

More Astrophotography



Interactive Workshop 2001

Neil Morley

Thanks also to Mike Whybray, James
Appleton, Paddy O'Sullivan, James Sullivan

Agenda...



⌘ Part 1 - Introduction and Review

⌘ Part 2 - Previous Followup aSession

- Mike Whybray and Neil Morley

⌘ Part 3 - More Photographs...

- Paddy O'Sullivan, James Appleton and Nick Sullivan

⌘ Part 4 - Future Project Ideas

- Ideas for future sessions welcomed!

Part 1 - Introduction and Review...

A thick, horizontal yellow brushstroke underline that spans the width of the slide, positioned below the title text.

Previous Talk



⌘ Unguided Photography

⌘ Guided Photography

⌘ Afocal Telescope Photography (overlap)

This Talk



⌘ Analogue and Digital Astrophotography

⌘ Emphasis on Telescope Photography

⌘ Three main methods:-

- Afocal
- Prime Focus
- Eyepiece Projection

Afocal Photography



- ⌘ Simplest telescope coupling (unguided)

 - Skylight filter recommended (protect camera lens)

- ⌘ Difficult alignment and focussing

- ⌘ Variable results - lots of patience!

- ⌘ Good telescope method to start with

 - Possibilities with Digital Cameras (covered later)

- ⌘ Requires good quality eyepiece

- ⌘ Discussion

Here's how it works...

