
OSIRIS

Optical, Spectroscopic, and Infrared Remote Imaging System

OSIRIS camera bad pixel list

RO-RIS-MPAE-TN-080

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1 / a	22/2/2017 G. Kovacs	Sec. 3	Section added
1 / b	21/02/2018 C. Güttler	Sect. 2 and 3	Adding NAC “scar” area to uncorrected bad pixel Harmonization of format
1 / c	24/10/2018 C. Güttler	Data: Sects. 2.2.3, 2.3.3, and 3 Text: all	- Added backtravel opening and black bottom line, to be treated as NO_CORR - Several clarifications in text
1 / d	3/6/2019 C. Tubiana	Sect. 2.2.2 and Sect.3	- Updated Sect. 2.1 - Updated Sect. 2.2.2- Updated .TXT file for NAC
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1 General aspects

1.1 Scope

This document describes the bad pixel list of the OSIRIS NAC and WAC. It also specifies their correction methods.

1.2 Introduction

The OSIRIS cameras are equipped with 2048x2048 backside illuminated CCDs. These devices may contain blemishes, which must be corrected during the image calibration process. These are generally referred to as *bad pixels* and are produced:

- during the manufacturing of the detector
- during integration of the camera system
- in-flight

Furthermore, temporary malfunction of the instrument may produce image artefacts, which are treated algorithmically similar to CCD blemishes and flagged in the QUALITY_MAP of the images. These are also listed in this document.

1.3 Applicable Documents

no.	document name	document number, Iss./Rev.
AD1	OSIRIS Experiment Data Record and Software Interface Specification (EDR/SIS)	RO-RIS-MPAE-ID-018
AD2	Rosetta-OSIRIS to Planetary Science Archive Interface Control Document	RO-RIS-MPAE-ID-015

1.4 Reference Documents

no.	document name	document number, Iss./Rev.
RD1	OSIRIS user manual	RO-RIS-MPAE-UM-004, D/s
RD2	OSIRIS Calibration Report	RO-RIS-MPAE-RP-147, D/b
RD3	OSIRIS Calibration Pipeline OsiCalliope	RO-RIS-MPAE-MA-007
RD4	Shutter parameters for exposure time calculation	RO-RIS-MPAE-TN-073



2 Bad pixel list

2.1 Correction method

The general concept is that bad pixels can be corrected by replacing their DN values by the median (or average) of the neighboring good ones. Lines, columns or areas can also be corrected by shifting their DN values to match the adjacent line or area. The implemented methods are called:

- *SHIFT_X_CORR* [$X = L$ or R]
- *SHIFT2_X_CORR* [$X = L$ or R]
- *MEDIAN_CORR*
- *AVERAGE_CORR*
- *NO_CORR*

Note that the *NO_CORR* method does not result in any correction but the affected pixels are flagged in the *QUALITY_MAP* of the image.

Details on the correction methods can be found in [RD3].

2.2 NAC bad pixels

The bad pixels list is applicable to all OSIRIS flight data.

2.2.1 Individual bad pixels and correction methods

No individual bad pixels are known or corrected.

2.2.2 Bad columns and correction methods

Column 995 is a bad column, with further effect on the neighboring columns (C994 and C996).

The method first corrects columns 994 and 996. Column 995 is then corrected by replacing each of its pixels DN with the median of 6 neighboring column pixels.

The following correction is implemented:

$$\begin{aligned} COLUMN &= (994, 0, SHIFT2_L_CORR, 128) \\ COLUMN &= (996, 0, SHIFT2_R_CORR, 128) \\ COLUMN &= (995, 0, MEDIAN_CORR, 128) \end{aligned}$$

2.2.3 Bad areas and methods

The NAC “blob” area is a rectangular area with effectively higher (dark) noise. This is marked in the image quality map, but not corrected.

The following is implemented in the database:

$$AREA_R = (915, 970, 20, 20, NO_CORR, 128)$$

Moreover, the “scar” area is a V-shaped feature from a particle sticking on the CCD surface. The particle is scattering light and dimming the pixels below. The feature is mostly corrected by the high spatial frequency flat-fielding but should be treated with care in some cases and, in particular, for photometry. The feature is not corrected by the bad-pixel algorithm but marked in the quality map.

The following is implemented in the database:



$AREA_R = (1559, 645, 14, 24, NO_CORR, 128)$

2.3 WAC bad pixels

The bad pixels list is applicable to all OSIRIS flight data.

2.3.1 Individual bad pixels and correction methods

No individual bad pixels are known or corrected.

2.3.2 Bad columns and correction methods

The WAC has one bad cluster at column 119, for line 1664 and larger.

The following correction is implemented:

$COLUMN = (119, 1664, MEDIAN_CORR, 128)$

2.3.3 Bad areas and methods

A total of 11 images in MTP029 and MTP032 are affected by an image artefact in the lower few lines (in Rosetta standard orientation). These pixels show sub-bias values and the number of affected lines are in the few tens. Images affected by this cannot be corrected but are flagged in the `QUALITY_MAP`. The correction is implemented for the first 100 lines in CCD coordinates, while it was recognized for two images that this artefact can also be observed for windowed images.

The following correction is implemented:

$AREA_R = (0, 0, 2048, 100, NO_CORR, 16)$

Note: This is only applied for images that are affected by this artefact, which is flagged in the `DATA_QUALITY_ID` in the image header.

3 Calibration files used by OsiCalliope

The calibration files used by OsiCalliope to calibrate OSIRIS images are:

- `WAC_FM_BAD_PIXEL_V02.TXT`
- `NAC_FM_BAD_PIXEL_V04.TXT`

Previous versions:

- `WAC_FM_BAD_PIXEL_V01.TXT`
- `NAC_FM_BAD_PIXEL_V03.TXT`
- `NAC_FM_BAD_PIXEL_V02.TXT`
- `NAC_FM_BAD_PIXEL_V01.TXT`
- `NAC_FM_BAD_PIXEL_LIST.LBL`
(obsolete, same values as `NAC_FM_BAD_PIXEL_V01.TXT`)
- `WAC_FM_BAD_PIXEL_LIST.LBL`
(obsolete, same values as `WAC_FM_BAD_PIXEL_V01.TXT`)