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|  | <p style="text-align: center;">eROSITA</p> <p style="text-align: center;">Data and products ownership</p> | <p>Ref. : eRO-MPE-PO-70-4</p> <p>Date : 2022-04-08</p> <p>Page : 1</p> |
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Abstract

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

Change Record

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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 947 processing of eRASS1, AND following processing versions (948/020, ...) of individual and cumulative data sets.

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2. REFERENCES

2.1. Applicable documents

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

eRO-MPE-PO-70-3_DataOwnership_946processingversion.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 |

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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 $-0.05576432 \leq l < 179.94423568$ degrees (Eastern Galactic hemisphere) belong to the Russian consortium, while data with $179.94423568 < l \leq 359.94423568$ 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.

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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 archive¹. 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 five 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. 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. There are 21 more 'eb...' sky tiles than in previous processing versions, 13 sky tiles changed their owner designation from 'm' to 'b' and 8 sky tiles changed from 'i' to 'b'. This is due to the wider and slightly shifted shared zone that has been implemented (see eRO-MPE-PO-70-3_DataOwnership_946processingversion for comparison).
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 three bits of the *flag*, i.e. the bit masks used to indicate various event conditions:
 - Bit 0: MPE_OWNER, 0: MPE access, 1: no access.
 - Bit 1: IKI_OWNER, 0: IKI access, 1: no access.
 - Bit 2: MPE_OVERLAP, 1: IKI half of shared area, 0 otherwise.
3. **Source catalogues:** each sky tile catalogue contains 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 = 0: source is in MPE half of shared area (MPE-IKI sky, see Section 3).

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

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

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- OWNER = 1: source belongs to IKI, no MPE access.
- OWNER = 2: source belongs to MPE, no IKI access.
- OWNER = 4: source is in IKI half of shared area (IKI+MPE sky, see Section 3).

Note that the owner character in the DETUID column of the source catalogues corresponds to the owner character in the corresponding source catalog products file name (see point 1 above). It is not intended to reflect the source ownership.

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 consist of source and background spectra, redistribution matrix files (RMFs), light curves, etc. The task that produces such products is called `srctool`. The source ownership is derived from the owner information in the source catalogue. It is coded in the source products file name as follows, the corresponding source catalogue owner number is given in parentheses:

- ‘em...’ (OWNER=2): source products belong to MPE, no IKI access.
- ‘en...’ (OWNER=0): source is in MPE half of shared area (MPE-IKI sky, see Sect. 3).
- ‘ei...’ (OWNER=1): source products belong to IKI, no MPE access.
- ‘ej...’ (OWNER=4): source is in IKI half of shared area (IKI+MPE sky, see Sect. 3).
- ‘eo...’ source products which invalid owner information

5. **OWNER header keyword:** all eSASS data products contain the OWNER header keyword, which also stores the ownership information as following:

- MPE: for products that belong to MPE.
- MPE-IKI: for products that belong to MPE+IKI.
- IKI-MPE: for products that belong to IKI+MPE.
- IKI: for products that belong to IKI.