amount to 4 couples in `XXLN` and 6 couples in `XXLS`. Actually the latter catalogue had also an *ambiguous triplet*, where, in field XXLs078-09, one had `Xseq=211179` associating soft source with id=116 with hard id=117 within 5.3″, `Xseq=211180` associating soft 117 with the same hard 117 within 5.8″, and `Xseq=211181` associating again soft 117 with hard 118 within 5.7″. Since only two soft and two hard detections are actually present, the ambiguity was solved deleting `Xseq=211180`. The remaining two objects have anyhow distinct catalogue names.

The overall numerology is 14134 and 11863 merged sources respectively in `XXLN` and `XXLS`, 12179 soft ones in `XXLNB`, 5626 hard ones in `XXLNCD`, 9935 in `XXLSB` and 4679 in `XXLSCD`.

I note that, despite the fact the individual band catalogues are supplied for consistency with earlier published catalogues, it is easier to get access to any column in any of the physical "member tables" using the Advanced query interface, and ticking the "View member tables" tick box available at the bottom of the left hand column in the "Tables" pane. Ticking it is actually *mandatory* to be able to view *object-related data products* in conjunction with a catalogue (this currently applies to NED and SIMBAD entries but will apply also to future optical or IR thumbnails).

2.6. Data products

X-ray tables (and catalogues) have currently associated a number of per-pointing *data products* (for some of them a cumulative tar.gz can be built on the fly for all pointings covered as result of a given query), namely

- X-ray FITS images (soft and hard band)
- wavelet FITS images (soft and hard band)
- X-ray expo map (soft and hard band; MOS1, MOS2 and pn)
- ds9 region files (soft and hard band)
- a tar.gz per pointing containing the event lists and all related stuff necessary to reanalyse them with the SAS.
- a tar.gz per pointing containing MOS1, MOS2 and pn images and segmentation maps

These are accessible both with the physical table (e.g. `north33`) and with the catalogue (e.g. `XXLN`). The original (soft and hard) FITS XAMIN catalogues are instead associated only to the physical tables.

Data products related with the non-X-ray tables are instead described below with the latter. Note however that thumbnail images around an X-ray source (currently none of such *data products* have been generated) will be associated to the X-ray tables (as object related data products).

3. Non-X-ray data

All non-X-ray database tables mentioned below are associated to at least one *correlation table* with the corresponding X-ray tables (`north33` or `south33` or both), usually within a 6″ radius. `XXLN` and `XXLS` inherit the correlation tables of the corresponding primary (X-ray) member table.

Correlation tables appear on the right hand side of the "Tables" pane when (exactly) two tables are ticked in the left hand side. You can choose the one you prefer (if more exist, a short description is shown), except the one marked "By Identifier Match" (this is a feature supported by ~~DART~~▷, i.e. our database interface, see Paioro et al. (2008)), but not implemented for our database).

It is advised always to select one correlation table, because this greatly improves efficiency. One can then apply selection criteria on distances (lower than the correlation table radius) using the SQL UDF (User Defined Function) `dist`, which has syntax `dist(tab1.ra1,tab1.dec1,tab2.ra2,tab2.dec2)*3600` to compute a distance in arcsec between a pair of RA,Dec columns in two tables.

In the next subsection I give some information on the way the various non-X-ray tables were populated. I will **not** give here any detail of the computation of source densities n(*brighter than* m) which might be useful for calculation of chance association probabilities (see section 4.3 of Chiappetti et al. 2013). A collection of material (plots and detailed information) about this is available separately on page `http://sax.iasf-milano.inaf.it/~lucio/XXL/WebAux/probability.html`.

3.1. Optical photometry

The reference photometric surveys are the CFHTLS in the north and the BCS in the south.

3.1.1. North area: CFHTLS

For the XMM-LSS (`2XLSSd`) we used release T004 of the CFHTLS in conjunction with three additional fields (so called ABC fields) located just on the north of the CFHTLS W1 area, and observed by us on GO time at CFHT (therefore rather similar to CFHTLS but limited to the grz bands).

For XXL I originally started using release T006 which was available at the time, and was very similar in file layout to T004 (panchromatic catalogues per tile, except that the i magnitude was replaced by the y magnitude in some later tiles). However we were left with the problem of overlap among adjacent tiles (for which suggestions were provided by J.Coupon). The data, ingested in the now obsoleted (and no longer mantained) `w1t6` table, were used for a preliminary astrometric correction of the `north33` data available at the time.

However quite soon afterwards release T007 became available as a frozen and published release (Hudelot et al., 2012). It was quite natural to move to use it, but there were some differences (for instance the addition of a new set of magnitudes to the older `MAG_AUTO` ones). The data are available in several sites and ways like per-tile panchromatic catalogues with either `MAG_AUTO` or `MAGSNLS` (still with the problems of removing overlaps) at Terapix and CADC, or as a huge "big merged" ftp-able file at Terapix, or as a database table at Vizier. Both the latter have the tile overlap issue solved in an official and robust way.

At the end I decided to use the catalogue (identified as II/317/cfhtls_w) at Vizier, which allows to upload a table of X-ray positions, and extract the $10''$ subset there. I also chose a selection of columns consistent with the earlier `w1t4` and `w1t6` tables and populated a `w1t7` table. In particular magnitudes are still `MAG_AUTO`. As it was customary for the earlier tables, undefined magnitudes are replaced with the tile limit magnitude (obtained from the Terapix synoptic page) changed of sign (i.e. flagged negative).

I also had to integrate the data from the ABC fields, which were extracted from the same input file used at the `2XLSSd` time and with almost the same procedure, except the normalization of some flags to a new convention (changed during the T006/T007 transition), and clearing sources in the overlapping area unless present only in the ABC fields. *I am aware that Sotiria Fotopoulou in Geneva is undergoing a reprocessing of the ABC fields in a manner more consistent with T007. The way of integrating the new results will be considered in the future.*

Table `w1t7` contains 128274 entries, of which 6376 from the ABC fields, and the rest from the CFHTLS proper. 52100 of them are in the $6''$ correlation table with `north33`, corresponding to 23383 distinct X-ray sources.

`w1t7` is the basic reference for astrometric correction of `north33`.

See section 3.2 for T007-related photometric redshift tables.

For the abandoned table `w1t6` I had attempted to define *data products* per-tile, i.e. i-band catalogues, panchromatic catalogues and i-band FITS images *residing at CADC*. In principle I could do something similar for `w1t7` but users can go directly to the public repository and do it themselves.

For `2XLSSd` I also used the CADC cutout service to extract FITS thumbnail images around the X-ray source position, so I can repeat this in case of interest.

An alternate photometry of the part of the CFHTLS area overlapping the WIRCam (MIRACLES) survey is described in section 3.5.1.

3.1.2. South area: BCS

There are two alternate analyses of the BCS photometric data, one done at Rutgers University and the other one at Ludwig-Maximilian University (LMU). They are quoted in the order in which I received the data. **Since there appears to be a large difference in several items between them, I urge the knowledgeable people to sort out the issue.**

I obtained first the data residing at Rutgers University, courtesy of F.Menanteau. They are available on their web site per tile (total of 78 tiles), in form of separate photometric catalogues for the griz bands. These catalogues, and the separated photometric redshift file (see 3.2) are all aligned with the same number of entries and same object id. We agreed to extract a subset of columns for analogy to pre-existing photometric tables, while our own DBcorr program was used to ingest objects within $10''$ from the X-ray positions into our table `bcsru`.

