

# **Denoising of photometric light curves**

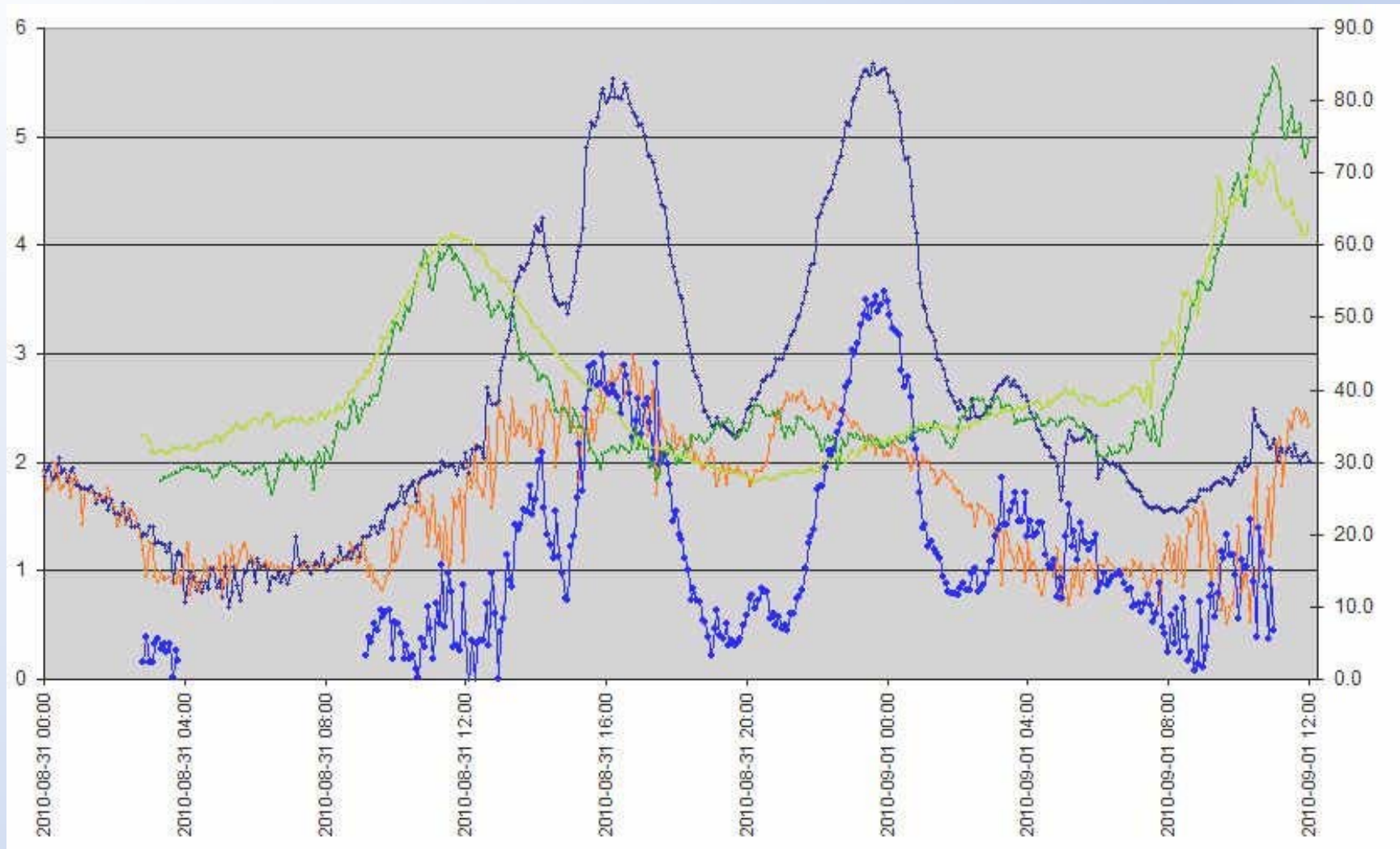
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Polish Association of Amateur Astronomers

Section of Observations of Positions  
and Occultations

## *Plan of presentation:*

- 1. Description of the problem (time runs affected by noise)**
- 2. Methods of denoising of recorded signal**
- 3. Example of elaborating of real light curve**



