



# ASTROPHOTOGRAPHY FROM A BACKYARD OBSERVATORY

ASSA Symposium 2012

# Outline

- ▣ History
- ▣ What is the allure of Astrophotography
- ▣ The Hunt
- ▣ The Challenge
- ▣ The Genres
- ▣ LRGB Photography
- ▣ Narrowband imaging
- ▣ Getting Started
- ▣ My Journey
- ▣ Some images



# History

- ▣ Because of the complexity of telescopes and film photography, originally the domain of professional astronomers
- ▣ The first breakthrough came in 1970 when Celestron introduced its "C8" 8" diameter 2032 mm focal length,  $f10$  telescope. Became affordable
- ▣ The next breakthrough was the goto telescope around 1992. Became easy to control
- ▣ Finally the CCD camera from the late 1990s

# What is the allure?

Astrophotography appeals to human nature

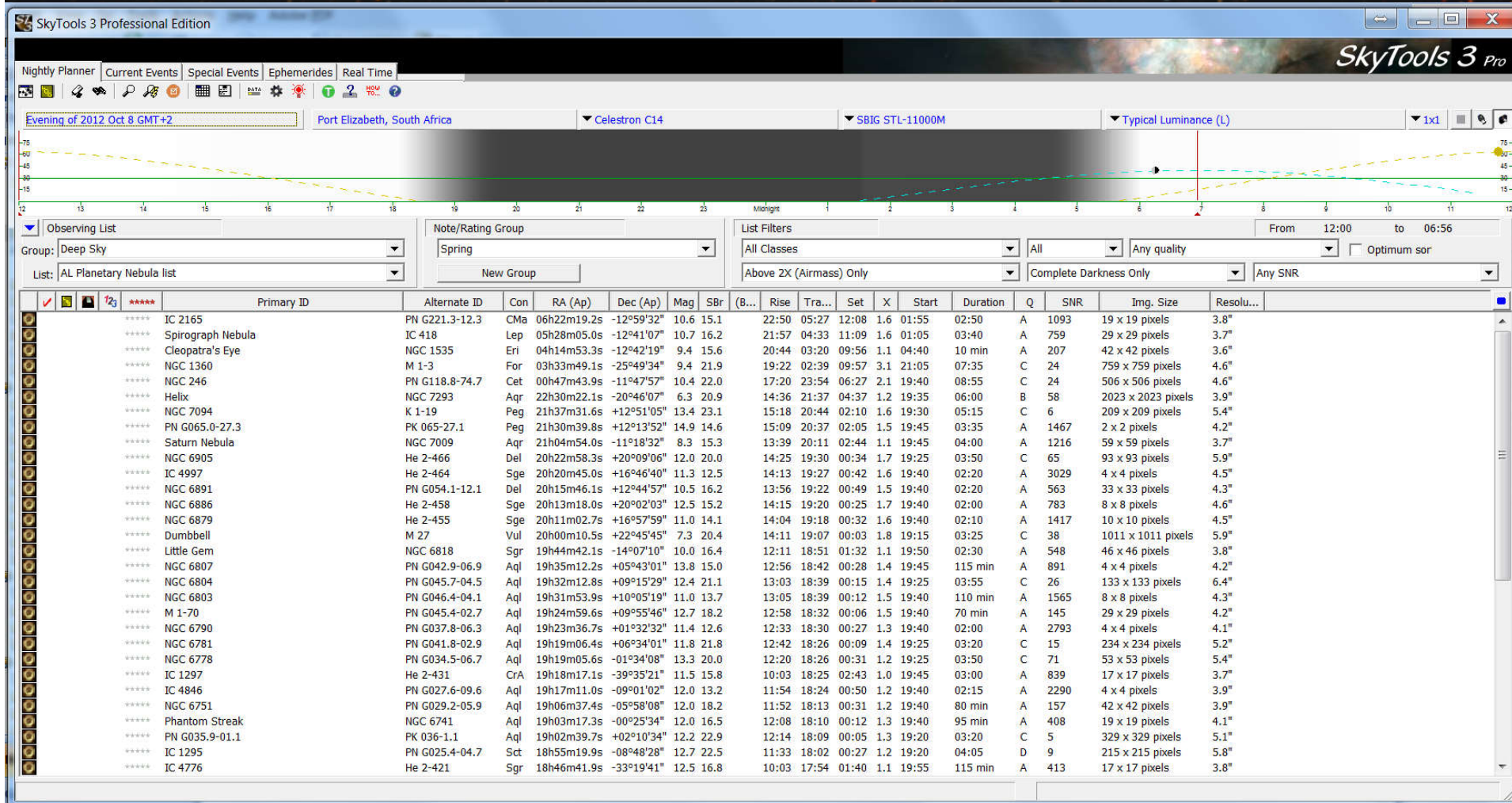
- ▣ The Hunt
- ▣ The Gamble
- ▣ The Challenge
- ▣ The Artistry
- ▣ Satisfaction
- ▣ Recognition