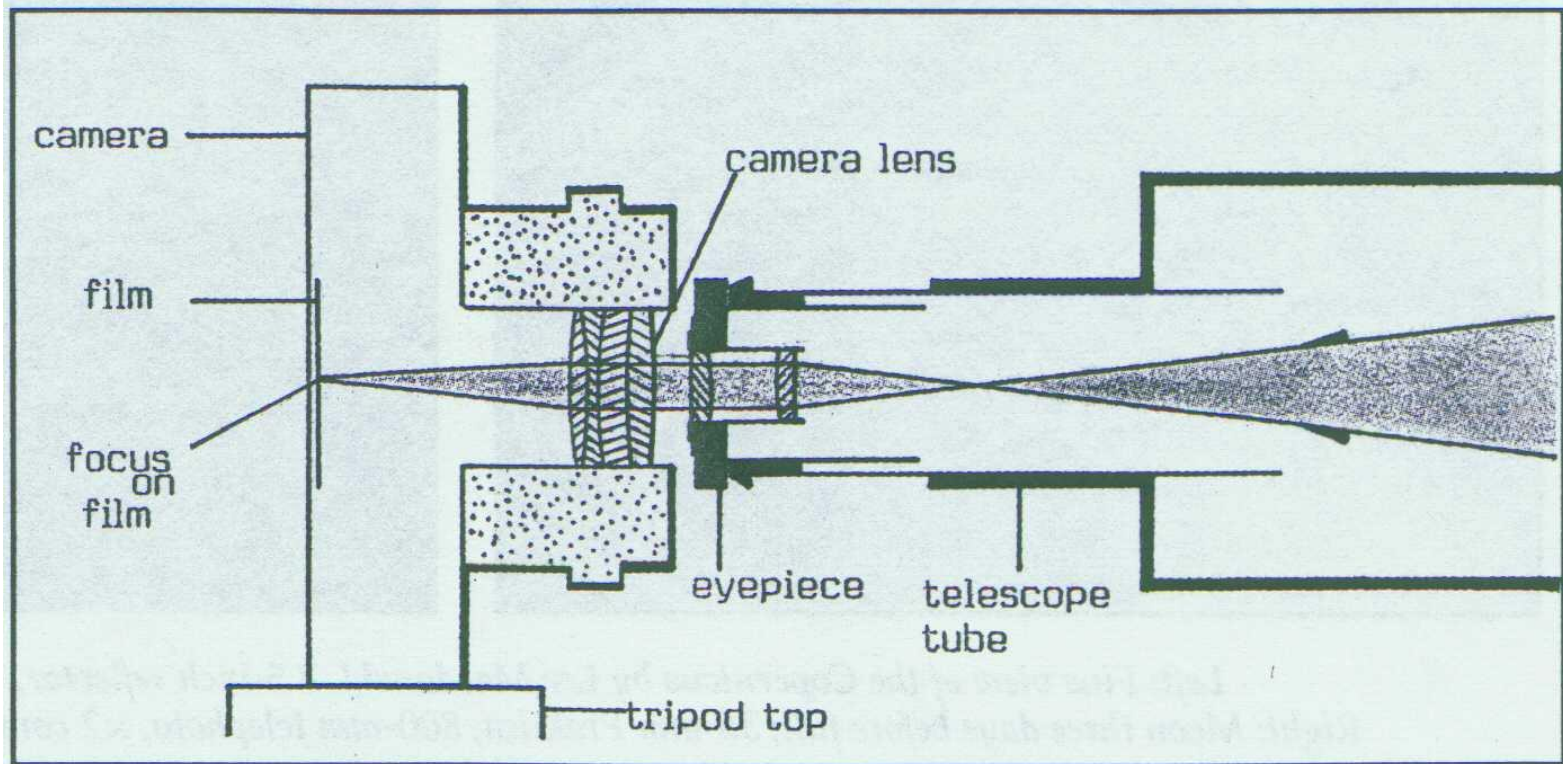


Diagram 1: The arrangement of camera and eyepiece in the afocal method.