These data were used as reference dataset for the astrometric correction of `south33`. The original per-tile per-band catalogues, the redshift catalogues and the FITS images are all made available as *data products*. They *reside at Rutgers University* and require to know a password for access (ask F.Menanteau).

I later obtained the data from LMU, courtesy of S.Desai. This dataset was supplied as a single file for all tiles, comprehensive of photometric redshifts. A subset of columns was ingested in a temporary table, and DBcorr was used to extract the objects within 10″ from our X-ray sources into our table `bcslmu`.

Both tables are correlated within 6″ to `south33`, but I also provide (as an extension to our basic policy for correlation tables) cross-correlation tables between `bcsru` and `bcslmu` in both directions, within a 1″ radius.

`bcsru` contains 31926 entries (16616 within 6″ of `south33`), `bcslmu` contains 40966 entries (19722 within 6″ of `south33`). There are 27653 couples of common objects in the two catalogues, while the rest is present in either one or the other.

The LMU analysis includes 98 tiles instead of 78, and they look displaced. Also the density $n(brighter\ than\ m)$ is rather different in the two cases as shown in the plots reported in the web page `http://sax.iasf-milano.inaf.it/~lucio/XXL/WebAux/probability.html`. I would appreciate an explanation of all these facts.

3.2. Photometric redshifts

In the south photometric redshifts computed with ANNZ from the LMU analysis were natively included in the input file for the `bcslmu` table. For the BCS Rutgers case they were computed with BPZ and supplied in separate, per-tile files, which were originally made available as *data products*. However, when `bcslmu` was created I decided to add some zphot-related columns to `bcsru` as well, and this is done routinely since then.

In the north instead there are two *independent* sources of photometric redshifts associated with the CFHTLS.

The first source is a large file hosted at Terapix as `photozCFHTLS-W1_270912.out.gz`. It has the advantage that tile and source identifiers are shared with the photometric tables (i.e. our `w1t7`) so I took all the sources in the big file (in chunks of 500000 at a time) and moved those which are listed in `w1t7` to the `zt7` table. So all `zt7` objects have an entry in `w1t7` (but not viceversa since no photometric redshift was computed for fainter objects), and de facto this is also a 10″ subset. All columns from the input file are stored (with minimal naming adjustment), and in particular this does not include only zphot-related data but also magnitudes (in this case corrected for galactic extinction).

The second source of photometric redshifts is the CFHTLenS project, which did an independent reanalysis of the CFHTLS data. In this case the data resides on a database at CADC. One can select the columns in the query, and select one tile at at time, but the extraction of the 10″ subset is done in Milan with DBcorr. Here too the set of columns chosen is quite large and includes not only zphot-related data but also independently-generated photometry.

Both tables are correlated within 6″ to `north33`, but I also provide (as an extension to our basic policy for correlation tables) cross-correlation tables between `w1t7`, `zt7` and `cfhtlens` in both directions, within a 1″ radius. `zt7` contains 47651 entries (of which 23223 correlate with `north33` within 6″, and all with an equivalent in `w1t7`), while `cfhtlens` contains 86886 entries (of which 37113 within 6″ from `north33`, and about 79000 might have a `w1t7` equivalent).

Of course objects in the ABC fields are missing from both tables.

Links with our own photometric redshifts calculated in Geneva will be taken into account in the future.

3.3. Optical spectroscopy

LAM in Marseille is mantaining a spectroscopic database within CESAM [1]. An integration between the Marseille and Milan databases has been arranged as follows.

At random times I will check their ”spectra” tables, and download it in the form of a CSV file, which I will ingest in our `marseillespec` table. *In fact after the test release before the Bonn meeting, I recently updated it to be aligned with C.Adami's presentation in Bonn.*

The Marseille DB is a compilation of redshifts of various origins with coordinates and a quality flag. Additionally it points to *data products*, which are spectra *in the native form* corresponding to each ”origin”. The spectra, *when present, reside in Marseille* and will be password-protected, accessible only to those who request an account at CESAM.

Currently their list contains *34054* redshifts with or without spectra, most in the XXL N area, and a small fraction at all unrelated to XXL. *Currently there is limited coverage in the XXL S area (just 436 entries).* However only *3239* objects are correlated to our X-ray sources within 6″ *in the north, and just 3 in the south.*

More spectroscopic information will be available in the future from the AAT observations (possibly via the Marseille database) and via the collaboration with GAMA. A list of GAMA redshifts (also in the northern area, and also with associated spectra *residing on a protected GAMA site*) has recently been ingested, but the relevant table `gamaall` is so far accessible only by the joint XXL/GAMA Matching Group and will be released according to the MoU when such team completes its job.

3.4. UV band

UV data is currently available from the GALEX and OM-SUSS surveys.

The OM-SUSS [2] (Page et al., 2012) is of some relevance for us, since it uses our own XMM-Newton pointings, which we never analysed on our own.

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[1] `http://cesam.oamp.fr/xmm-lss/`

[2] `http://www.mssl.ucl.ac.uk/www_astro/XMM-OM-SUSS/`

For the GALEX survey I used a procedure analogous to the one we used for `2XLSSd`, but instead of the GR4/GR5 release, we used the latest GR6/GR7 release.

3.4.1. North area

For the OM-SUSS I downloaded the FITS file available on the MSSL web site. The current version of the survey contains XMM data in the interval 2000-2007, which means only our GTO, SXDS, AO1 and AO2 pointings in the northern area. I know that the OM team plans to process later data, so we should keep a watch to update the `omsuss` table.

I loaded all sources in a rectangular area encompassing our `north33` area, but of course I obtained only a partial coverage, both because several of our pointings were later than the interval covered, and because the OM field of view is narrower (sometimes *much* narrower depending on the observing mode). Anyhow of 9339 OM-SUSS sources, less than 10% are associated to an X-ray source within a radius of 10″.

Note also that the UV bands covered by the various observations may be different since they depend on the choices of the PI of each observation. Anyhow in most cases data is in the UVW1 band.

For GALEX the ingestion of data occured from the NASA MAST site[3] using CasJobs. The list of our non-spurious sources was uploaded in chunks, and correlated on the MAST site within 10″. The result was ingested in table `galexgr6` which has the same choice of columns used in the past for `2XLSSd` (and similarly a flagging for possible tiling overlaps was done).

Of 42853 GALEX sources in the northern area of `galexgr6`, 29693 are listed in the correlation table within 6″.

3.4.2. South area

No data in the southern area has been processed by the current version of the **OM-SUSS**. Possibly part of it could be included in a future release.

For GALEX a procedure identical to the one used in the northern area has been used. The overall number of sources loaded in table `galexgr6` for the southern area is 10602, and those in the correlation table within 6″ are 7902.

