Catalogue of earthshine telescope observations - July 2012

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Abstract

We compile all earthshine telescope data from the start on Mauna Loa until early July 2012. We apply a simple but powerful technique for identifying those data that are not suffering from failure of the filter-wheel and shutter. We find at about 25 good nights suitable for further reduction with scattered-light removal and albedo analysis.

1 Introduction

We have been using the Lund/DMI earthshine telescope since march/April 2012 for regular observations, when weather and equipment allowed. We present here a discussion and review of all the suitable data.

We will calculate fluxes from observed counts and requested exposure time, and we will plot fluxes for each filter, on a given night, against airmass, and derive extinction coefficients if possible. We are in the situation that the setting of the color filters and the precision of the shutter are in question. At times we get good images but later realize that the color filter was not set properly (i.e. we do not know which filter we observed through in a given exposure). Or we realize that the exposure time we requested cannot possibly be the one we got. While exposure time does not affect the usefulness of co-add mode data we cannot be quite sure if a funny flux is due to improperly set color filter or just loss of exposure time. We therefore need a discussion of how to find the good data.

The many pages of figures in the rest of this report show what we have achieved on all nights that had suitable lunar phases and were obvious problems were not hindering observations.

We now plot against airmass the fluxes calculated from nominal filter position and nominal exposure time, and we plot, in histograms, the fluxes

to enable analysis of flux-ratios between filters as this may be a good way to spot situations were filters definitely were not set correctly.

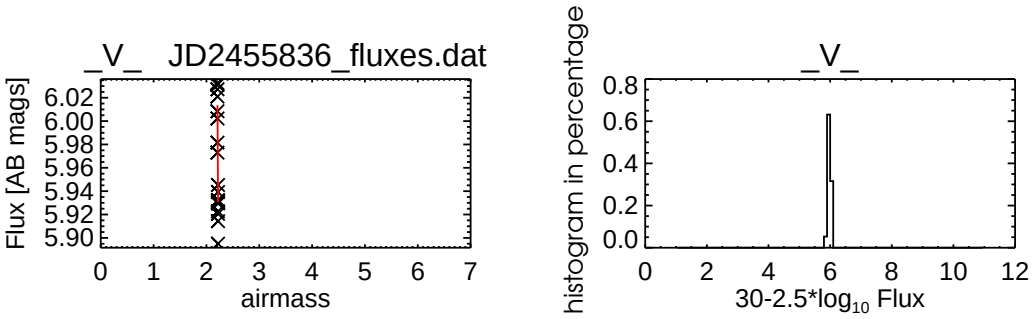
Section 2 shows the plots while section 3 discusses some of the data in order to gain insight into a possible data-selection filter or method, for later use.

2 The data

On each of the following pages we show, ideally, two columns with five rows - each page summarizes all the good observations for one night and collects the data for different filters in different rows. When a filter is missing the row is blank. In the left columns we show fluxes (calculated as total counts from bias-subtracted images) divided by nominal exposure time in seconds against airmass. Airmass was calculated from knowledge of the time of observation, the target coordinates (the Moon), and the location of the observatory (Mauna Loa). A red line shows the robust linear regression (`ladfit` from `IDL` was used). The vertical scale is set by the minimum and maximum fluxes fro that night. Fluxes are shown as magnitudes, arbitrarily calculated as

$$30 - 2.5log_{10}(flux) \tag{1}$$

In the right column are histograms of the magnitudes plotted in the left column. The range is fixed for easier comparison from night to night.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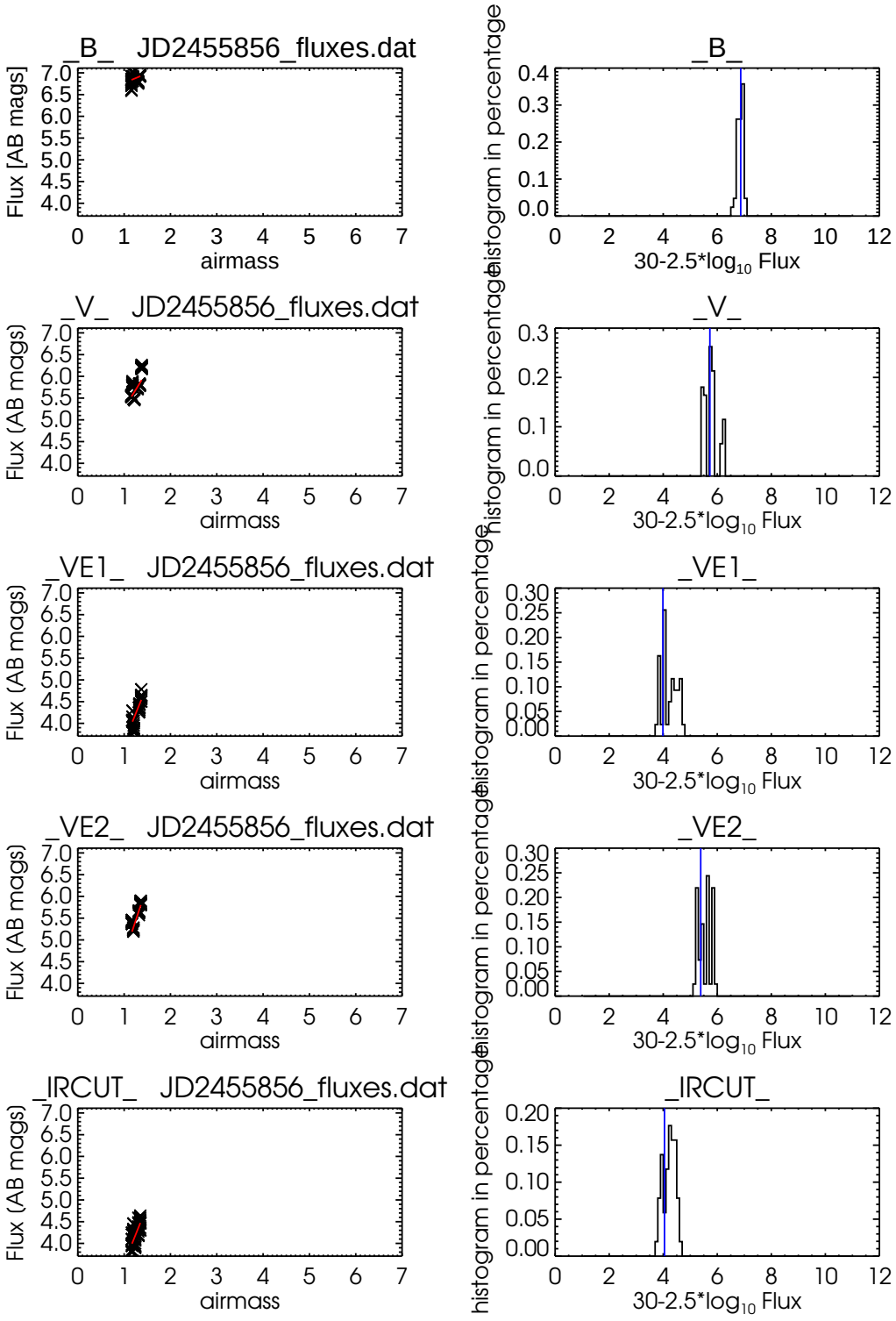
Flux [AB mags]
6.02
6.00
5.98
5.96
5.94
5.92
5.90
0 1 2 3 4 5 6 7
airmass
_V_
histogram in percentage
0.8
0.6
0.4
0.2
0.0
0 2 4 6 8 10 12
30-2.5*log10 Flux

Figure 1: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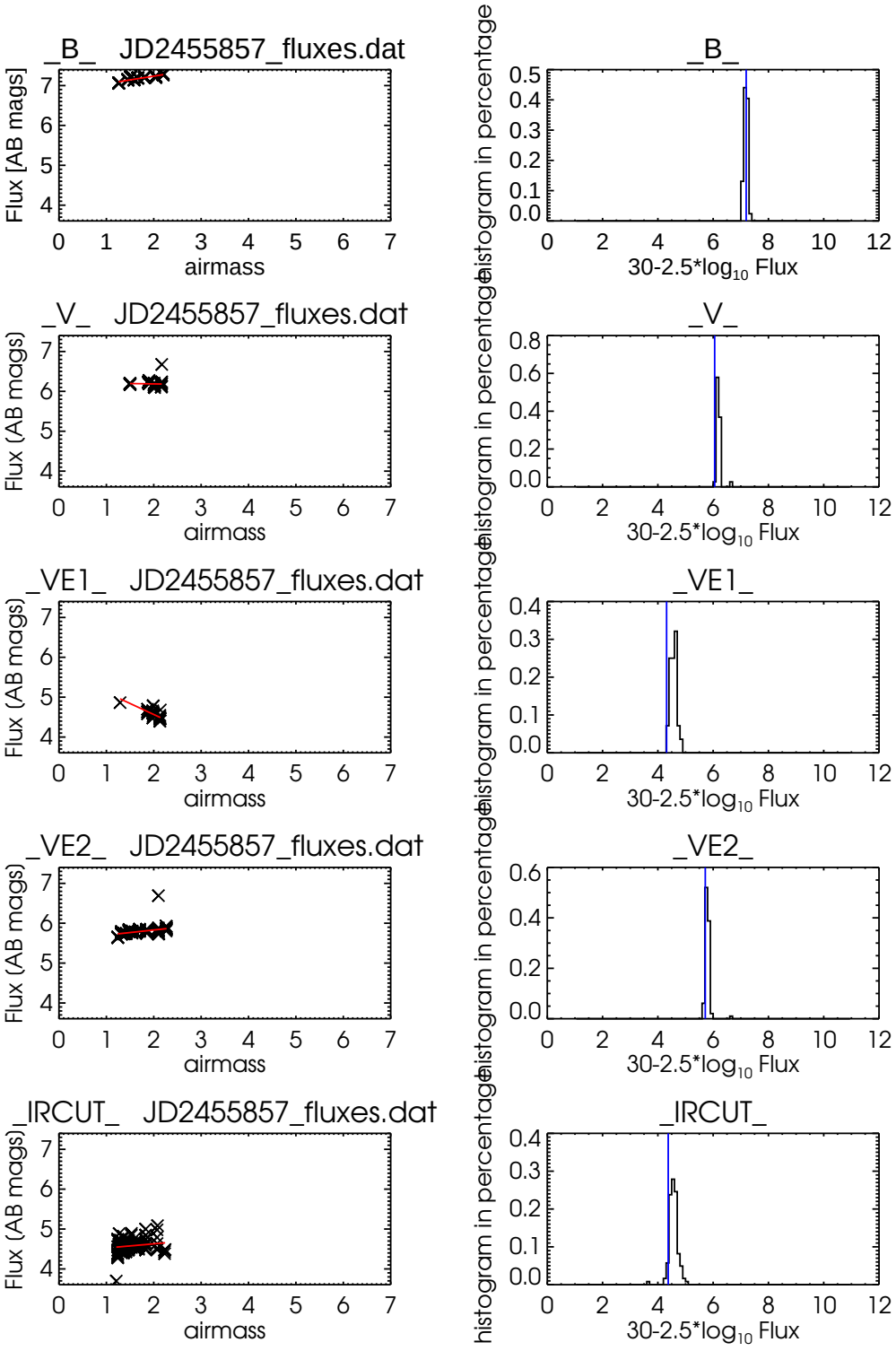
Flux [AB mags]
airmass
_V_ JD2455856_fluxes.dat
Flux (AB mags)
airmass
_VE1_ JD2455856_fluxes.dat
Flux (AB mags)
airmass
_VE2_ JD2455856_fluxes.dat
Flux (AB mags)
airmass
IRCUT JD2455856_fluxes.dat
Flux (AB mags)
airmass
_B_
_V_
_VE1_
_VE2_
IRCUT
histogram in percentage
30-2.5*log10 Flux

Figure 2: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Flux [AB mags]
airmass
_V_ JD2455857_fluxes.dat
Flux (AB mags)
airmass
_VE1_ JD2455857_fluxes.dat
Flux (AB mags)
airmass
_VE2_ JD2455857_fluxes.dat
Flux (AB mags)
airmass
IRCUT JD2455857_fluxes.dat
Flux (AB mags)
airmass
_B_
_V_
_VE1_
_VE2_
IRCUT
histogram in percentage
30-2.5*log10 Flux

Figure 3:

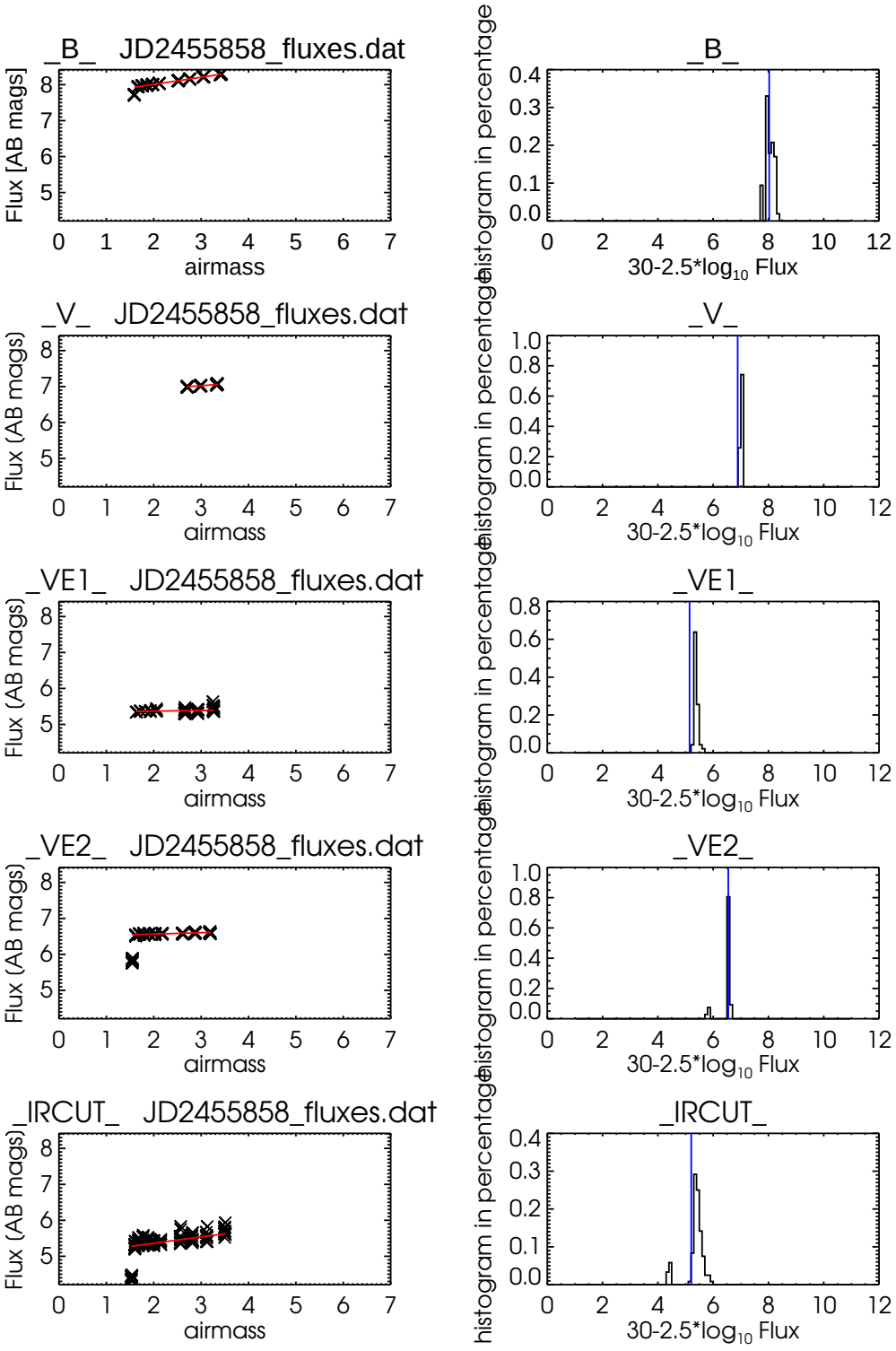
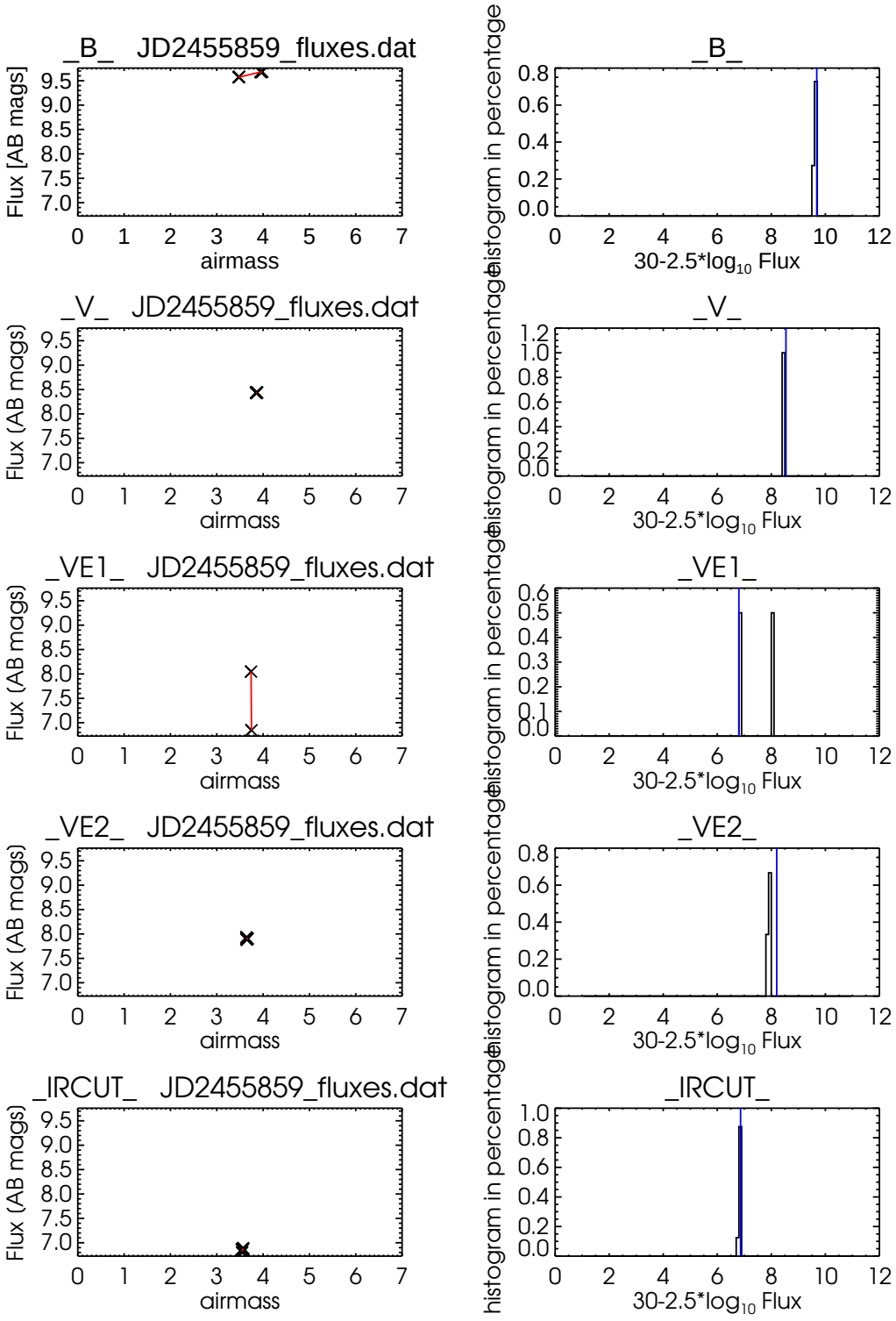

_B_ JD2455858_fluxes.dat
Flux [AB mags]
airmass
_B_
histogram in percentage
30-2.5*log10 Flux
_V_ JD2455858_fluxes.dat
Flux (AB mags)
airmass
_V_
histogram in percentage
30-2.5*log10 Flux
_VE1_ JD2455858_fluxes.dat
Flux (AB mags)
airmass
_VE1_
histogram in percentage
30-2.5*log10 Flux
_VE2_ JD2455858_fluxes.dat
Flux (AB mags)
airmass
_VE2_
histogram in percentage
30-2.5*log10 Flux
IRCUT JD2455858_fluxes.dat
Flux (AB mags)
airmass
IRCUT
histogram in percentage
30-2.5*log10 Flux

Figure 4: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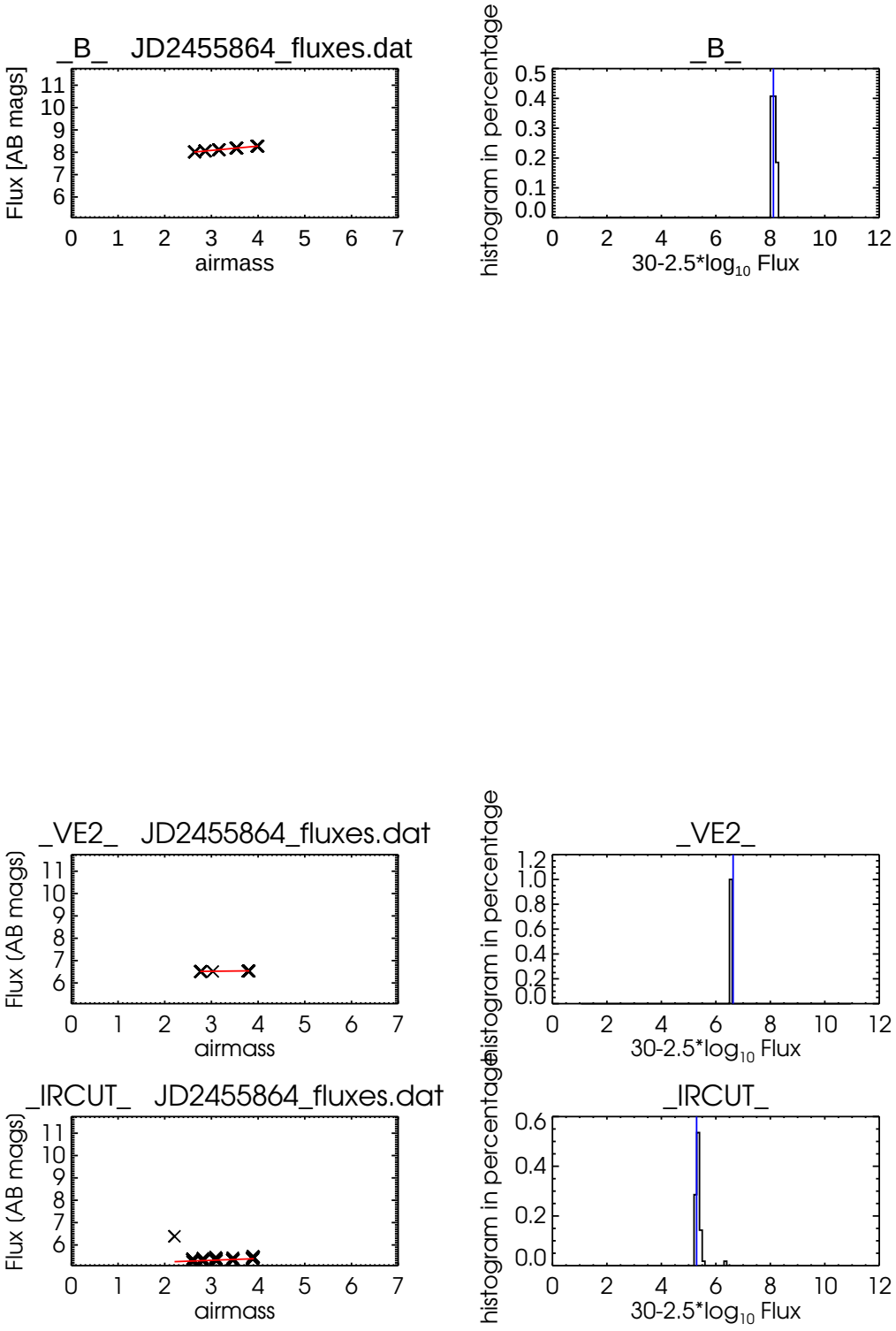
airmass
_V_ JD2455859_fluxes.dat
Flux (AB mags)
airmass
_VE1_ JD2455859_fluxes.dat
Flux (AB mags)
airmass
_VE2_ JD2455859_fluxes.dat
Flux (AB mags)
airmass
IRCUT JD2455859_fluxes.dat
Flux (AB mags)
airmass
_B_
_V_
_VE1_
_VE2_
IRCUT
histogram in percentage
30-2.5*log10 Flux

Figure 5: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Flux [AB mags]
airmass
_B_
histogram in percentage
30-2.5*log10 Flux
_VE2_ JD2455864_fluxes.dat
Flux (AB mags)
airmass
_VE2_
histogram in percentage
30-2.5*log10 Flux
IRCUT JD2455864_fluxes.dat
Flux (AB mags)
airmass
IRCUT
histogram in percentage
30-2.5*log10 Flux

Figure 6:

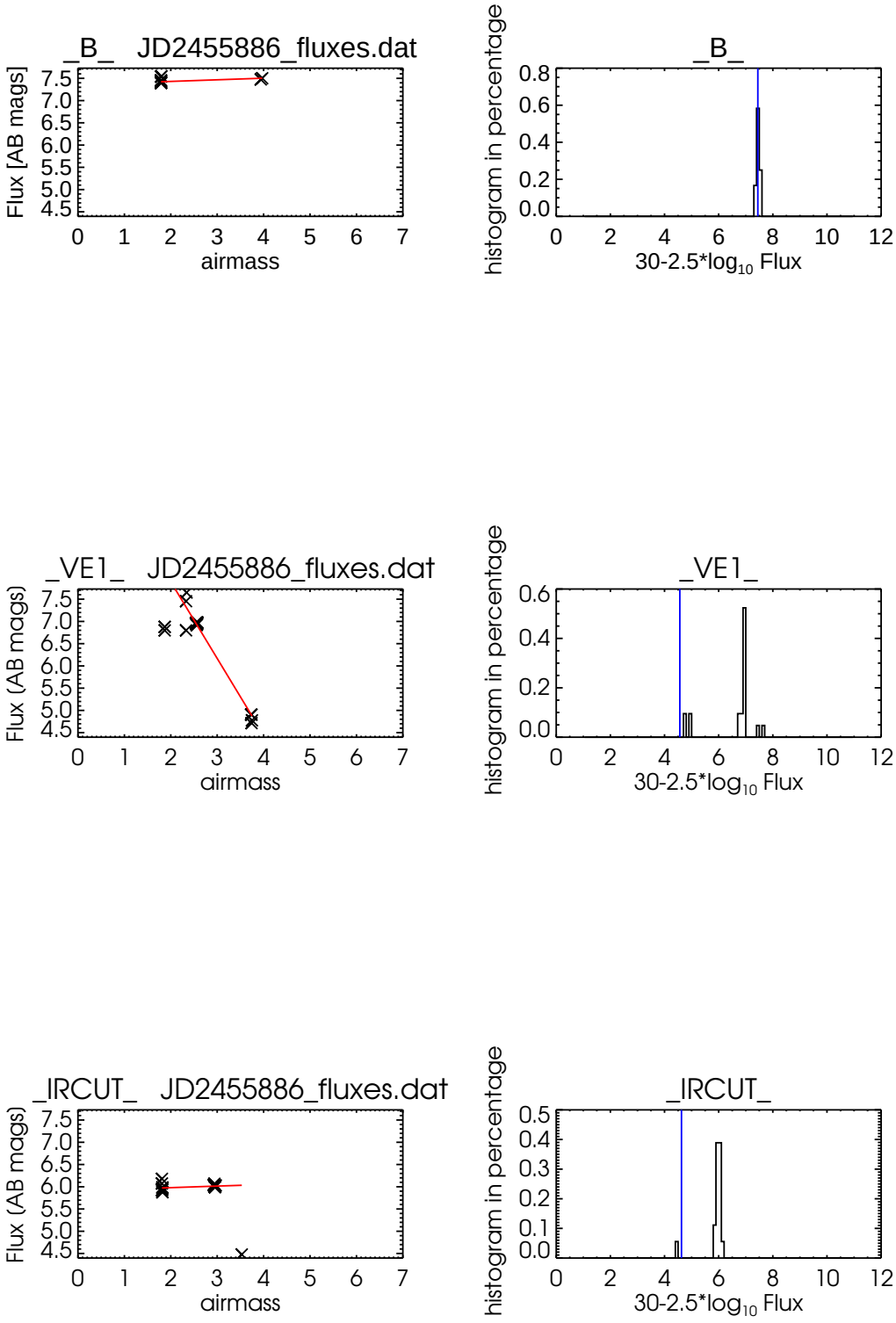

_B_ JD2455886_fluxes.dat
Flux [AB mags]
airmass
_B_
histogram in percentage
30-2.5*log10 Flux
_VE1_ JD2455886_fluxes.dat
Flux (AB mags)
airmass
_VE1_
histogram in percentage
30-2.5*log10 Flux
IRCUT JD2455886_fluxes.dat
Flux (AB mags)
airmass
IRCUT
histogram in percentage
30-2.5*log10 Flux

Figure 7:

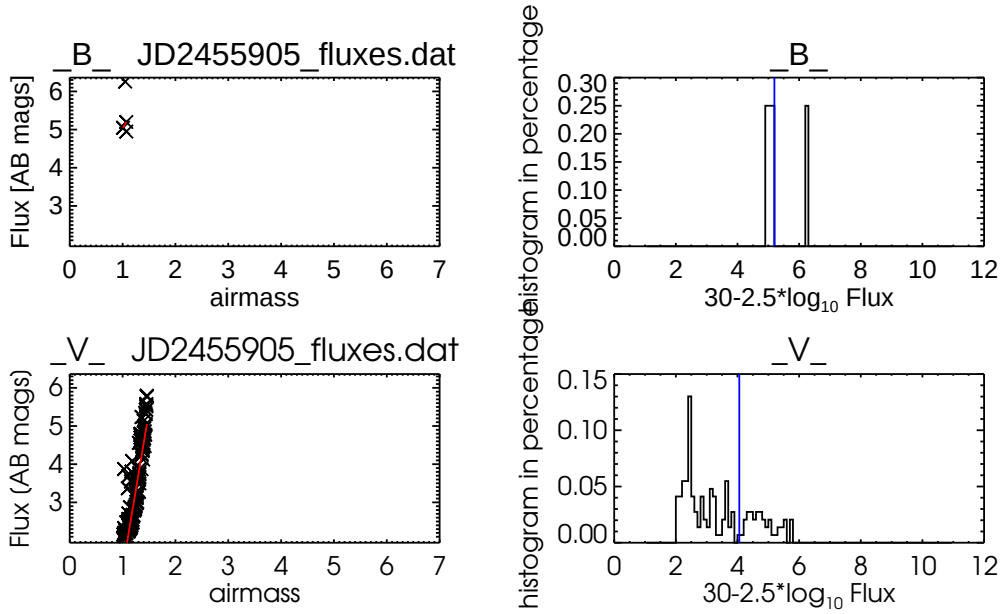

_B_ JD2455905_fluxes.dat
Flux [AB mags]
airmass
_V_ JD2455905_fluxes.dat
Flux (AB mags)
airmass
_B_
histogram in percentage
30-2.5*log10 Flux
_V_
histogram in percentage
30-2.5*log10 Flux

Figure 8:

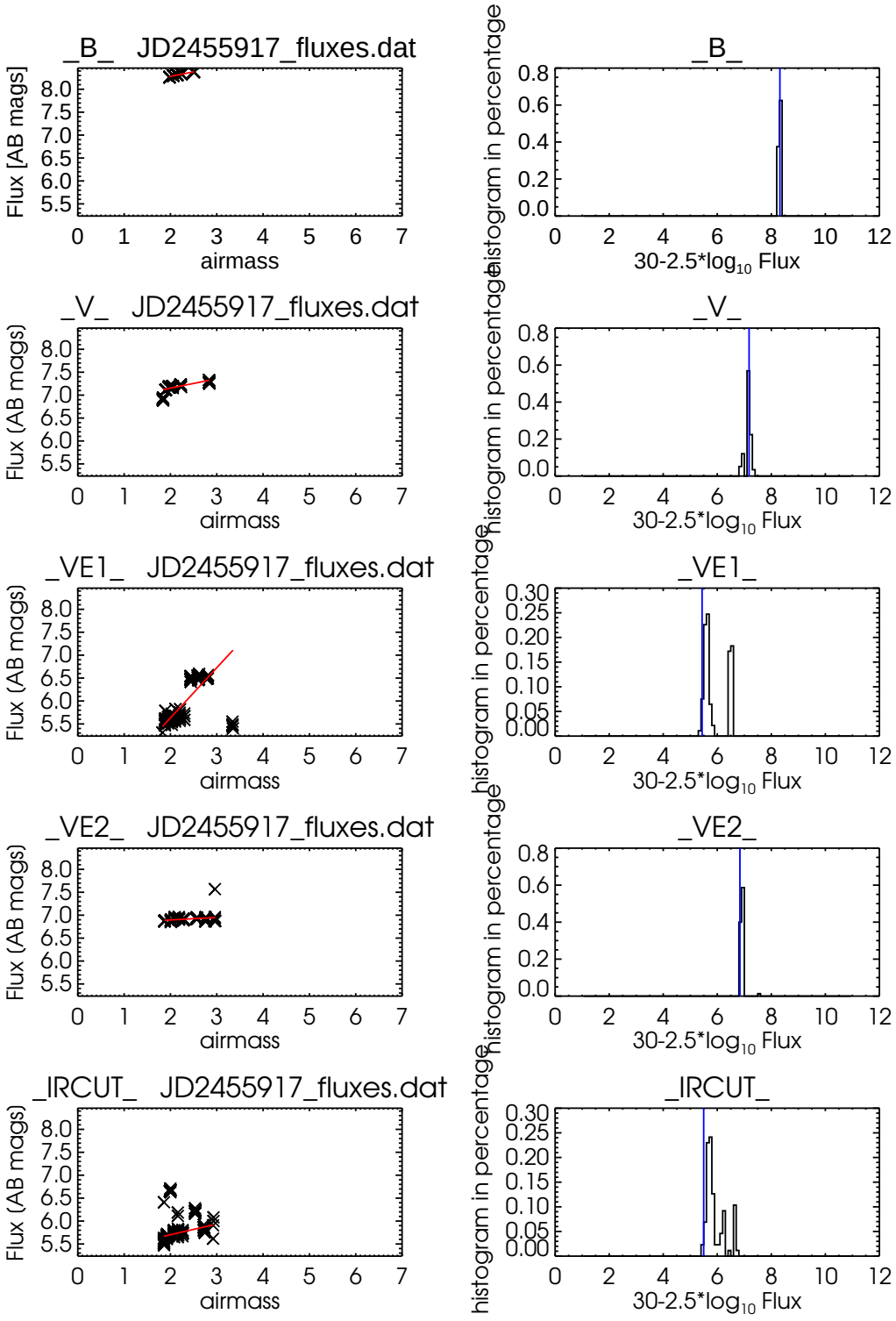

_B_ JD2455917_fluxes.dat
Flux [AB mags]
airmass
_V_ JD2455917_fluxes.dat
Flux (AB mags)
airmass
_VE1_ JD2455917_fluxes.dat
Flux (AB mags)
airmass
_VE2_ JD2455917_fluxes.dat
Flux (AB mags)
airmass
IRCUT JD2455917_fluxes.dat
Flux (AB mags)
airmass
_B_
_V_
_VE1_
_VE2_
IRCUT
histogram in percentage
30-2.5*log10 Flux

Figure 9:

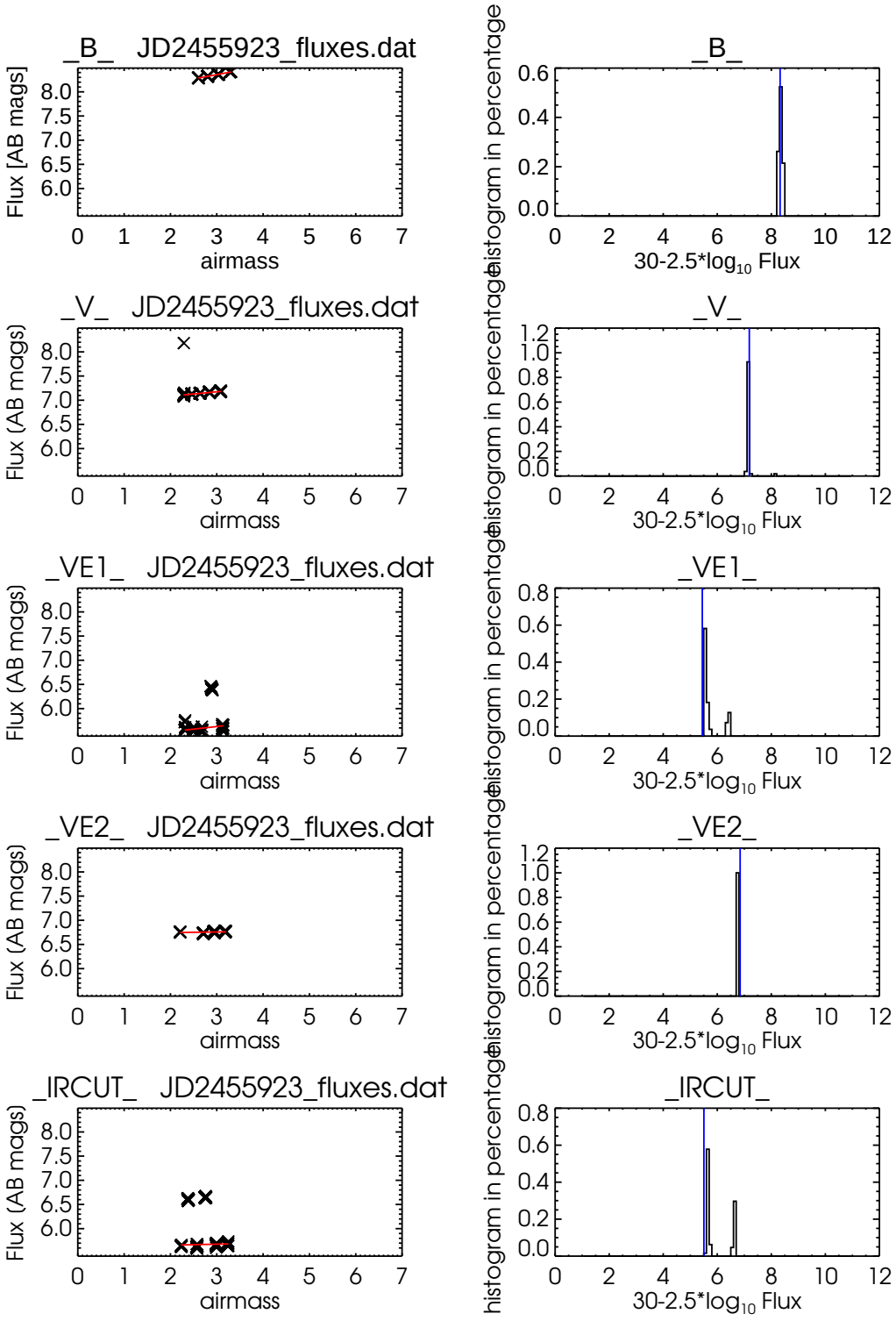
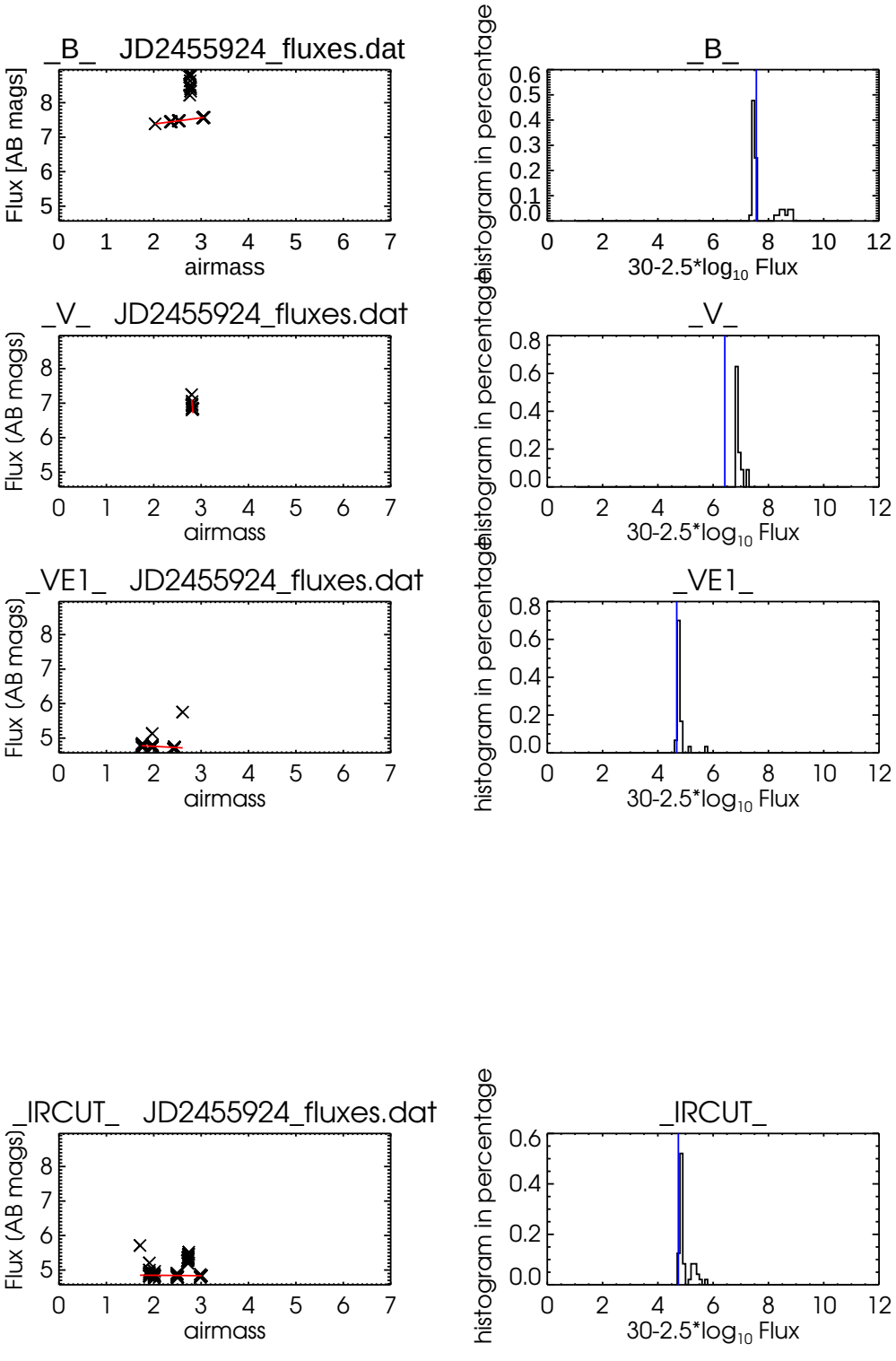

_B_ JD2455923_fluxes.dat
Flux [AB mags]
airmass
_B_
histogram in percentage
30-2.5*log10 Flux
_V_ JD2455923_fluxes.dat
Flux (AB mags)
airmass
_V_
histogram in percentage
30-2.5*log10 Flux
_VE1_ JD2455923_fluxes.dat
Flux (AB mags)
airmass
_VE1_
histogram in percentage
30-2.5*log10 Flux
_VE2_ JD2455923_fluxes.dat
Flux (AB mags)
airmass
_VE2_
histogram in percentage
30-2.5*log10 Flux
IRCUT JD2455923_fluxes.dat
Flux (AB mags)
airmass
IRCUT
histogram in percentage
30-2.5*log10 Flux

Figure 10: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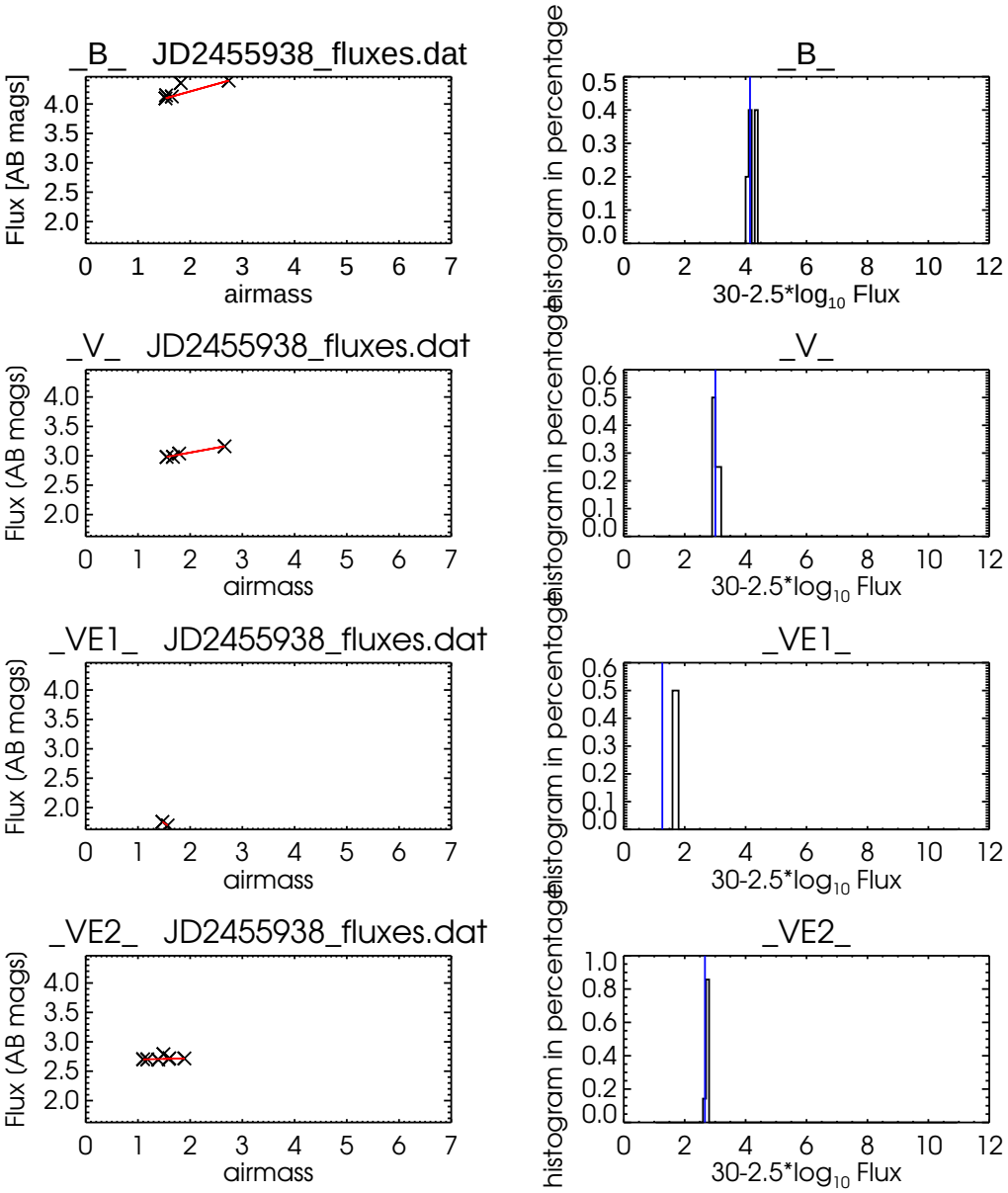
Flux [AB mags]
airmass
_V_ JD2455924_fluxes.dat
Flux (AB mags)
airmass
_VE1_ JD2455924_fluxes.dat
Flux (AB mags)
airmass
_B_
histogram in percentage
30-2.5*log10 Flux
_V_
histogram in percentage
30-2.5*log10 Flux
_VE1_
histogram in percentage
30-2.5*log10 Flux

IRCUT JD2455924_fluxes.dat
Flux (AB mags)
airmass
IRCUT
histogram in percentage
30-2.5*log10 Flux

Figure 11: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Flux [AB mags]
airmass
_V_ JD2455938_fluxes.dat
Flux (AB mags)
airmass
_VE1_ JD2455938_fluxes.dat
Flux (AB mags)
airmass
_VE2_ JD2455938_fluxes.dat
Flux (AB mags)
airmass
_B_
_V_
_VE1_
_VE2_
histogram in percentage
30-2.5*log10 Flux

Figure 12:

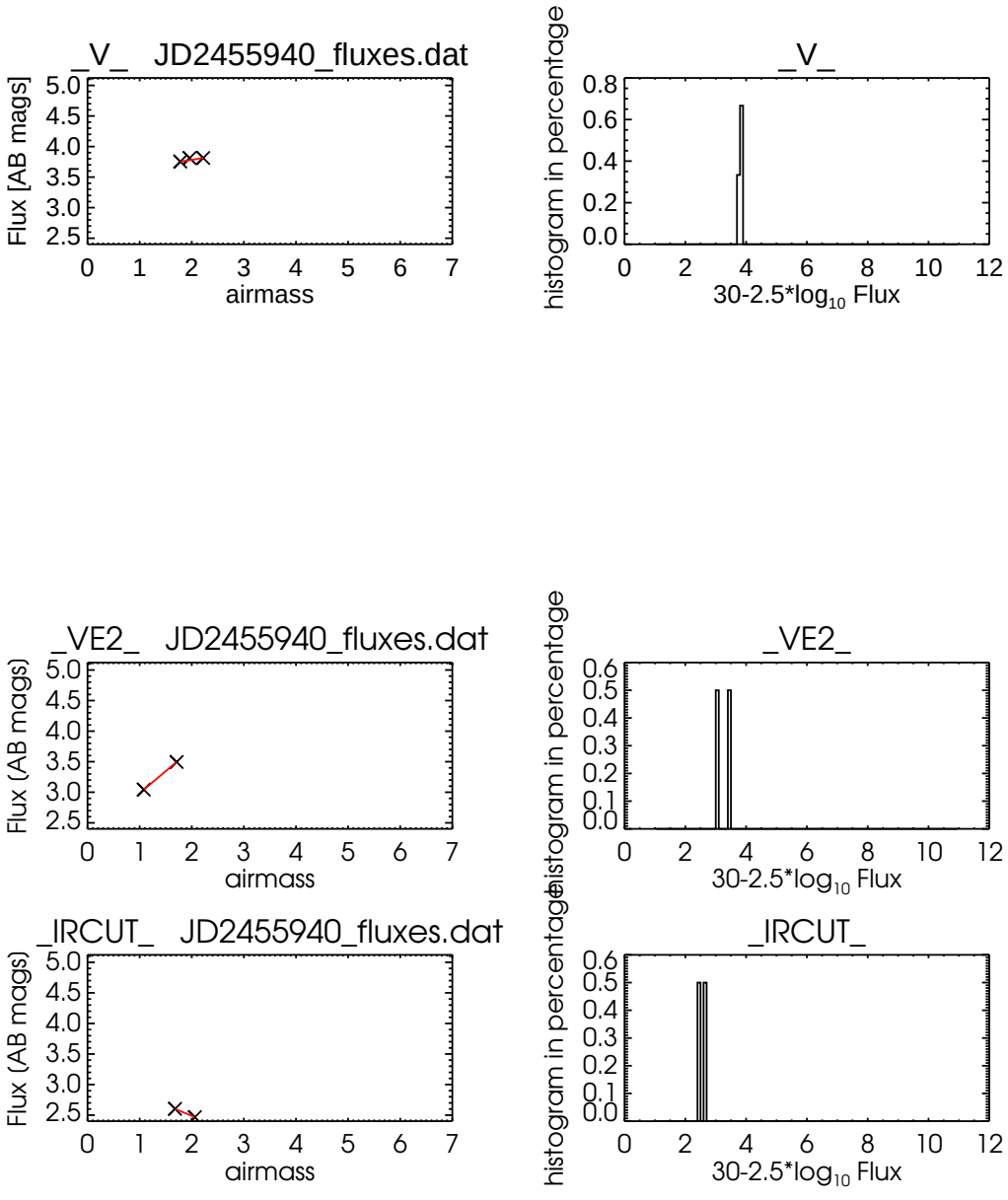
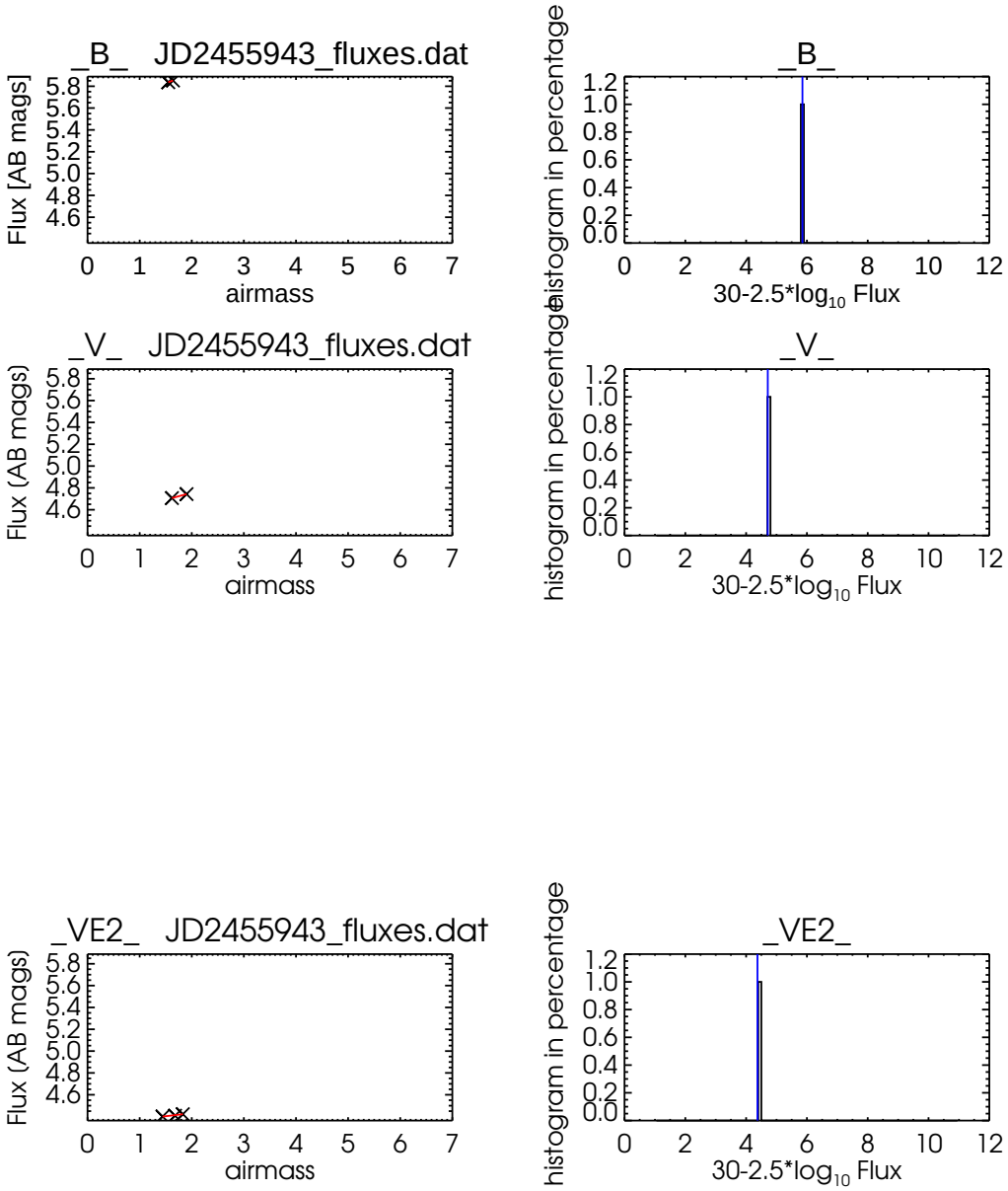

_V_ JD2455940_fluxes.dat
Flux [AB mags]
airmass
_V_
histogram in percentage
30-2.5*log10 Flux
_VE2_ JD2455940_fluxes.dat
Flux (AB mags)
airmass
_VE2_
histogram in percentage
30-2.5*log10 Flux
IRCUT JD2455940_fluxes.dat
Flux (AB mags)
airmass
IRCUT
histogram in percentage
30-2.5*log10 Flux

Figure 13: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Flux [AB mags]
airmass
_V_ JD2455943_fluxes.dat
Flux (AB mags)
airmass
_B_
histogram in percentage
30-2.5*log10 Flux
_V_
histogram in percentage
30-2.5*log10 Flux

_VE2_ JD2455943_fluxes.dat
Flux (AB mags)
airmass
_VE2_
histogram in percentage
30-2.5*log10 Flux

Figure 14:

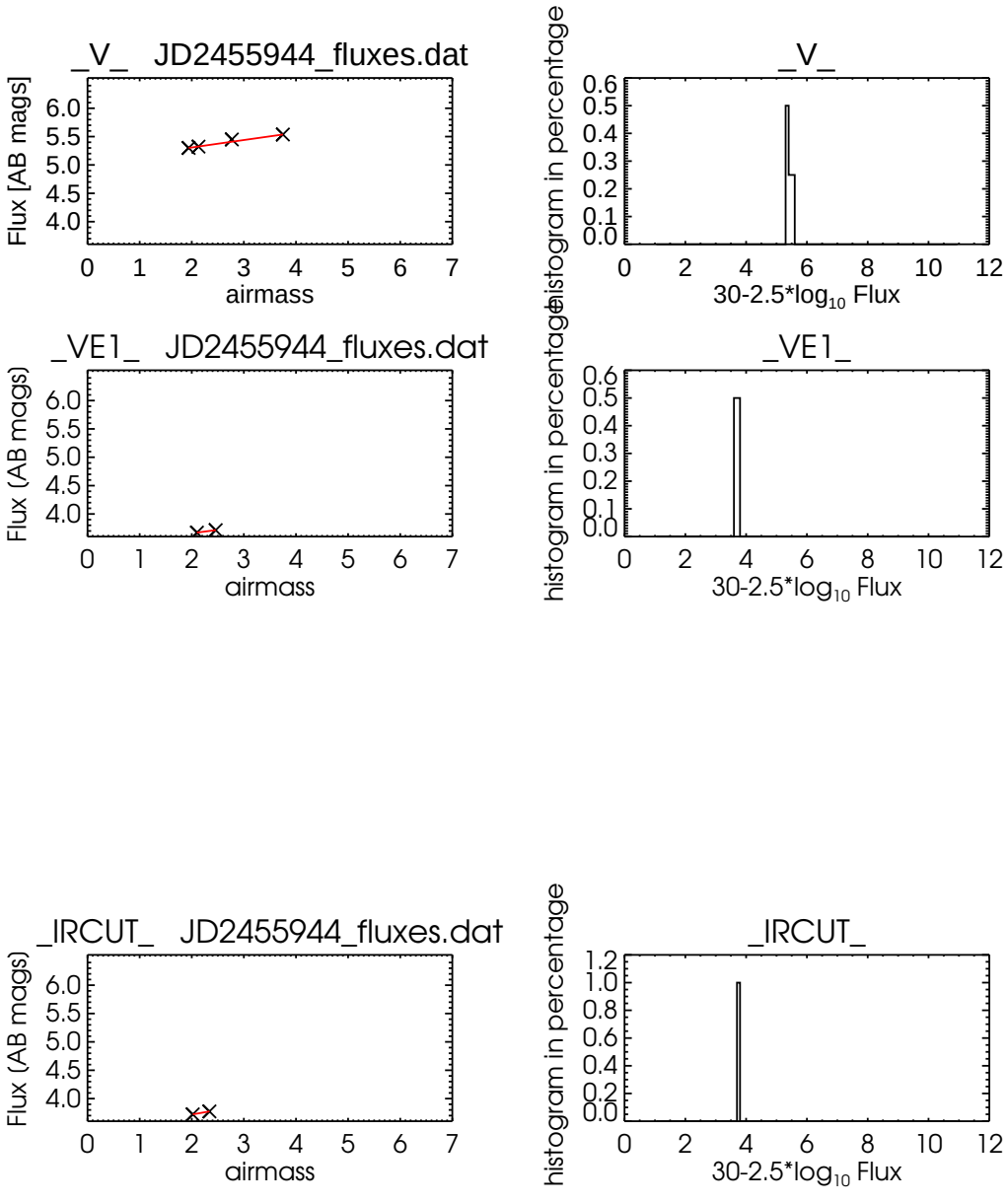
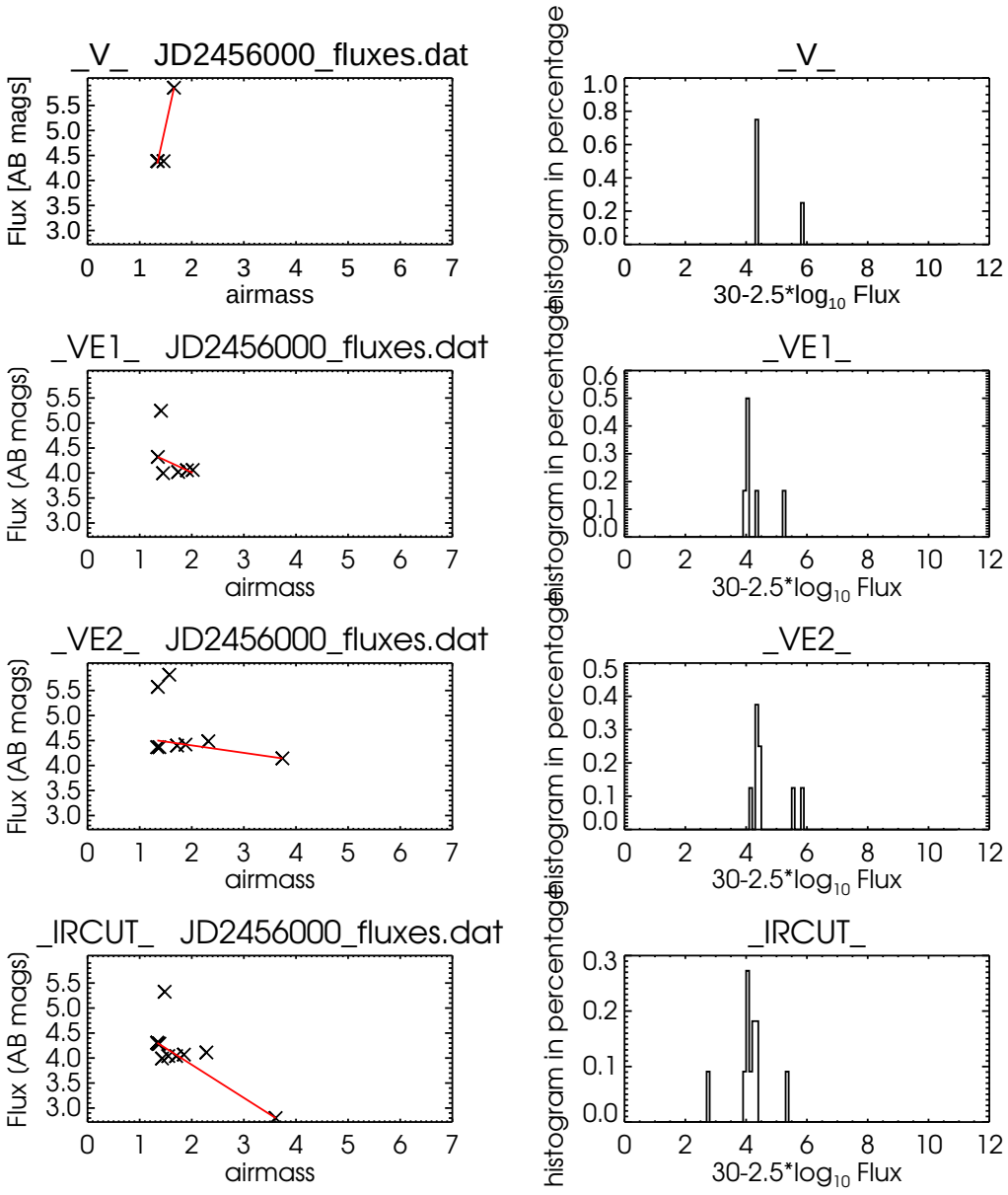

_V_ JD2455944_fluxes.dat
Flux [AB mags]
airmass
_V_
histogram in percentage
30-2.5*log10 Flux
_VE1_ JD2455944_fluxes.dat
Flux (AB mags)
airmass
_VE1_
histogram in percentage
30-2.5*log10 Flux
IRCUT JD2455944_fluxes.dat
Flux (AB mags)
airmass
IRCUT
histogram in percentage
30-2.5*log10 Flux

Figure 15: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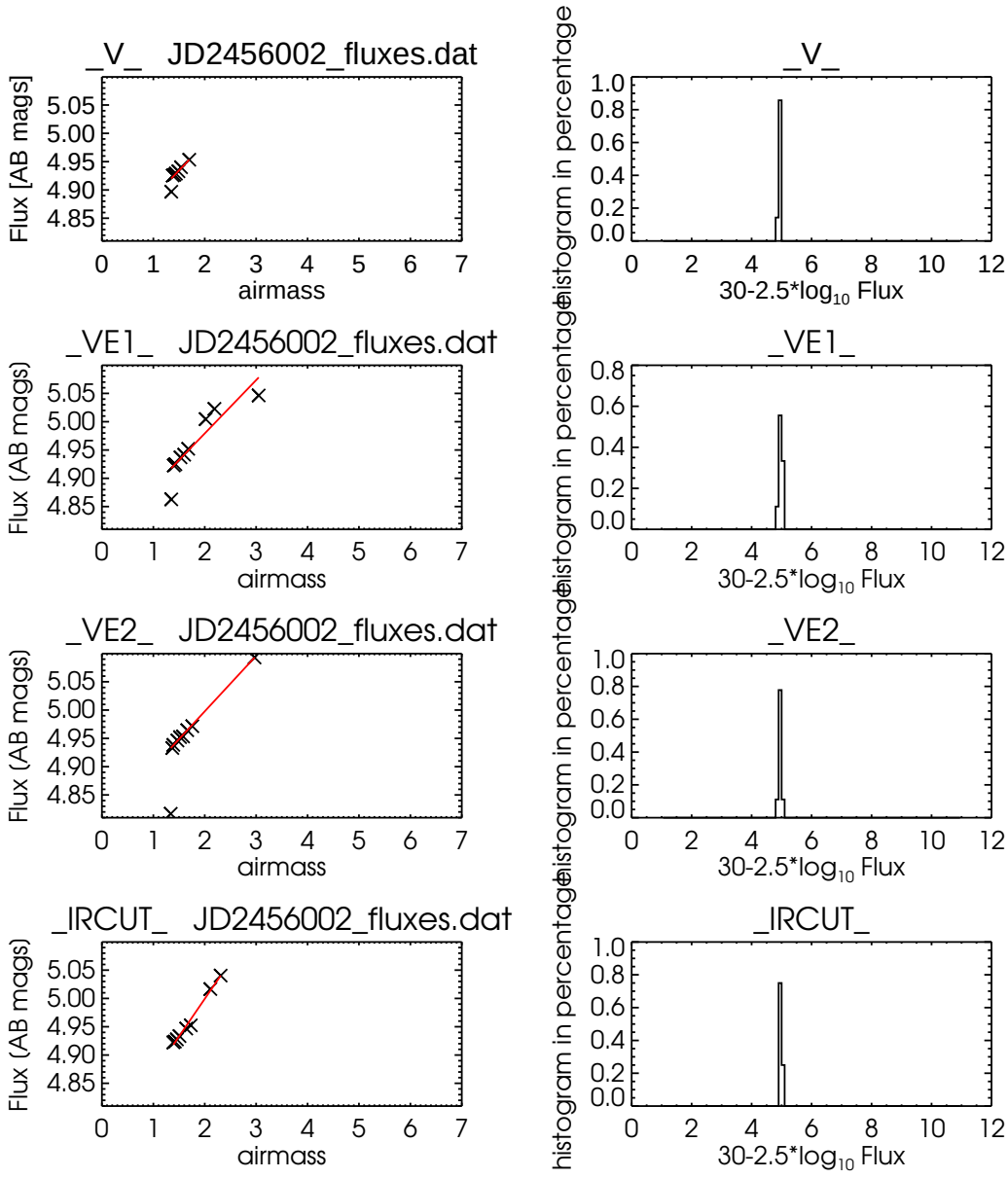
Flux [AB mags]
airmass
_V_
histogram in percentage
30-2.5*log10 Flux
_VE1_ JD2456000_fluxes.dat
Flux (AB mags)
airmass
_VE1_
histogram in percentage
30-2.5*log10 Flux
_VE2_ JD2456000_fluxes.dat
Flux (AB mags)
airmass
_VE2_
histogram in percentage
30-2.5*log10 Flux
IRCUT JD2456000_fluxes.dat
Flux (AB mags)
airmass
IRCUT
histogram in percentage
30-2.5*log10 Flux

Figure 16: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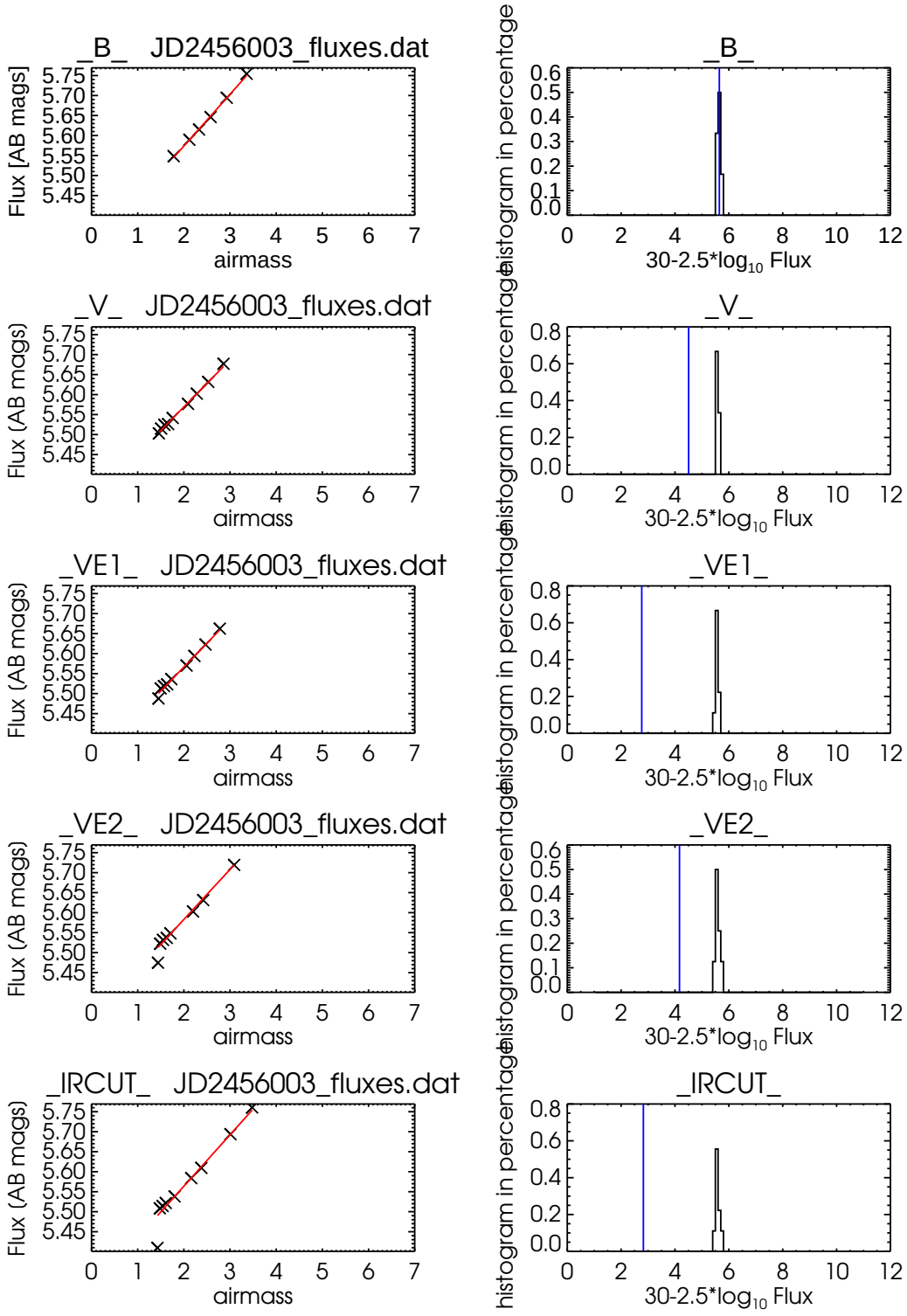
Flux [AB mags]
airmass
_VE1_ JD2456002_fluxes.dat
Flux (AB mags)
airmass
_VE2_ JD2456002_fluxes.dat
Flux (AB mags)
airmass
IRCUT JD2456002_fluxes.dat
Flux (AB mags)
airmass
_V_
_VE1_
_VE2_
IRCUT
histogram in percentage
30-2.5*log10 Flux

Figure 17: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Flux [AB mags]
airmass
_B_
histogram in percentage
30-2.5*log10 Flux
_V_ JD2456003_fluxes.dat
Flux (AB mags)
airmass
_V_
histogram in percentage
30-2.5*log10 Flux
_VE1_ JD2456003_fluxes.dat
Flux (AB mags)
airmass
_VE1_
histogram in percentage
30-2.5*log10 Flux
_VE2_ JD2456003_fluxes.dat
Flux (AB mags)
airmass
_VE2_
histogram in percentage
30-2.5*log10 Flux
IRCUT JD2456003_fluxes.dat
Flux (AB mags)
airmass
IRCUT
histogram in percentage
30-2.5*log10 Flux

Figure 18:

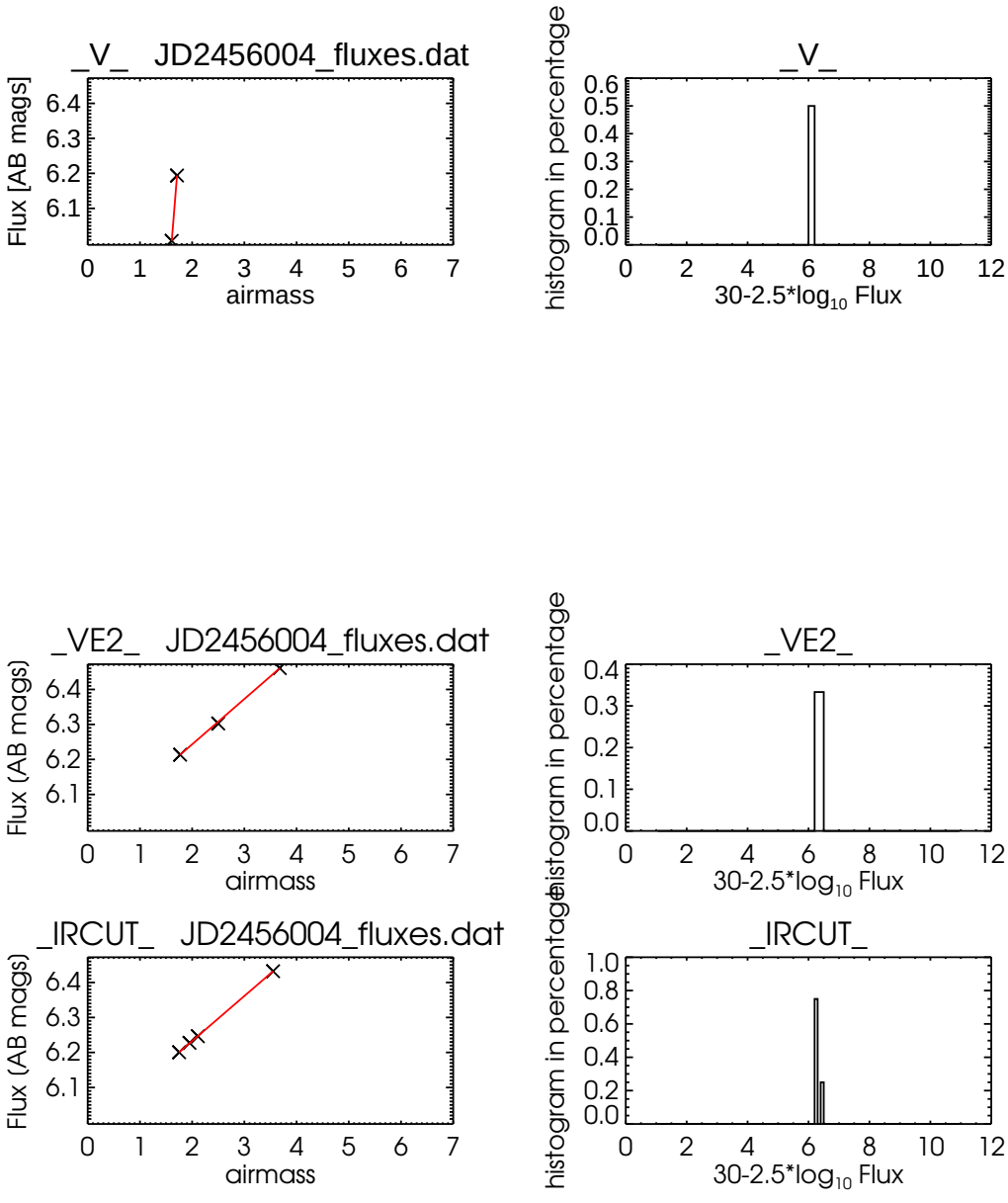

_V_ JD2456004_fluxes.dat
Flux [AB mags]
airmass
_V_
histogram in percentage
30-2.5*log10 Flux
_VE2_ JD2456004_fluxes.dat
Flux (AB mags)
airmass
_VE2_
histogram in percentage
30-2.5*log10 Flux
IRCUT JD2456004_fluxes.dat
Flux (AB mags)
airmass
IRCUT
histogram in percentage
30-2.5*log10 Flux

Figure 19:

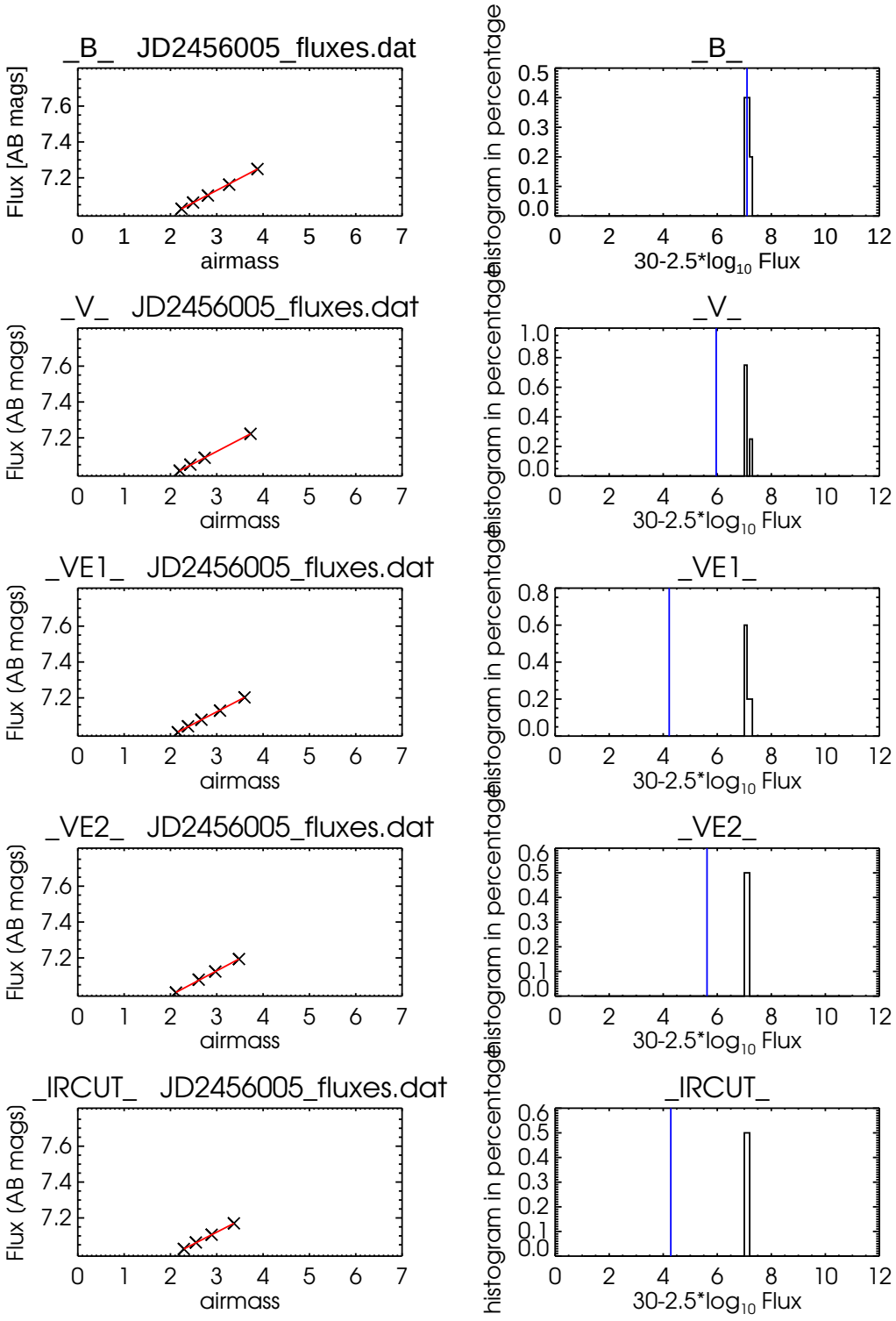
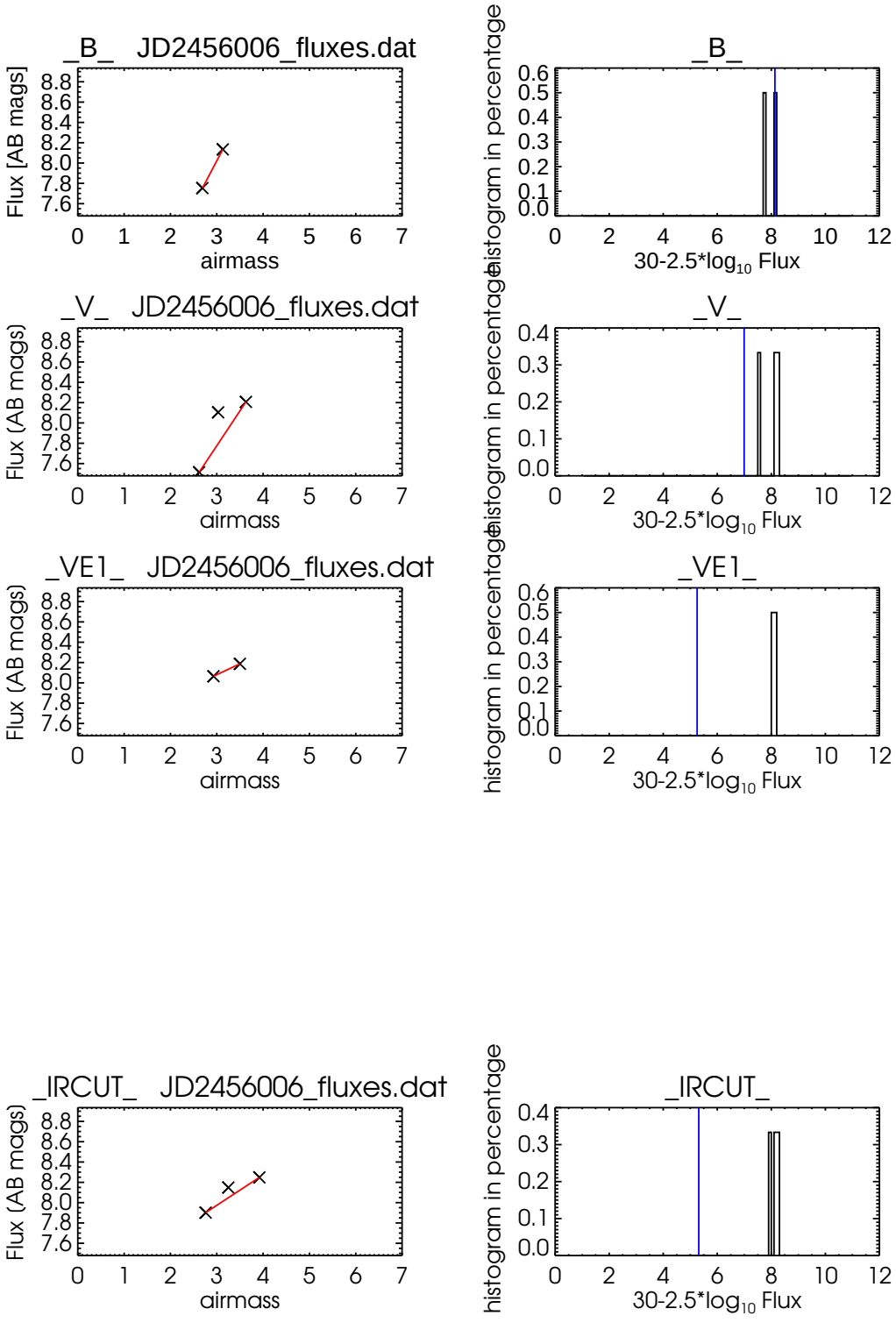

_B_ JD2456005_fluxes.dat
Flux [AB mags]
airmass
_V_ JD2456005_fluxes.dat
Flux (AB mags)
airmass
_VE1_ JD2456005_fluxes.dat
Flux (AB mags)
airmass
_VE2_ JD2456005_fluxes.dat
Flux (AB mags)
airmass
IRCUT JD2456005_fluxes.dat
Flux (AB mags)
airmass
_B_
_V_
_VE1_
_VE2_
IRCUT
histogram in percentage
30-2.5*log10 Flux

Figure 20: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airmass
_V_ JD2456006_fluxes.dat
Flux (AB mags)
airmass
_VE1_ JD2456006_fluxes.dat
Flux (AB mags)
airmass
IRCUT JD2456006_fluxes.dat
Flux (AB mags)
airmass
_B_
_V_
_VE1_
IRCUT
histogram in percentage
30-2.5*log10 Flux

Figure 21:

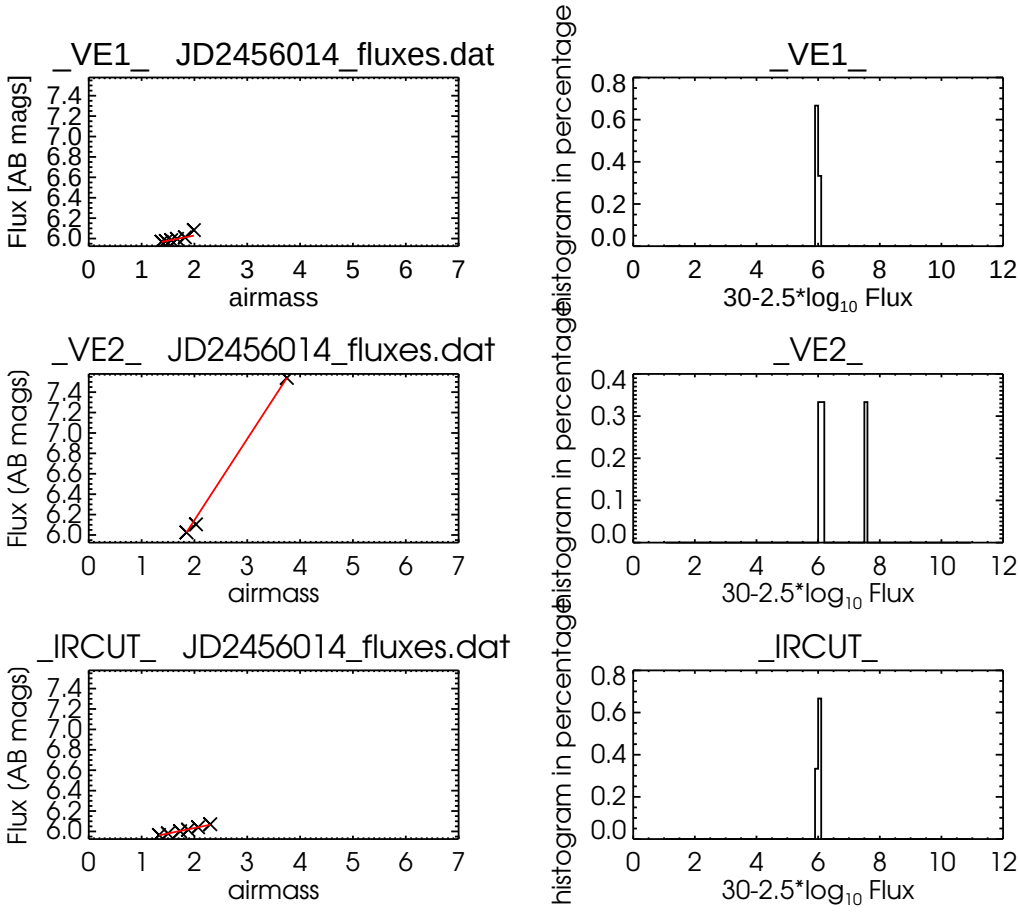
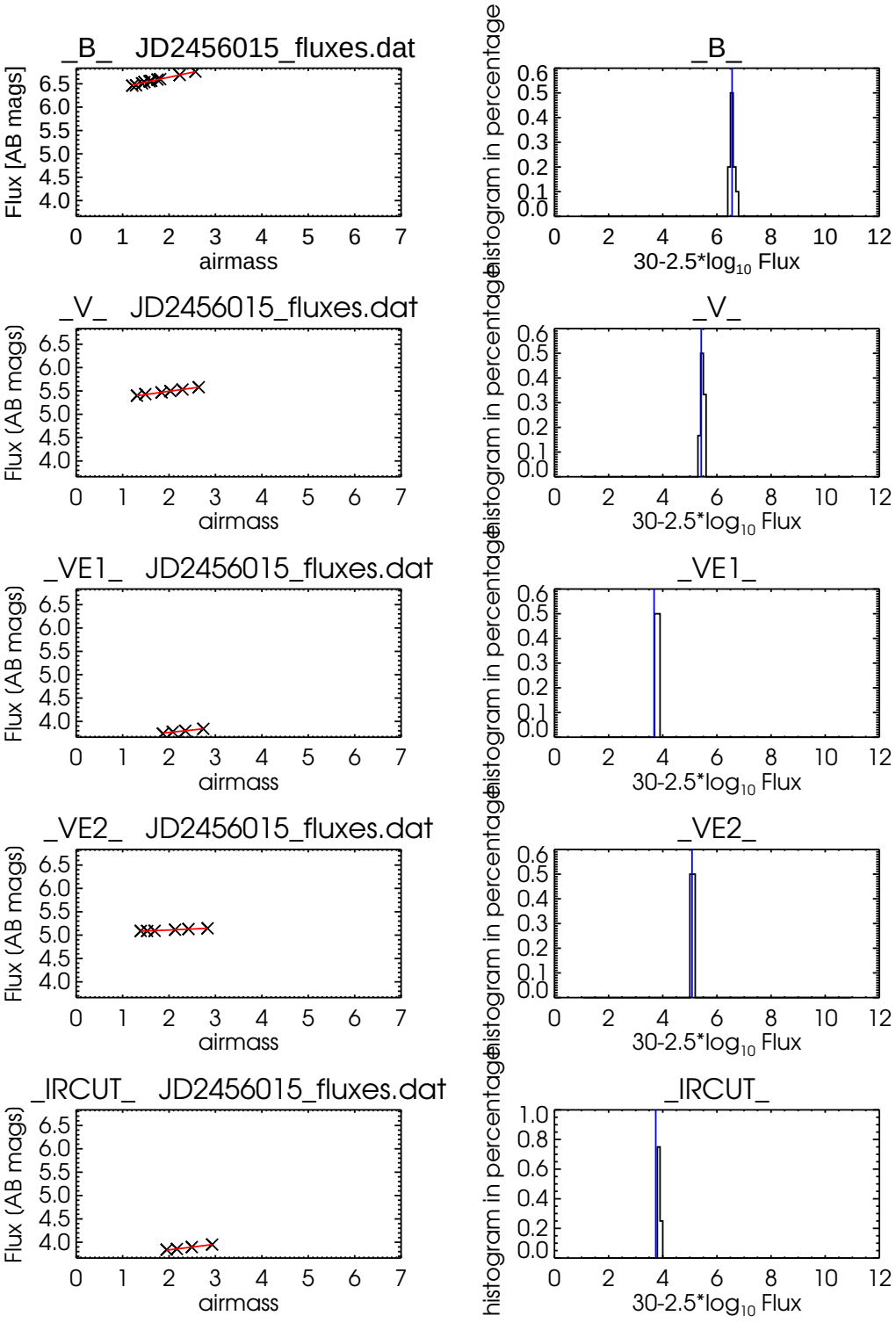

_VE1_ JD2456014_fluxes.dat
Flux [AB mags]
airmass
_VE2_ JD2456014_fluxes.dat
Flux (AB mags)
airmass
IRCUT JD2456014_fluxes.dat
Flux (AB mags)
airmass
_VE1_
histogram in percentage
30-2.5*log10 Flux
_VE2_
histogram in percentage
30-2.5*log10 Flux
IRCUT
histogram in percentage
30-2.5*log10 Flux

Figure 22: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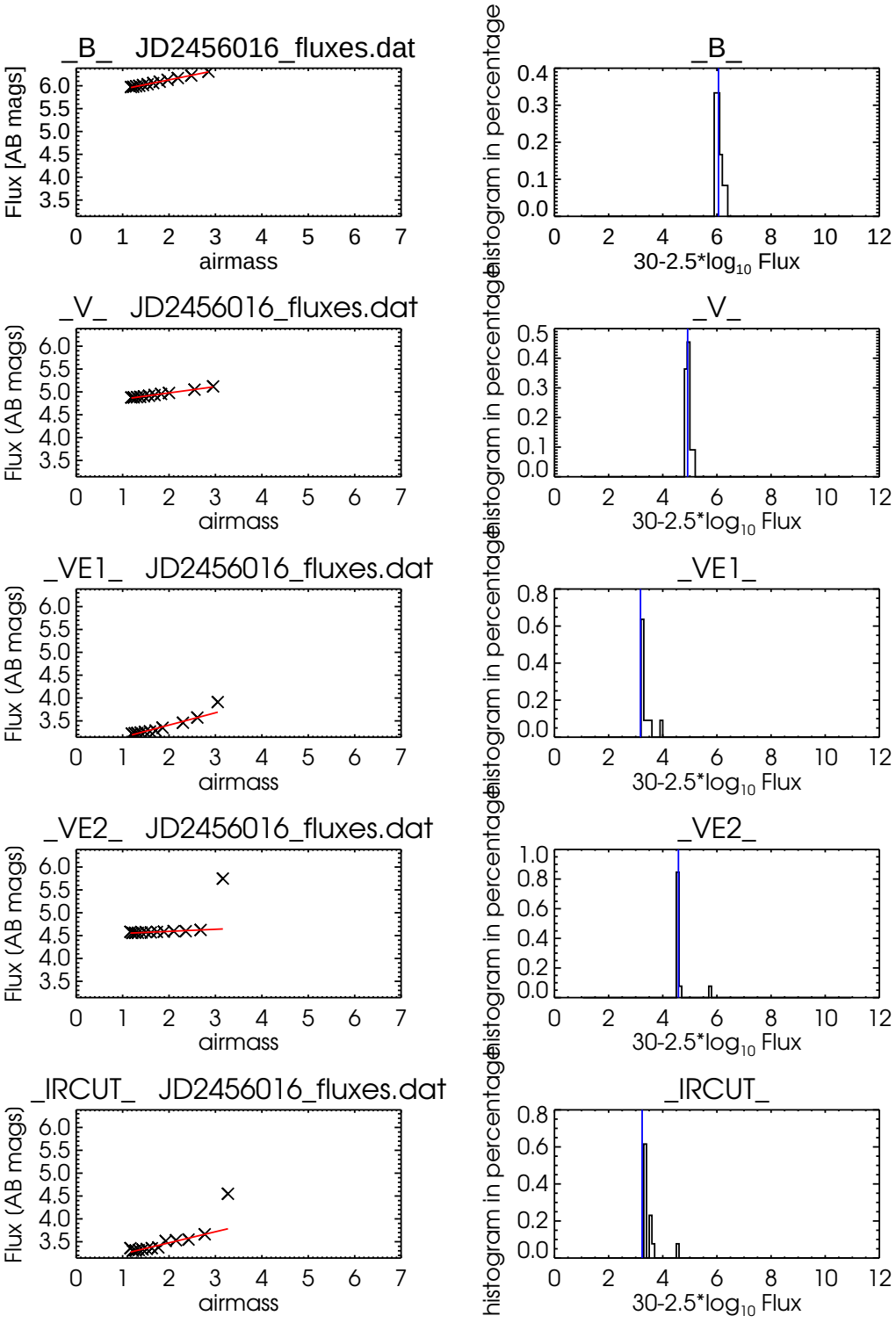
Flux [AB mags]
airmass
_V_ JD2456015_fluxes.dat
Flux (AB mags)
airmass
_VE1_ JD2456015_fluxes.dat
Flux (AB mags)
airmass
_VE2_ JD2456015_fluxes.dat
Flux (AB mags)
airmass
IRCUT JD2456015_fluxes.dat
Flux (AB mags)
airmass
_B_
_V_
_VE1_
_VE2_
IRCUT
histogram in percentage
30-2.5*log10 Flux

Figure 23: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Flux [AB mags]
airmass
_V_ JD2456016_fluxes.dat
Flux (AB mags)
airmass
_VE1_ JD2456016_fluxes.dat
Flux (AB mags)
airmass
_VE2_ JD2456016_fluxes.dat
Flux (AB mags)
airmass
IRCUT JD2456016_fluxes.dat
Flux (AB mags)
airmass
_B_
_V_
_VE1_
_VE2_
IRCUT
histogram in percentage
30-2.5*log10 Flux

Figure 24:

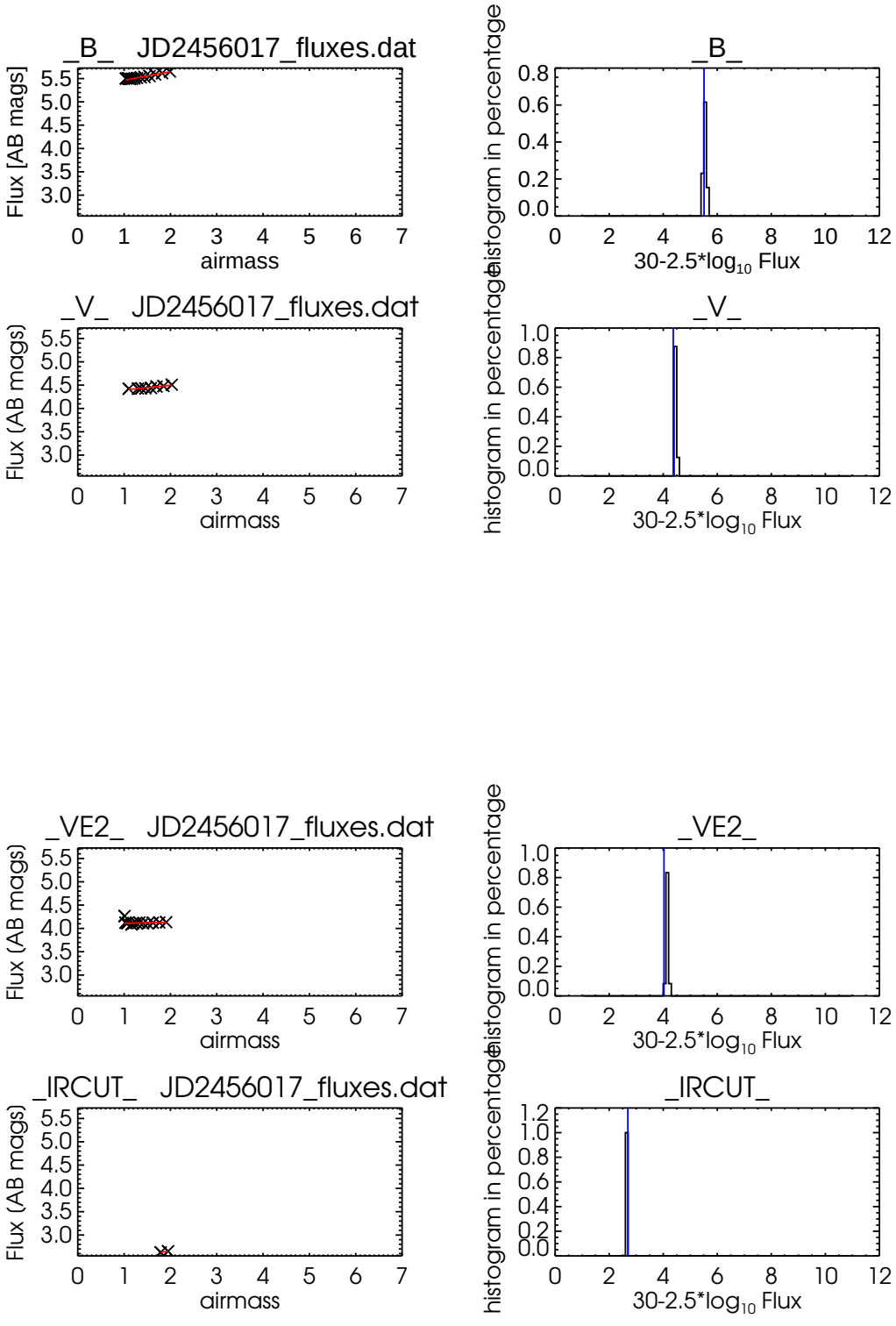

_B_ JD2456017_fluxes.dat
Flux [AB mags]
airmass
_V_ JD2456017_fluxes.dat
Flux (AB mags)
airmass
_B_
histogram in percentage
30-2.5*log10 Flux
_V_
histogram in percentage
30-2.5*log10 Flux
_VE2_ JD2456017_fluxes.dat
Flux (AB mags)
airmass
IRCUT JD2456017_fluxes.dat
Flux (AB mags)
airmass
_VE2_
histogram in percentage
30-2.5*log10 Flux
IRCUT
histogram in percentage
30-2.5*log10 Flux