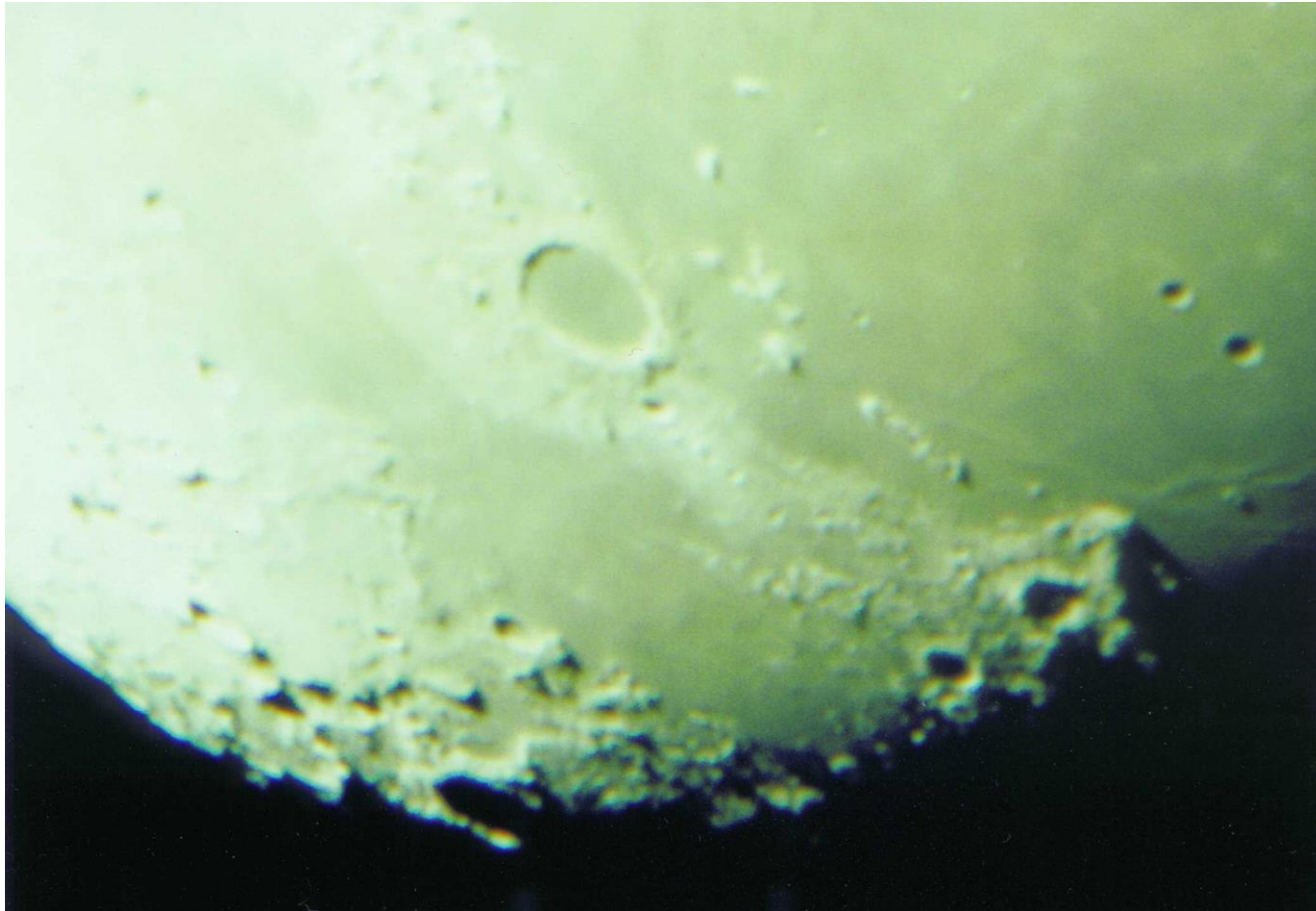
Telescope Photography

LX200 - Afocal and Piggyback methods



Afocal Moon Shot

SLR 135mm, F2.8, 1 sec, LX200, 18mm EP



Afocal Shot of Saturn

SLR 135mm, F2.8, 10 sec, LX200, 18mm EP



Part 2 - Previous Session...




⌘ Evening of April 17th 2000

⌘ OASI Observatory

⌘ Using Main Telescope

Telescope Specification



⌘ Objective Lens - 258mm or 10" diameter

⌘ Focal Length - 3894mm or 12ft 9.3"

⌘ Focal Ratio - F/15.1

Configurations



- ⌘ Prime Focus F/15.1 with Adapter
- ⌘ Eyepiece Projection with 25mm Plossl and short extension tube e.g. approx F/30
- ⌘ Eyepiece Projection with 25mm Plossl and longer extension tube e.g. approx F/50

Effective Eyepiece Projection F Ratio



$$\text{EP Proj F Ratio} = (F * (D-E)) / E$$

F = F ratio of Telescope

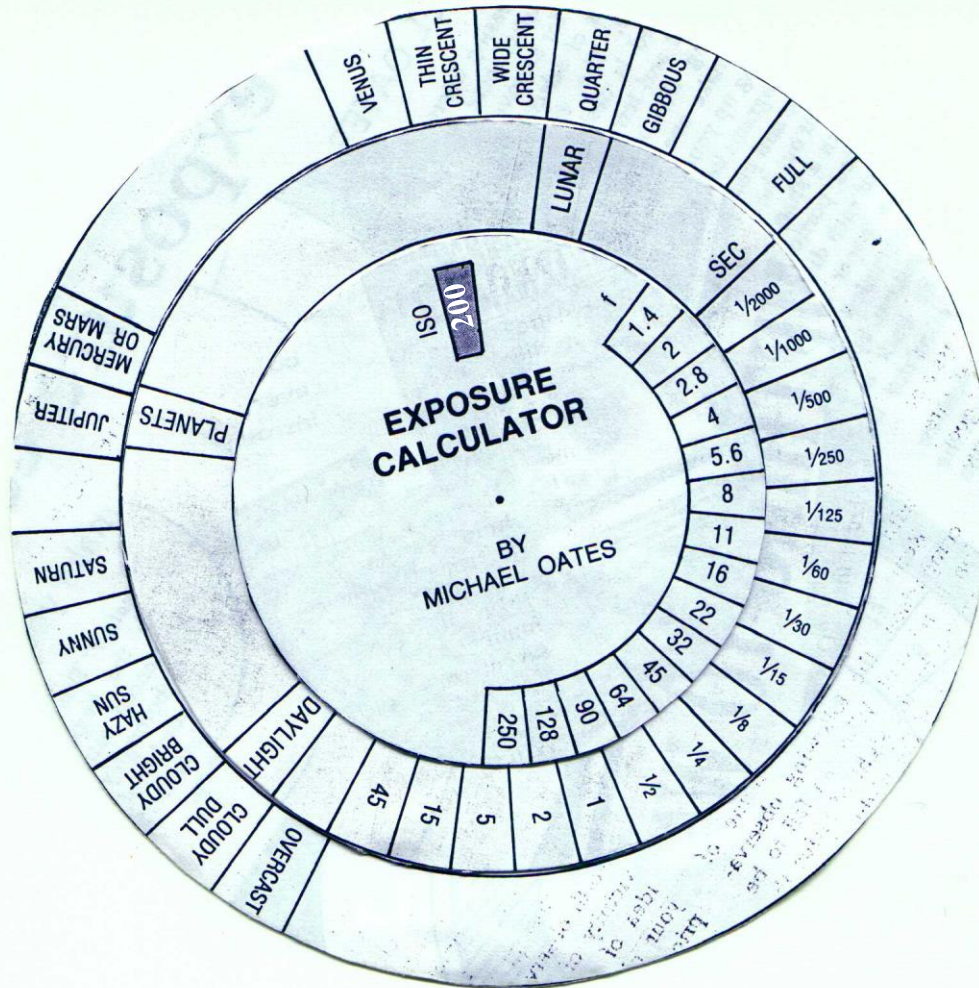
D = Dist between eyepiece and film focal planes (mm)