I note that probably the GALEX mission did cover the northern and southern areas in a different way. I get 18 tiles in the southern area vs 131 tiles in the northern area. This, together with the fact that 66% of the northern sources are flagged for tiling overlap, while only 32% of southern sources (and 26% in the XMM-LSS area with GR4/GR5) seems to indicate that the northern area was re-observed much more times.

3.5. NIR band

3.5.1. North area

I checked the **UKIDSS** survey (of which we had used release DR5plus for `2XLSSd`), and found that the latest release available *pro tempore* i.e. DR10 contains more data than the latest "world release" (DR8). As customary I ingested data from the WSA site[4] using their internal CrossId facility. The list of our non-spurious sources was uploaded in chunks, and correlated within 10″. The result was ingested in table `ukidssdr10` which has the same choice of columns used in the past for `2XLSSd`.

This results in 10782 sources deriving from the DXS and 6509 from the UDS (which covers mainly the SXDS area). Of all these 8406 are in the correlation table within 6″ with `north33` (note that there is no full coverage of the area anyhow, but now the A, B and Mira Ceti fields are covered).

Data from the **WIRCam** *MIRACLES survey has been recently released by J.Willis. The analysis combines WIRCam data in the K_s band with the CFHTLS ugriz data which are re-analysed together. Therefore positions and optical magnitudes may be different from those in* `w1t7`.

As customary I ingested (in table `wircam`*) only data within 10″from our X-ray positions, i.e. just 51044 sources out of 2.5 million. I ingested only* `mag_auto` *magnitudes in the optical band, while I ingested the full variety, i.e.* `mag_auto` *and 3 different aperture magnitudes, in the K_s band. Users interested in the full dataset may refer to the e-mail message circulated by J.Willis on 15 Aug 2013.*

I also provide (as an extension to our basic policy for correlation tables) cross-correlation tables between `w1t7` *and* `wircam` *in both directions, within a 1″ radius.* `wircam` *contains 51044 entries (of which 20951 correlate with* `north33` *within 6″, but only 28720 have an equivalent in* `w1t7` *within 1″).*

3.5.2. South area

Currently I have no coverage of the southern area in the NIR bands.

3.6. IR band

If anybody has suggestions to advance about other sources of IR observations to be ingested beyond those listed in the next subsections, I would be grateful to cope with them (specially if details on downloading are supplied).

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[3] `http://galex.stsci.edu/GR6/`

[4] `http://surveys.roe.ac.uk/wsa/`

3.6.1. North area: SWIRE

Unfortunately there is no public release from the SWIRE survey stored at IPAC later than the Spring '05 version. I decided therefore to use the **same** *private and preliminary* dataset (unofficially termed DR6) we had used for `2XLSSd`.

I decided therefore to share table `swiredr6` between the XMM-LSS and the XXL databases, *adding* sources within 10″ of `north33` non-spurious sources (of course it is possible they were already in, and any source in proximity of unconfirmed `2XLSSd` objects will remain in), using the same procedure used for `2XLSSd`.

Considering the correlation table within 6″ with `north33`, this lists 9119 SWIRE objects.

Currently there are no *data products* associated to the SWIRE sources, but I have the know-how to retrieve from IPAC thumbnails in all IRAC and MIPS bands around X-ray positions (I did this for `2XLSSd` and can repeat it in case of interest).

3.6.2. South area: SSDF

SSDF is an IRAC survey of a contiguous 100 deg^2 area within the deepest South Pole Telescope survey field done in the 3.6 μm and 4.5 μm as customary during the Spitzer Warm Mission. According the agreement between XXL and SSDF, I retrieved data sets from the University of California at Davis from the recent Version 8 release (a Version 9 is foreseen for the end of the year).

There are two datasets with data in both bands, one is 3.6 μm-selected (so called dataset 1, with 4.6 million objects) and the other 4.5 μm-selected (dataset 2 with about 3.5 million objects). According to the recommendation by A.S.Stanford, I used dataset 2 to populate table `ssdf2v8` released to our consortium. We chose 29 columns out of 45 in the original dataset. In particular there are three set of magnitudes (`AUTO`, 4″ and 6″ apertures), and A.S.Stanford recommends to use the 4″ one.

I loaded also an equivalent subset for dataset 1 and used it for some quick checks reported on the wiki, but did not release it to prevent confusion.

My population procedure uses our own fast correlation DBcorr program to extract a subset within 10″ from our positions. This gives 29789 objects in `ssdf2v8` of which 16554 in the 6″ correlation table with `south33`.

I have associated as *data products* to the `ssdf2v8` table the FITS images in the two bands. They *reside at UC Davis* and are password protected (those interested should apply to A.S.Stanford). There are other auxiliary data (flag maps and coverage maps) available at UC Davis which could be linked as *data products* on request.

The SSDF data will be at some time delivered to IPAC. It is possible that at such time one could extract thumbnails using IPAC's cutout facilities similarly to what described above for SWIRE. If so they will be considered at such time.

3.7. External catalogues

Similarly to what I did in the past for XMM-LSS, for the convenience of our users I have generated some tables from external public sources.

The `usno` table contains all USNO A2.0 objects (taken from a source residing at ESO ST-ECF) within 20′ from the centres of our XMM pointings. The table, shared with the XMM-LSS database, contains position and R and B magnitudes for bright objects (it is occasionally used for backup astrometric correction tests). Of these 2353 and 3382 are respectively within 6″ from `north33` and `south33`.

The `simbad` and `ned` tables are also shared with the XMM-LSS database, and contain pointers (and coordinates) of objects in SIMBAD and NED. The updating procedure originally used 20′ from the centres of our XMM pointings for both sites, but recently this has proven to be excessive for NED, so now I use 0.5′ from X-ray position. However correlation tables restrict the objects shown to those within 20″ (which used to be the typical thumbnail radius). Note that these correlation tables do not include null entries, therefore X-ray sources *without* a SIMBAD or NED association *won't be shown at all*.

One can use these tables to get the `id` of the SIMBAD or NED object, or one can access the original page with all details on the SIMBAD or NED sites, treating them as they were *data products* (when you click on "Online generation" you will be redirected to the appropriate web page instead of downloading a file).

Coverage in the north and south is inhomogeneuous. Within the 20″ correlation tables we have 4787 SIMBAD and 78162 NED items in the north, and only 383 and 2220 in the south. This is in part due to some big surveys in the north, as can be checked looking at the root of the `id`. For instance about 30000 NED entries are from the VVDS, and more than 20000 from another single paper.

3.7.1. Literature tables

We should decide if there is interest in loading database tables from literature data, and correlating them with our own X-ray positions. Of course they will not enter the generation of our multiwave catalogue.

In the past I loaded a number of such tables in the XMM-LSS database (the "blue" database, separate from the current XXL "pink" database). Most of them were based on our own XMM-LSS papers, but there are a few exceptions (however always covering the XMM-LSS area). They are listed in Table 4.

Note that propagating the table to the XXL database is a relatively trivial operation (since the physical storage area is shared between the pink and blue databases, but not the administrative databases, which however have the same layout), while the correlation will have to be done afresh.

