

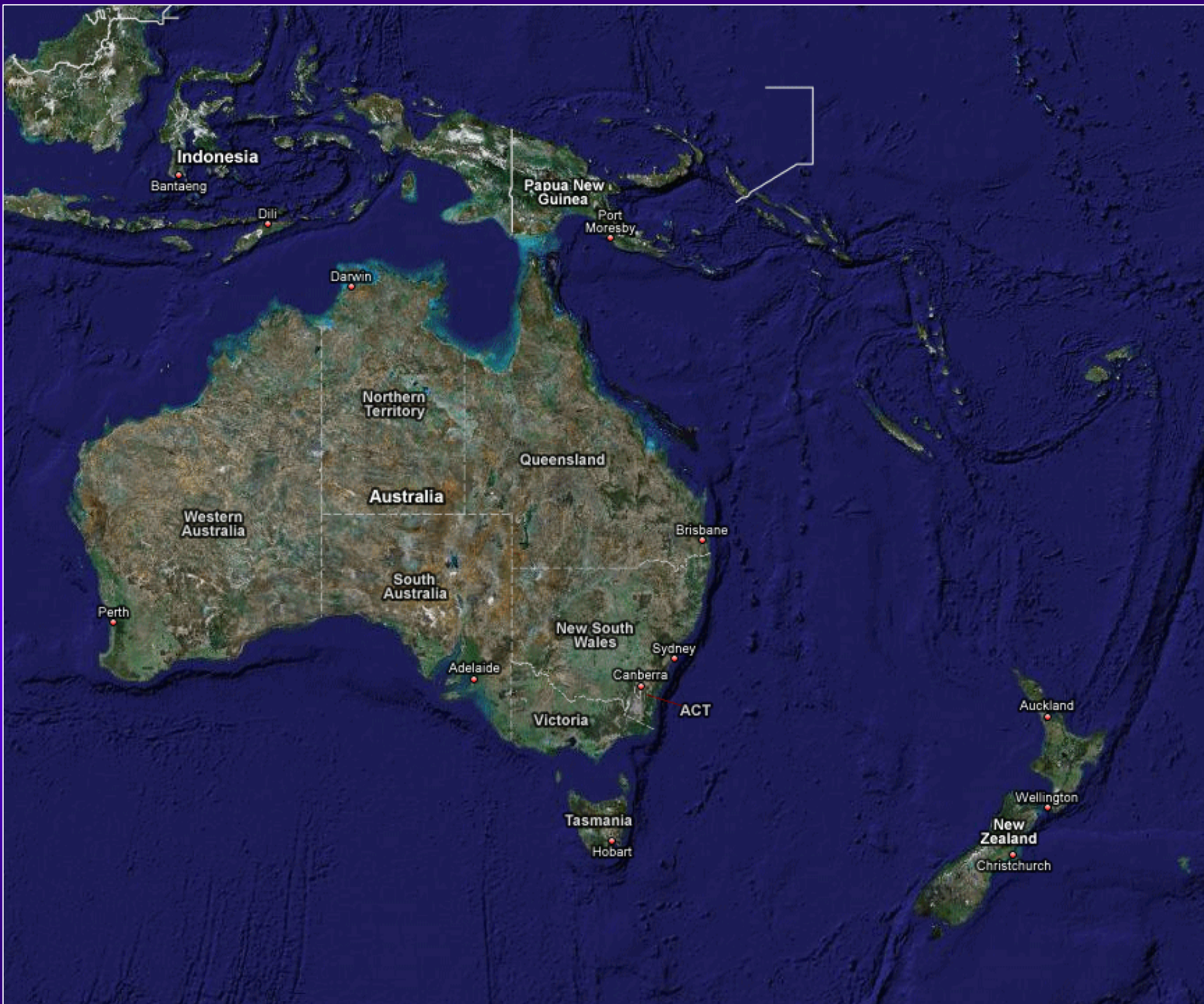
Lightcurves from a backyard in
Craigie
Western Australia
(CBA Perth)

Greg Bolt



Where is Craigie ?

- About 20 kilometres north of Perth city centre
- East Longitude 115 45 25.6
- Latitude -31 47 26.1
- Altitude 45 Metres



© Google



10 km
10 mi

Observatory

- Built 1998
- Modified 3 x 4 m garden shed with roll-off roof





Equipment

- 10" LX200, F6.3 - 1997
- SBIG ST7 (NABG) - 1998
- Optec TCF-S Focuser - 1999
- True Technology Filter Wheel - 2001