Figure 25:

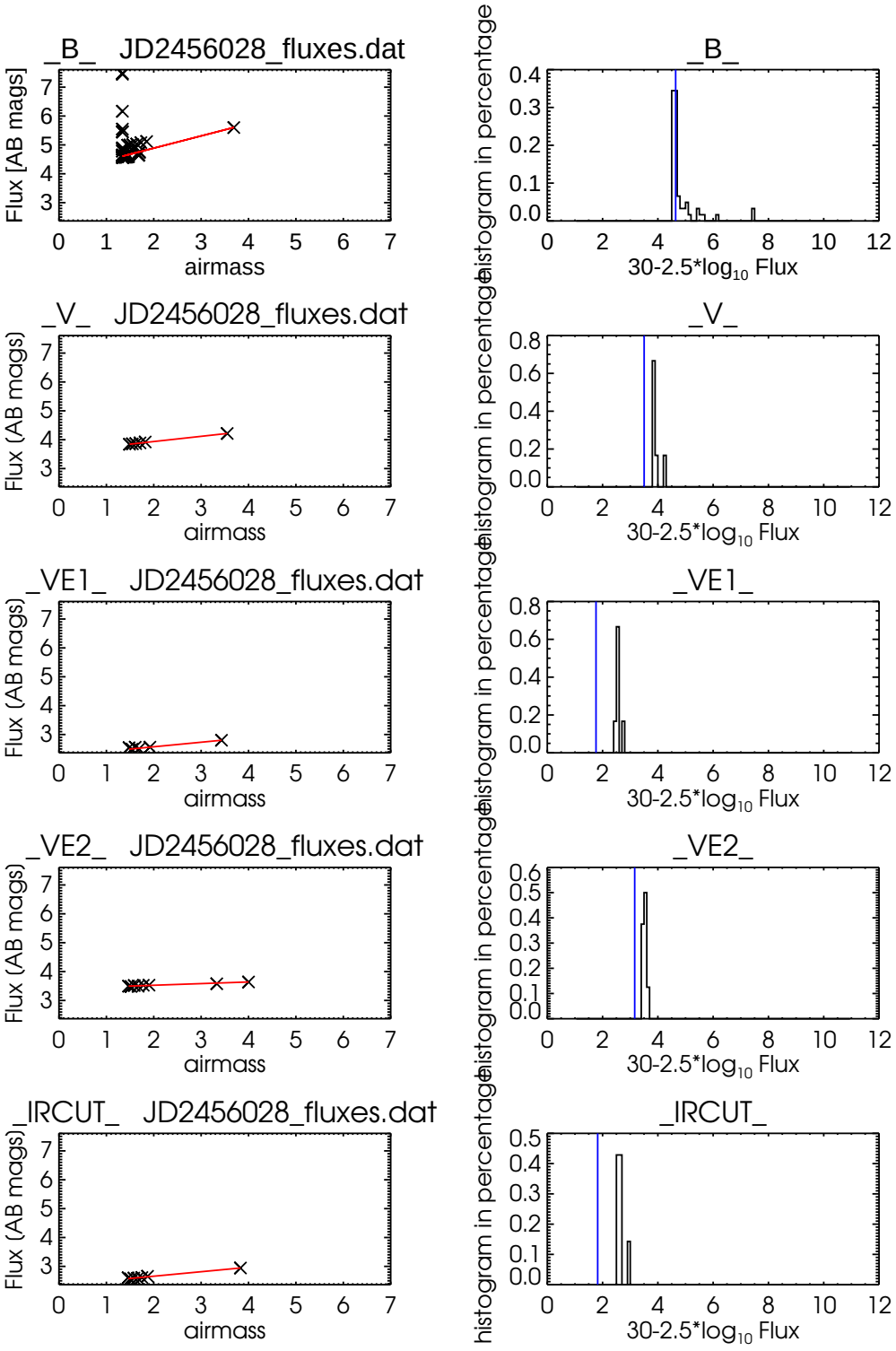

_B_ JD2456028_fluxes.dat
Flux [AB mags]
airmass
_V_ JD2456028_fluxes.dat
Flux (AB mags)
airmass
_VE1_ JD2456028_fluxes.dat
Flux (AB mags)
airmass
_VE2_ JD2456028_fluxes.dat
Flux (AB mags)
airmass
IRCUT JD2456028_fluxes.dat
Flux (AB mags)
airmass
_B_
_V_
_VE1_
_VE2_
IRCUT
histogram in percentage
30-2.5*log10 Flux

Figure 26:

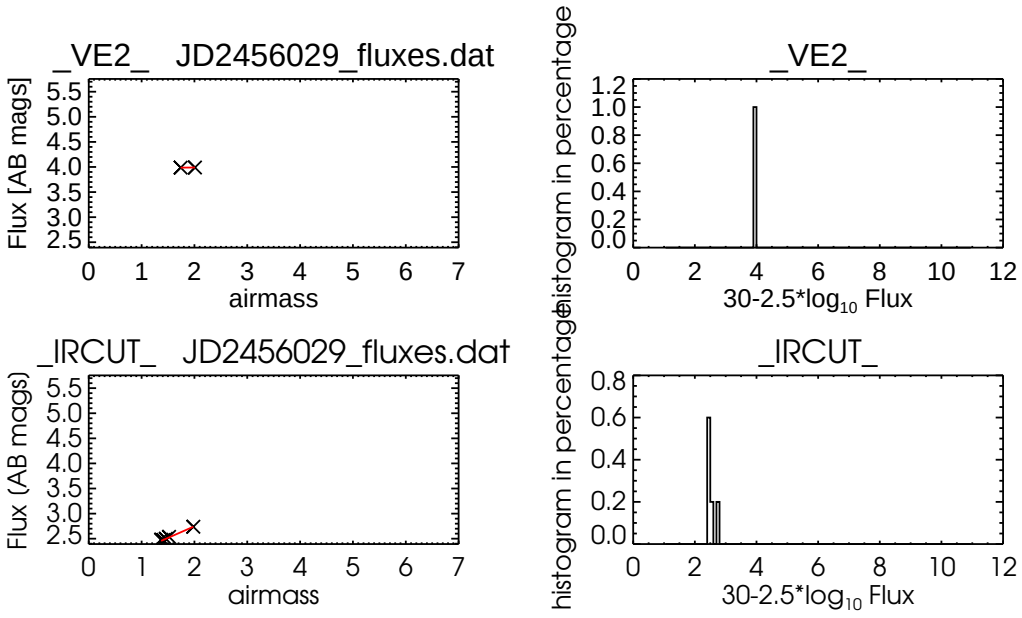

_VE2_ JD2456029_fluxes.dat
Flux [AB mags]
airmass
IRCUT JD2456029_fluxes.dat
Flux (AB mags)
airmass
_VE2_
histogram in percentage
30-2.5*log10 Flux
IRCUT
histogram in percentage
30-2.5*log10 Flux

Figure 27:

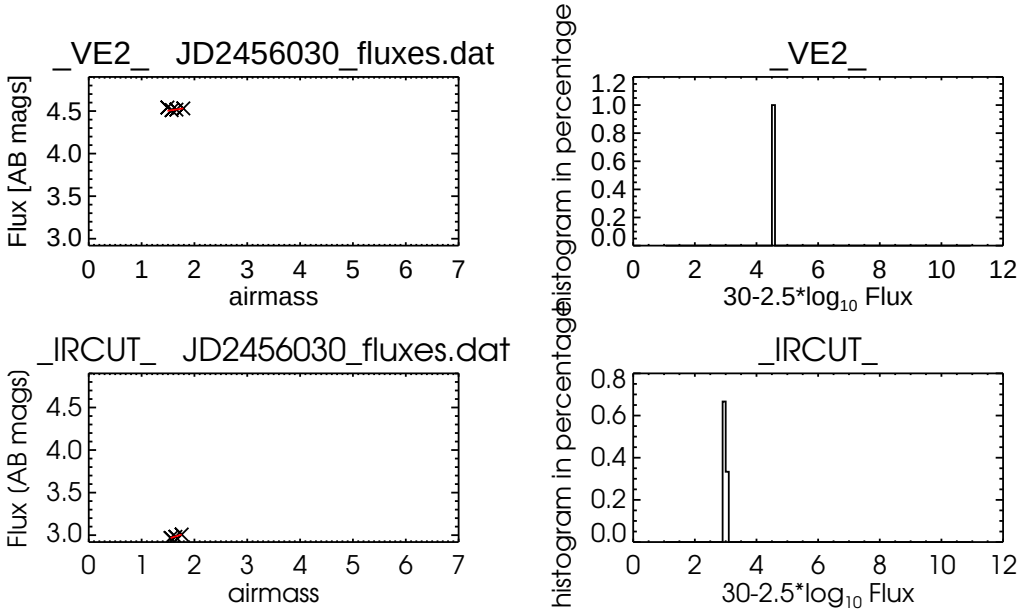

_VE2_ JD2456030_fluxes.dat
Flux [AB mags]
airmass
IRCUT JD2456030_fluxes.dat
Flux (AB mags)
airmass
_VE2_
histogram in percentage
30-2.5*log10 Flux
IRCUT
histogram in percentage
30-2.5*log10 Flux

Figure 28:

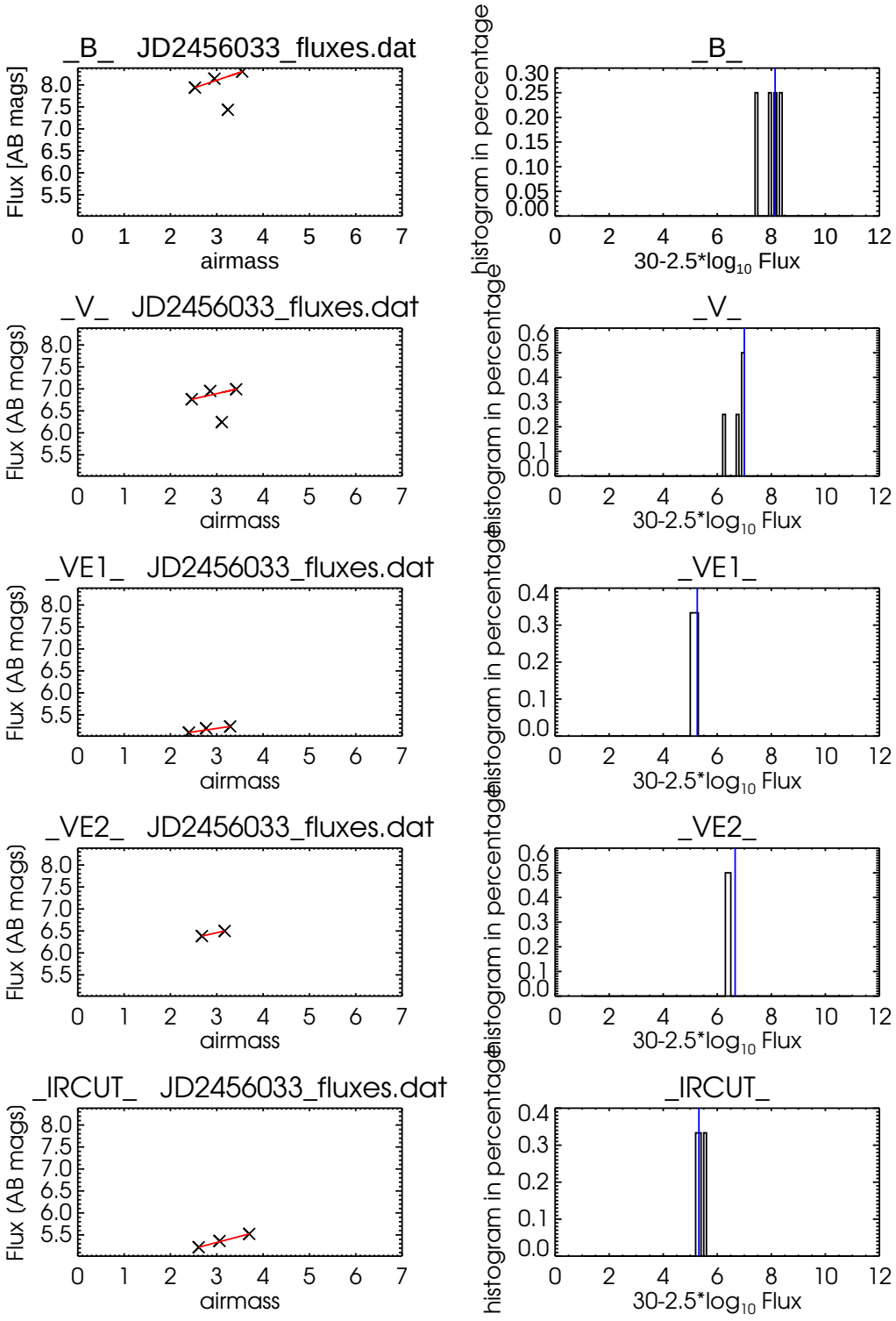

_B_ JD2456033_fluxes.dat
Flux [AB mags]
airmass
_V_ JD2456033_fluxes.dat
Flux (AB mags)
airmass
_VE1_ JD2456033_fluxes.dat
Flux (AB mags)
airmass
_VE2_ JD2456033_fluxes.dat
Flux (AB mags)
airmass
IRCUT JD2456033_fluxes.dat
Flux (AB mags)
airmass
_B_
_V_
_VE1_
_VE2_
IRCUT
histogram in percentage
30-2.5*log10 Flux

Figure 29:

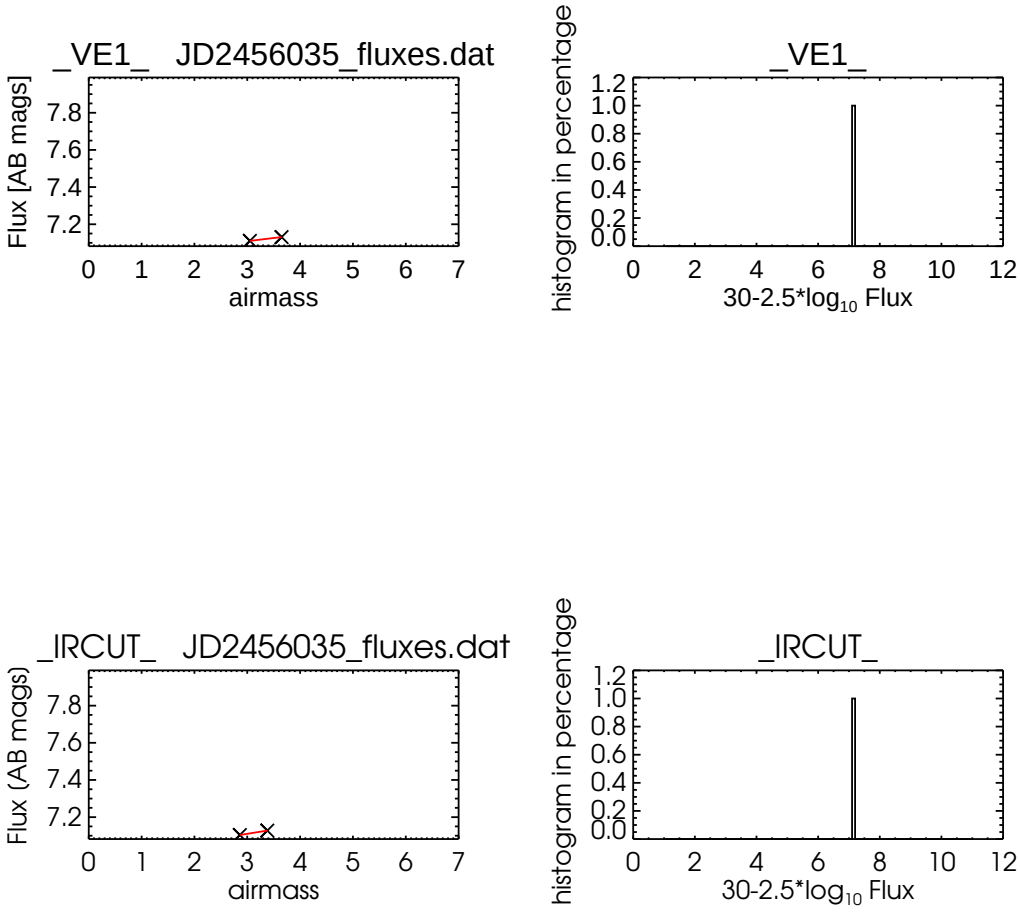

_VE1_ JD2456035_fluxes.dat
Flux [AB mags]
7.8
7.6
7.4
7.2
0 1 2 3 4 5 6 7
airmass
_VE1_
histogram in percentage
1.2
1.0
0.8
0.6
0.4
0.2
0.0
0 2 4 6 8 10 12
30-2.5*log10 Flux
IRCUT JD2456035_fluxes.dat
Flux (AB mags)
7.8
7.6
7.4
7.2
0 1 2 3 4 5 6 7
airmass
IRCUT
histogram in percentage
1.2
1.0
0.8
0.6
0.4
0.2
0.0
0 2 4 6 8 10 12
30-2.5*log10 Flux

Figure 30:

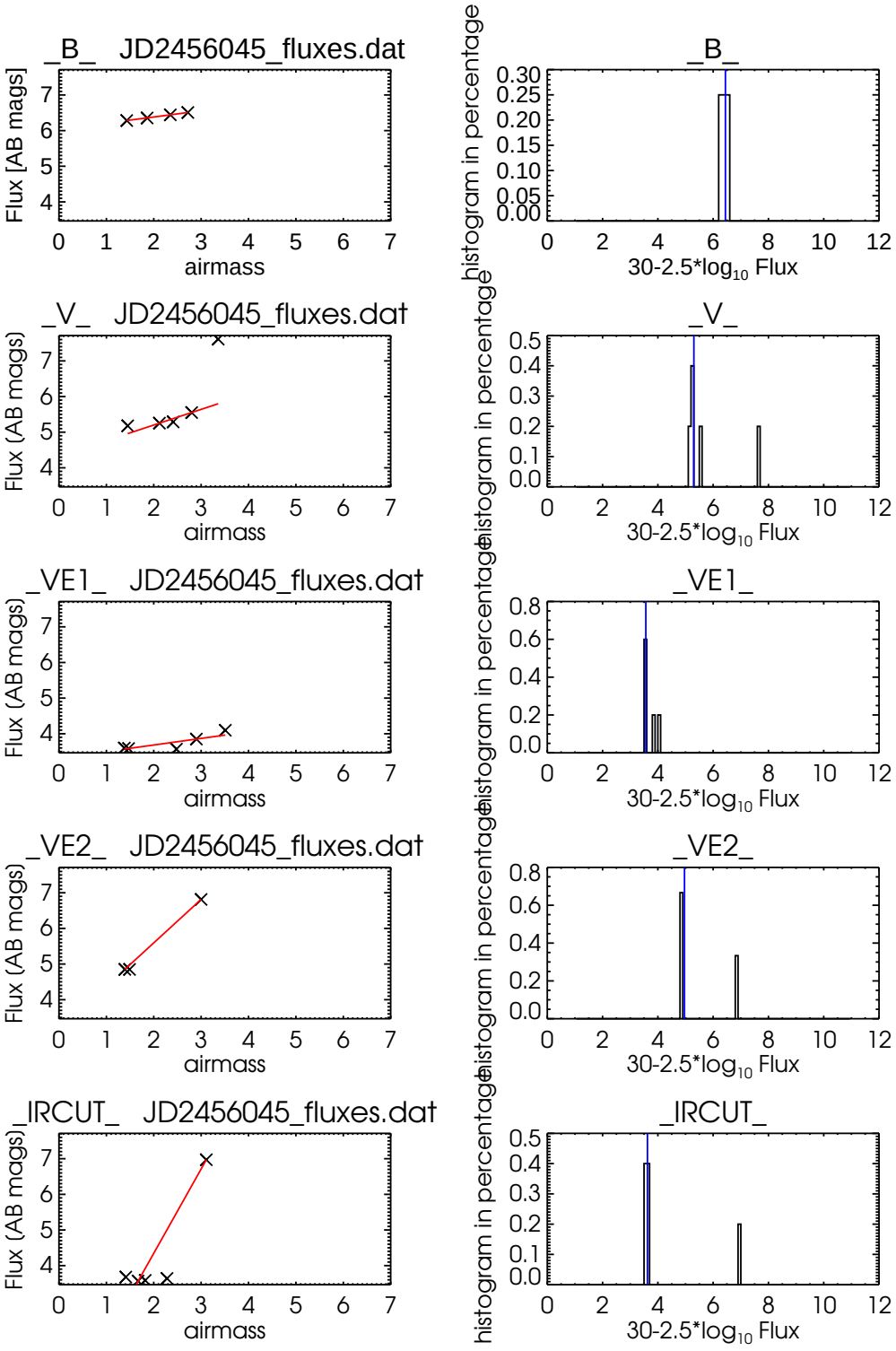

_B_ JD2456045_fluxes.dat
Flux [AB mags]
airmass
_B_
histogram in percentage
30-2.5*log10 Flux
_V_ JD2456045_fluxes.dat
Flux (AB mags)
airmass
_V_
histogram in percentage
30-2.5*log10 Flux
_VE1_ JD2456045_fluxes.dat
Flux (AB mags)
airmass
_VE1_
histogram in percentage
30-2.5*log10 Flux
_VE2_ JD2456045_fluxes.dat
Flux (AB mags)
airmass
_VE2_
histogram in percentage
30-2.5*log10 Flux
IRCUT JD2456045_fluxes.dat
Flux (AB mags)
airmass
IRCUT
histogram in percentage
30-2.5*log10 Flux

Figure 31:

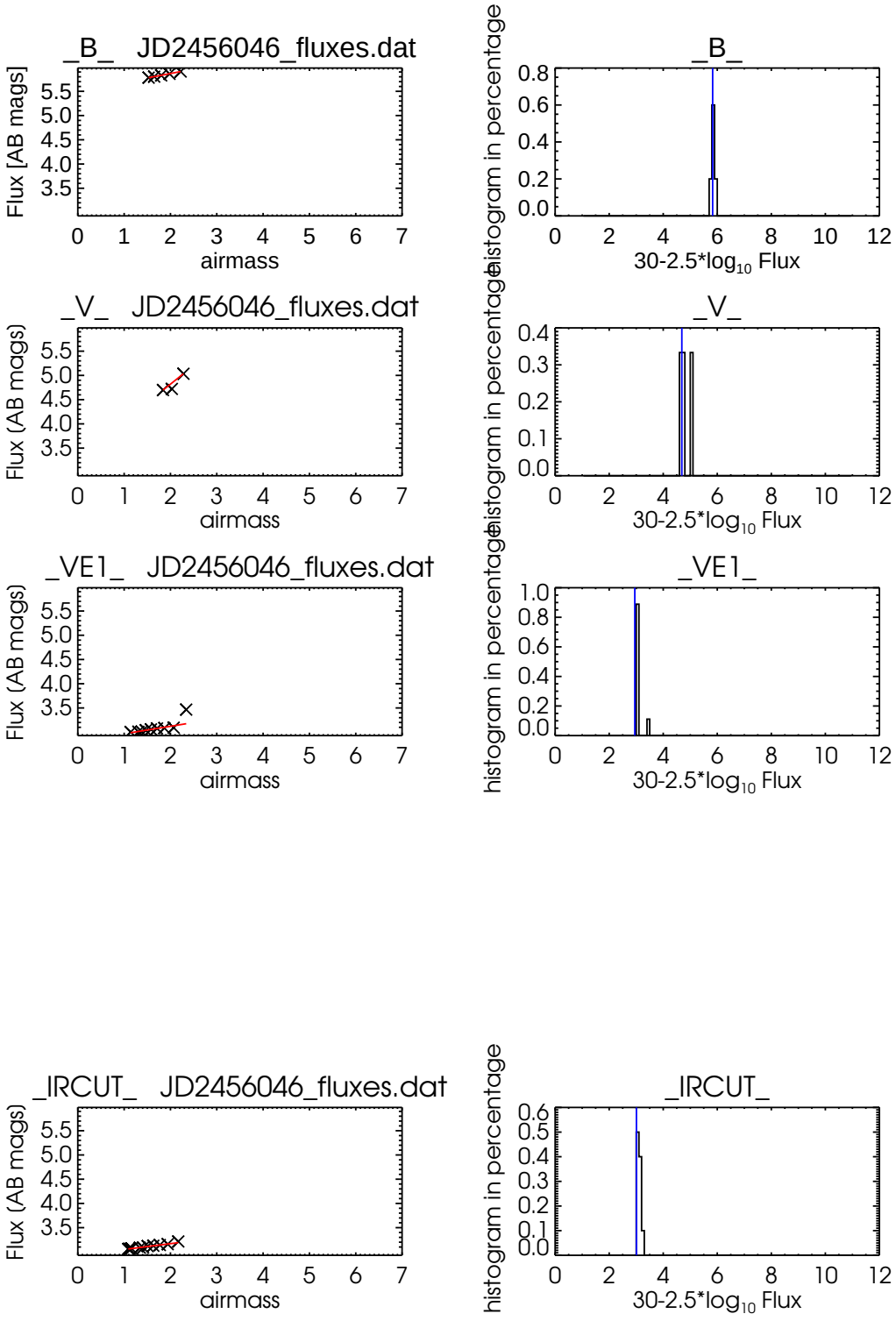

_B_ JD2456046_fluxes.dat
Flux [AB mags]
airmass
_V_ JD2456046_fluxes.dat
Flux (AB mags)
airmass
_VE1_ JD2456046_fluxes.dat
Flux (AB mags)
airmass
IRCUT JD2456046_fluxes.dat
Flux (AB mags)
airmass
_B_
_V_
_VE1_
IRCUT
histogram in percentage
30-2.5*log10 Flux

Figure 32:

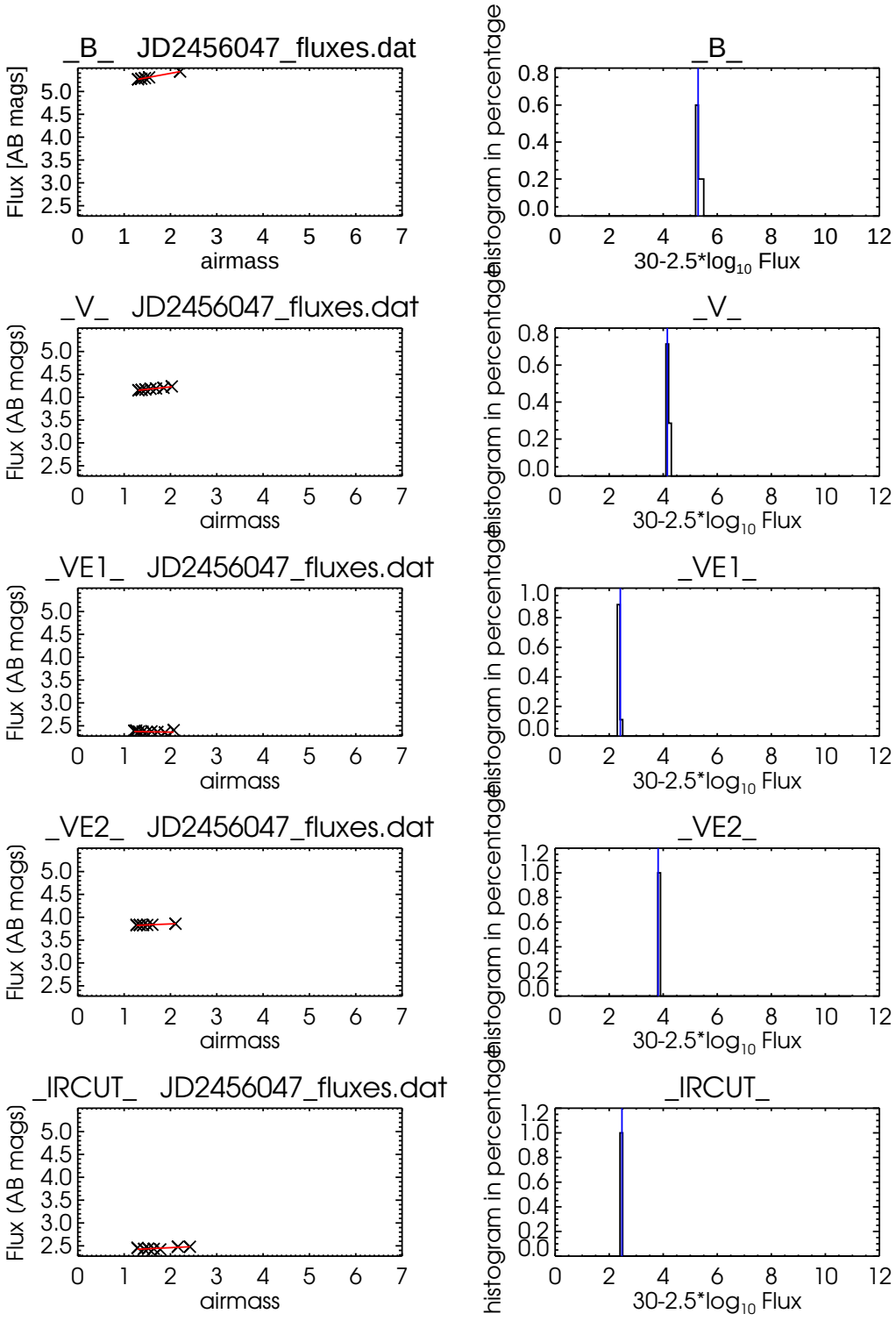

_B_ JD2456047_fluxes.dat
Flux [AB mags]
airmass
_V_ JD2456047_fluxes.dat
Flux (AB mags)
airmass
_VE1_ JD2456047_fluxes.dat
Flux (AB mags)
airmass
_VE2_ JD2456047_fluxes.dat
Flux (AB mags)
airmass
IRCUT JD2456047_fluxes.dat
Flux (AB mags)
airmass
_B_
_V_
_VE1_
_VE2_
IRCUT
histogram in percentage
30-2.5*log10 Flux

Figure 33:

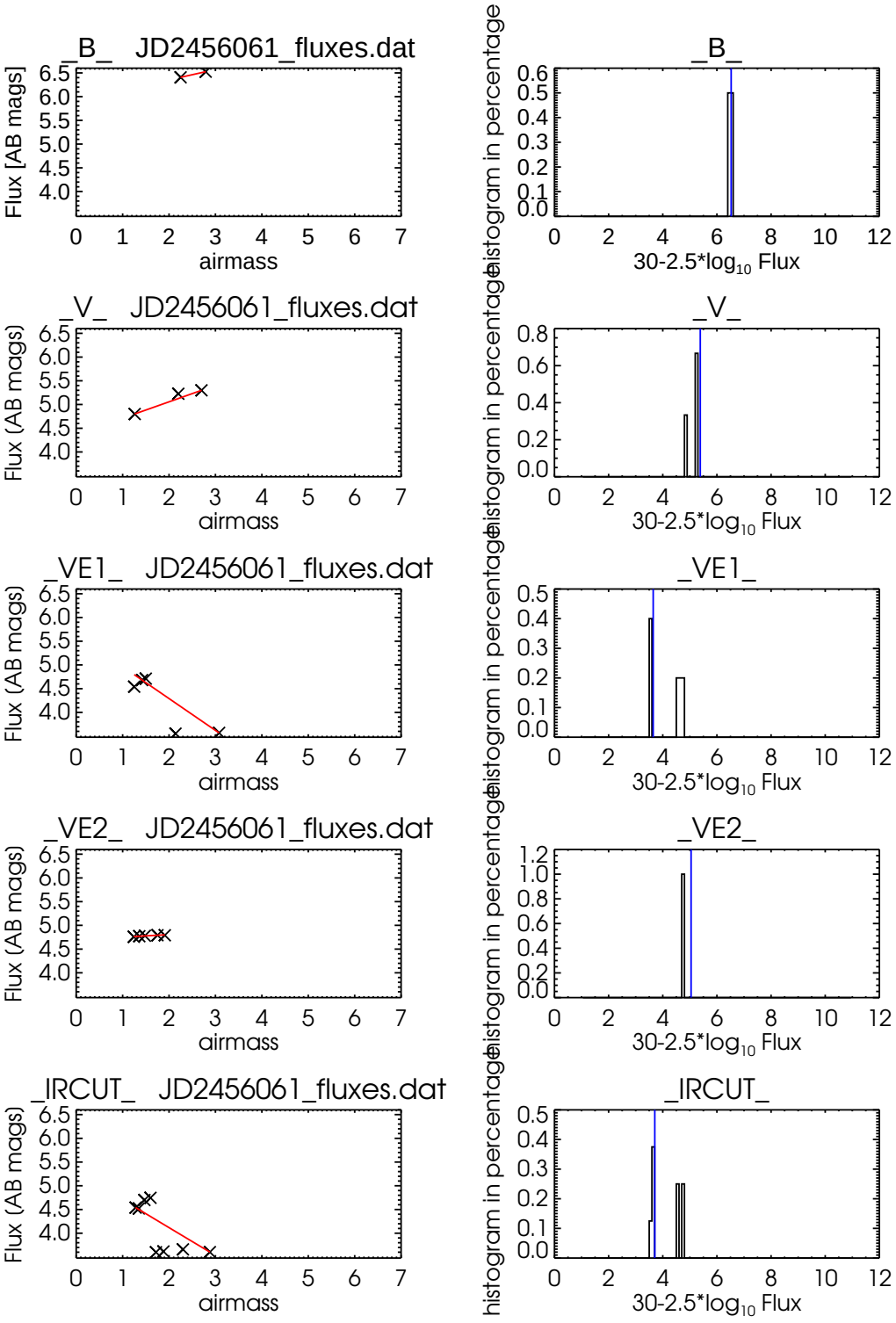

_B_ JD2456061_fluxes.dat
Flux [AB mags]
airmass
_V_ JD2456061_fluxes.dat
Flux (AB mags)
airmass
_VE1_ JD2456061_fluxes.dat
Flux (AB mags)
airmass
_VE2_ JD2456061_fluxes.dat
Flux (AB mags)
airmass
IRCUT JD2456061_fluxes.dat
Flux (AB mags)
airmass
_B_
_V_
_VE1_
_VE2_
IRCUT
histogram in percentage
30-2.5*log10 Flux

Figure 34:

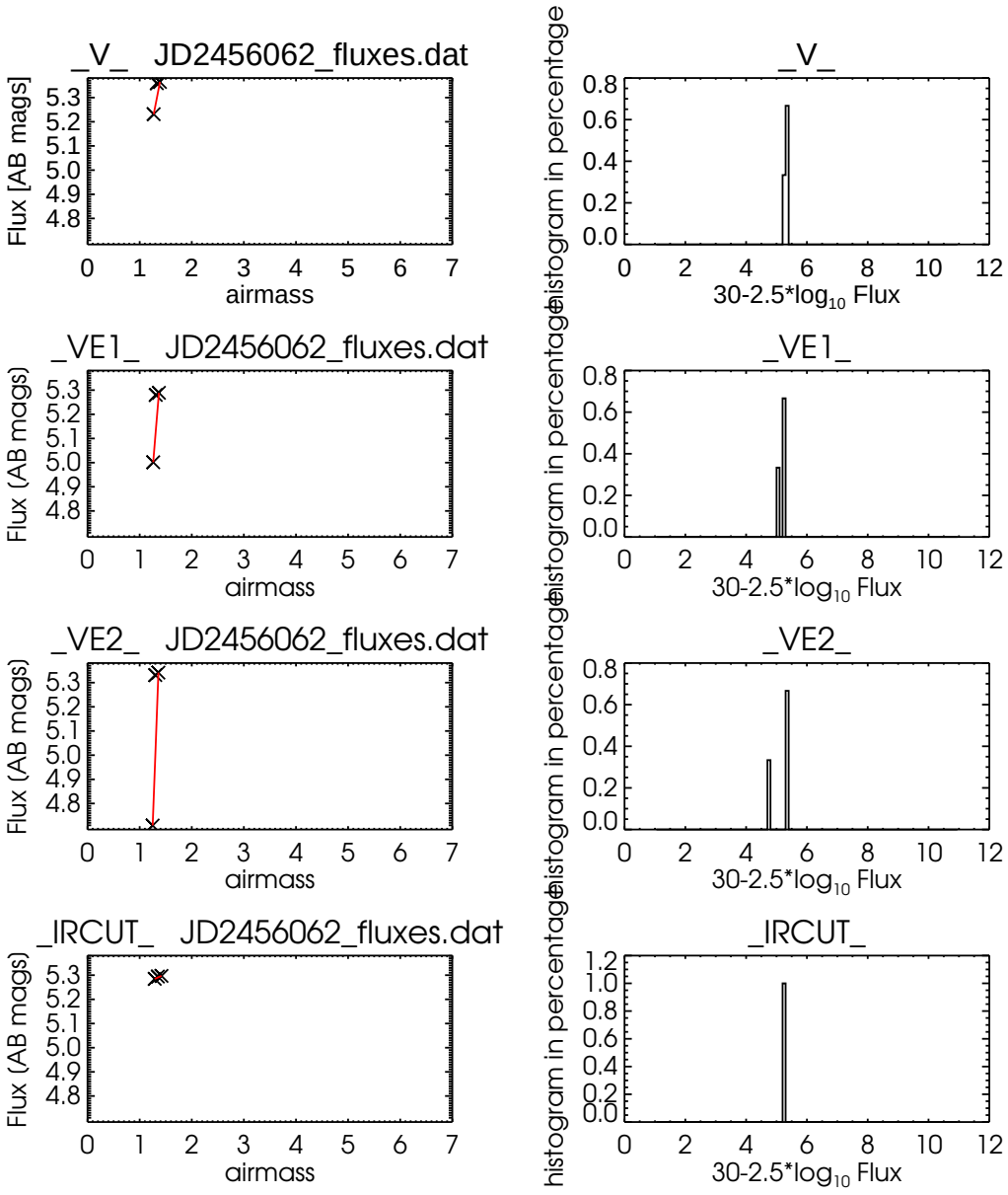

_V_ JD2456062_fluxes.dat
Flux [AB mags]
airmass
_V_
histogram in percentage
30-2.5*log10 Flux
_VE1_ JD2456062_fluxes.dat
Flux (AB mags)
airmass
_VE1_
histogram in percentage
30-2.5*log10 Flux
_VE2_ JD2456062_fluxes.dat
Flux (AB mags)
airmass
_VE2_
histogram in percentage
30-2.5*log10 Flux
IRCUT JD2456062_fluxes.dat
Flux (AB mags)
airmass
IRCUT
histogram in percentage
30-2.5*log10 Flux

Figure 35:

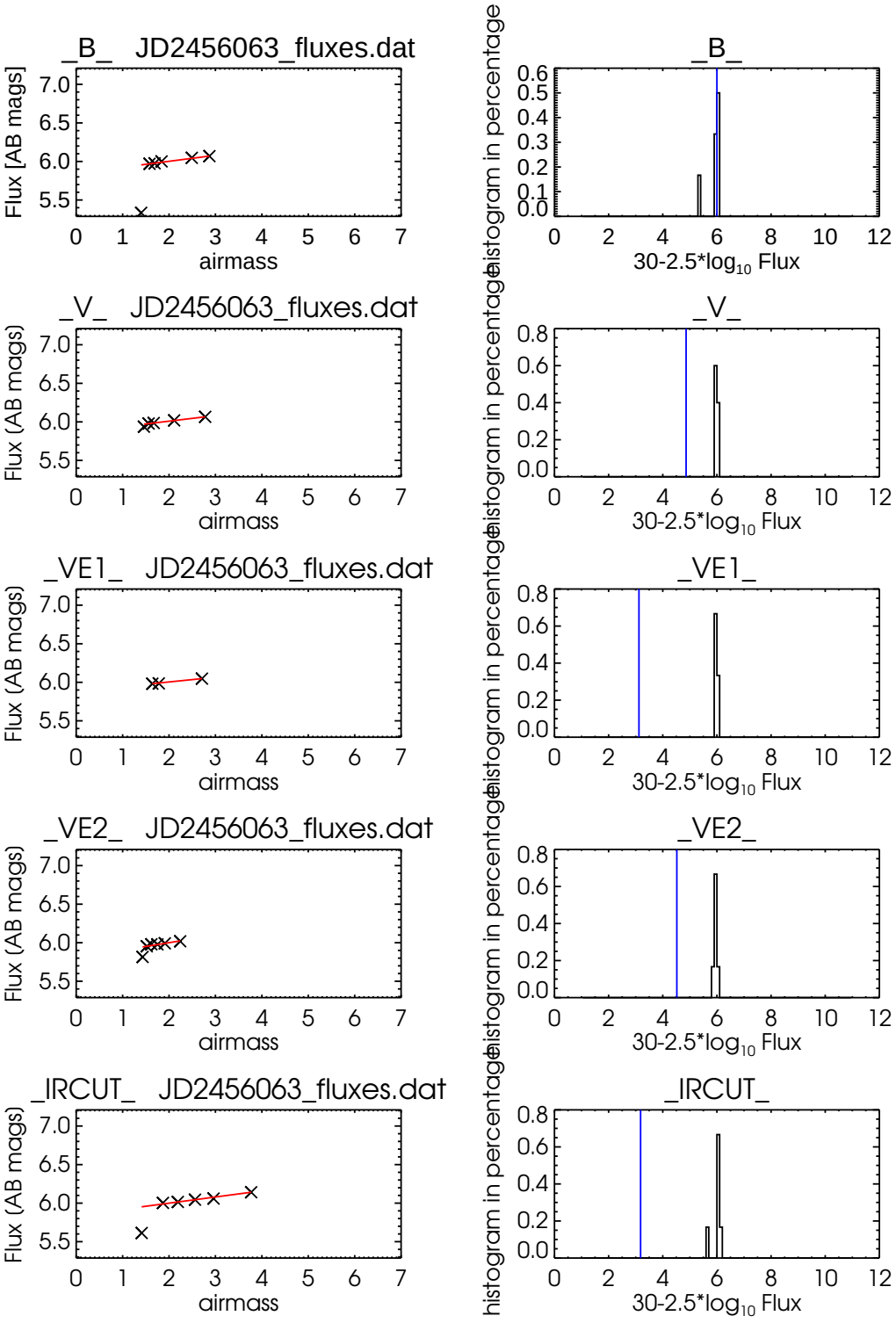
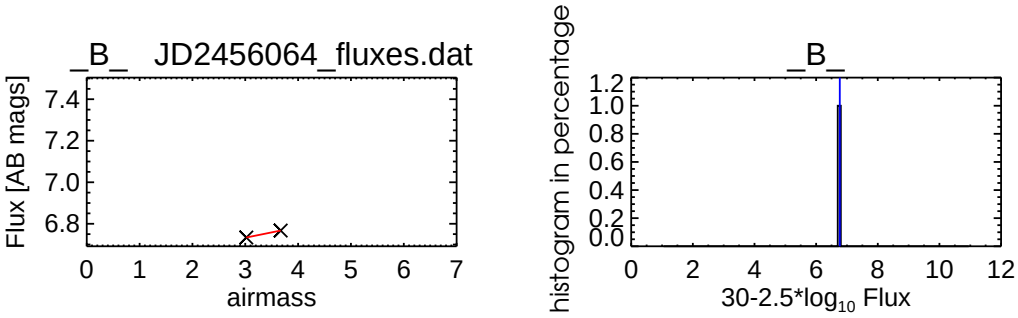

_B_ JD2456063_fluxes.dat
Flux [AB mags]
airmass
_V_ JD2456063_fluxes.dat
Flux (AB mags)
airmass
_VE1_ JD2456063_fluxes.dat
Flux (AB mags)
airmass
_VE2_ JD2456063_fluxes.dat
Flux (AB mags)
airmass
IRCUT JD2456063_fluxes.dat
Flux (AB mags)
airmass
_B_
_V_
_VE1_
_VE2_
IRCUT
histogram in percentage
30-2.5*log10 Flux

Figure 36:


_B_ JD2456064_fluxes.dat
Flux [AB mags]
7.4
7.2
7.0
6.8
0 1 2 3 4 5 6 7
airmass
_B_
histogram in percentage
1.2
1.0
0.8
0.6
0.4
0.2
0.0
0 2 4 6 8 10 12
30-2.5*log10 Flux

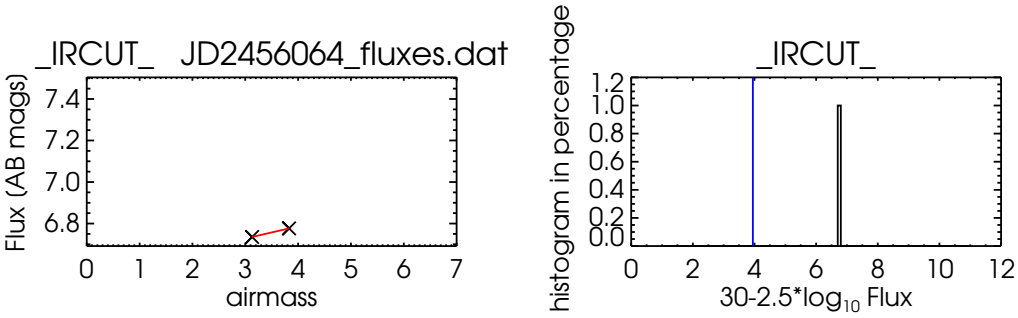

IRCUT JD2456064_fluxes.dat
Flux (AB mags)
7.4
7.2
7.0
6.8
0 1 2 3 4 5 6 7
airmass
IRCUT
histogram in percentage
1.2
1.0
0.8
0.6
0.4
0.2
0.0
0 2 4 6 8 10 12
30-2.5*log10 Flux

Figure 37:

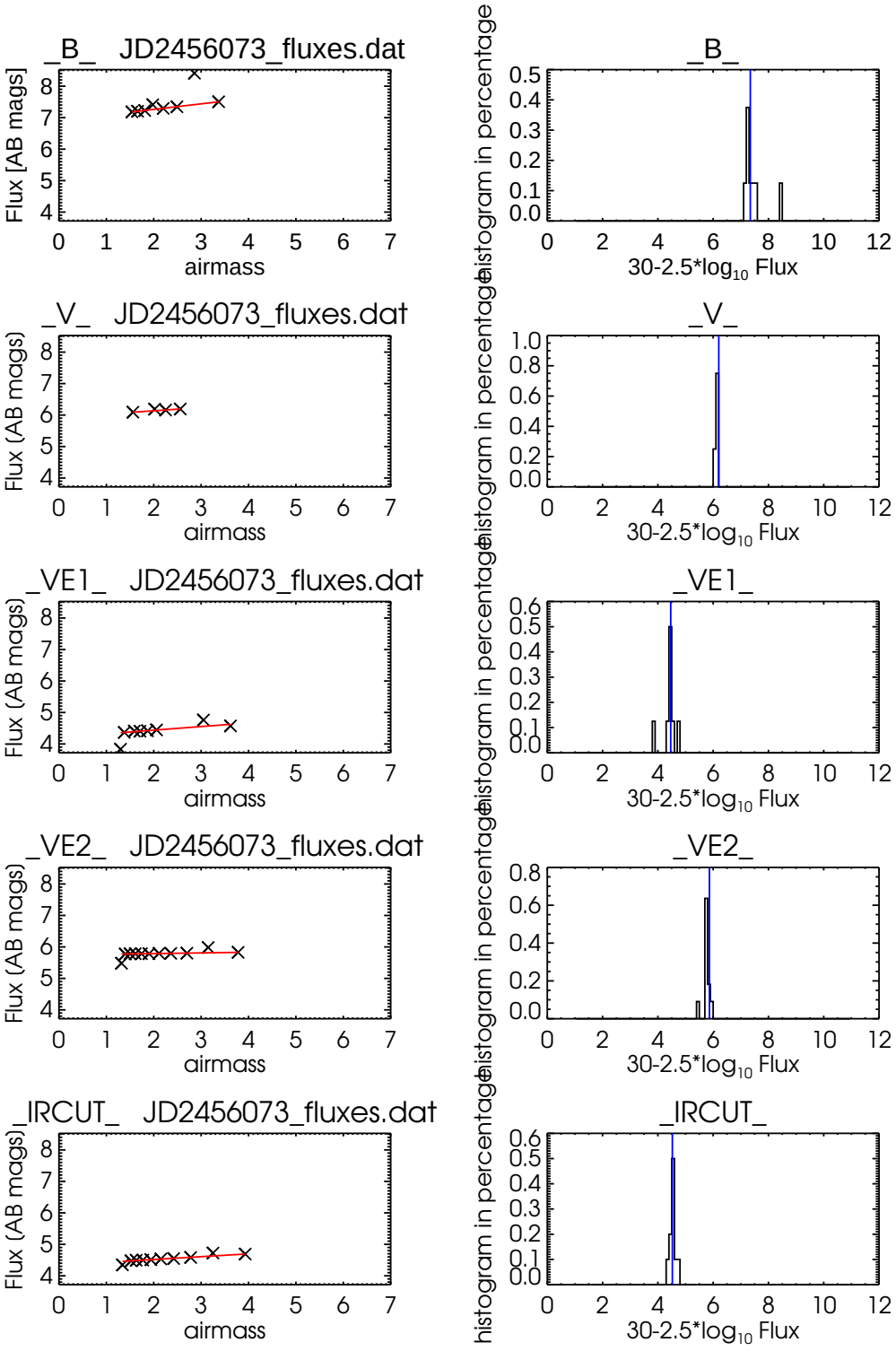

_B_ JD2456073_fluxes.dat
Flux [AB mags]
airmass
_V_ JD2456073_fluxes.dat
Flux (AB mags)
airmass
_VE1_ JD2456073_fluxes.dat
Flux (AB mags)
airmass
_VE2_ JD2456073_fluxes.dat
Flux (AB mags)
airmass
IRCUT JD2456073_fluxes.dat
Flux (AB mags)
airmass
_B_
_V_
_VE1_
_VE2_
IRCUT
histogram in percentage
30-2.5*log10 Flux