Table name	Reference
`tajer07`	Tajer et al. (2007)
`polletta07`	Polletta et al. (2007)
`garcet07`	Garcet et al. (2007)
`pacaud07`	Pacaud et al. (2007)
`ueda08`	Ueda et al. (2008)
`rr08`	Rowan-Robinson et al. (2008)
`stalin09`	Stalin et al. (2010)
`melnyk13`	Melnyk et al. (2013)

Table 4. Database tables referring to literature papers available in the XMM-LSS database. All tables but `ueda08`, `rr08` and `stalin09` refer to papers of our collaboration.

3.8. Future work

In principle I could start from the *existing set* of non-X-ray tables and associated correlation tables to generate a *generalized correlation table* and a multiwave catalogue similarly to what described in Section 4 of Chiappetti et al. (2013).

Or we could agree on a different, possibly better procedure.

And/or I could ingest additional non-X-ray tables (suggestions about this are welcome). Actually it would be easier to have the complete set of non-X-ray tables ready before generating the generalized correlation table.

Another possible future activity would be experimenting with band merging on 3 bands.

In all cases, despite the procedure is sort of time consuming (I estimate a couple of days, irrespective of the number of sources affected), existing non-X-ray tables will be *mantained* (i.e. updated) in case new X-ray sources are added to the X-ray tables. This might occur in case new fields are observed *and processed with* XAMIN *3.3*. If instead a bulk reprocessing with XAMIN 3.4 or later will occur, this implies a release of an *entirely new version* of all catalogues.

4. Comparison between `XXLN` and `2XLSSd`

A comparison between all detections in all XMM-LSS fields in the *physical tables* `north33` and `jan11` has been reported in former Report XI, to which the reader is referred.

Here instead we compare the *catalogues* `XXLN` and `2XLSSd`. The differences are not only due to the different XAMIN version but also to the different *overlap removal* procedure choices, and to the presence of the outer fields.

We consider as *LSS fields* those with id's in pseudo-mosaics `XXLn000` (XMM-LSS proper) and `XXLn998` (SXDS). Note that `2XLSSd` did not use all possible LSS fields (it did not use the 12 `XXLn000*z` "mosaic" combinations; did a slightly different choice for SXDS fields; and did not use `XXLn000-35b`, `B35b` is what is now called `XXLn000-35c`). `XXLN` contains 843 sources from the new `XXLn000*z` "mosaics" and 1 from `XXLn000-35b`.

In addition, as shown in Fig. 1, the *LSS area* contains new fields which weren't part of XMM-LSS or SXDS, namely archival observations fully overlapping previous fields (they are `XXLn999-02 04 07 09` with 284 `XXLN` sources), archival fields at the edge of the LSS area (`XXLn999-01 05 08` with 252 `XXLN` sources at most), and XXL fields at the edge (`XXLn001-01 02 011-01 02 031-01 02 03 04 032-01 052-01 053-01b 074-01 095-01 096-01 02` with 883 `XXLN` sources at most). It is not obvious to count how many of the sources in the latter fields are actually in the real LSS area, because of the complex shape of the XMM FoV: one could perhaps approximate taking a radius of e.g. 15′ from the LSS proper FoV centres).

We have been forced to consider the following cases in the comparison (the association is done within 6″ in either raw or astrometrically corrected coordinates):

- A `north33` source in LSS fields with `jan11` in same field, of which
- A1 present in `XXLN` and `2XLSSd`
- A2 present in `XXLN` only
- A3 present in `2XLSSd` only
- B `north33` source in LSS fields with `jan11` in other field, of which
- B1 present in `XXLN` and `2XLSSd`
- B2 present in `XXLN` only
- B3 present in `2XLSSd` only
- C `north33` source in LSS fields with no `jan11` association, present in `XXLN`
- D `north33` source in *LSS area* with `jan11` associated, of which
- D1 present in `XXLN` and `2XLSSd`
- D2 present in `XXLN` only
- D3 present in `2XLSSd` only
- E `north33` source in LSS area with no `jan11` association, present in `XXLN`
- F `jan11` source in `2XLSSd` (by definition in LSS fields) with no `north33` association

Of course the above matches returns multiple associations, but anyhow the number of distinct `2XLSSd` sources is 6721 as expected, while the number of presumably `XXLN` sources in the LSS fields and area is 7767 (the LSS area can be in excess, but a visual inspection shows only about 10 sources outside the XMM-LSS FoVs). Multiple associations can be cleaned preferring the `XXLN` to `2XLSSd` association or taking the closest association.

Cleaned classes A1, B1 and D1 together represent the common objects. I find 5816 distinct `2XLSSd` and 5823 distinct `XXLN` sources. One `XXLN` source (`Xseq=225693`) is associated to two `2XLSSd` objects (which are a "suspect" couple for what concerns band merging). 8 `2XLSSd` sources are associated each to two `XXLN` objects (2 of them are "suspect" cases, the rest are just not at the same dis-