Equipment – ST7

- Imaging CCD

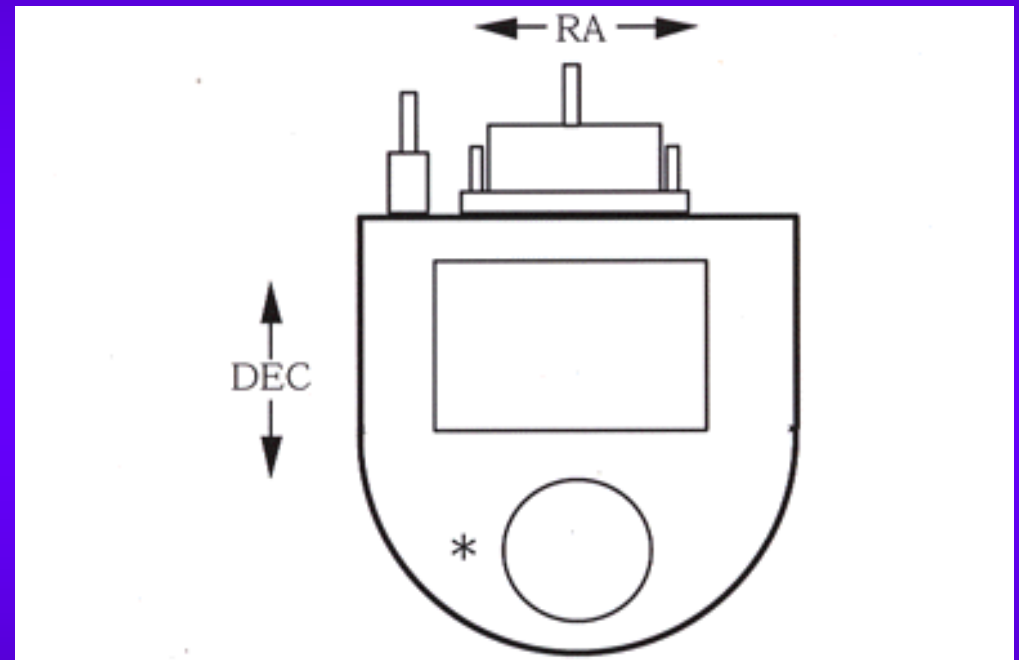
- Kodak KAF0400 chip
- 765 x 510 pixels (9 x 9 μ)
- 6.9 x 4.6 mm

- Guiding CCD

- TC211
- 192 x 164 pixels (13.75 x 16 μ)
- 2.6 x 2.6 mm

Equipment – Configuration

- Operating at F7.3
(1856.3mm)
- Imaging CCD
 - Chip FOV 12.7' x 8.5'
 - Pixel FOV 1" x 1"
- Guiding CCD
 - Chip FOV 4.8' x 4.8'
 - Pixel FOV 1.5" x 1.8"



Observatory



LX200
ST7
TCF-S
Filter Wheel

Observatory Computer Windows 98

- Scope Control (MPO)
- Camera/Filter Wheel Control (CCDSOFT)
- Focuser Control

House

Windows XP

- Remote control of observatory computer
- VNC to Linux

Linux

- Image Store (samba)
- Reduction and Processing (C-Muniphot)
- Runs Time Series "Monitor"
- NTP server

Image/Data Acquisition Process

- Choose Target – determine RA/DEC
- - Cartes de Ciel, Aladin, Lowell Asteroid Finder
- Choose nearby bright star & perform 1 star alignment
- Slew to target and verify field
- Find guide star and start autoguiding
- Setup auto-save and commence time series
- Setup the time series “Monitor”

Time Series “Monitor”

- Simple Perl Script
- - periodically checks for new image
- - checks for star within defined error circle and magnitude range
- - sends SMS if star not found or no new images



CCDSoft - xz_eri_60.00000136.FIT

File Edit View Image Camera Research Window Help

Camera Control

Setup Take Image Focus Tools Autoguide Color AutoSave

Exposure: Minutes: 1, Seconds: 0.000, Delay (s): 0.00, Series of: 1000

Subframe: On Size..., Bin: 2x2

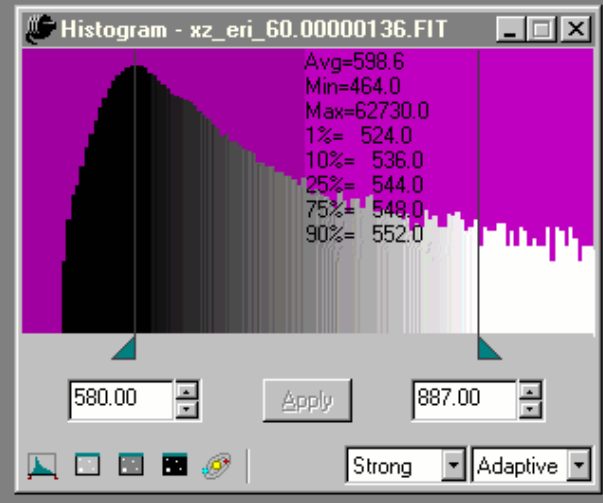
Image: Frame: Light, Reduction: None

Filter: To new window

Imager Autoguider

Take Series Abort

Device	Linked	Status	Temperature	Shutter	Filter	Max
Imager	Yes	Exposing Light (33.30 Left) (9/1000)	-9.8° (68%)	Open		62730
Autoguider	Yes	Exposing Light (0.44 Left)	-9.8° (68%)	Open		487



TCF-S Control

File Setup Help

DRO

2315

IN OUT

Steps Mode Temp.