E = Eyepiece Focal Length (mm)

This Formula only applies to Eyepiece Projection!
If using Prime Focus, apply Telescope F Ratio!

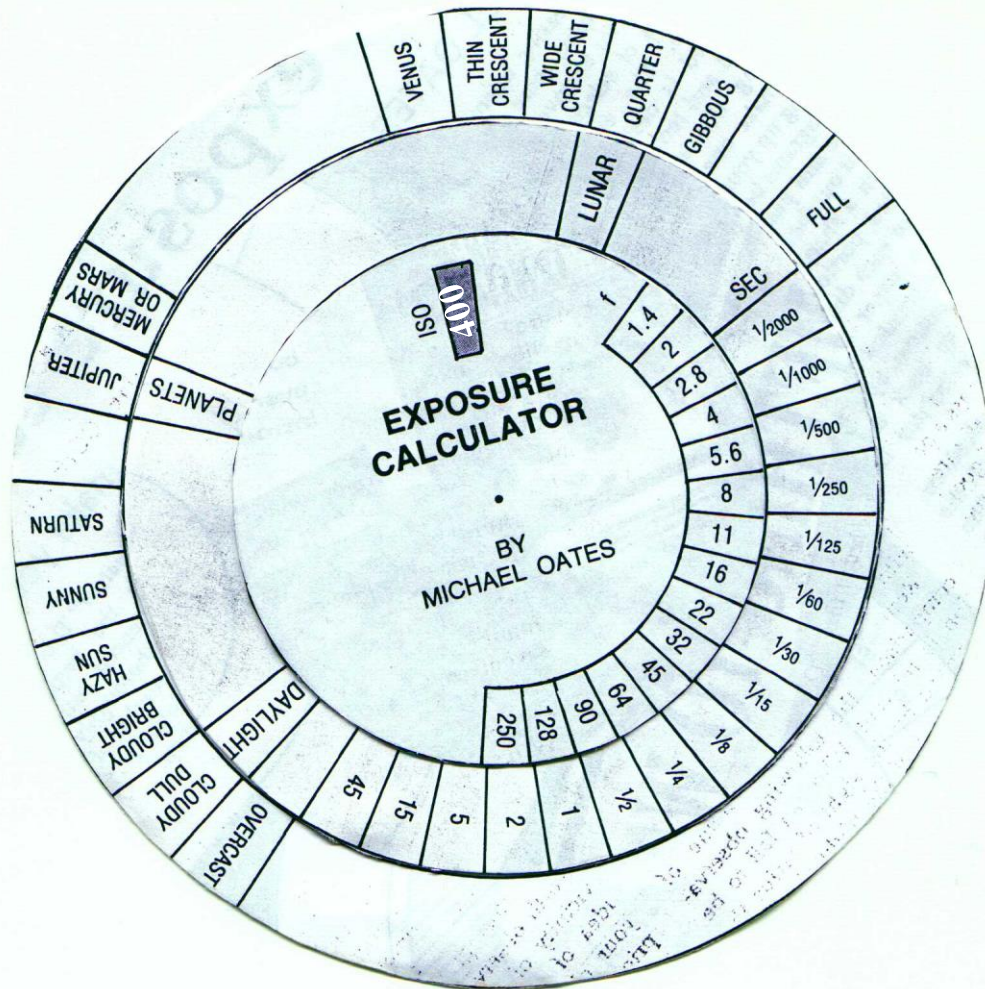
Astro Exposure Calculator

Example 1 - 200 ASA Film




Astro Exposure Calculator

Example 2 - 400 ASA Film



Summary of Exposure Times

200 ASA Film, Moon Quarter Phase



⌘ Prime Focus - $1/60$ sec

⌘ Eyepiece Proj with shorter tube - $1/8$ sec

⌘ Eyepiece Proj with longer tube - $1/4$ sec

⌘ More accurate measurement!