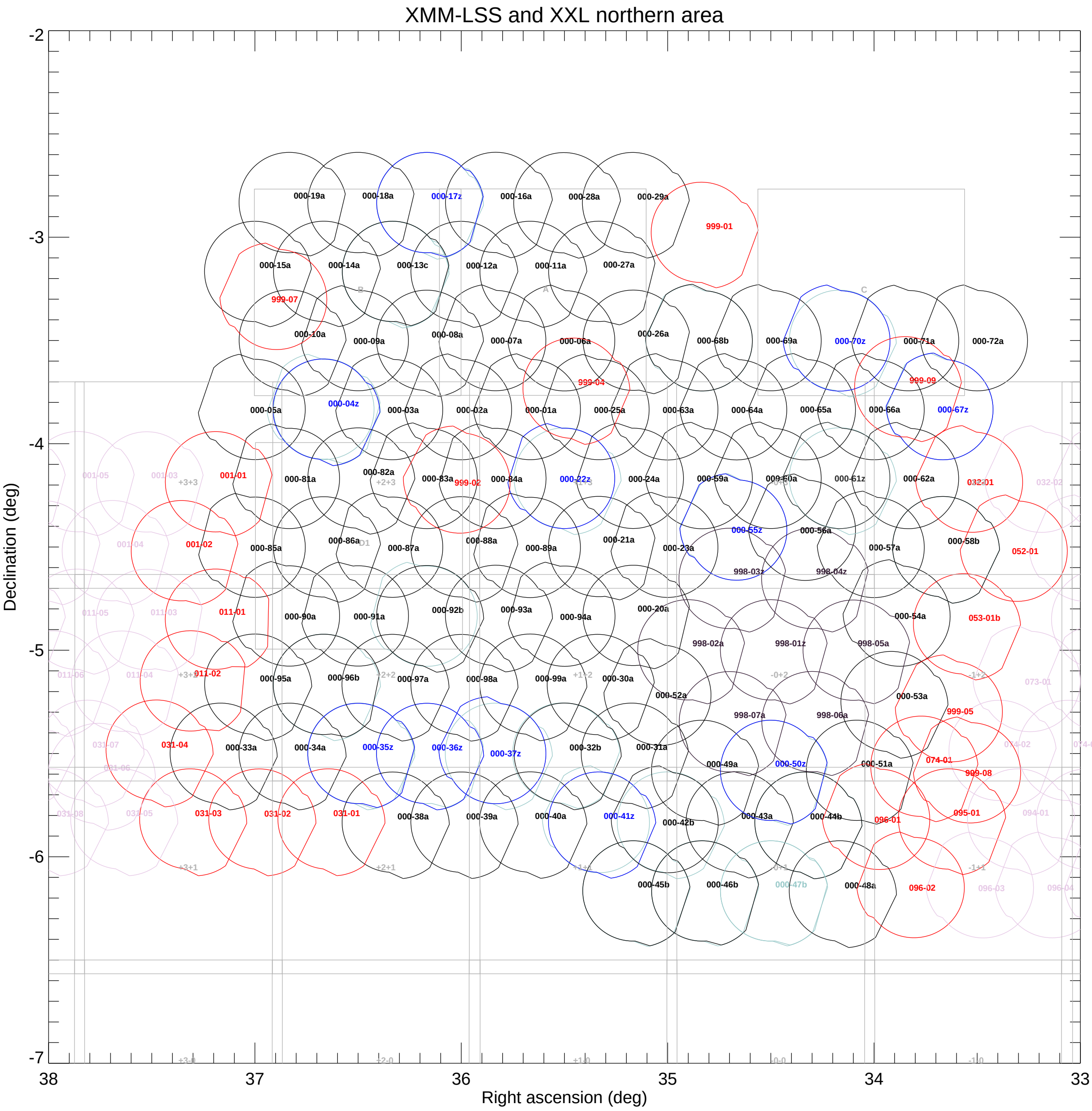

Fig. 1. XMM-LSS pointings used in `2XLSSd` and labelled with their new names are shown in black when good or in blue-gray when bad (unlabelled unless they are the last repeat), SXDS pointings are in pink-gray. Blue indicates XMM-LSS `XXLn000*z` "mosaics" which are used for the first time in `XXLN`, instead of a former single good field. Red indicates both archival fields fully enclosed in the *LSS area* as well as ordinary XXL fields overlapping at the edge of the *LSS area*. Remaining XXL fields not entering the comparison are shown in light pink. Light gray rectangle indicate the CFHTLS and ABC optical fields. This figure can be directly compared with Fig. 1 of Chiappetti et al. (2013).

tance). We can use such classes to provide `Xlsspointer`, and accept that 16 `XXLN` objects will point to the same 8 `2XLSSd` objects, since the number of ambiguities is really limited (less than 0.3% of the total !).

Considering the other classes (and not counting entries already classified as common) one remains with 930 entries, for 903 distinct `jan11`, which are `2XLSSd` *not* associated with `XXLN`. Of them 609 (class F) have no `north33` counterpart at all, 321 have something in `north33` but not in `XXLN`, namely 258 are `spurious=1` `north33` sources (rightfully excluded from the catalogue) and the remaiming 63 are in the list of objects rejected by the overlap removal procedure (verified).

The reverse case is of 1973 entries for 1944 distinct `north33`, which are `XXLN` *not* associated with `2XLSSd`. Of them 1190 (classes C and E) have no `jan11` counterpart at all, 783 have something in `jan11` but not in `2XLSSd`, namely 746 spurious and only 37 presumably rejected by the overlap removal procedure (no longer verifiable).

Of the 903 `2XLSSd` objects unconfirmed in XXL, most of them are single-band detections (only 79 are detected in both bands). 586 of them are very poor (the best $ML < 20$!), 836 are below 3σ ($ML < 40$) and 877 are below 4σ ($ML < 75$).

Conversely of the 1944 `XXLN` objects missing in `2XLSSd`, most of them are single-band detections too (only 185 are detected in both bands). 1144 of them are very poor (the best $ML < 20$!), 1731 are below 3σ and 1838 are below 4σ.

On the other hand 42% of the common objects are detected in both bands in one of the catalogues. Only 14% of the `2XLSSd` and 10% of the `XXLN` common objects are below $ML < 20$, only 47% (44%) below 3σ and only 68% (66%) below 4σ. So the common objects have definitely a better quality than the objects present in a single catalogue.

Considering the common objects, almost all have the same *extended/ non-extended flagging*. Only 45 (less than 1% of the total) divide in equal proportion as `2XLSSd` extended becoming pointlike, or pointlike becoming extended.

If we go to the *detailed "PE" classification*, we see that 91% have the same identical classification in both energy bands (i.e. pointlike, extended or undetected). 492 (8.5%) have the same overall extended/ non-extended flag but nominally different classifications. Most of them are however compatible (same in one band and different or undetected in the other, the most diffuse case being 224 soft P- becoming PP and 167 PP becoming P-). Only 5 cases are extended and all compatible. Only 11 cases are incompatible (6 -P become P-, 4 P- become -P and one PE becomes -P).

4.1. Positions

In Fig. 2 we report the histogram of the distances between `XXLN` and `2XLSSd` astrometrically corrected positions for common objects between the two catalogues, peaking at 0.5″ (compare Fig. 1 in Report XI or panel c of Fig. 5 of Chiappetti et al. 2013). The coloured plots report the distribution of the A1-associations (when `XXLN` and `2XLSSd` sources are in the same pointing), dominating the total one, as well as the shallower distributions of the B1-associations (`XXLN` and `2XLSSd` sources in different XMM-LSS fields) and of the D1-associations (`XXLN` sources in *LSS area* fields).

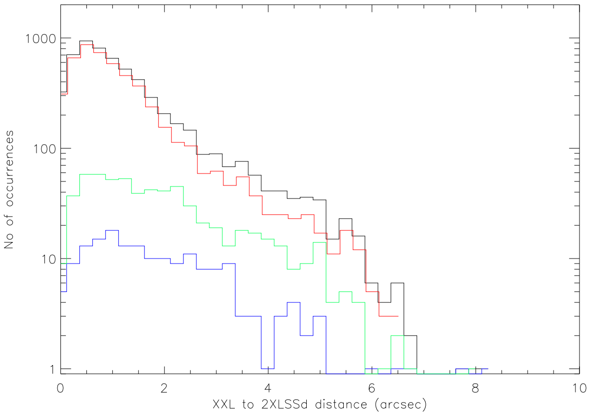

Fig. 2. Histogram (as number of occurrences) of the distance between XXL and `2XLSSd` positions in astrometrically corrected coordinates for all objects (black), or for samples A1 (red), B1 (blue) and D1 (green). See text of section 4 for sample definition.

The distances of the secondary associations (i.e. `XXLN` with `jan11` sources not in `2XLSSd`, or `2XLSSd` with `north33` sources not in `XXLN`, i.e. categories A2/B2/D2 and A3/B3/D3) are not shown but peak at larger distances and are shallower.

4.2. Likelihood and flux

In the final figures we compare two key parameters like the *detection likelihood* (Fig. 3-4) and the *flux* (Fig. 5-6) in the two energy bands.