0050 Auto A +16.4

03:00:44

Set 20:46
 Rise 05:50
 Alt -5.6°
 Az 233.5°

(381,104) Value:00537

Image Processing

- The muniphot package using the python x-windows GUI interface
- Originally used the compiled fortran version
- Recently moved to the c-muniphot release for operation on 64-bit linux

Image Processing

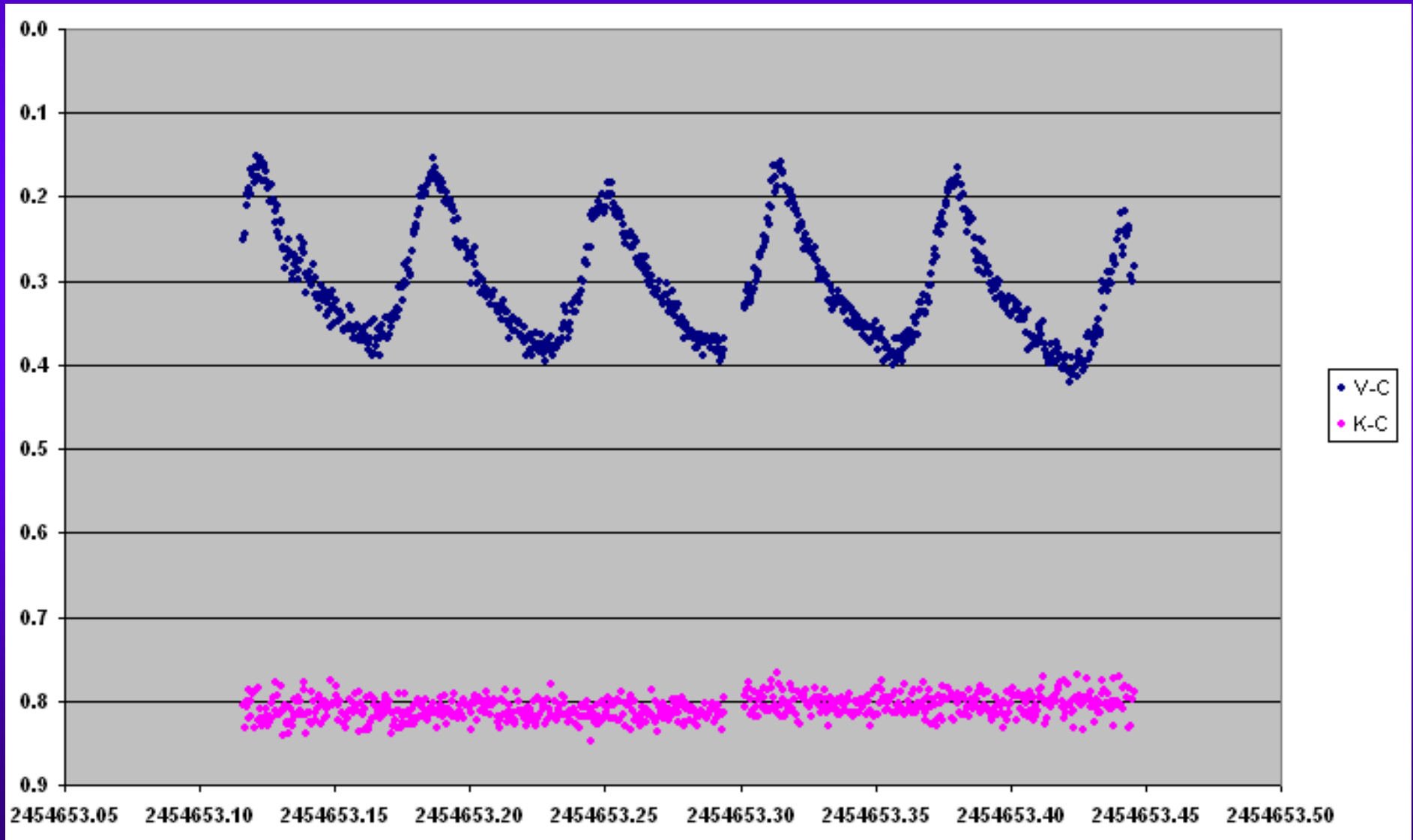
- For all images in the sequence
 - applies master dark / flat (-> uFun)
 - whole image photometry
 - matches image fields
 - asks user to select variable & 4 comp stars
 - outputs text file containing the photometry
- Extra Steps for Moving Objects
 - asks user to select object in first/last image
 - Outputs text file containing photometry for object

Projects

- Times Series Photometry:
 - CVs (CBA and VSNET)
 - Minor Planet Period Determination
 - uFun
 - Other Time Series, e.g. Pluto Occultation
- Astrometry