Equipment - Zenit 122K SLR Camera

- ⌘ Manually operated
- ⌘ Coupling to telescope via two adapters...!
- ⌘ Cable release used
- ⌘ Fixed exposure times of B(ulb), 1/30, 1/60, 1/125, 1/250 and 1/500 second
- ⌘ Longer exposures using B judged by hand!
- ⌘ Matt Focussing Screen!

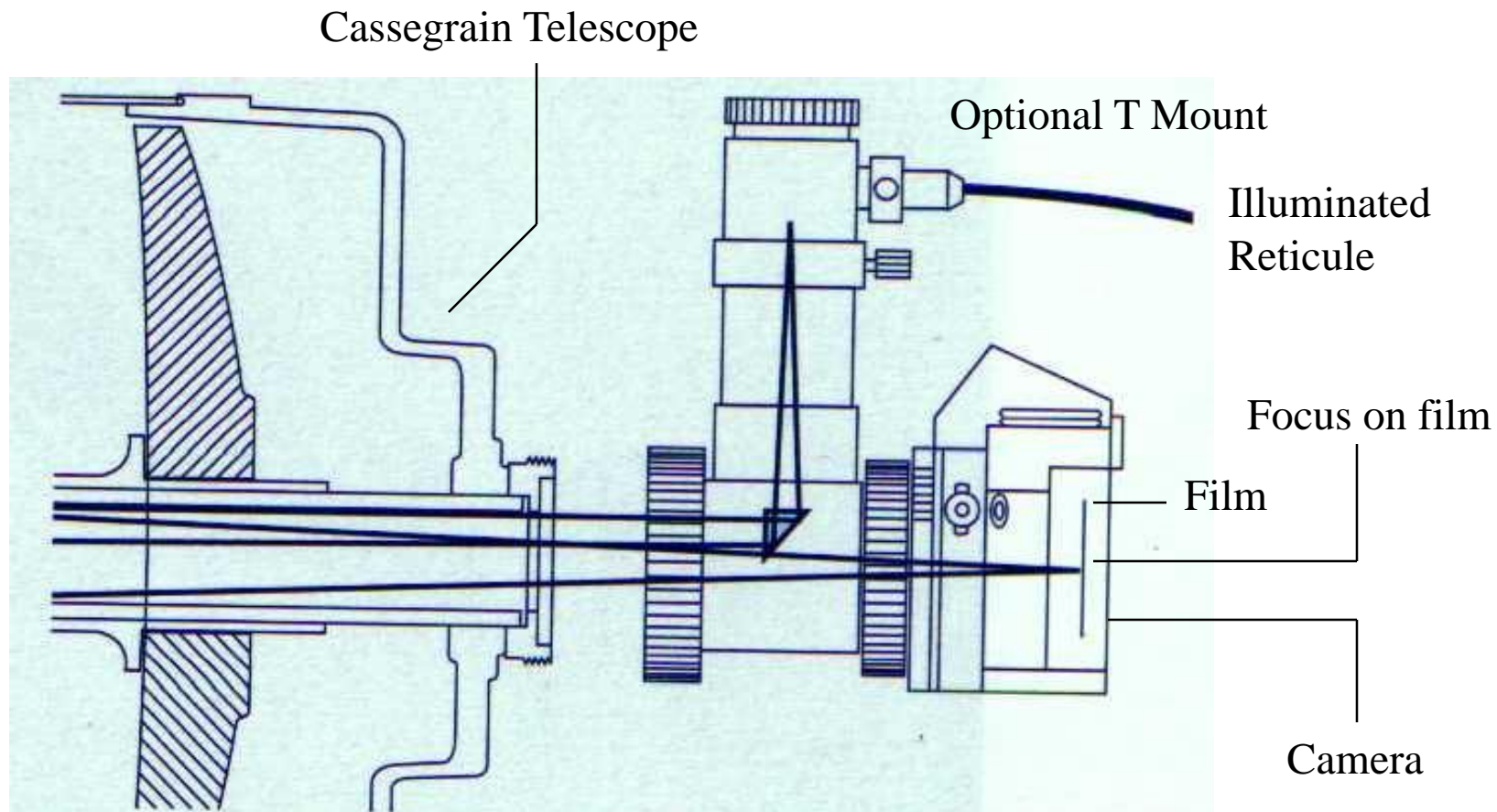