The figures are rather complex. In each band we consider the common sources which are detected in the band in both catalogues (`XXLN` and `2XLSSd`), the common sources which are not detected in the band in one of the two catalogues (to which the blue histogram refers), the common sources not detected in the band in both catalogues (just counted and annotated on the top as "undef"), and the sources present in only one of the two catalogues (shown along both axes as histograms, according to the A-F classification described above in Section 4).

I.e. for common sources detected in the band we plot the parameter (likelihood or flux) in one catalogue vs the other, while when only one value is available we report an histogram along the corresponding axis.

From the first two figures (Fig. 3-4) we can see that the majority of the sources present in one catalogue only are usually with rather poor likelihood, though not spurious.

For the rest the likelihood of the best sources (the black ones, i.e. pointlike, detected in both catalogues as such) has values matching within a very reasonable scatter. Sources detected in different fields (or even in the *LSS area* at large) are usually shifted to the right, i.e. have a better likelihood in `XXLN`. A larger scatter is apparent for the few sources which have changed classification from extended to pointlike or viceversa.

Coming to the fluxes (Fig. 5-6) the majority of the sources present in one catalogue only (gray histogram) have a flux distribution not unlike those detected in both. For sources detected in both catalogues fluxes match within a reasonable scatter, which is somewhat larger when the detection occurs in different pointings (blue and gray diamonds).

The scatter can be quantified in terms of the percentage deviation in absolute value between `2XLSSd` and `XXLN` fluxes. For all sources with a defined soft flux in both catalogues, 66% of the cases deviate less than 10%, 87% are within 20% and 98% within 50%. For the A1 class (associated sources in same pointing) the figures are similar (72%, 91%, 99%). For the B1 and D1 classes (associated sources in other LSS pointing, or `XXLN` in *LSS area*) they are respectively 30%, 56%, 87% and 34%, 58%, 87%. For all sources with a defined hard flux the figures are 56%, 84%, 98%. Here too the A1 class dominates and the B1 and D1 classes have a large scatter.

4.3. Correlation tables

Column `Xlsspointer` has been set in the `XXLN` catalogues for 5823 cases in the band merged catalogue (5338 in the soft band one and 2495 in the hard band one). Querying on it one can know the `2XLSSd` source associated to a `XXLN` one, and then separately look it up in `2XLSSd`.

In addition we provide two correlation tables between `XXLN` and `2XLSSd`. One is a "normal" correlation table (distance below 6″). The other one is based on `2XLSSd.Xseq=XXLN.Xlsspointer`. Note that since both tables are catalogues (views) and not physical tables, access is somewhat slower. Note also that the correlation table through the pointer has no null entries, i.e. shows *only the common objects*. The correlation table through distance shows everything, and it might be appropriate to hide the `XXLN` sources without `2XLSSd` association for any reason using a clause `XXLN.Xlsspointer<>0`.

Note also two little mismatches between the two correlation tables. There are 5 cases where the distance-based correlation table returns an `2XLSSd` object different from the one pointed by `Xlsspointer`. This is because there are two `jan11` objects close to the `XXLN` one. The closest was chosen for `Xlsspointer` (and is returned too by the correlation table). There are other 21 cases where `Xlsspointer` is set but they aren't returned by the distance-based correlation table. This is because the distance is larger than 6″ in astrometrically corrected coordinates, but smaller in raw coordinates (we preferred to assign `Xlsspointer` anyhow).

A (pleasant) side effect of the correlation table is that a (correlated) query on `XXLN` is able to return the `2XLSSd` data products (like optical or SWIRE thumbnails) associated to the `2XLSSd` counterpart.

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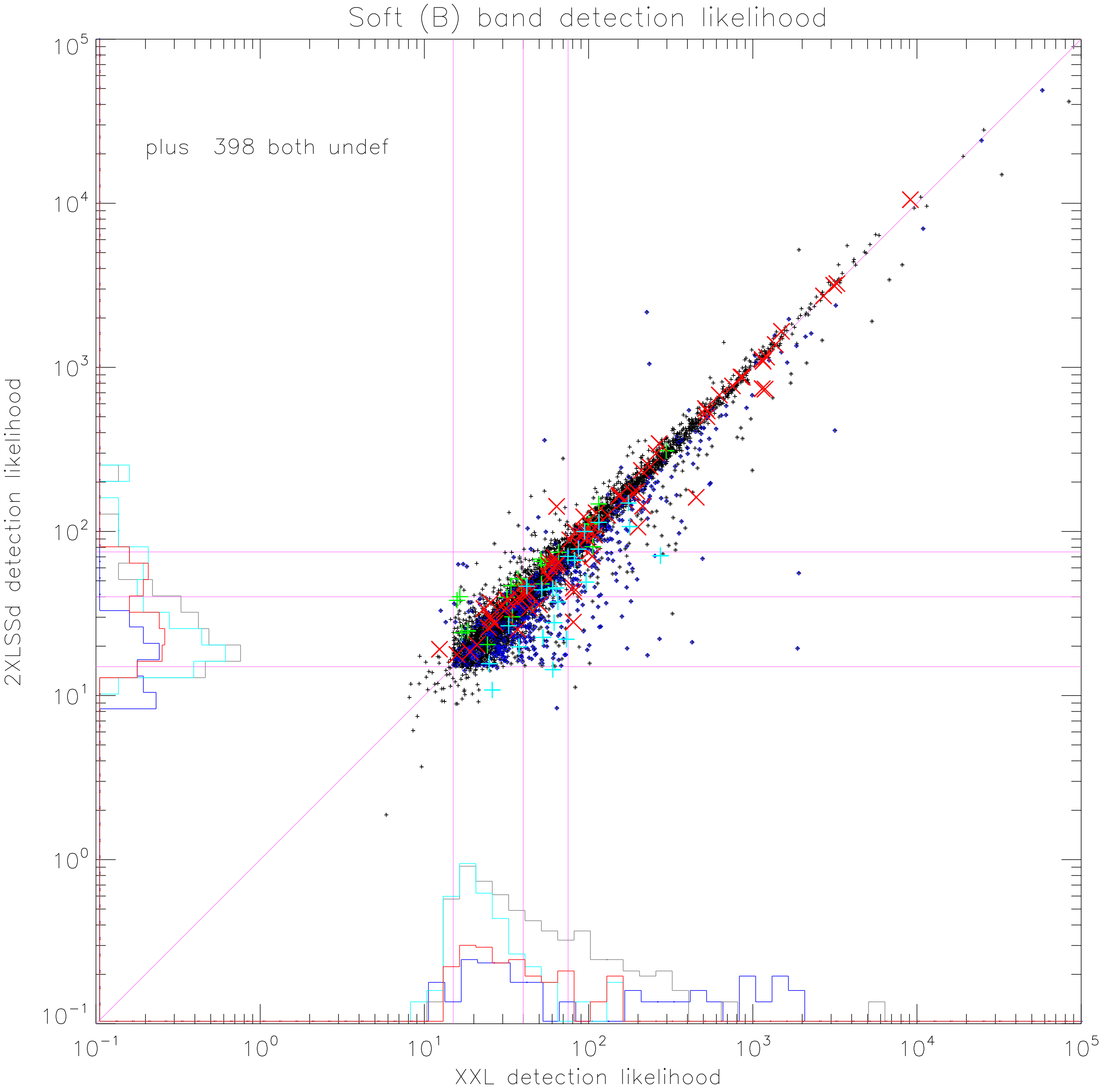

Fig. 3. Comparison of the *detection likelihood in the soft band* between the `XXLN` and `2XLSSd` data. The pink fiducial lines mark the likelihood levels of 15 (below which a source is classified *spurious*), 40 and 75 (corresponding to 3σ and 4σ according to Appendix C of Chiappetti et al. 2013) and (diagonal line) the locus of equal likelihood. Symbol and colour coding is explained in the caption of Fig.4.