Figure 38:

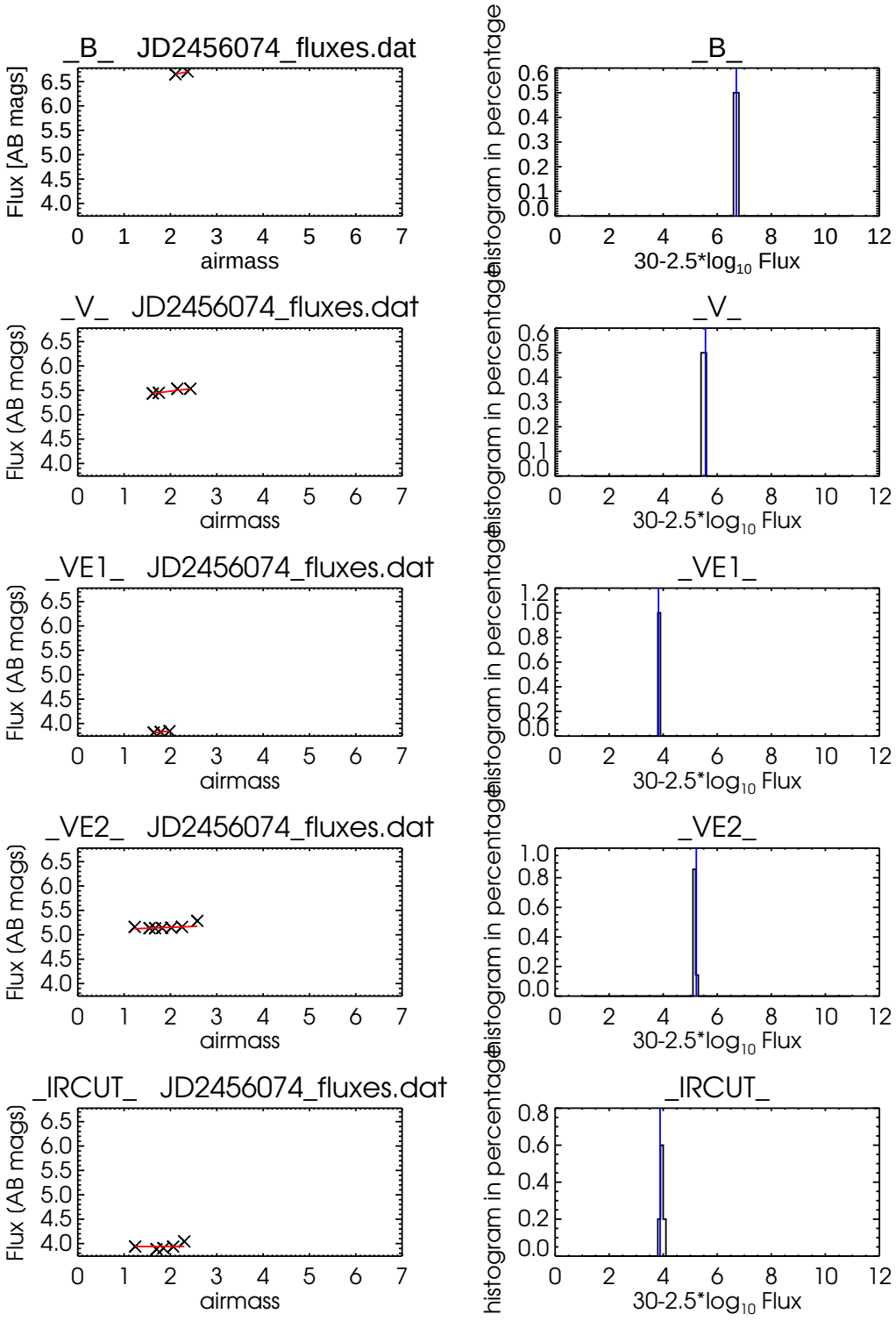

_B_ JD2456074_fluxes.dat
Flux [AB mags]
airmass
_B_
histogram in percentage
30-2.5*log10 Flux
_V_ JD2456074_fluxes.dat
Flux (AB mags)
airmass
_V_
histogram in percentage
30-2.5*log10 Flux
_VE1_ JD2456074_fluxes.dat
Flux (AB mags)
airmass
_VE1_
histogram in percentage
30-2.5*log10 Flux
_VE2_ JD2456074_fluxes.dat
Flux (AB mags)
airmass
_VE2_
histogram in percentage
30-2.5*log10 Flux
IRCUT JD2456074_fluxes.dat
Flux (AB mags)
airmass
IRCUT
histogram in percentage
30-2.5*log10 Flux

Figure 39:

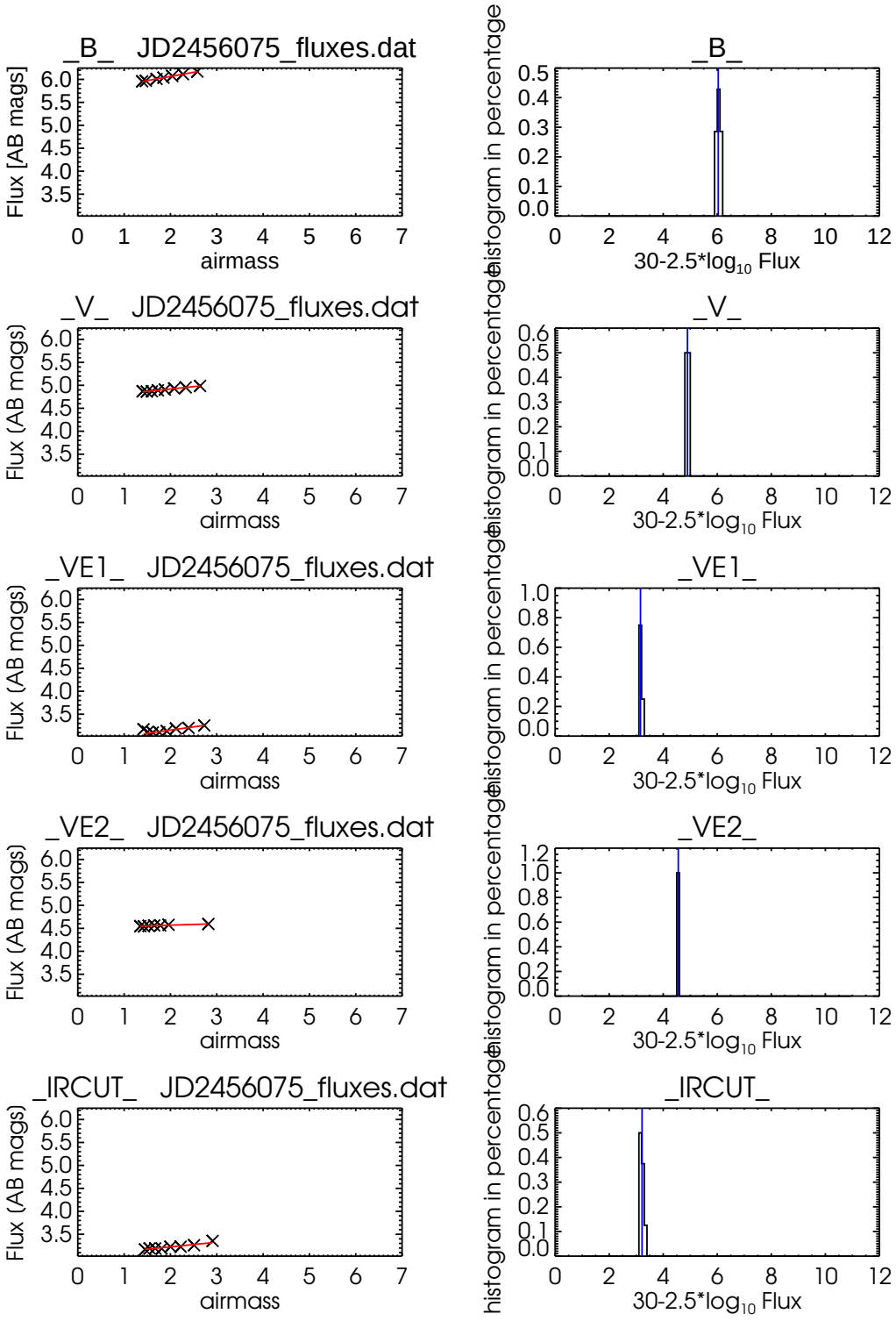

_B_ JD2456075_fluxes.dat
Flux [AB mags]
airmass
_B_
histogram in percentage
30-2.5*log10 Flux
_V_ JD2456075_fluxes.dat
Flux (AB mags)
airmass
_V_
histogram in percentage
30-2.5*log10 Flux
_VE1_ JD2456075_fluxes.dat
Flux (AB mags)
airmass
_VE1_
histogram in percentage
30-2.5*log10 Flux
_VE2_ JD2456075_fluxes.dat
Flux (AB mags)
airmass
_VE2_
histogram in percentage
30-2.5*log10 Flux
IRCUT JD2456075_fluxes.dat
Flux (AB mags)
airmass
IRCUT
histogram in percentage
30-2.5*log10 Flux

Figure 40:

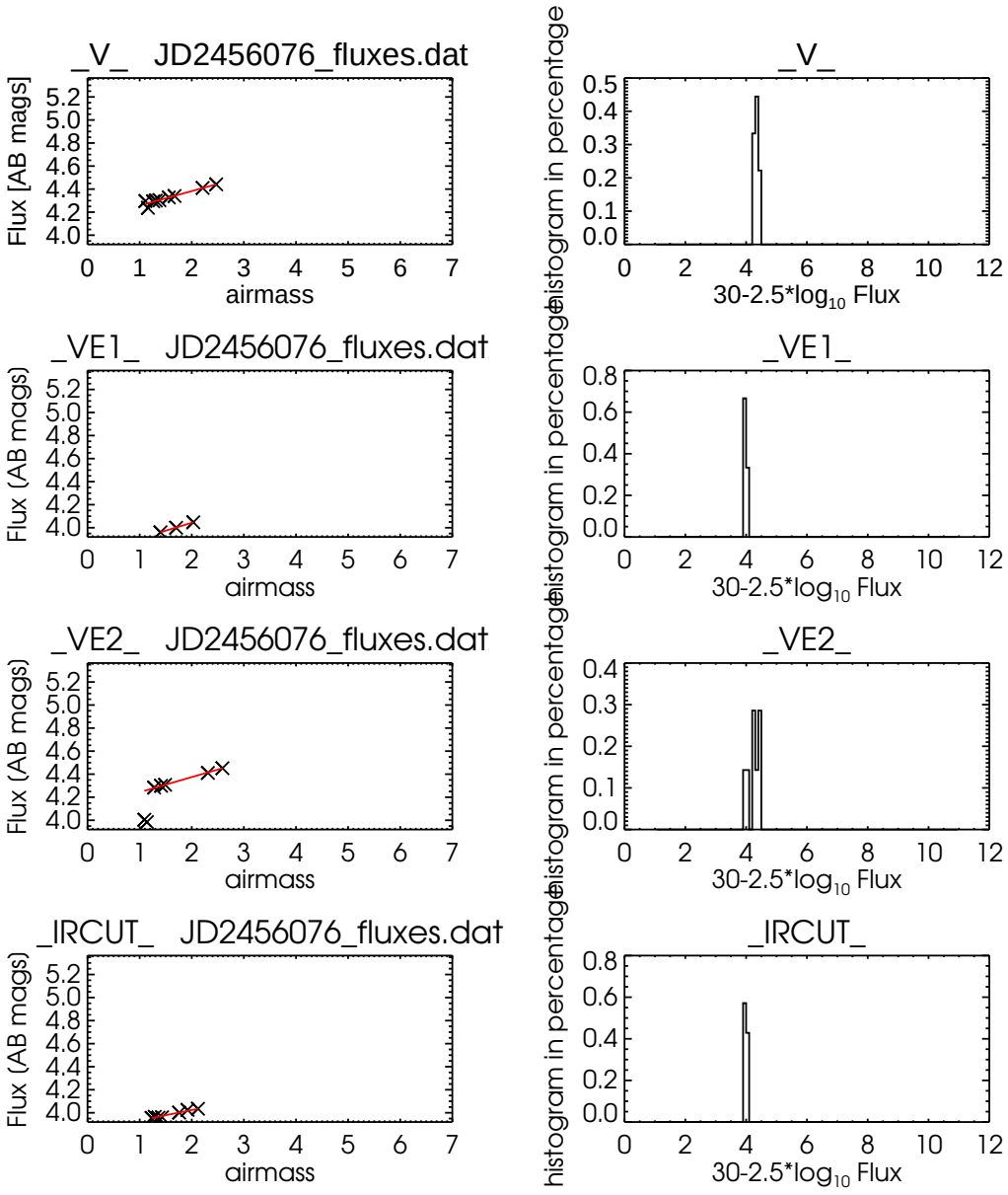

_V_ JD2456076_fluxes.dat
Flux [AB mags]
airmass
_V_
histogram in percentage
30-2.5*log10 Flux
_VE1_ JD2456076_fluxes.dat
Flux (AB mags)
airmass
_VE1_
histogram in percentage
30-2.5*log10 Flux
_VE2_ JD2456076_fluxes.dat
Flux (AB mags)
airmass
_VE2_
histogram in percentage
30-2.5*log10 Flux
IRCUT JD2456076_fluxes.dat
Flux (AB mags)
airmass
IRCUT
histogram in percentage
30-2.5*log10 Flux

Figure 41:

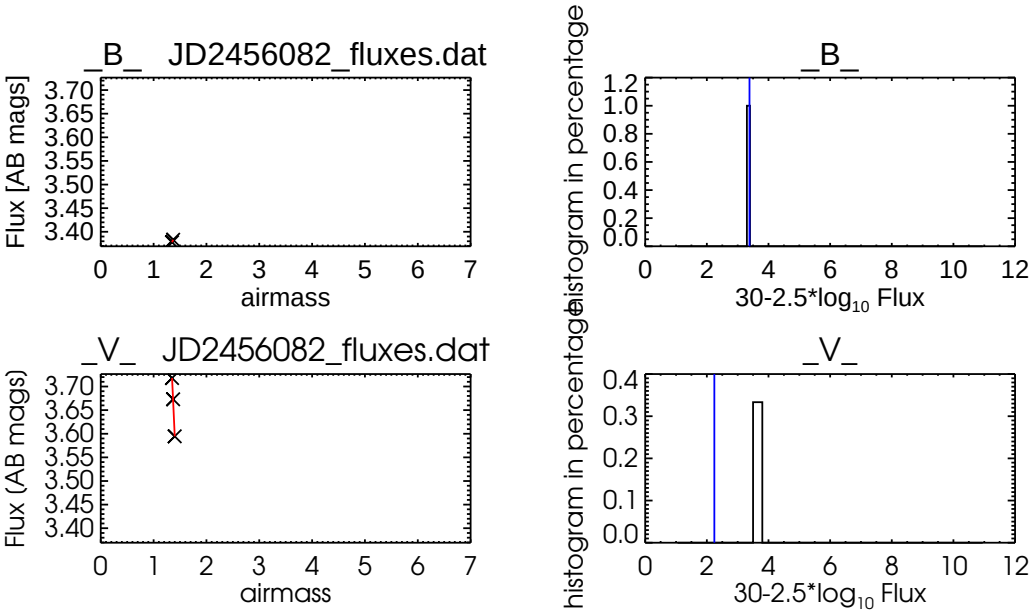

_B_ JD2456082_fluxes.dat
Flux [AB mags]
airmass
_V_ JD2456082_fluxes.dat
Flux (AB mags)
airmass
_B_
histogram in percentage
30-2.5*log10 Flux
_V_
histogram in percentage
30-2.5*log10 Flux

Figure 42:

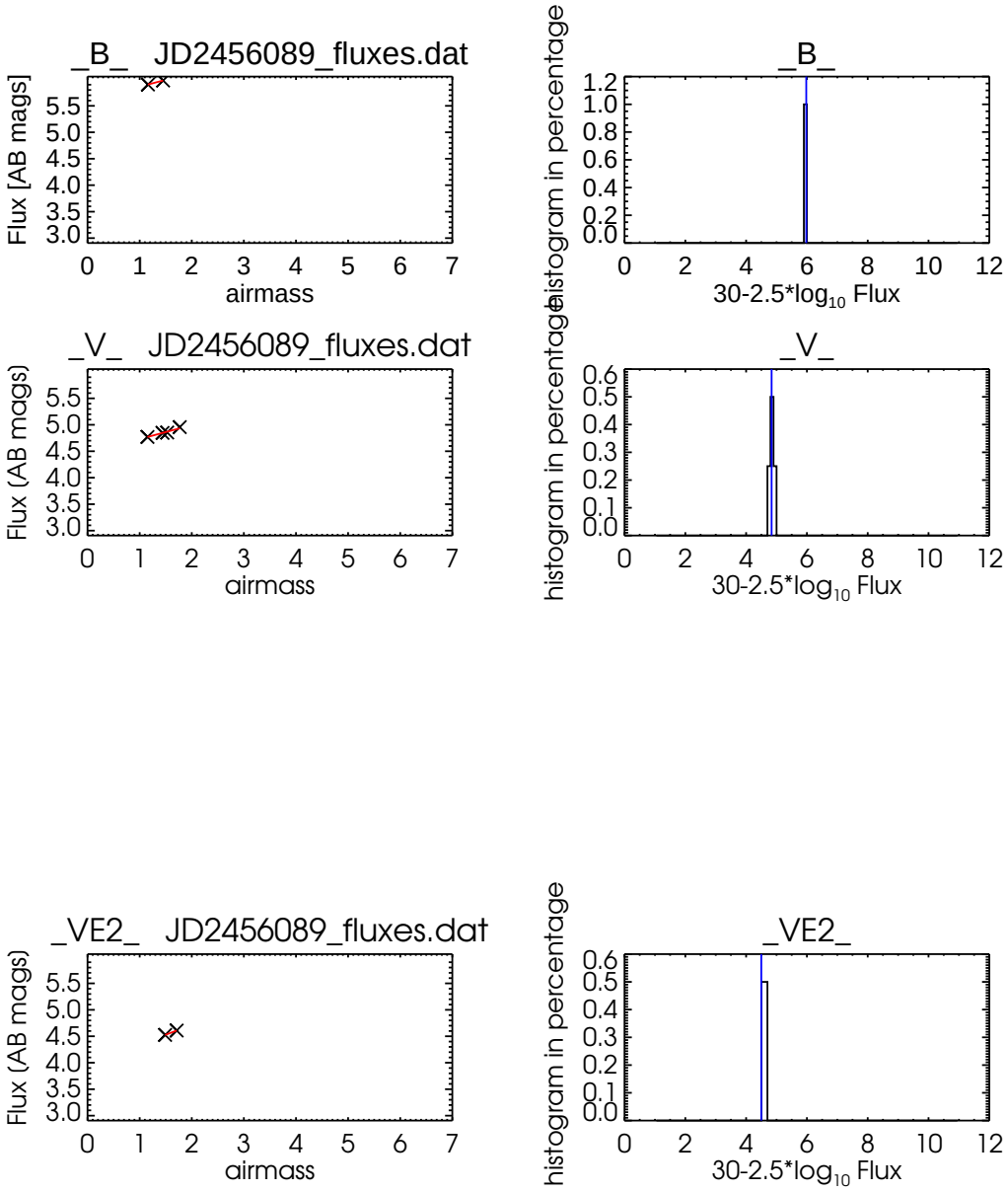

_B_ JD2456089_fluxes.dat
Flux [AB mags]
airmass
_V_ JD2456089_fluxes.dat
Flux (AB mags)
airmass
_VE2_ JD2456089_fluxes.dat
Flux (AB mags)
airmass
_B_
histogram in percentage
30-2.5*log10 Flux
_V_
histogram in percentage
30-2.5*log10 Flux
_VE2_
histogram in percentage
30-2.5*log10 Flux

Figure 43:

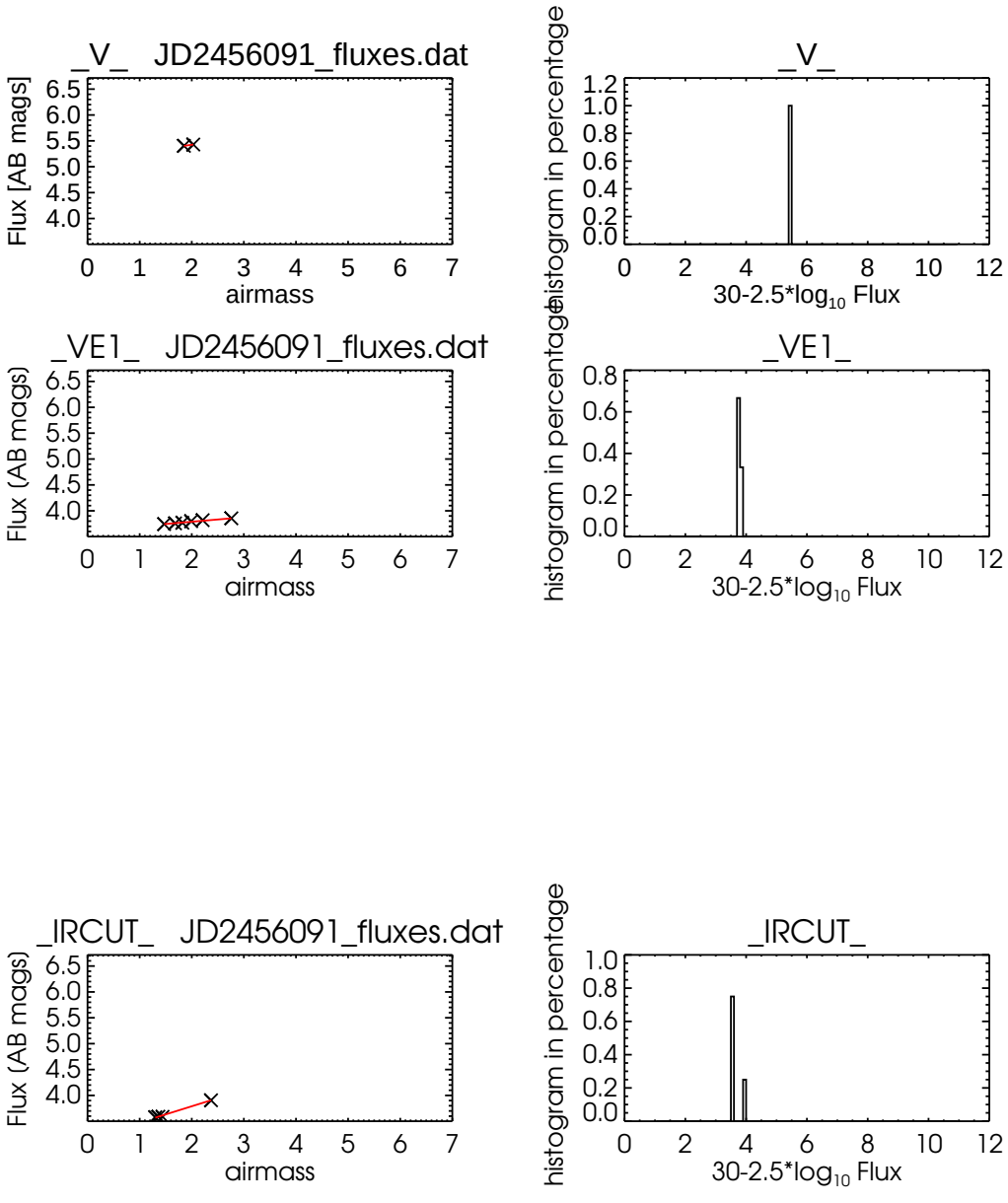

_V_ JD2456091_fluxes.dat
Flux [AB mags]
airmass
_V_
histogram in percentage
30-2.5*log10 Flux
_VE1_ JD2456091_fluxes.dat
Flux (AB mags)
airmass
_VE1_
histogram in percentage
30-2.5*log10 Flux
IRCUT JD2456091_fluxes.dat
Flux (AB mags)
airmass
IRCUT
histogram in percentage
30-2.5*log10 Flux

