

Failure of the PI estimation due to incorrect HK values of the video temperature.

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1 Introduction

The video temperature of the AE/TCE is used to convert PHA to PI in xispi. The temperature is recorded in the “S[0-3]_VDCHK18_CAL” column in the “XIS_AE_TCE_I” extension of xis HK FITS files. The AE/TCE sometimes returns false HK values, which is known as an AE-FPGA problem¹. If the anomaly happened to the HK value of video temperature, the conversion from PHA to PI must result in failure.

2 When does it happen?

The problem occurs sometimes in the burst mode with or without a window option.

3 Symptom

Please look at the time profile of the S[0-3]_VDCHK18_CAL value in your observation. Let's assume that you have an XIS3 HK file, for example, ae20060404_0255_1420_xis3.hk.gz. The next command shows the time profile of the video temperature;

```
%> fplot "ae20060404_0255_1420_xis3.hk.gz[XIS_AE_TCE_I]"  
      xparm=TIME yparm=S3_VDCHK18_CAL
```

If the time profile looks like figure 1(a), your data is not affected by the problem; the video temperature is usually between 10 deg and 30 deg, and it shows 55 deg only during the SAA passage. However, if your light curve looks like figure 1(b), your data are probably affected by the problem. In this case, you can see many events whose PI is 4095 ch but PHA is much less than 4095ch.

The problem actually happened in the Crab observations in March and April, 2006, which utilized the burst mode with an exposure time of 0.1s and a 1/4 widow option. Events misclassified as PI = 4095ch are 7 to 10 % of all events.

4 How to resolve the problem?

Please discard the incorrect HK values from your HK file. For example,

```
%> fcopy "ae20060404_0255_1420_xis3.hk.gz[XIS_AE_TCE_I]"  
      [S3_VDCHK18_CAL>10&&S3_VDCHK18_CAL<30]" xis3_new.hk
```

¹This is a rather technical problem and it is very difficult to explain it for ordinary XIS users to understand. If you want to know it in detail, please look at “AE-FPGA problem” in <http://wwwxray.ess.sci.osaka-u.ac.jp/hayasida/Study/xis2.htm>

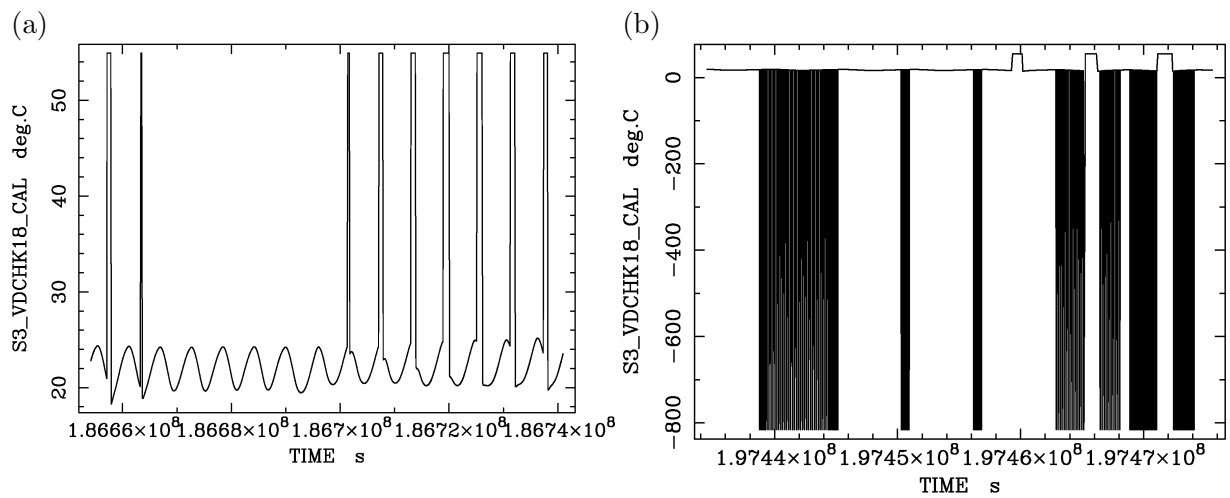


Figure 1: Examples of time profiles of the S[0-3].VDCHK18_CAL value: (a) a normal profile, (b) the HK value is affected by the AE-FPGA problem.

and do xispi again to your “uf.evt files” (not the cleaned event files)² to calculate the PI column again.

²xispi currently do not support the cleaned event files.