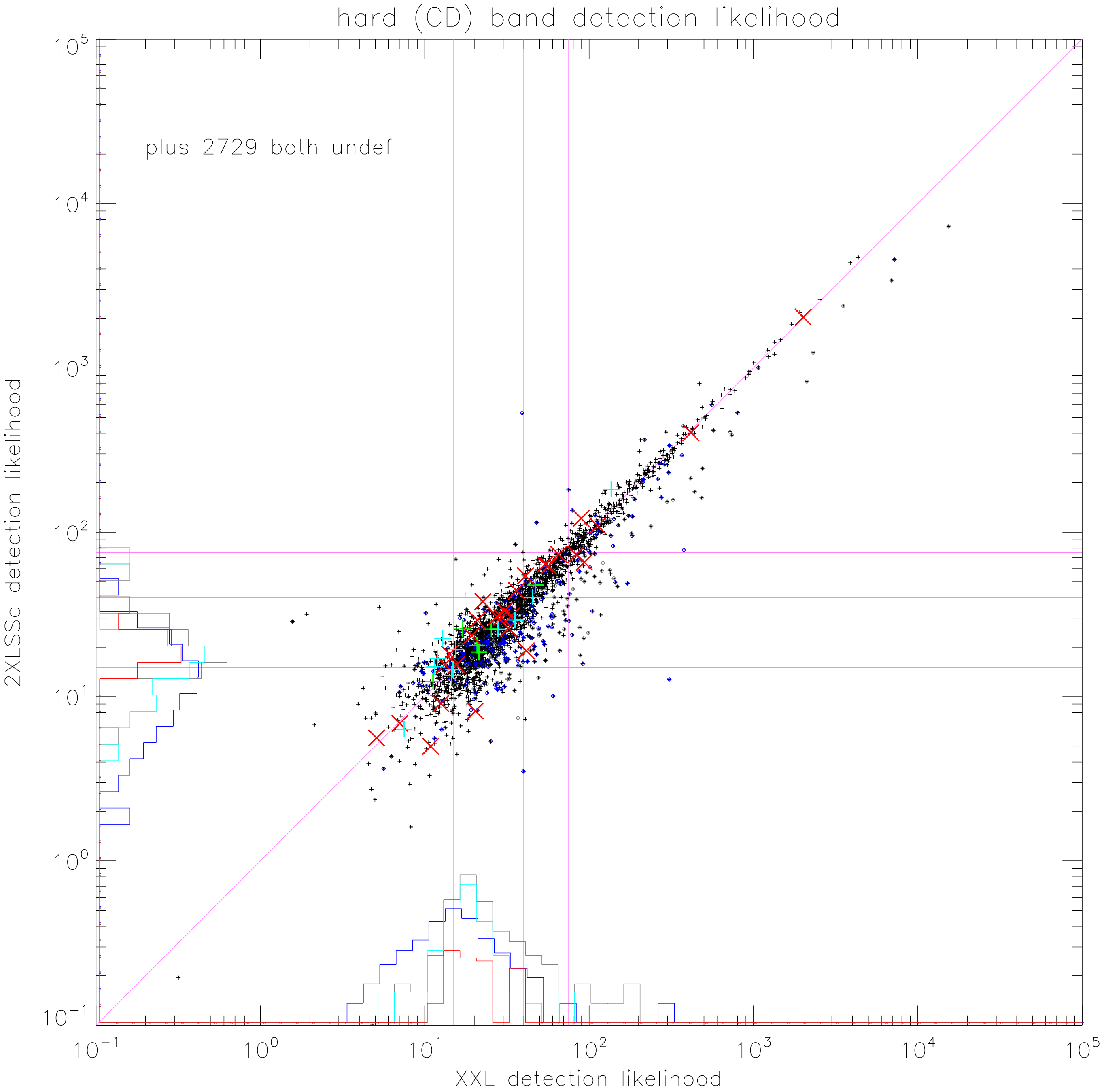

Fig. 4. Comparison of the *detection likelihood in the hard band* between the `XXLN` and `2XLSSd` data. Fiducial marks as in Fig.3. Symbol and colour coding is as follows: black crosses are sources classified pointlike both in `XXLN` and `2XLSSd`; when surrounded by a gray diamond they belong to category B1, i.e. the `2XLSSd` object is in a different LSS field; when surrounded by a blue diamond they belong to category D1 i.e. the `XXLN` field is only in the *LSS area*; otherwise they are in category A1, i.e. in the same LSS field; big thick red X are sources classified extended in both catalogues; big green crosses are objects extended in `2XLSSd` and pointlike in `XXLN`; big cyan crosses are the reverse, extended in `XXLN` and pointlike in `2XLSSd`. The histograms (arbitrary y log axis in number of occurrences) indicate: blue, sources present in both `2XLSSd` and `XXLN` but having undefined likelihood in the energy band of interest in one catalogue; red, extended sources detected only in one catalogue; gray, pointlike sources of classes C/E or F,i.e. detected only in one catalogue with no association at all; cyan, pointlike sources of classes A2/B2/D2 or A3/B3/D3, i.e. no catalogued counterpart in the other catalogue, but associated to an uncatalogued `jan11` or `north33` object.