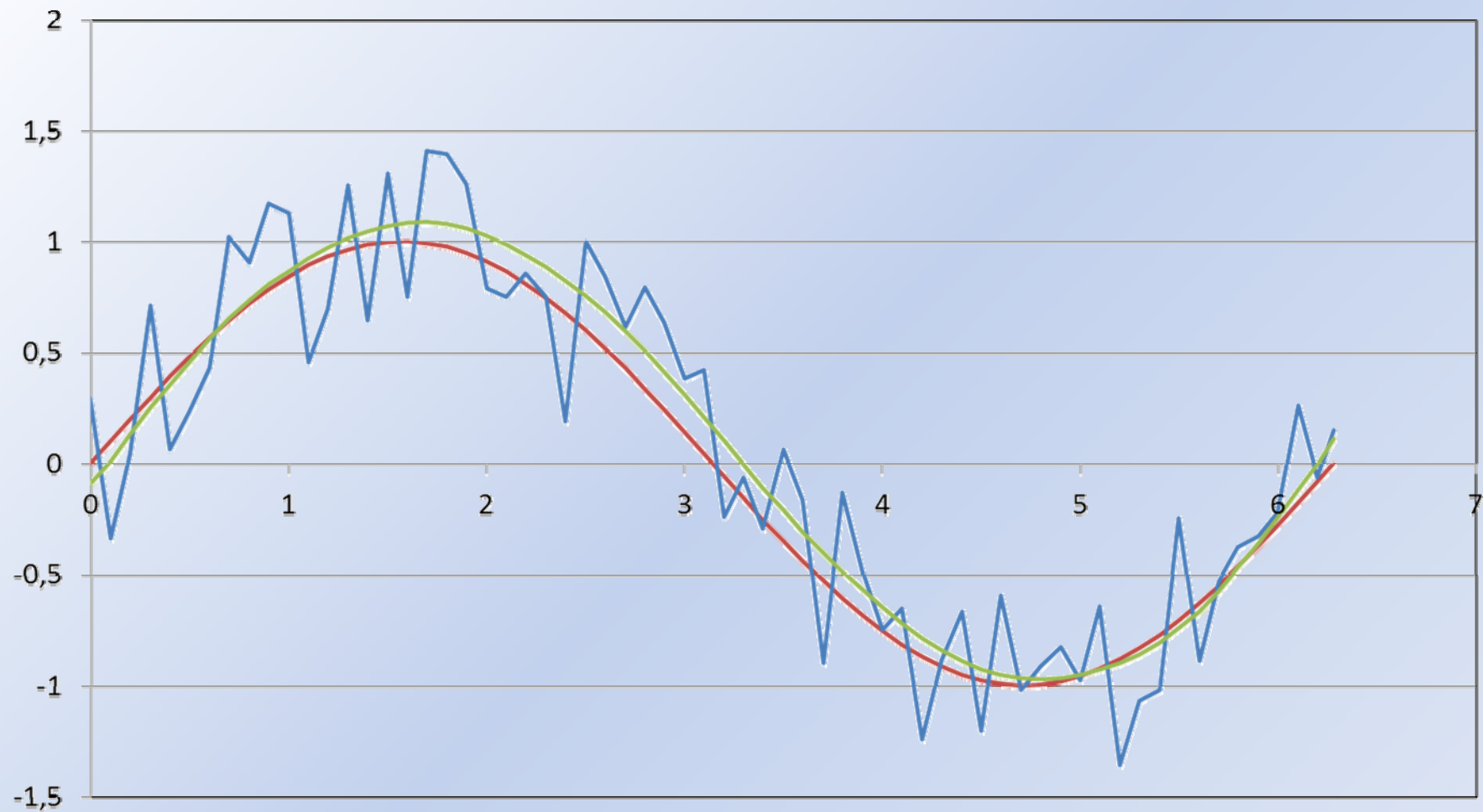
An example of runs containing periodical and random variations

**Denoising** is a procedure that removes random noise signal from the main measured signal.

Two algorithms were checked:

1. **The Eigendecomposition filtration (reconstruction)** procedure that sets a signal strength threshold for retaining all signal-bearing eigenmodes and filtering out all noise-containing ones. This option is used exclusively to remove noise. In general, eigenfiltration is the most effective method for denoising. The order and signal space threshold should be defined by the user.