Prime Focus



- ⌘ Camera directly coupled to telescope
- ⌘ Telescope objective acts as very long focus lens - no magnification
- ⌘ Camera replaces telescope eyepiece
- ⌘ Focussing easier than afocal method
- ⌘ Telescope guiding desirable!

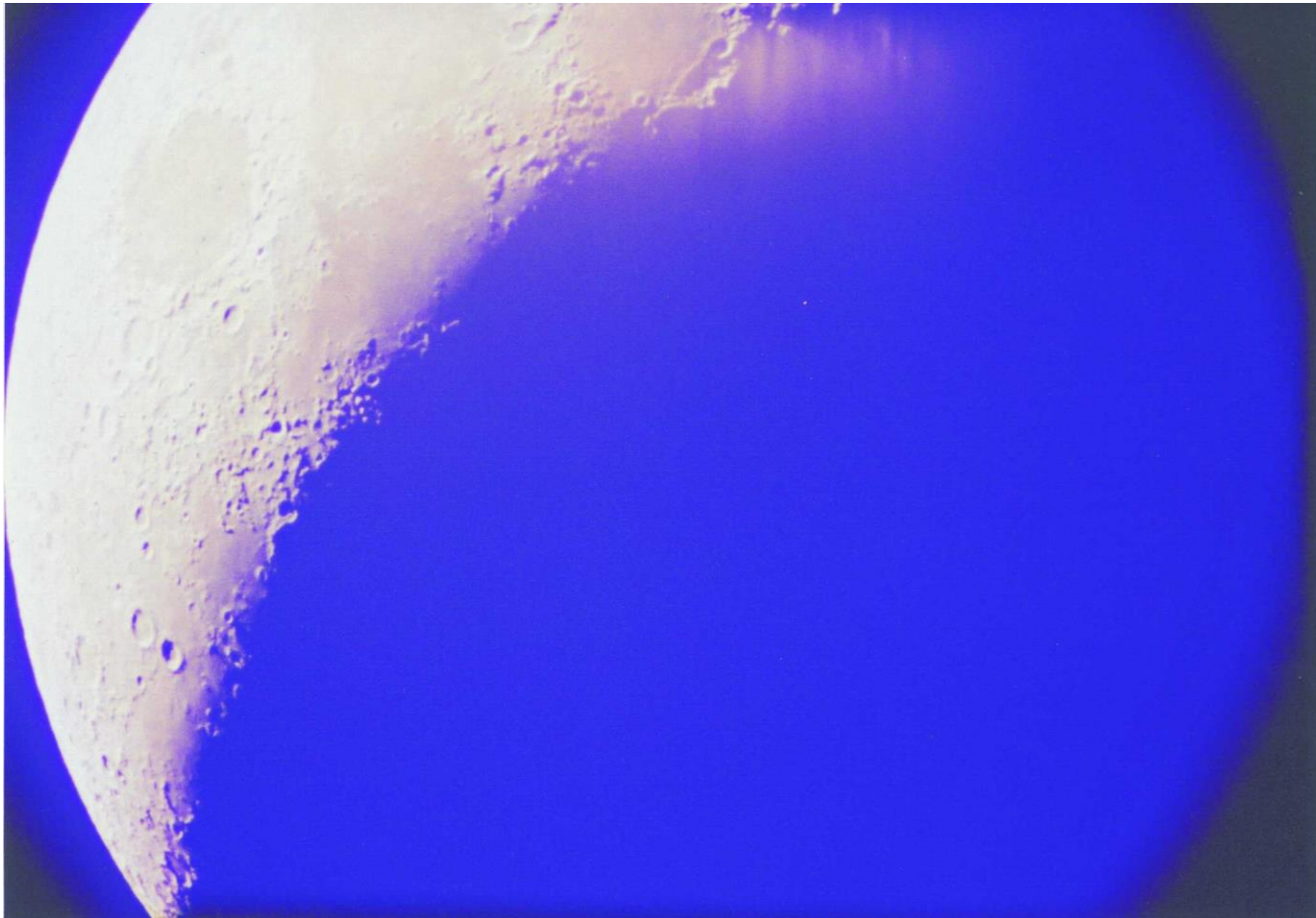
Here's How it Works...