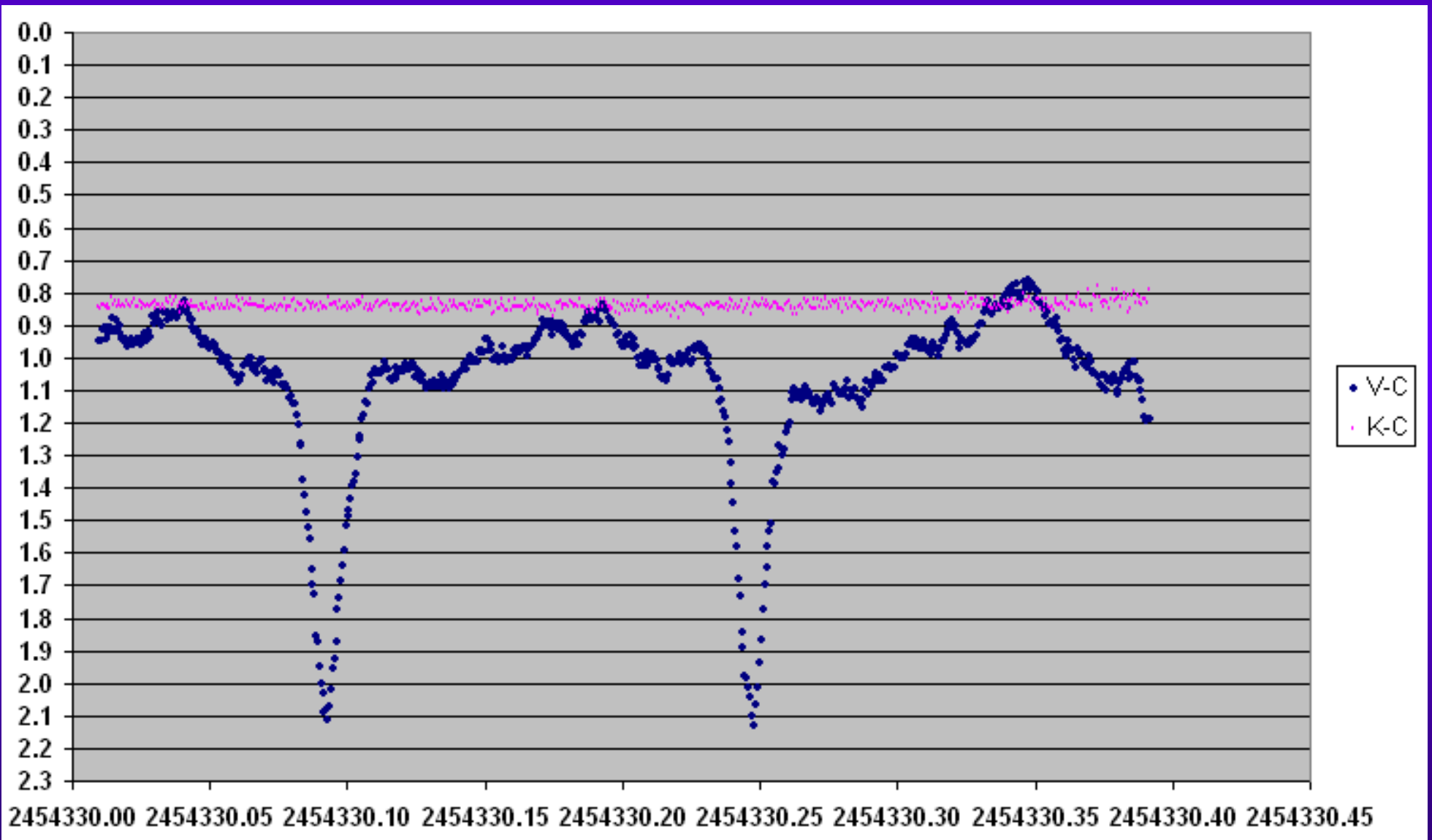
VY Aqr : 5 July 2008

- 30 sec exposures (R filter) – mag ~ 10.7

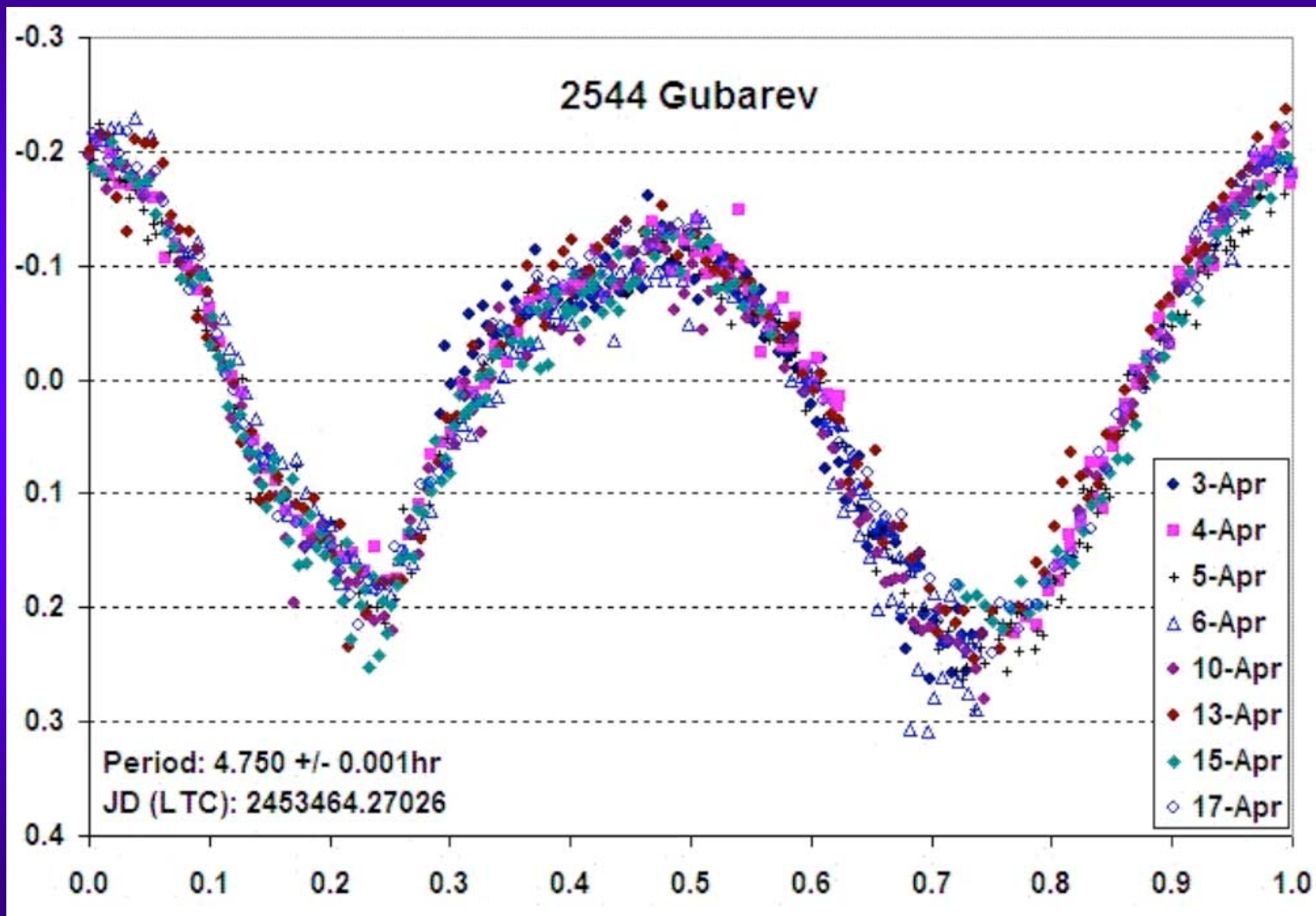


EC21178-5417 : 17 Aug 2007

- 45 sec exposures (unfiltered)