2. **The Savitzky-Golay Smoothing Filter** procedure that offers effective time-domain smoothing for data sets with uniform X-spacing. This time-domain method of smoothing is based on least squares polynomial fitting across a moving window within the data. Typically, Savitzky-Golay smoothing uses a quartic (order 4) polynomial. Maximum order can be 12. The user has also to input the size of the window and the number of sequential applications of the smoothing filter (number of passes).

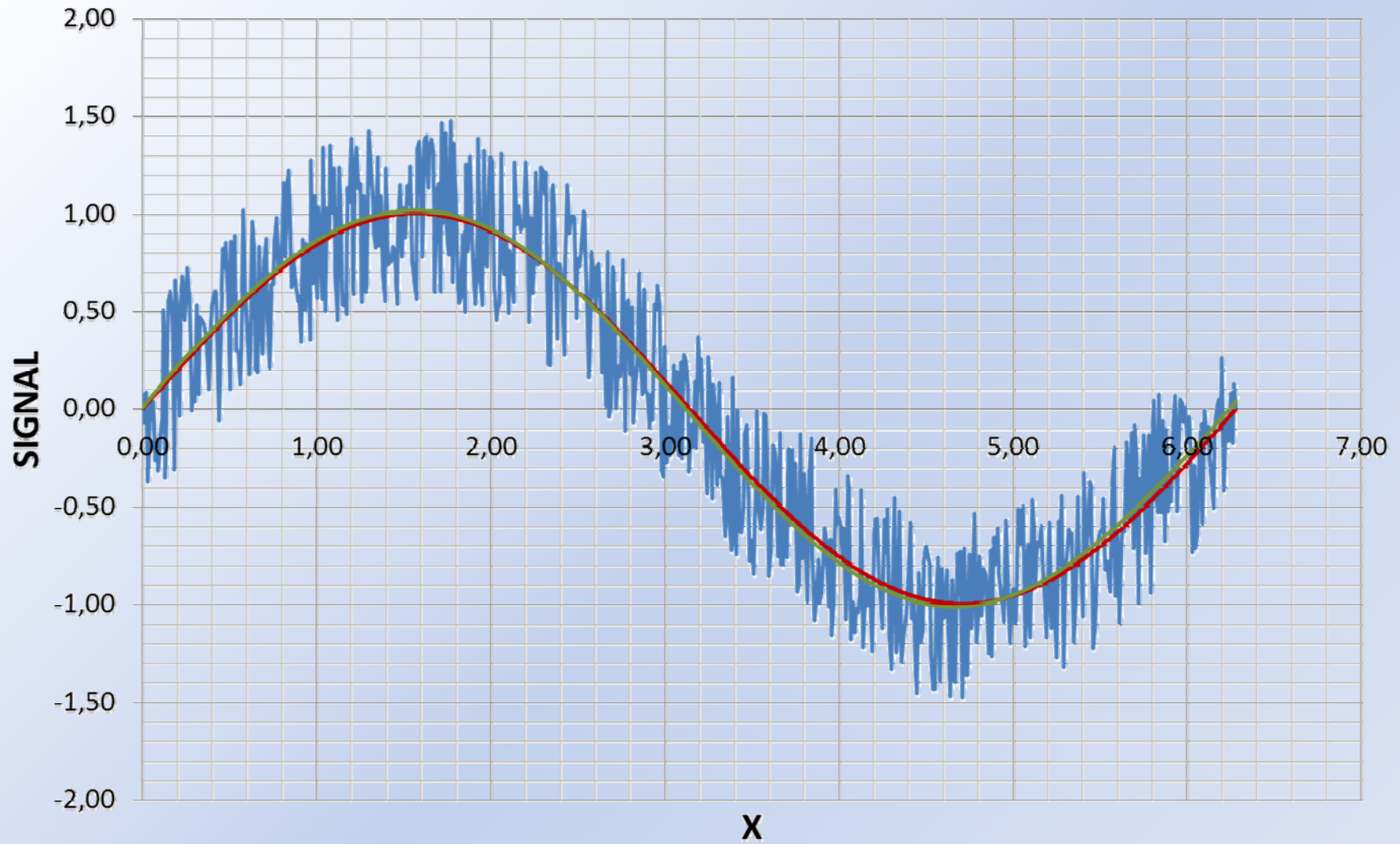


— SIN(X)    — SIN(X)+NOISE    — AFTER DENOISING

### EIGENDECOMPOSITION AND RECONSTRUCTION

SYSTEMATIC ERROR OF THE NOISED CURVE: +6%

SYSTEMATIC ERROR OF THE DENOISED CURVE: +6%



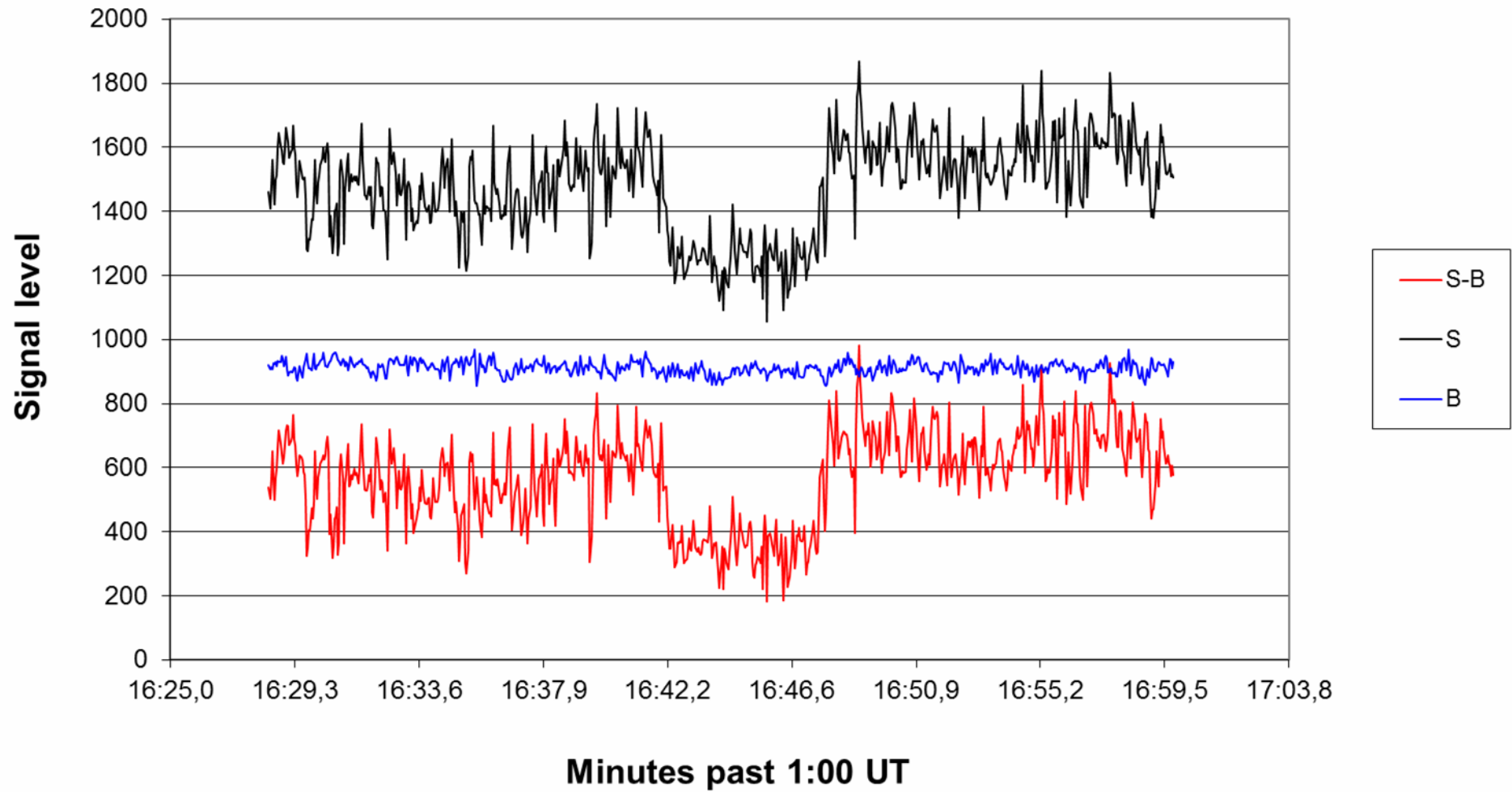
— SIN(X)+NOISE — SIN(X) — AFTER DENOISING