# The Hunt

- ▣ Target Selection
  - Books
  - Internet
  - Software Tools

# The Hunt





# The Hunt

- ▣ Target Selection
  - Books
  - Internet
  - Software Tools
  - Planetarium Application

# Chart Settings\* - TheSkyX Professional Edition

File Edit Display Orientation Input Tools Telescope Help

Look North Look East Look South Look West Look Up

Move Up Move Down Move Left Move Right

Zoom In Zoom Out

1° 40' 36" x 1° 40' 36"

Computer Clock 2012 / 09 / 25 22:08:23

Go Backward Step Backward Stop Step Forward Go Forward

1x (realtime)

Show Stars

Show Variable Stars

Show Double Stars

Find Find Search for: m83 Find

Labels

Photos

Chart Elements...

Telescope...

Observing...

Dome

Camera

M 83

Center

Frame

Show Photo+

Slew

Copy Text

Add to List

Lock On

Abort

Details Advanced Log

Object Information Report

Object Name: M 83

Name 2: M 83

Object Type: Spiral Galaxy

RA (Topocentric): 13h 37m 43.19s

Dec (Topocentric): -29° 55' 54.36"

RA (2000.0): 13h 37m 00.20s

Dec (2000.0): -29° 52' 02.00"

Azimuth: 223° 36' 13"

Altitude: -09° 36' 04"