Figure 44:

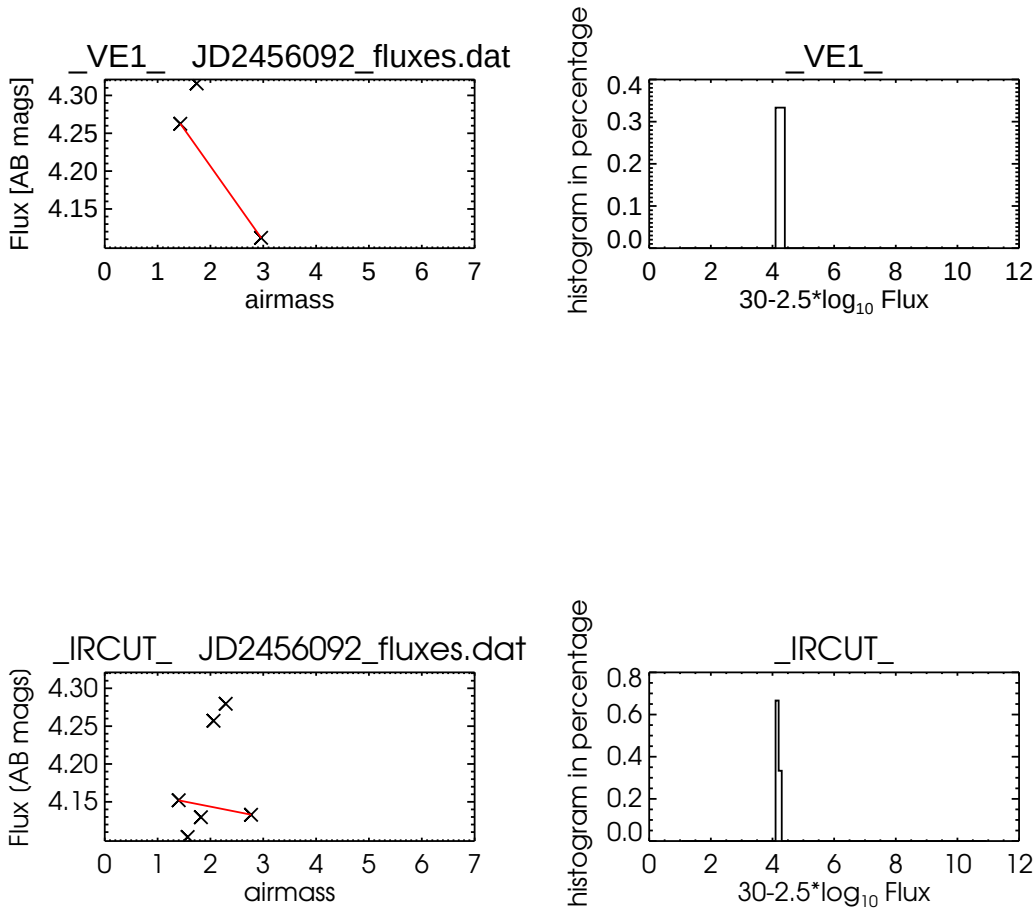

_VE1_ JD2456092_fluxes.dat
Flux [AB mags]
4.30
4.25
4.20
4.15
0 1 2 3 4 5 6 7
airmass
_VE1_
histogram in percentage
0.4
0.3
0.2
0.1
0.0
0 2 4 6 8 10 12
30-2.5*log10 Flux
IRCUT JD2456092_fluxes.dat
Flux (AB mags)
4.30
4.25
4.20
4.15
0 1 2 3 4 5 6 7
airmass
IRCUT
histogram in percentage
0.8
0.6
0.4
0.2
0.0
0 2 4 6 8 10 12
30-2.5*log10 Flux

Figure 45:

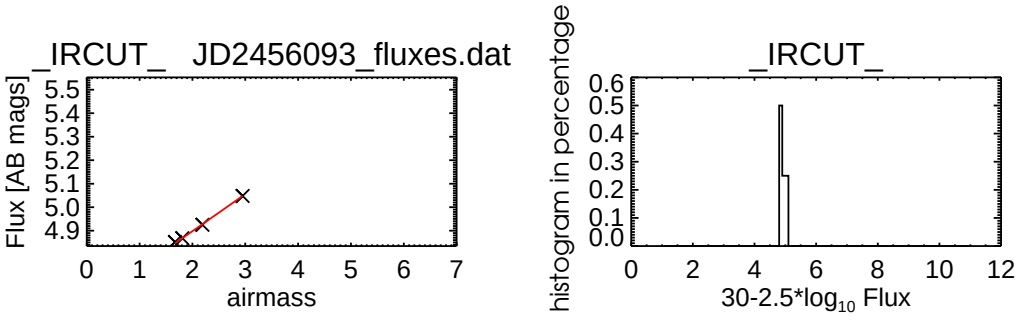
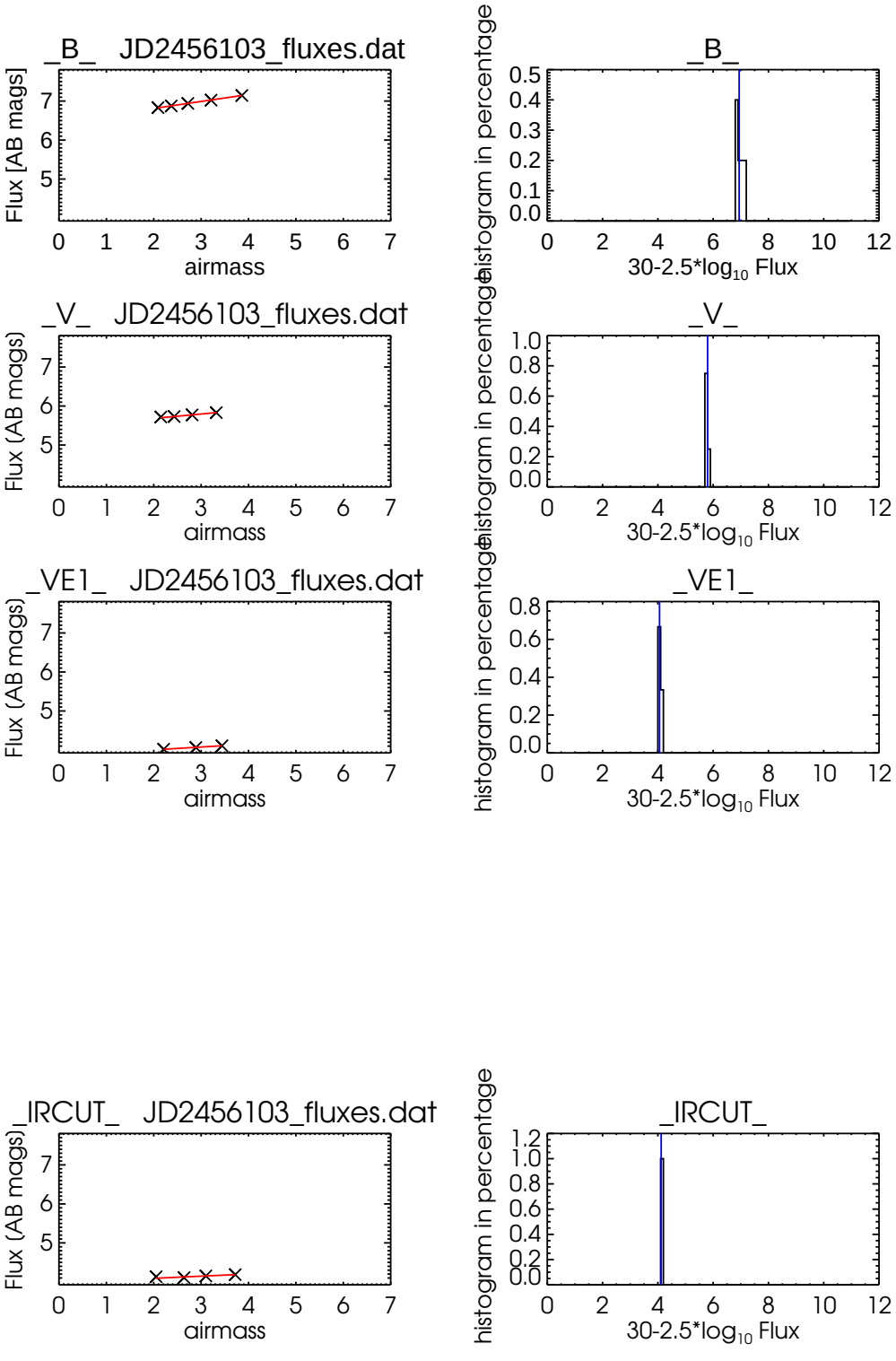

IRCUT JD2456093_fluxes.dat
Flux [AB mags]
5.5
5.4
5.3
5.2
5.1
5.0
4.9
0
1
2
3
4
5
6
7
airmass
IRCUT
histogram in percentage
0.6
0.5
0.4
0.3
0.2
0.1
0.0
0
2
4
6
8
10
12
30-2.5*log10 Flux

Figure 46:


_B_ JD2456103_fluxes.dat
Flux [AB mags]
airmass
_V_ JD2456103_fluxes.dat
Flux (AB mags)
airmass
_VE1_ JD2456103_fluxes.dat
Flux (AB mags)
airmass
_B_
histogram in percentage
30-2.5*log10 Flux
_V_
histogram in percentage
30-2.5*log10 Flux
_VE1_
histogram in percentage
30-2.5*log10 Flux

IRCUT JD2456103_fluxes.dat
Flux (AB mags)
airmass
IRCUT
histogram in percentage
30-2.5*log10 Flux

Figure 47:

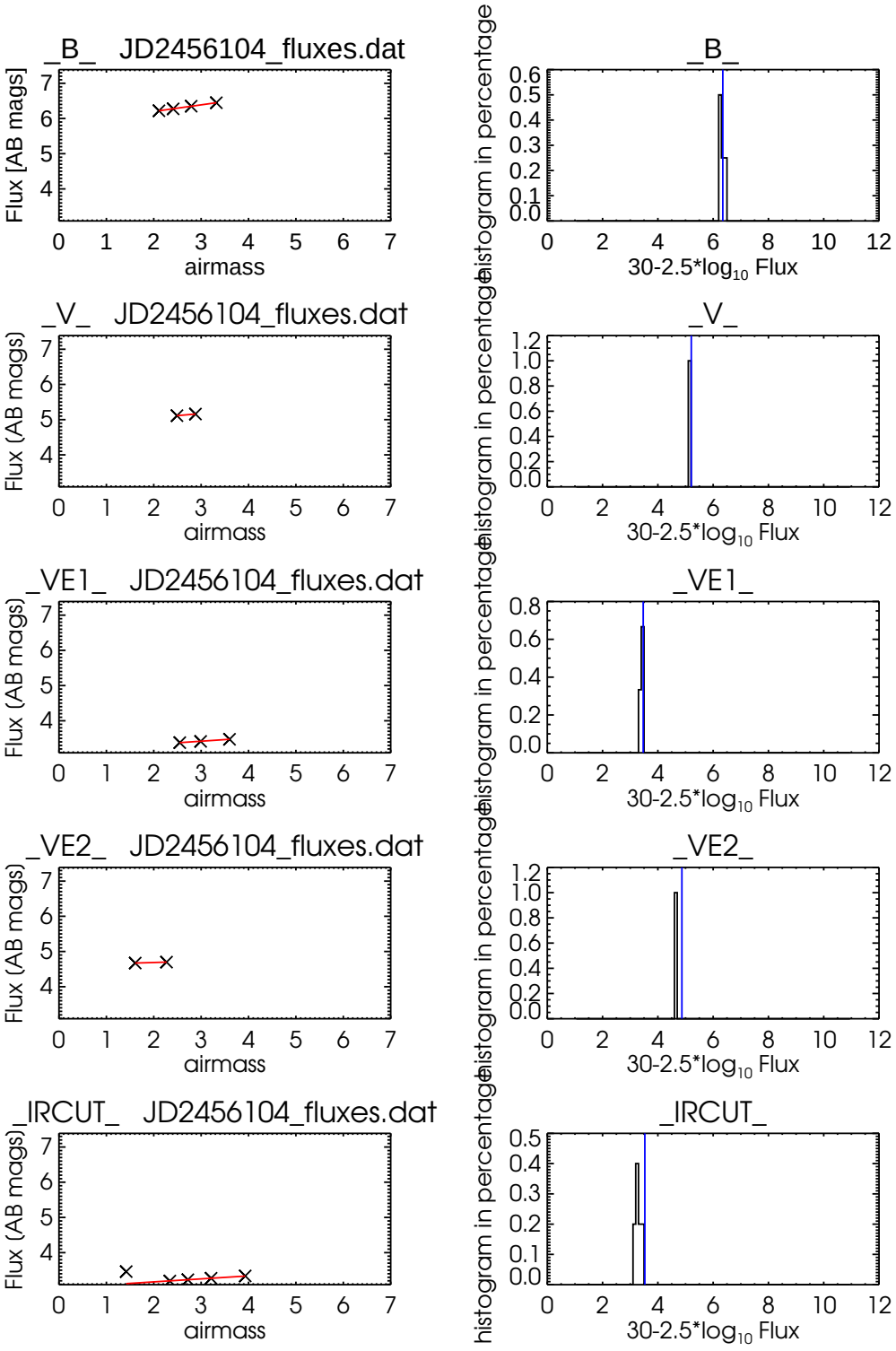

_B_ JD2456104_fluxes.dat
Flux [AB mags]
airmass
_B_
histogram in percentage
30-2.5*log10 Flux
_V_ JD2456104_fluxes.dat
Flux (AB mags)
airmass
_V_
histogram in percentage
30-2.5*log10 Flux
_VE1_ JD2456104_fluxes.dat
Flux (AB mags)
airmass
_VE1_
histogram in percentage
30-2.5*log10 Flux
_VE2_ JD2456104_fluxes.dat
Flux (AB mags)
airmass
_VE2_
histogram in percentage
30-2.5*log10 Flux
IRCUT JD2456104_fluxes.dat
Flux (AB mags)
airmass
IRCUT
histogram in percentage
30-2.5*log10 Flux

Figure 48:

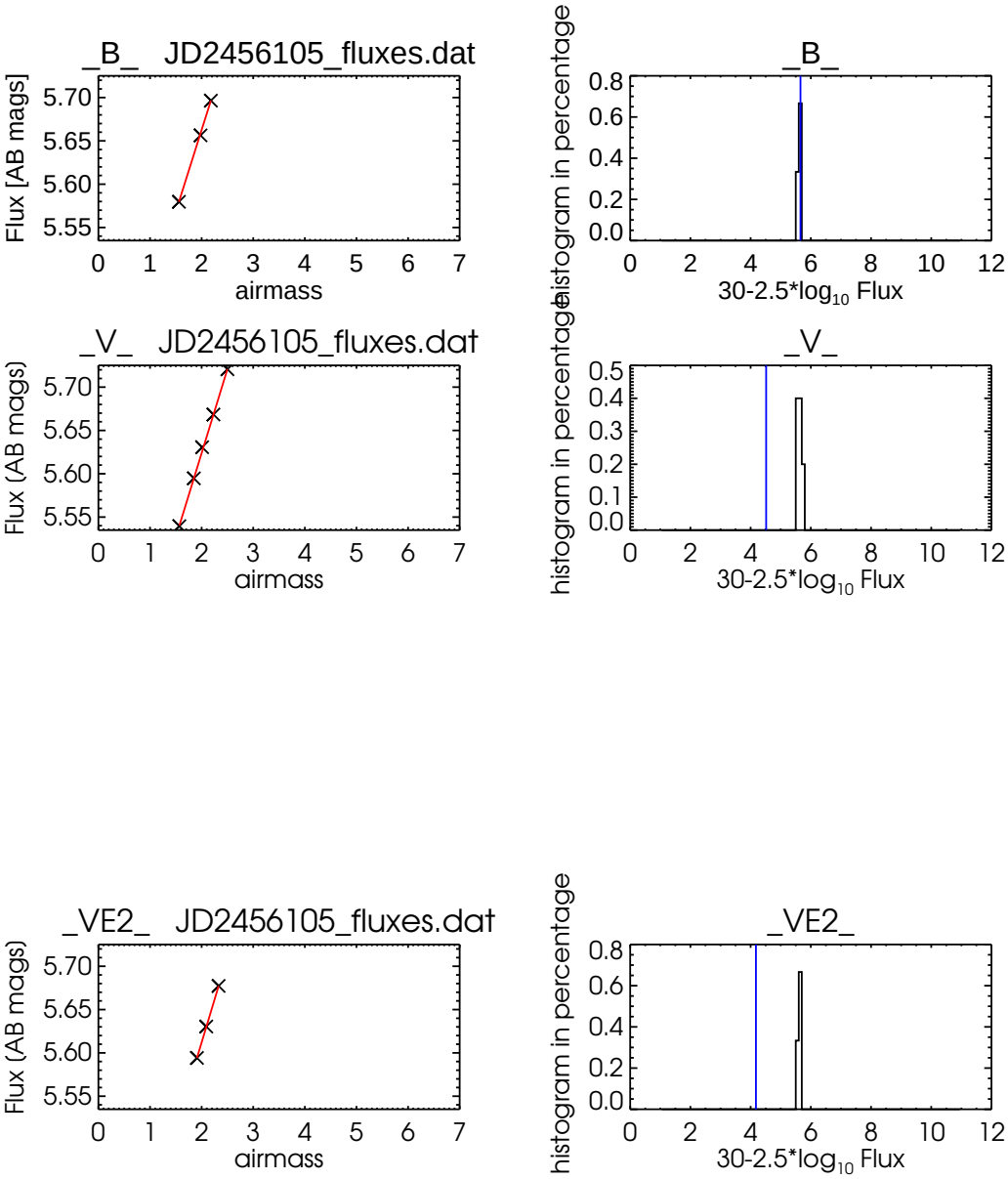

_B_ JD2456105_fluxes.dat
Flux [AB mags]
airmass
_V_ JD2456105_fluxes.dat
Flux (AB mags)
airmass
_B_
histogram in percentage
30-2.5*log10 Flux
_V_
histogram in percentage
30-2.5*log10 Flux
_VE2_ JD2456105_fluxes.dat
Flux (AB mags)
airmass
_VE2_
histogram in percentage
30-2.5*log10 Flux

Figure 49:

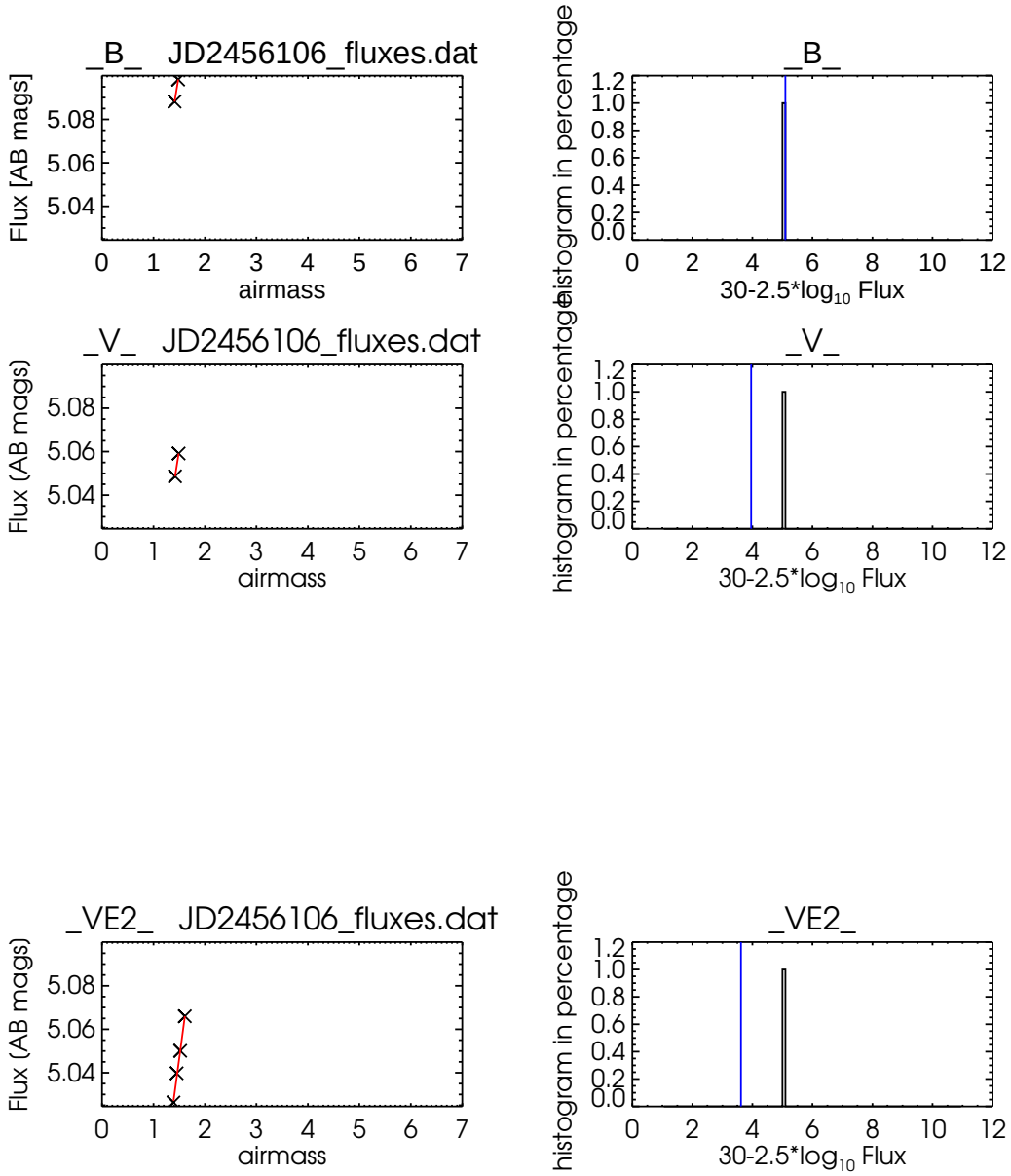

_B_ JD2456106_fluxes.dat
Flux [AB mags]
airmass
_V_ JD2456106_fluxes.dat
Flux (AB mags)
airmass
_VE2_ JD2456106_fluxes.dat
Flux (AB mags)
airmass
_B_
histogram in percentage
30-2.5*log10 Flux
_V_
histogram in percentage
30-2.5*log10 Flux
_VE2_
histogram in percentage
30-2.5*log10 Flux

Figure 50:

Table 1: Offsets, in magnitudes for Moonshine, on the night of JD2456075. mean values and standard deviations are given. These offsets suggest that proper exposure time ratios for the 5 filters, in order to ensure the same counts in each image should be: 34:12:2.4:8.7:2.5.

mags	mean	S.D.
B	0	0.08
V	-1.14	0.04
VE1	-2.88	0.06
VE2	-1.48	0.02
IRCUT	-2.82	0.06

3 Discussion

On night JD2455858 we see that most observations fall along extinction sequences, but that in the `VE2` and `IRCUT` filters, at least, the first observations are flawed somehow. A plot such as this could be used to find the good data, and eliminate the bad.

On the night JD2456063 we see another problem - the fluxes (most easily noticed in the histogram column on the right) are all the same. On night JD2456075 the fluxes are different. We expect that the filters, with their different transmission properties - and the differences in spectral flux from the Moon - would cause each image taken through a different filter to have different fluxes. We suggest that noting the approximate ratio from filter to filter on good nights such as JD2456075 we can detect nights such as JD2456063 automatically by using a cumulation of hand-selected 'good' flux ratios and a search routine.

From experience we know that similar counts are obtained through the 5 filters if the exposure times are scaled as 34:11.8:2.6:10:2.6 for the `B`, `V`, `VE1`, `VE2` and `IRCUT` filters, respectively. These numbers suggest that the magnitude difference between observed fluxes should be 0, 1.2, 2.8, 1.3, and 2.8 relative to the B magnitude. For night JD2456075 the offsets relative to B, extracted from the figure, are given in Table 1. Perhaps it is possible to use such a set of numbers to 'screen' observations? The color of the Moon is not constant because while the Sunshine lighting it up may have a constant color the Moon does not show the same face all the time, due to libration. We therefore expect some, small, changes in color from night to night and hence in these offsets. Towards New Moon the Earthshine also contributes, and as we have shown in the blog, the contribution may be several or 10% just before new Moon. However, we rarely observe then due to the proximity to the Sun.

A blue line is plotted on the histograms to indicate the expected magnitude, based on the `B` magnitude. If `B` is not available, no estimate is given.

4 Conclusion

Inspection of data can help us identify the nights when good data was obtained. We find that 24 out of 50 nights have data where the flux ratios follow expectations. A few more night will be uncovered with this method. These data can then go on to be subjected to reduction for scattered light, and, ultimately, for albedo analysis.