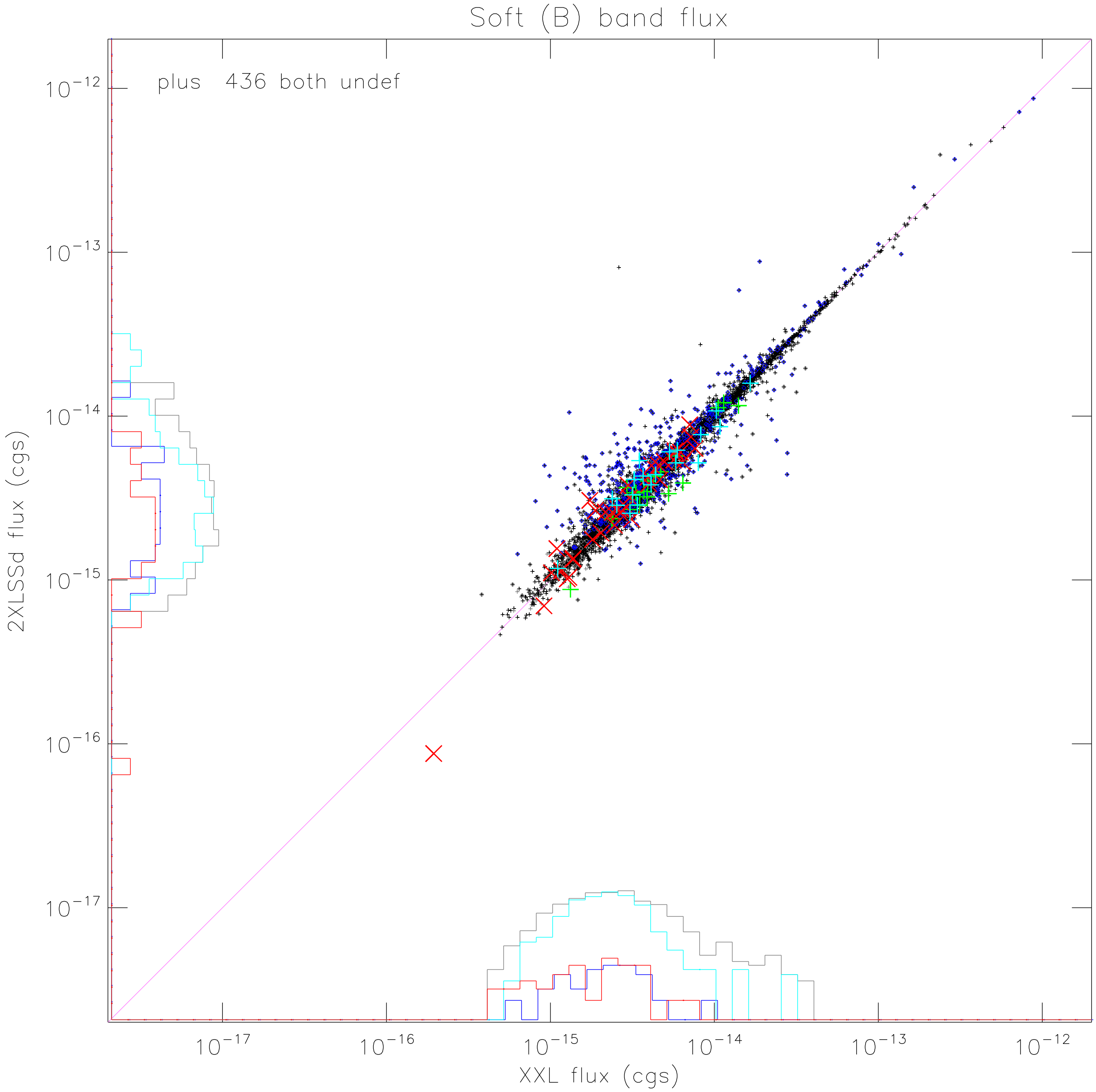

Fig. 5. Comparison of the *fluxes in the soft band* between the XXL and `2XLSSd` data. The pink fiducial diagonal line is the locus of equal fluxes. Symbol and colour coding is similar to the one of Fig.3 and 4, with the following additions: gray crosses instead of black ones correspond to common pointlike sources which are spurious in the band in one of the two catalogues. The largest outlier is an extended source `2XLSSd.Xseq=32162` or `XXLN.Xseq=214584`.

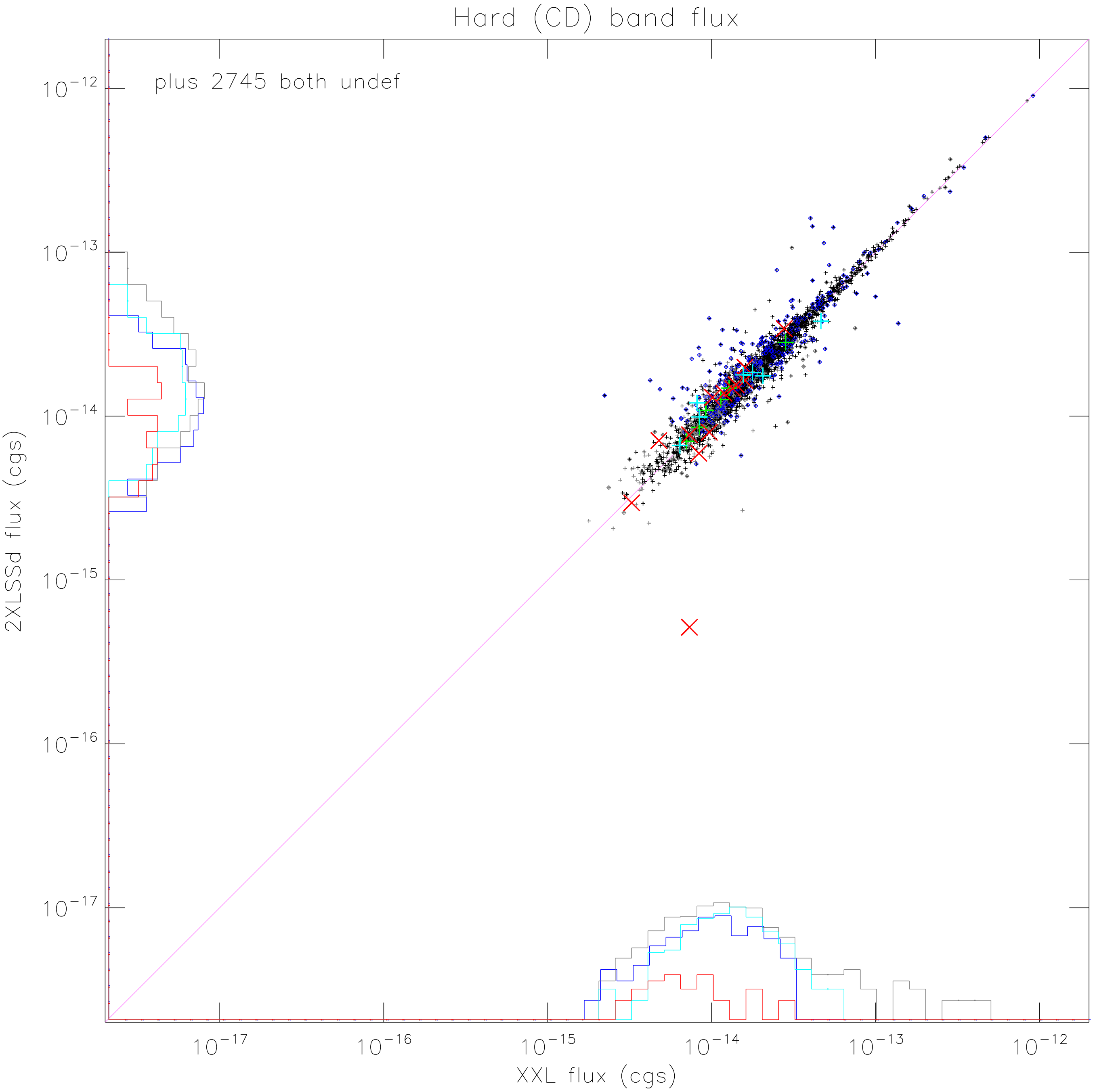

Fig. 6. Comparison of the *fluxes in the hard band* between the XXL and `2XLSSd` data. Fiducial marks, symbol and colour coding identical to Fig. 5. The largest outlier is a nominally extended source `2XLSSd.Xseq=23524` or `XXLN.Xseq=217163`.