### **EIGENDECOMPOSITION AND RECONSTRUCTION**

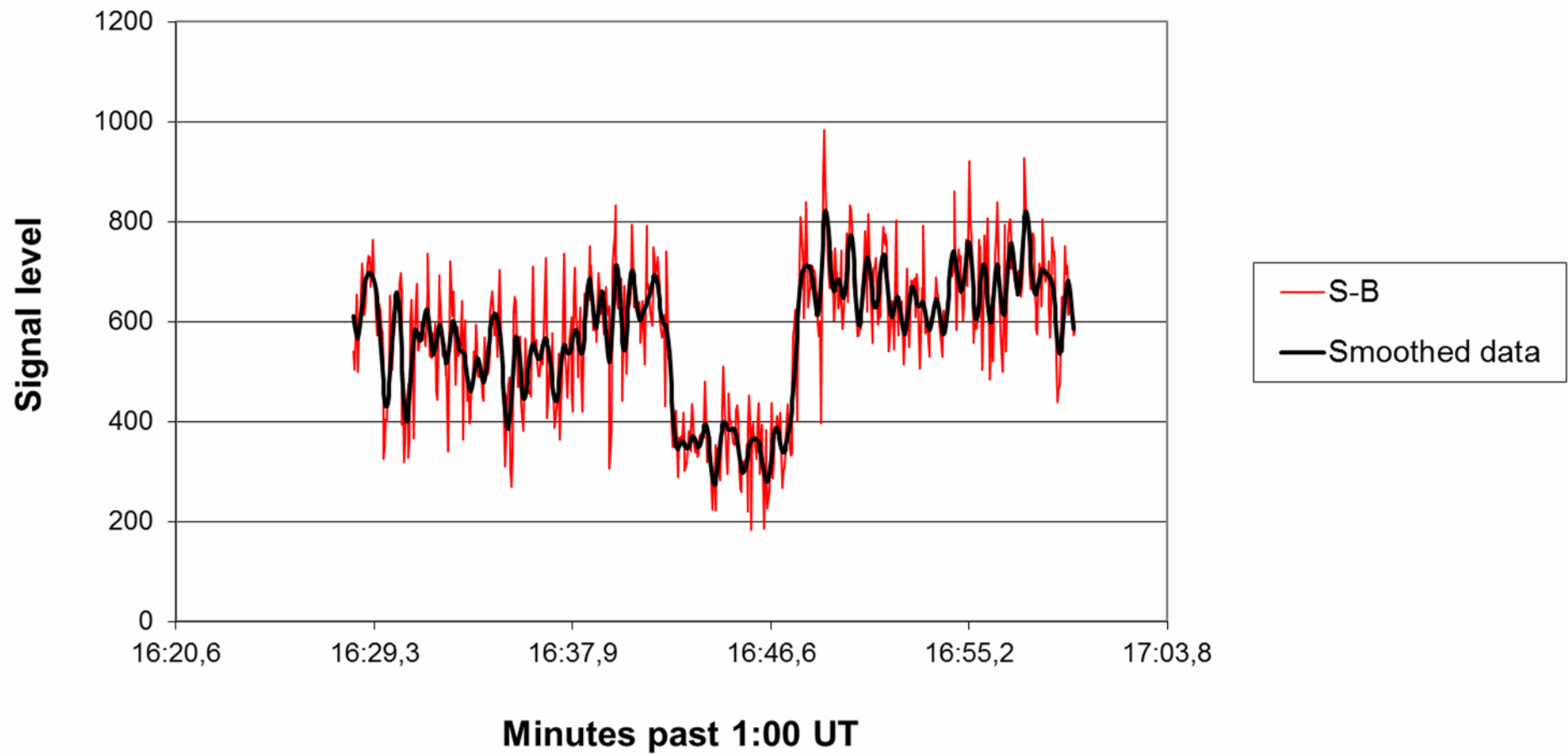
SYSTEMATIC ERROR OF THE NOISED CURVE: +0.13%

