	eROSITA **Data and products ownership**	**Ref. : eRO-MPE-PO-70-3** **Date : 2022-02-10** **Page : 1**

Abstract

This document describes the eROSITA data and source products ownership adopted by the German eROSITA Consortium.

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1. SCOPE AND INTRODUCTION

This document describes the ownership of photons collected by the eROSITA instrument onboard the SRG mission, as well as the ownership of the processed data and source products produced by the eROSITA Science Analysis Software System (eSASS) pipeline. There are four types of owner information, so it is of utmost importance that the eROSITA-DE members are aware of the information.

The information presented in this document concerns old eSASS processing versions (941-945), 946 processing of eRASS1-4 AND 947 processing of eRASS5.

2. REFERENCES

2.1. Applicable documents

eRO-MPE-PO-70-2-eROSITA_DE_naming_conventions_30092020.pdf

2.2. Reference documents

N/A

2.3. Acronyms

Specific acronyms used in this document are defined below:

eROSITA-DE	German eROSITA consortium
eRASS	eROSITA All-Sky Survey
eSASS	eROSITA Science Analysis Software System
MPE	Max Planck Institute for Extraterrestrial Physics
IKI	Space Research Institute of the Russian Academy of Sciences
PI	Principal Investigator
DE	Germany
RU	Russia

3. SCIENTIFIC EXPLOTATION OF THE ALL-SKY SURVEY DATA

The scientific exploitation of the eRASS data is shared equally between a German and a Russian consortium. Two hemispheres of the sky have been defined, over which each team has unique scientific data exploitation rights, while all-sky data are available to both teams for purposes of technical and calibration analysis, pipeline validation, and so on. This scheme guarantees a fair share of both Galactic and extragalactic areas.

Data rights are split by Galactic longitude (l) and latitude (b), with a division marked by the great circle passing through the Galactic poles (l,b)=(0,+90);(0,-90) and the Galactic Center SgrA* (l,b)=(359.94423568,-0.04616002).

Data with -0.05576432 <= l < 179.94423568 degrees (Eastern Galactic hemisphere) belong to the Russian consortium, while data with 179.94423568 < l <= 359.94423568 degrees (Western Galactic hemisphere) belong to the eROSITA-DE.

It has been agreed that there is a 1-degree wide stripe straddling the dividing great circle which is "shared". In this region, both eROSITA-DE and Russian scientists can look at the sources. Specific publications of objects discovered in this area (apart from the catalogues) should be done in collaboration between the eROSITA-DE and the Russian consortium.

This sky division implies that there are four regions with distinct data access:

1. MPE sky: the part of the DE hemisphere only DE scientists have access to.
2. MPE-IKI sky: the part of the DE hemisphere both DE and RU scientists have access to.
3. IKI-MPE sky: the part of the RU hemisphere both RU and DE scientists have access to.
4. IKI sky: the part of the RU hemisphere only RU scientists have access to.

Note: Old eSASS processing versions (941-945), 946 processing of eRASS1-4 AND 947 processing of eRASS5 divide the sky by a great circle passing through the Galactic poles (l,b)=(0,+90);(0,-90) and the coordinates (l,b)=(0.0,0.0). Users are encouraged to carefully use the data and products around the shared area.

4. ESASS PIPELINE PRODUCTS AND OWNERSHIP

4.1. Naming convention

The document eRO-MPE-PO-70-2-eROSITA_DE_naming_conventions_30092020 describes the file naming convention of the eSASS pipeline products in the eROSITA-DE MPE archive[1]. In short, files names start with the letters '**ex**…', where x denotes the proprietary right of the data in the tile: **m** stands for MPE, **i** for IKI and **b** for both.

4.2. eSASS pipeline and ownership

In the eSASS pipeline, there are four types of owner information:

1. **Sky tiles data products:** the eSASS pipeline creates sky tile-based products, which have the file name designations described in Section 4.1. Section 4.3 shows the type of products that are affected.

2. **Event ownership:** each X-ray photon detected by eROSITA has a proprietorship. The task `evatt` assigns the ownership based on the photon position in the sky (see Section 2) and the information is encoded in the first two bits of the *flag*[2], i.e. the bit masks used to indicate various event conditions.

3. **Source catalogues:** each sky tile catalogue contain a column that shows the ownership of each source. This is based on the position of the source in the sky (see Section 3). OWNER equals 0 means both, IKI and MPE, can study the source, OWNER equal 1 means the source belongs to IKI, while OWNER equals 2 is for MPE ownership. *Note*: the owner character in the DETUID column is not meant to reflect the source ownership. The only purpose of the DETUID is to provide a unique identification of each detected source. It simply takes the owner character from the sky tile the source was detected in.