*The arrangement of the Prime Focus Method
as described in the Meade Catalogue*

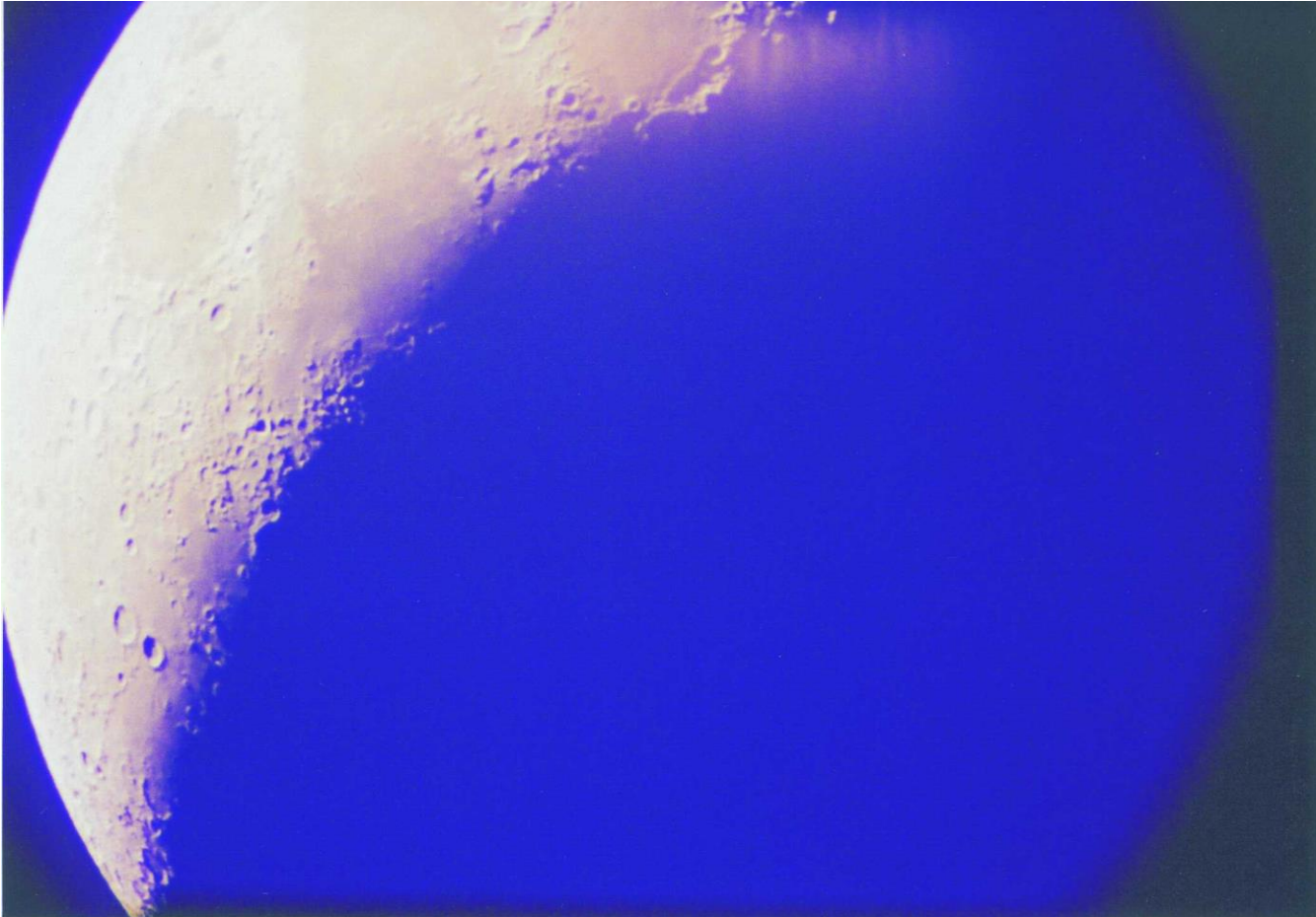
Moon

Prime Focus, F/15.1, 1/30 sec exposure, processing problem?