SYSTEMATIC ERROR OF THE DENOISED CURVE: +0.35%

# Occultation of 3UC241-056753 by Alphonsina 2013 Feb 9

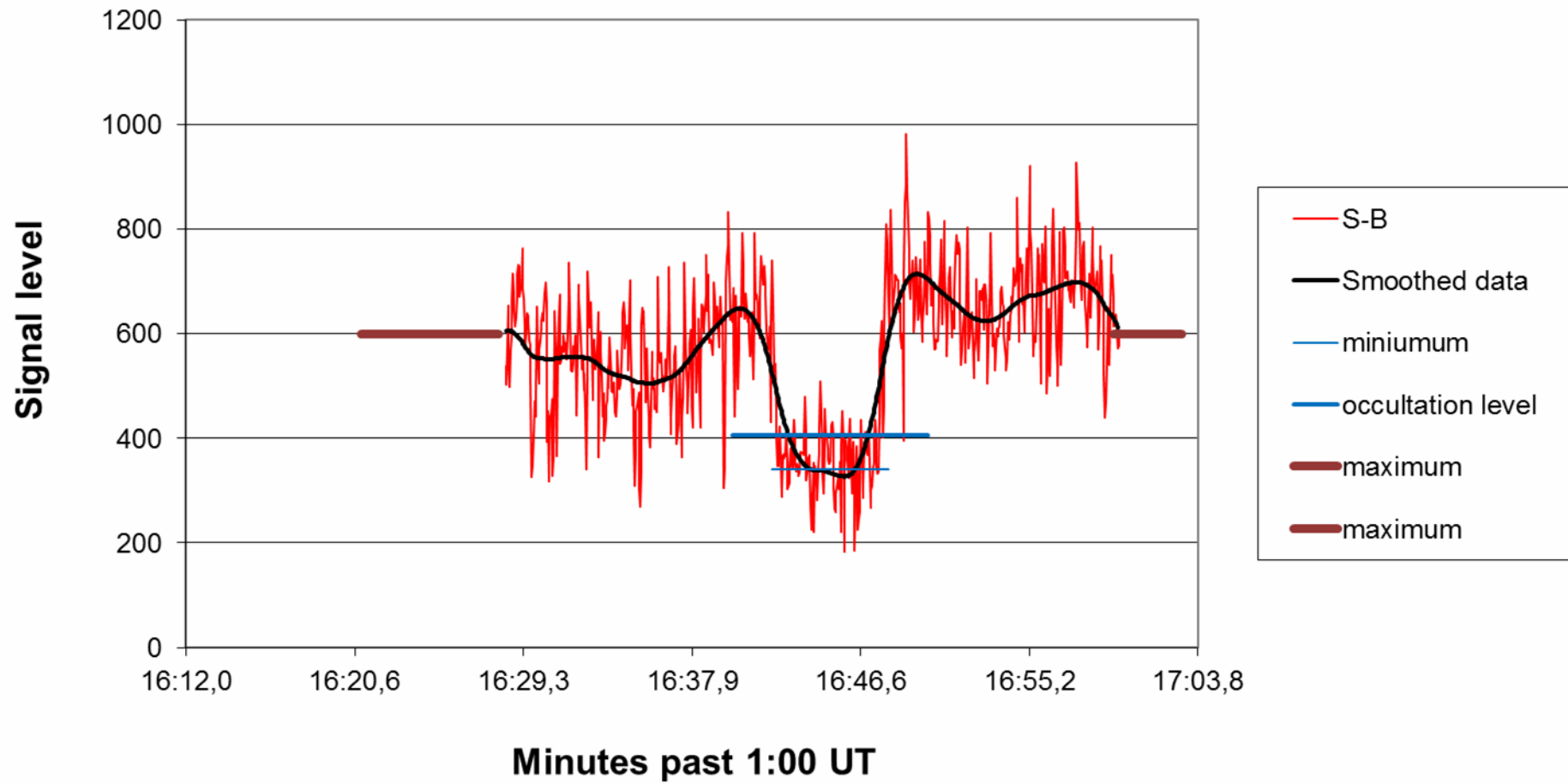


## Occultation of 3UC241-056753 by Alphonsina 2013 Feb 9

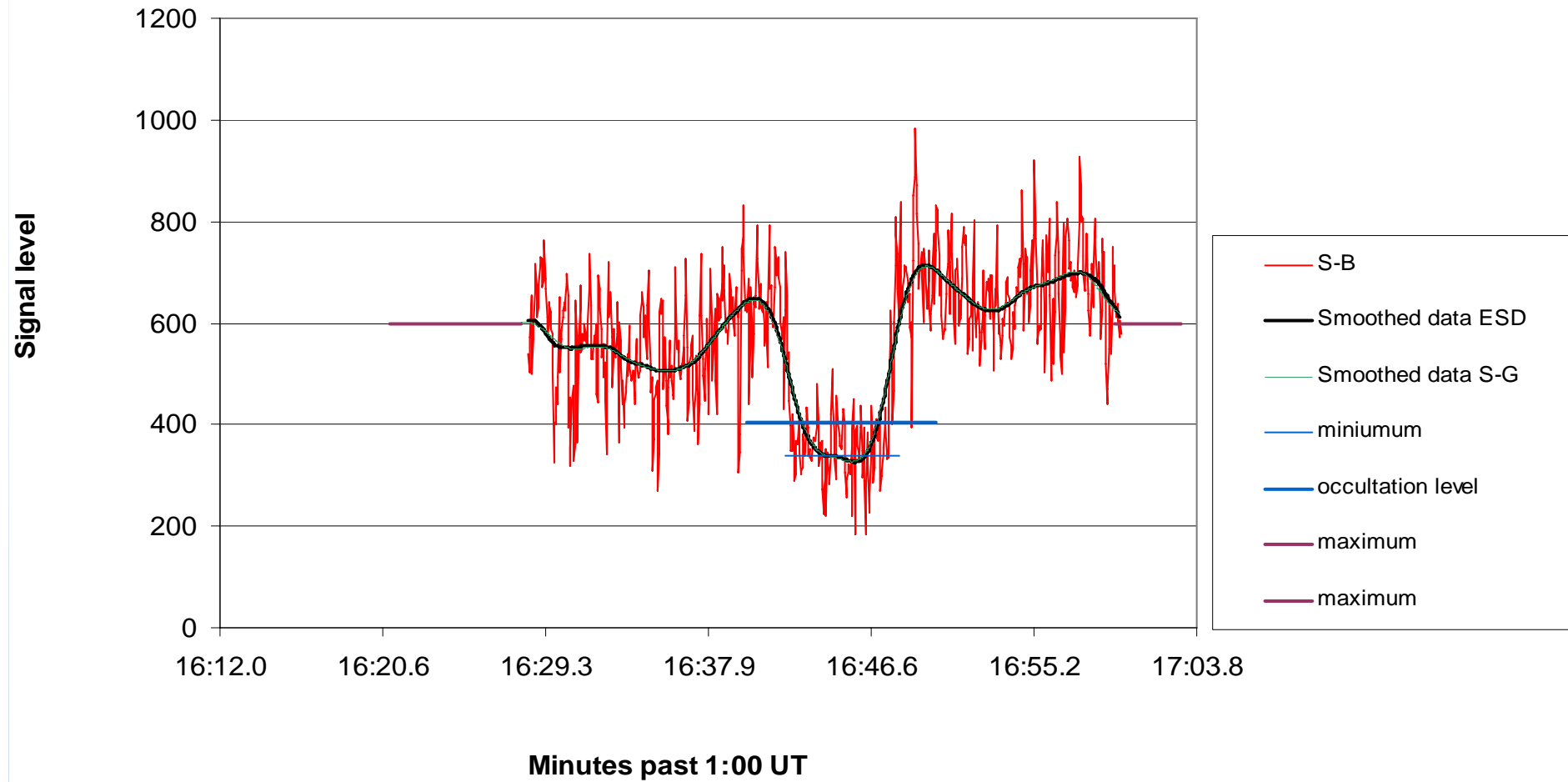




## Occultation of 3UC241-056753 by Alphonsina 2013 Feb 9



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Event	Carles Schnabel	Denoising data	
		25% level	Mean level
Disappearance	1:16:42.18	1:16:42.86	1:16:42.38
Reappearance	1:16:47.46	1:16:46.94	1:16:47.34
Duration	5.28	4:08	4:96
Decrease of light curve		2:96	
Increase of light curve		3:28	

Thank You for Your attention