

# Digitization of Baldone Schmidt telescope astronomical photos archive

I.Eglitis

Institute of Astronomy, University of Latvia, 19 Raina blvd., Riga, LV-1586, Latvia, [ilgmars@latnet.lv](mailto:ilgmars@latnet.lv)



Schmidt telescope (80/120/240 cm) of the Astrophysical Observatory of the Institute displaced on the hill Riekstukalns (103 m) near Baldone town.

$$\varphi = +24^{\circ}24'.0, \lambda = 56^{\circ}47'$$

For more than 35 years (1967-2001) 22000 direct and 3000 objective prism spectral photographic negatives, were obtained.

In fields  $l=76^{\circ} - 96^{\circ}; 172^{\circ} - 180^{\circ}$  with  $b=\pm 7^{\circ}$  and M31 observations were made regularly in time span more than 35 years.

The digitization process was begun at 2012 with flat bed scanner Epson Expression and will end in five next years.

## •Digital plates

Dimensions: 21640 by 21644 pixels  
Pixel type: int (2 bytes per pixel)

Format: fits file  
Size: ~920MB

## •Astrometric solution of plates

### Image transformation

As celestial coordinates standard we used UCAC4 (The fourth U.S. Naval Observatory CCD Astrograph Catalog) and IRAF (Image Reduction and Analysis Facility).

For coordinates transformation we used power series polynomial (order  $xx, xy, yx, yy = 4$ ).