Minor Planet Rotation Period



Pluto occultation of UCAC2 25370733

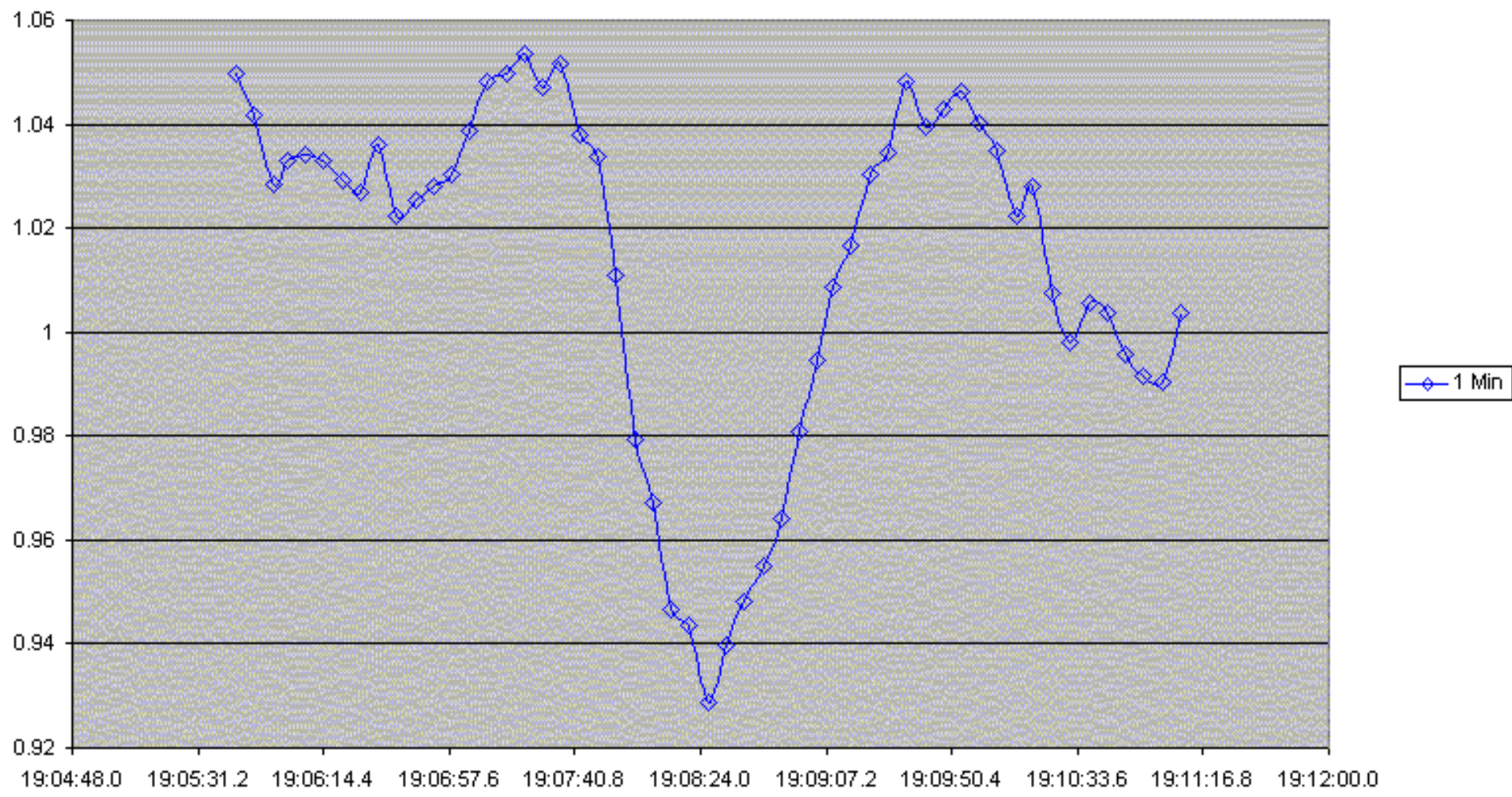
22 Jun 2008

- Star Magnitude 12.4
- 2 second exposures
- 3 x 3 binning (4" d/1 time)
- 10 images/minute