4. **Source data products:** the eSASS pipeline produces specific source products based on the list of sources contained in the source catalogues. These source products also follow the above file naming convention (see Section 4.1) but they have an extra complication as described in detail in Section 4.4.

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[1] Further information about data products naming convention can be found in:

https://erosita.mpe.mpg.de/internal/eROdoc/pipeline/SASS-products_file_naming_04.html or

https://wiki.mpe.mpg.de/eRosita/CookBook#Pipeline_data_products

[2] 0x1 for MPE_OWNER and 0x2 for IKI_OWNER.

4.3. Sky tile level data products

These data products consist of event lists, images, exposure maps, detection masks, background maps, source model images, sensitivity maps, source catalogues. Each of these products covers an area of 3.6x3.6 degrees, and they follow the file name convention described in Section 4.1. The 'eb…' sky tile level data products cover an area larger than the shared IKI–MPE area, so eROSITA-DE members must be aware that part of those products must not be analysed.

Note: Old eSASS processing versions (941-945), 946 processing of eRASS1-4 AND 947 processing of eRASS5 used 0.63-degree wide stripe straddling the dividing great circle which is "shared", instead of 1-degree. As consequence, some sky tiles and their corresponding products have the wrong ownership.

4.4. Source data products

The eSASS pipeline also creates source data products, such as source and background spectra, redistribution matrix files (RMFs), light curves, etc. The task that produces such products is called `srctool`. However, `srctool` assigns the owner of the source products based on the event owner flag (see Section 4.2) not from the catalogue owner column. `srctool` also considers the extraction area (via the event owner flag) to assign the ownership of the source products. This complicates the ownership attribution as explained below.

4.4.1. `srctool` ownership and file naming convention

Although `srctool` follows the naming convention described in Section 4.1, the fact that it takes into account the extraction area at the time of producing source data products has an effect on the assignation of the ownership in the created files. Therefore, there are several different possible values of ownership:

- MPE (m) – if all events in the source products belong to MPE.
- IKI (i) – if all events in the source products belong to IKI.
- IKI+MPE (b) – if all events in the source products belong to IKI and MPE.
- INVALID (o) – if the events in the source products are neither owned by MPE nor IKI.
- INVALID (o) – if there are no events in the source products (unlikely).
- MIXED (o) – if there is a combination of events in the source products, i.e. photons in the extraction area that belong to IKI and/or MPE and/or IKI+MPE.

The letter in parenthesis shows the second letter in the file name in the source data products. The different cases are illustrated in Figure 1.

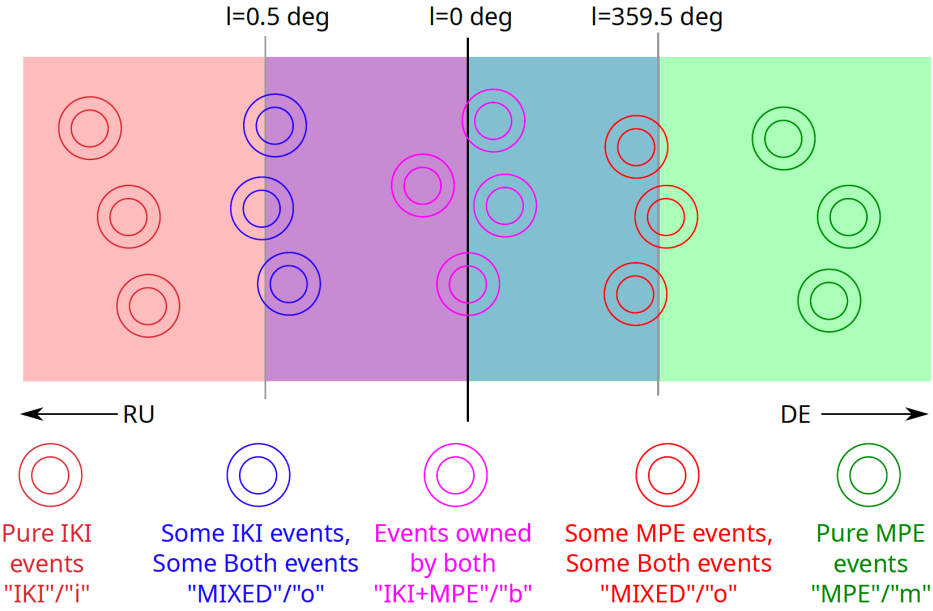

Figure 1. Illustration of the different possible values of ownership assigned by `srctool`. The inner circles represent the source area while the annulus represents the background extraction area.

Note: eROSITA-DE members are allowed to use "eo…" source data products produced by old eSASS processing versions (941-945), 946 processing of eRASS1-4 AND 947 processing of eRASS5. Users are encouraged to CAREFULLY use the source data products with mixed ownership.