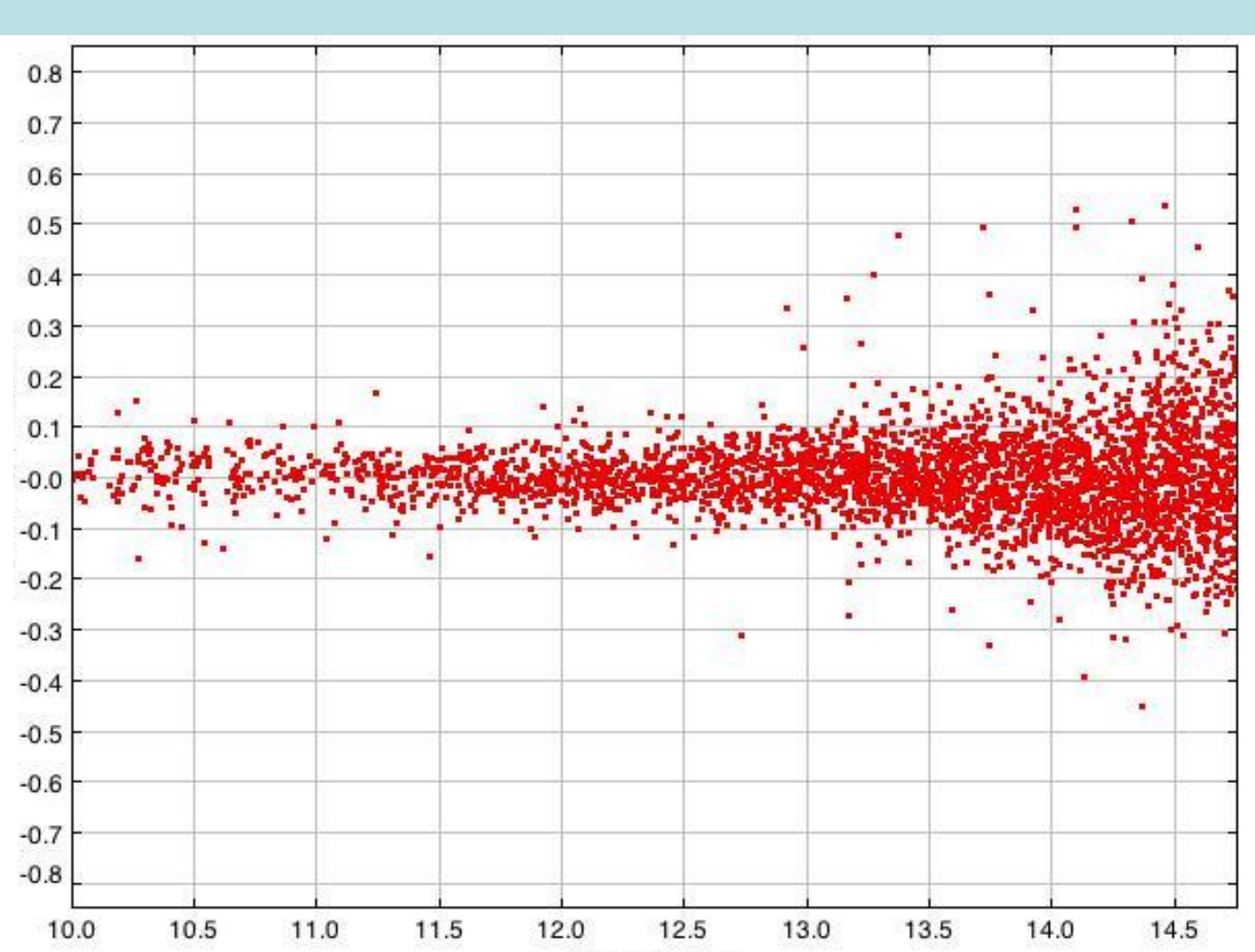
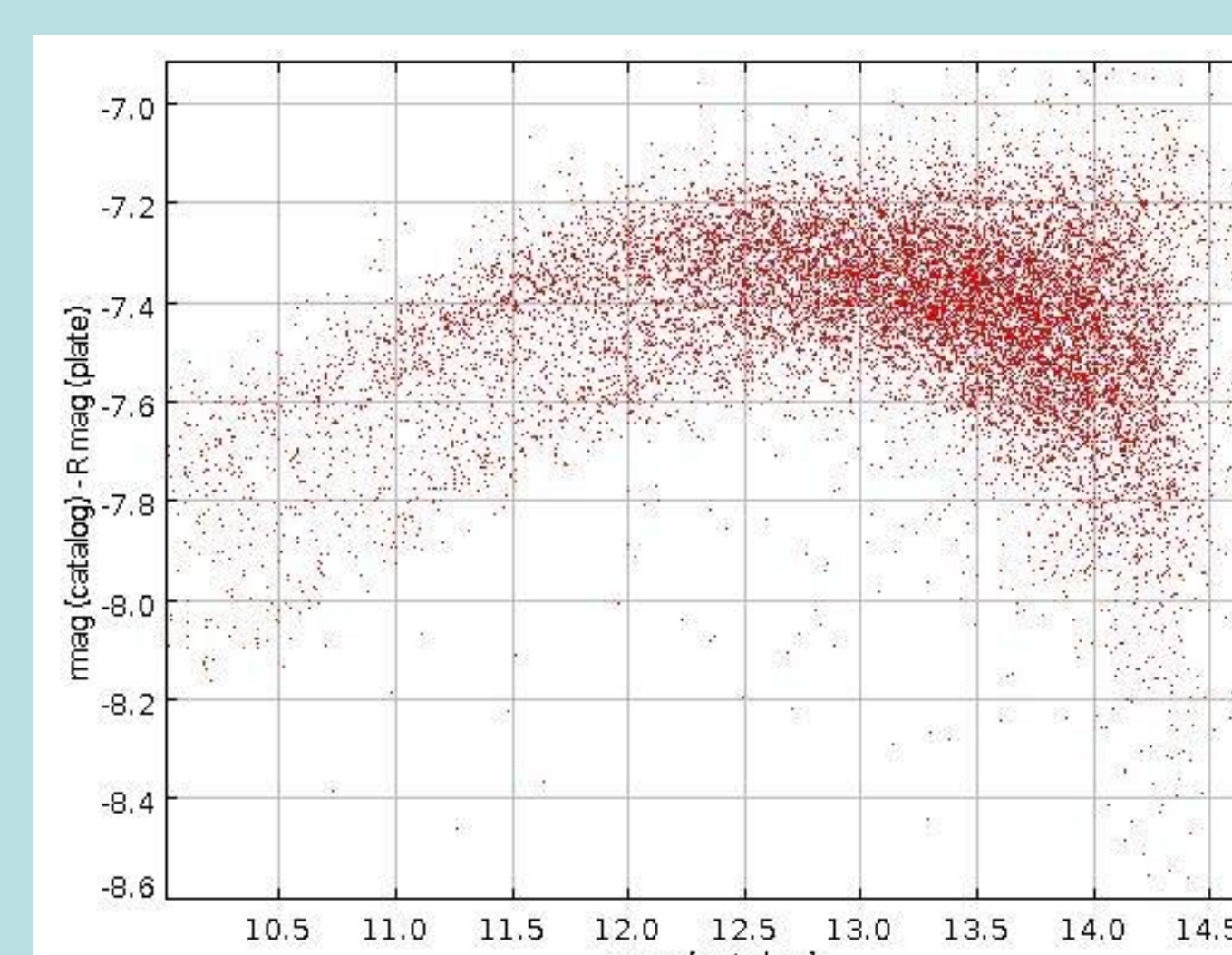
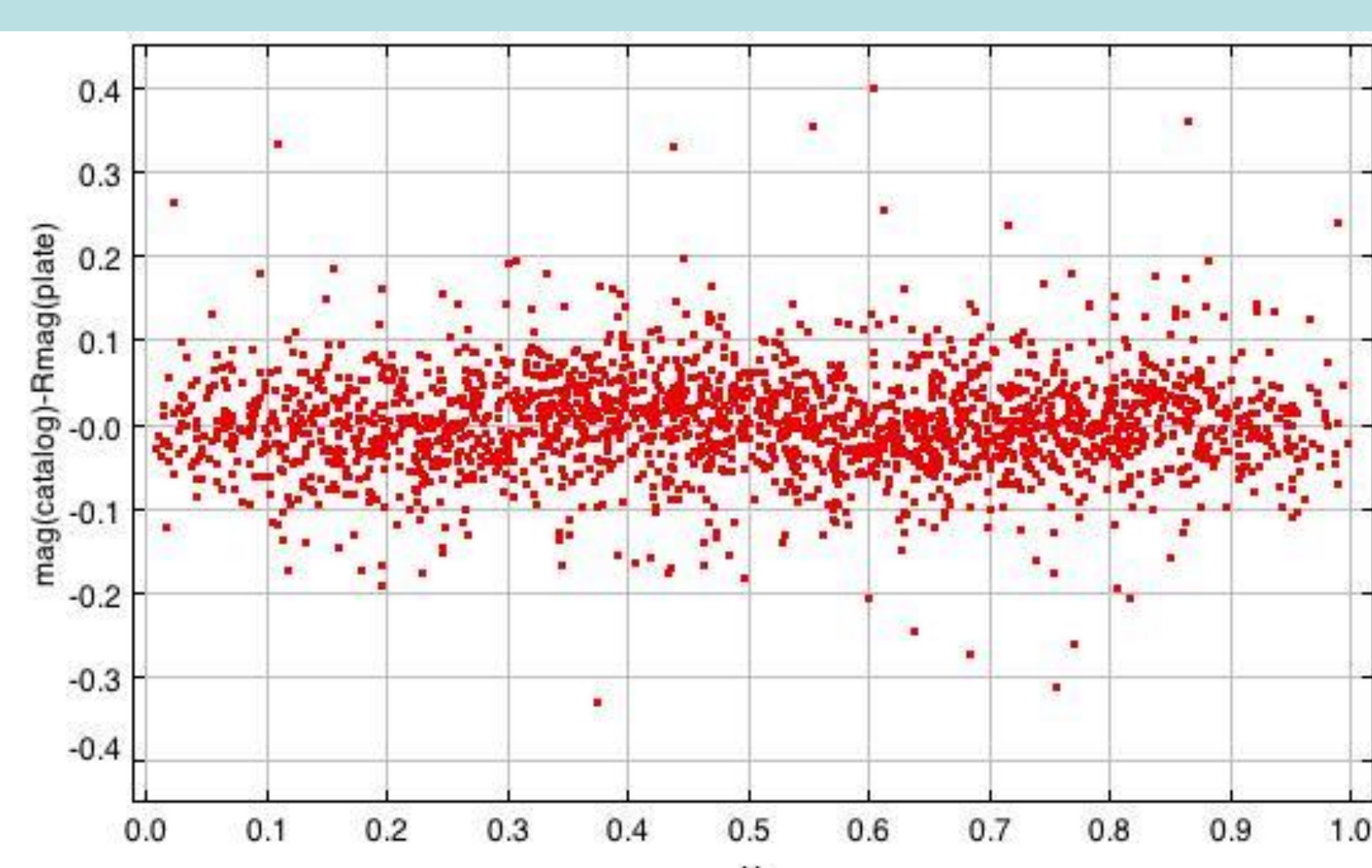
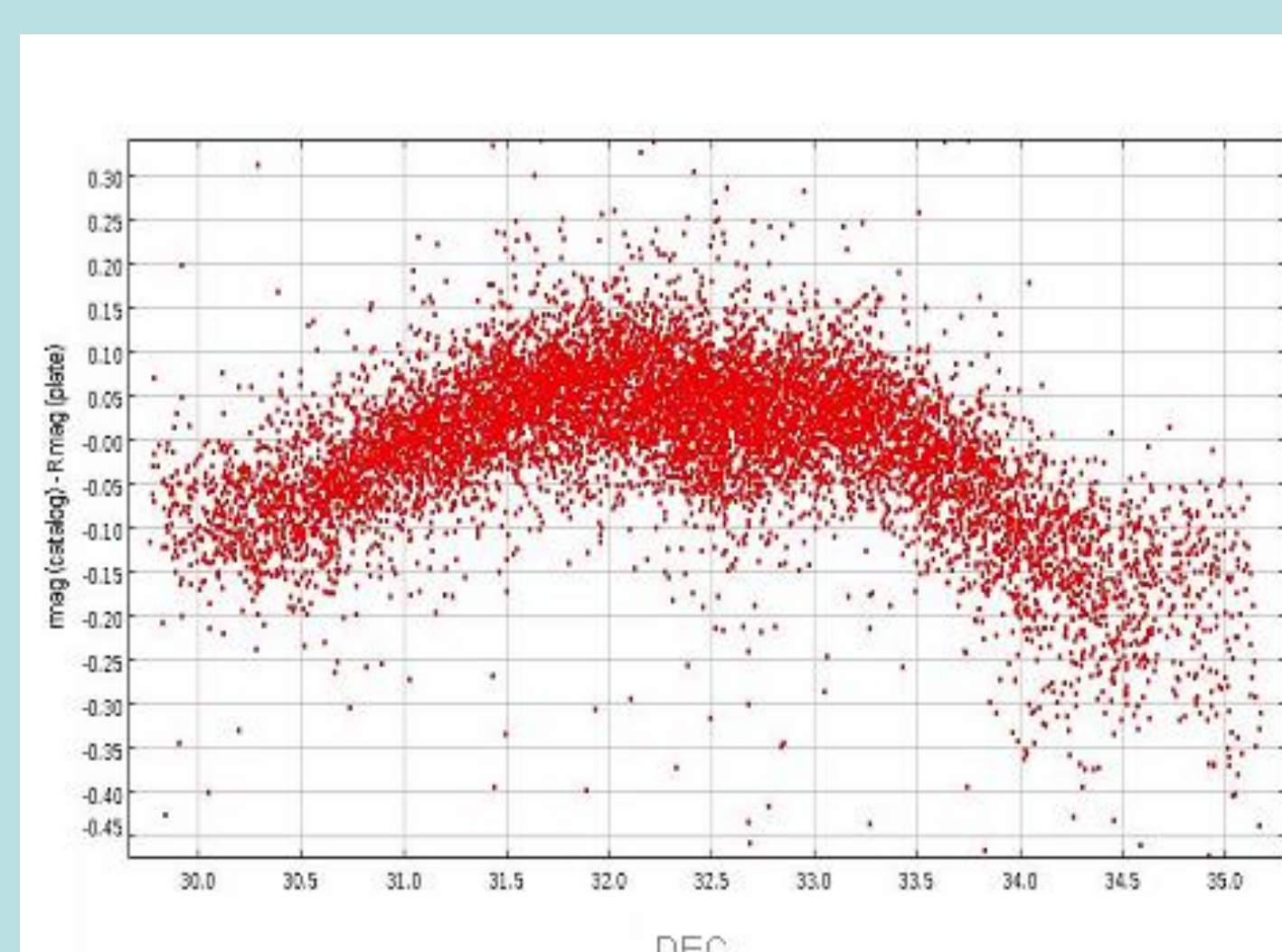
## •Photographic photometry

Plate transmission transformation not linear, but the best is to use:  $I \sim 1/T$ .

For photometric calibration we use UCAC4 catalog and five different apertures to improve the accuracy of photometry of bright and faint stars, and IRAFgaussfit task, which solves as nonlinear equations by least square method using code:

$$V = a + c1*(B-V) + d1*M + d2*M^2 + e1*PSF + a10*X + a20*X^2 + a30*X^3 + a40*X^4 + b10*Y + b20*Y^2 + b30*Y^3 + b40*Y^4 + M^1*(a11*X + a21*X^2 + b11*Y + b21*Y^2 + a31*X*Y)$$

This method give the average accuracy  $SD=\pm 0.045$  mag. in range  $10 < R(0.63\mu) \text{ mag.} < 13$ .



Before coordinates transformation    After coordinates transformation

Before using code

After using code