Pluto occultation of UCAC2 25370733

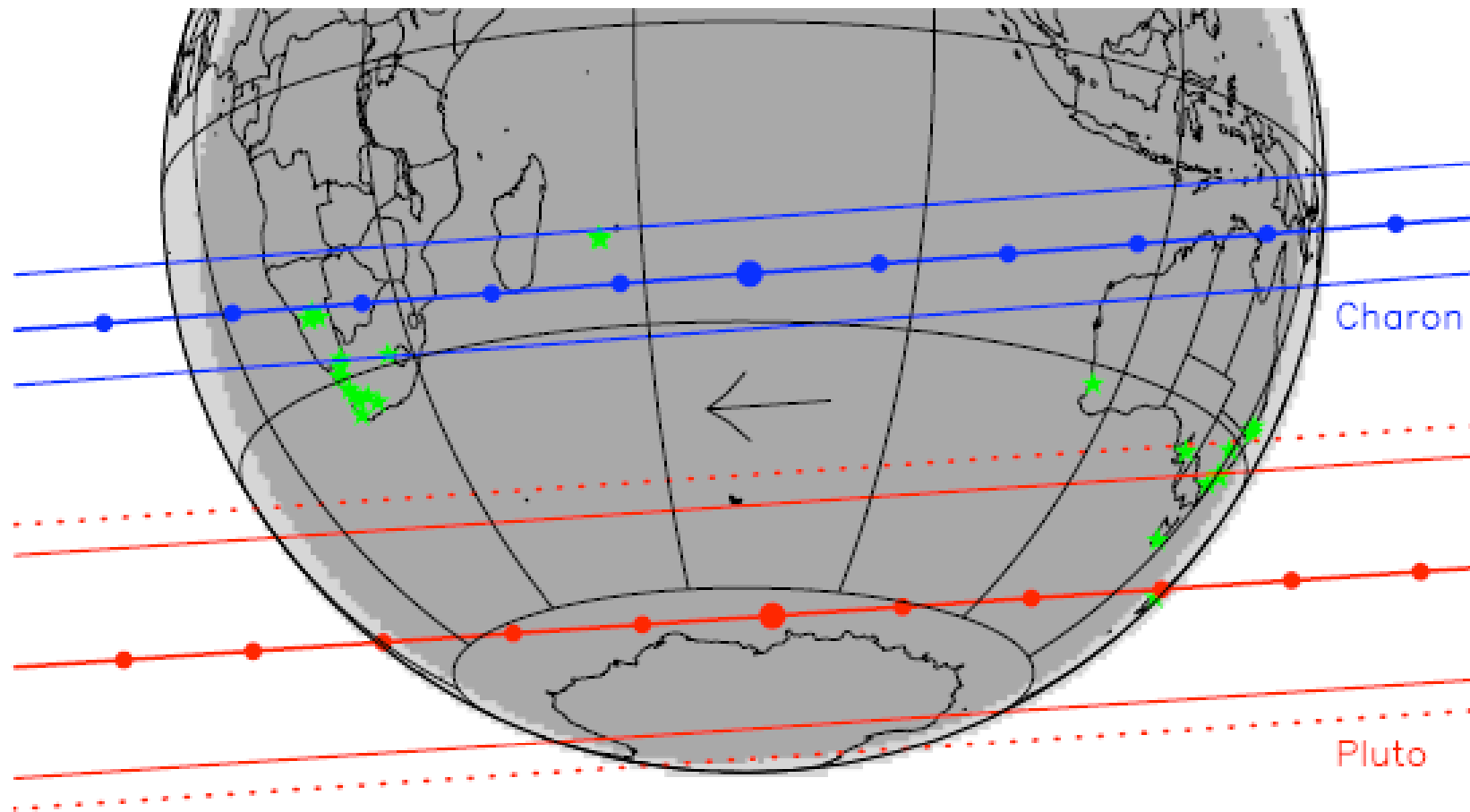
22 Jun 2008

Pluto Flux Bolt



Pluto occultation of UCAC2 25370733 – 22 Jun 08

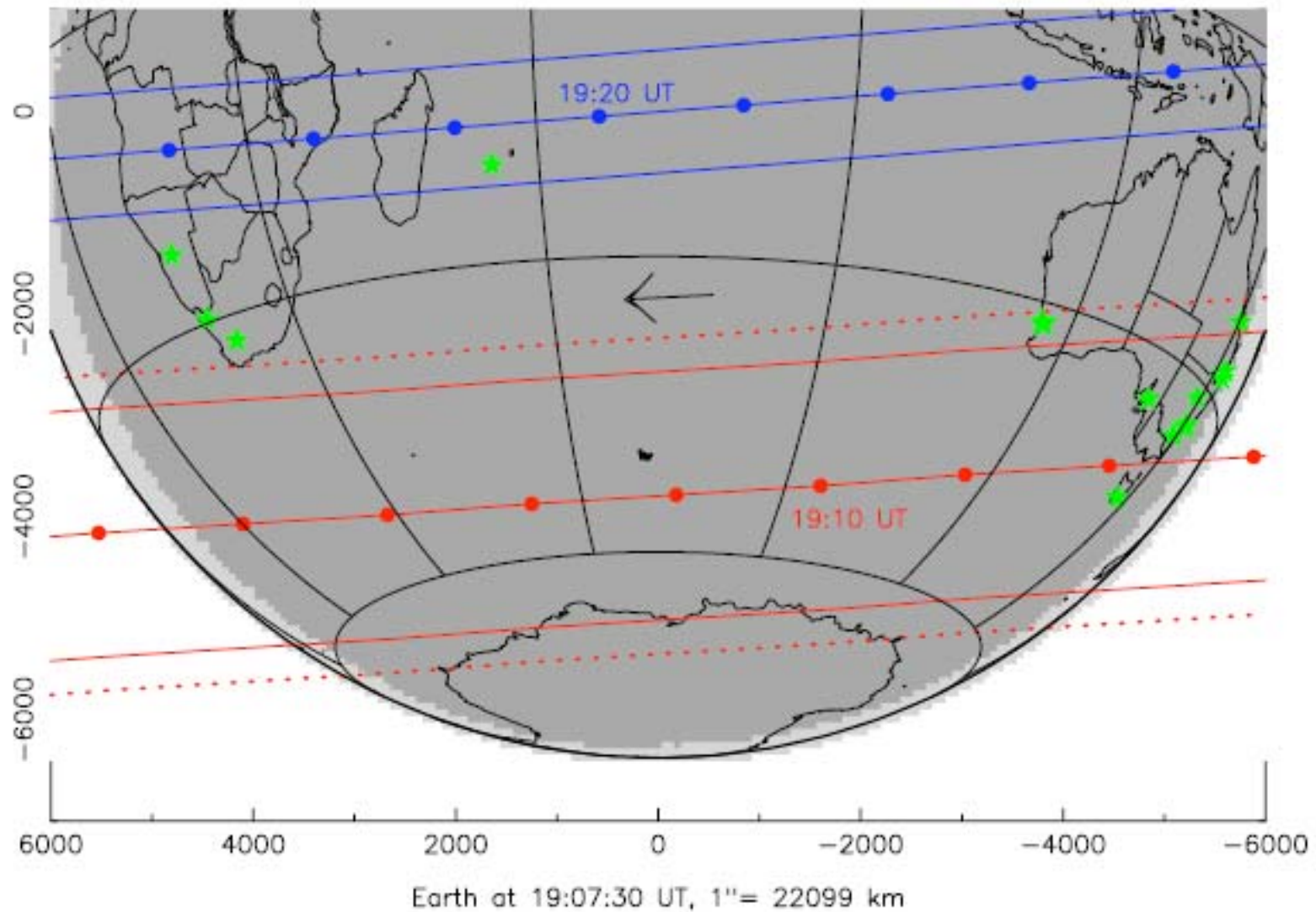
Star: Rio group, Dec 2007, offset wrt DE413= -100 mas, +60 mas



d	m	year	h:m:s UT	ra	dec	J2000_candidate	C/A	P/A	vel	Delta	V*	R*	lon	
22	06	2008	19 09 49.	17 58	33.0133	-17 02	38.358	0.211	176.12	-23.80	30.47	13.0	12.9	71.
22	06	2008	19 18 26.	17 58	33.0133	-17 02	38.358	0.041	175.62	-23.73	30.47	13.0	12.9	69.