Major Axis: 12.9

Related Search Results

M 83

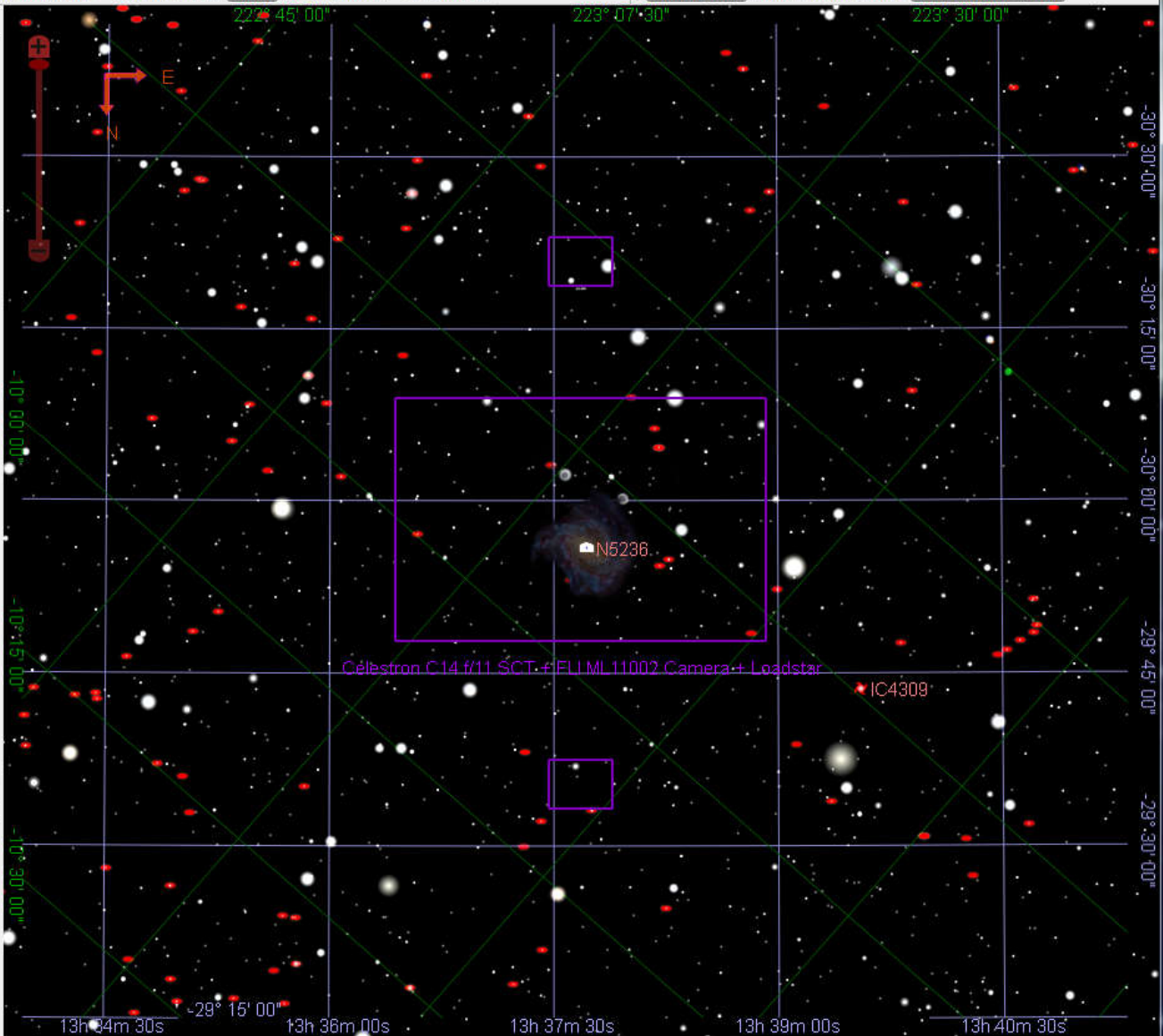
M 83

Chart Status

Location Description: Port Elizabeth, South Africa

Date: 2012/10/08

Time: 09:51:52 STD



FOV: 1° 40' 36" 2012/10/08 09:51:52 STD



# The Hunt

- ▣ Target Selection
  - Books
  - Internet
  - Software Tools
  - Planetarium Application
- ▣ Target Acquisition

# Create Plan for Dale Observatory

File Tools Help

ACP Observatory Control Software

DC-3 Dreams

[Plan format specs, sample plans, and more](#)

Target  
M83

Presets:

LRGB 2x600/200

Apply

Filter	Num.	Sec.	Bin.
Lum	2	600	1
Green	1	200	2
Blue	1	200	2
Red	1	200	2
	1	300	1
	1	300	1
	1	300	1
	1	300	1

Save as new preset

Right-click for options

Startup: Open & Chill

☐ Dusk flats

☐ Dawn flats

☐ Shutdown at end of run

[Sky flat help](#)

Repeat above image set 1 times

Total time is 00:35:10

Reset

Update

Click here then click an object in TheSky

Add Target from FOVI

Quick FOVI Display

Timing visualization disabled. Mouse wheel time control is still active.

Time control: This window must be active,  
Mouse Roll - 10 min Shift + Roll - 30 min  
Ctrl + Roll - 1 min Wheel Down Roll - 1 hr

Chart Status

Location Description: Port Elizabeth

Date: 2012/10/08

Time: 11:03:00 STD

Zoom In Zoom Out

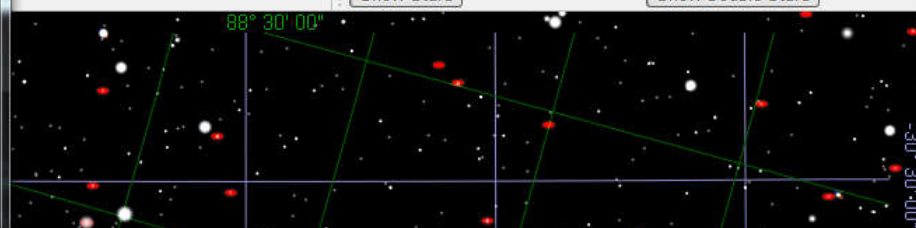
1° 40' 36" x 1° 40' 36"

1x (realtime)

Show Stars

Show Variable Stars

Show Double Stars



Test.txt - Notepad

File Edit Format View Help

-----  
This plan was generated by ACP Planner 4.2.6  
-----

For: br001  
Location: Port Elizabeth, South Africa  
Coords: Lat = -33° 58' 00" Lon = -25° 36' 00"  
Targets: 1

