

amdlib-3

Memo Number: ???

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Copy to :
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Subject : **Using the best possible bias estimation for amdlib3**

Presents :

1 – Introduction

amdlib3 uses a single BIAS file. This file is used to compute (1) the offset level above which the stellar flux is recorded (this offset contains a detector and a thermal contribution), and (2) the variance of this offset level, that includes all source of noise (detector, photon sky) except the photon noise from the stellar source.

We know that:

- The BIAS file should contain at least 150 frames in order to estimate properly the offset level and the variance.
- In LowRes, this number of frames is achieved in the night-calibrations (SKY and DARK) because this mode mainly use $DIT < 0.5s$. In Medium and High-Resolution modes, this number of frames is almost never achieved in the night-calibrations. Data reduction should rely on morning-calibrations.
- In LowRes, the thermal emission shape depends of the exact position of the grating, which is not repeatable. We should not touch the grating between the OBJECT and the associated BIAS.
- In Medium-K and High-K, the thermal emission is seen in long DITs, but his shape does not depend of the exact position of the grating (repeatability is enough).
- In Medium-H and High-H, the thermal emission is negligible.

2 – Proposition of automatic selection for amdlib3

Here is a proposed order of priority to select the bias file. If none can be found, the data are not reduced.

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- **LowRes:** The thermal emission is important, and depends on the grating exact position. The number of frame in the night-time calibrations is enough:
 1. SKY with same P2VM-ID, same DIT and NDIT>150 (night-calibration)
 2. HOT-DARK with same P2VM-ID, same DIT and NDIT>150 (night-calibration)
- **Medium, High:** The thermal emission is slightly seen in K, but do not depend on the grating exact position. The number of frame in the night-time calibrations is generally too small:
 1. Same as LowRes
 2. HOT-DARK with same windowing, same DIT and NDIT>150 (morning-calibration)
 3. COLD-DARK with same windowing, same DIT and NDIT>150 (morning-calibration),
a warning is issued for long DITs in the K-band.

3 – Impact on operation

- HOT-DARK and/or SKY **should** be taken at night in LowRes with NDIT>150.
- HOT-DARK **should** be taken in the morning for all Medium and High-Resolution setups, with NDIT>150.
- COLD-DARK are not necessary for amdlib3.