Pluto occultation of UCAC2 25370733 – 22 Jun 08

Pluto offset -529.61 km, $+2521.69$ km = -23.965 mas, $+114.106$ mas

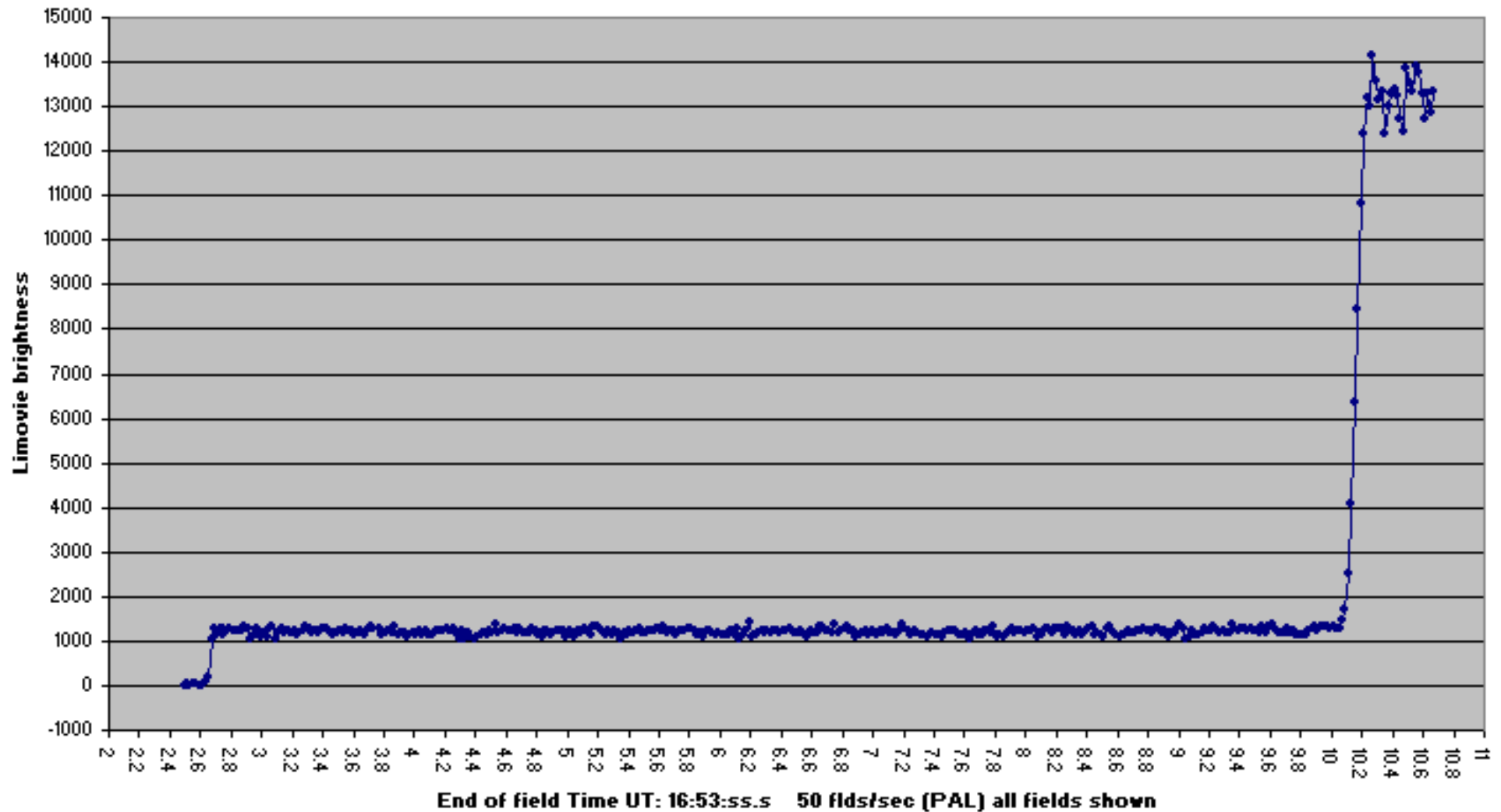


Occultation of Antares – 23 Apr 08



Occultation of Antares – 23 Apr 08

Antares Reappearance, 23 Apr 2008



New Horizons and 3rd Stage Rocket Leaving Earth

- Time of Launch 19 Jan 2006, 19:00 (UT)
- Exposure Length : 5 seconds
- Exposure Mid-times(UT): 20:15:00, 20:15:12, 20:15:23, 20:15:35
- Range 26,000 km (9hrs later NH crossed Moon's orbit)