NOTE: Timing features are disabled

-----  
=== Target M83 ===

```
#dither ; Automatic dithering
#repeat 1
#count 2,1,1,1
#filter Lum,Green,Blue,Red
#interval 600,200,200,200
#binning 1,2,2,2
M83 13:36:57.72 -29° 54' 32.0"
#dither 0 ; Disable dithering
```

-----  
; END OF PLAN

13h 34m 30s

-29° 15' 00"

13h 36m 00s

13h 37m 30s

13h 39m 00s

13h 40m 30s

FOV: 1° 40' 36" 2012/10/08 11:03:00 STD



# The Challenge

Many different disciplines involved

- ▣ Astronomy
- ▣ Optics
- ▣ Mechanics
- ▣ Computers & Software
- ▣ Various astro-imaging applications
- ▣ Camera electronics (Noise, SNR, etc.)
- ▣ Data acquisition processes (pixel math, probability theory, etc.)
- ▣ Data processing (calibration, data rejection, aligning, combining, etc)
- ▣ Image processing, eg. Photoshop

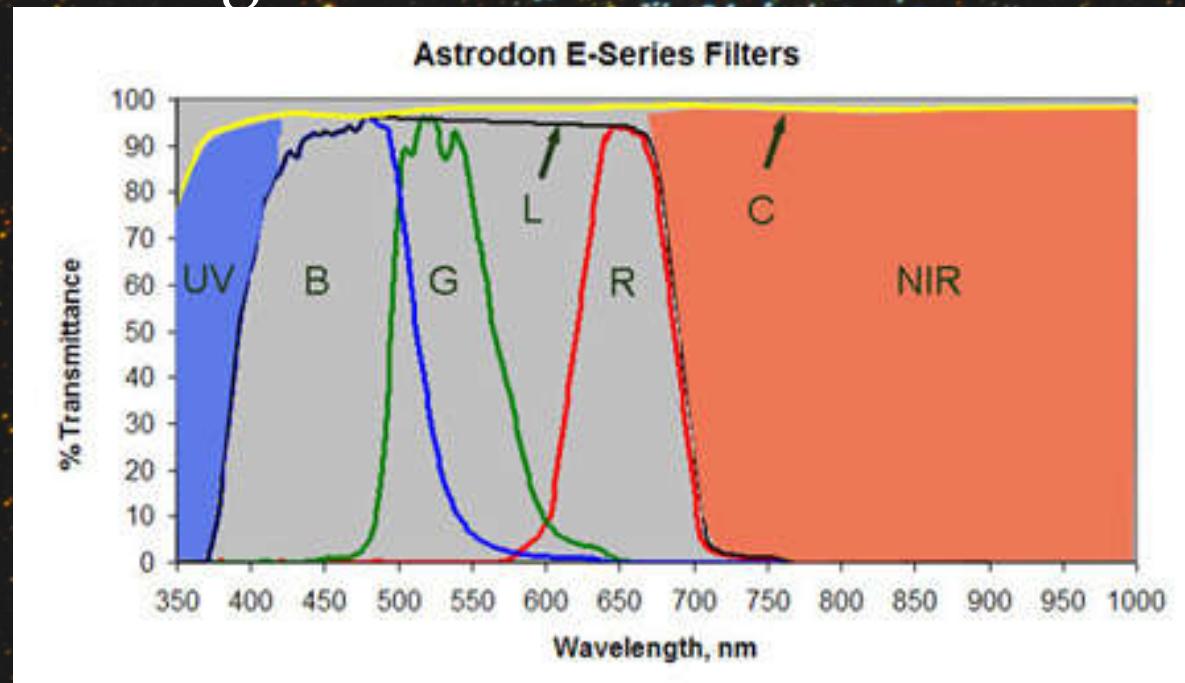
# The Genres

- ▣ Purely Scientific
- ▣ Planetary and lunar
  - High magnification scope, video camera, mono or colour
- ▣ Deep Sky
  - Wide (Nebula, Clusters) or narrow field scope (Nebula, Clusters, galaxies)
  - Colour (cooled or Uncooled) or monochrome (cooled or uncooled)
  - Monochrome: LRGB or Narrowband



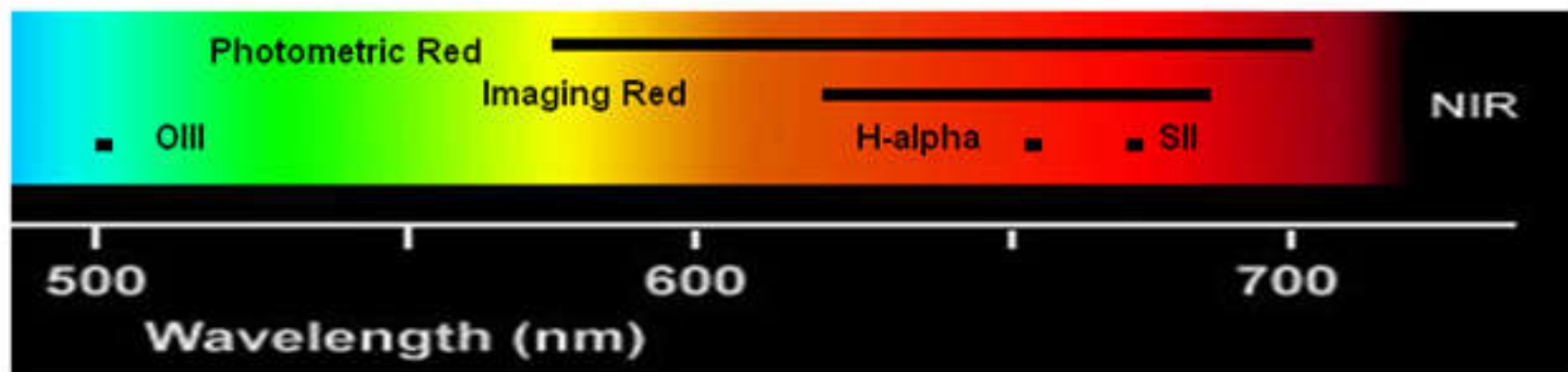
# LRGB Photography

- ▣ For luminance, I typically capture 12+ 600s images, unbinned
- ▣ For RGB, I typically capture 9+ 200s images at 2x2 binning



# Narrowband Imaging

- ▣ I typically use 10+ 20min frames for 3nm Ha, SII and OIII filters





# I want to start with Astrophotography ...

- Get some textbooks
- Join Yahoo astronomy groups
- The internet
- Join a club
- Software manuals
- Video tutorials
- Select a reputable dealer



# I want to start with Astrophotography ...

- ▣ What do you already have and what is your budget?
- ▣ Telescope
  - Wide field  
Celestron Omni XLT 102ED Refractor Telescope f/8.82 with Celestron Omni CG-4 Equatorial Mount \$1000
  - Deep Sky  
Celestron - C9.25 Advanced Series Telescope - 9.25" f/10 SCT on CG-5 GoTo Mount \$2000
- ▣ Camera
  - A DSLR
  - Celestron Nightscape 8300 CCD Camera \$1700
- ▣ Software
  - Free Planetarium Application
  - Free Capture and processing or MaximDL \$200
  - Adobe Photoshop Elements \$105



# My Journey

- ▣ First Scope – 90mm Meade ETX 90 \$400



# My Journey

- ▣ First Scope – 90mm Meade ETX 90 \$400
- ▣ Next – 8" Meade LX90 \$2000 with Meade DSI camera





# My Journey Part 1

- ▣ First Scope – 90mm Meade ETX 90 \$400
- ▣ Next – 8" Meade LX90 \$2000 with Meade DSI camera
- ▣ Swopped the DSI for a modified Canon 20Da and later a SBIG ST2000 one shot colour
- ▣ Takahashi FSQ 106 ED on Takahashi EM200 Mount with a SBIG STL1100 mono camera



# My Journey Part 2

- ▣ About 3 years ago I decided that lugging equipment out at night and back in the morning was for the birds.
- ▣ Built an observatory above my garage with a roll-off roof and height adjustable pier.
- ▣ Some 2 years ago I decided I also wanted to go deep, so I purchased a Celestron C14 EdgeHD on a ASA direct drive mount.
- ▣ My observatory is now fully robotic/automated and busy adding a dome for improved performance in the wind











# Some Images





# Some Images

M104 Sombrero Galaxy in LRGB



# Some Images





# Some Images



NGC 6257 in Narrow band



# Thanks

▣ Questions?