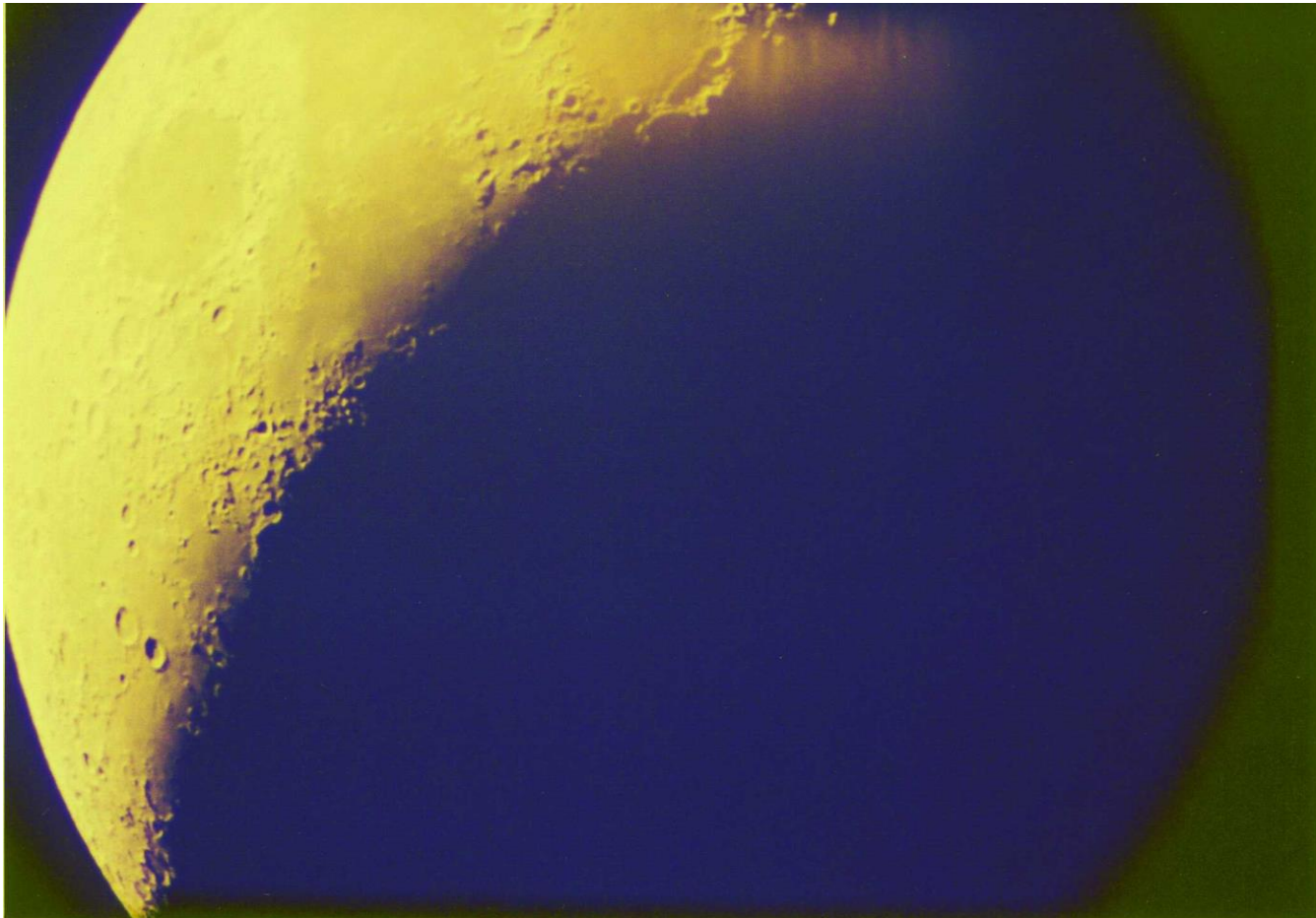
Moon

Prime focus, F/15.1, 1/60 sec exposure, processing problem?



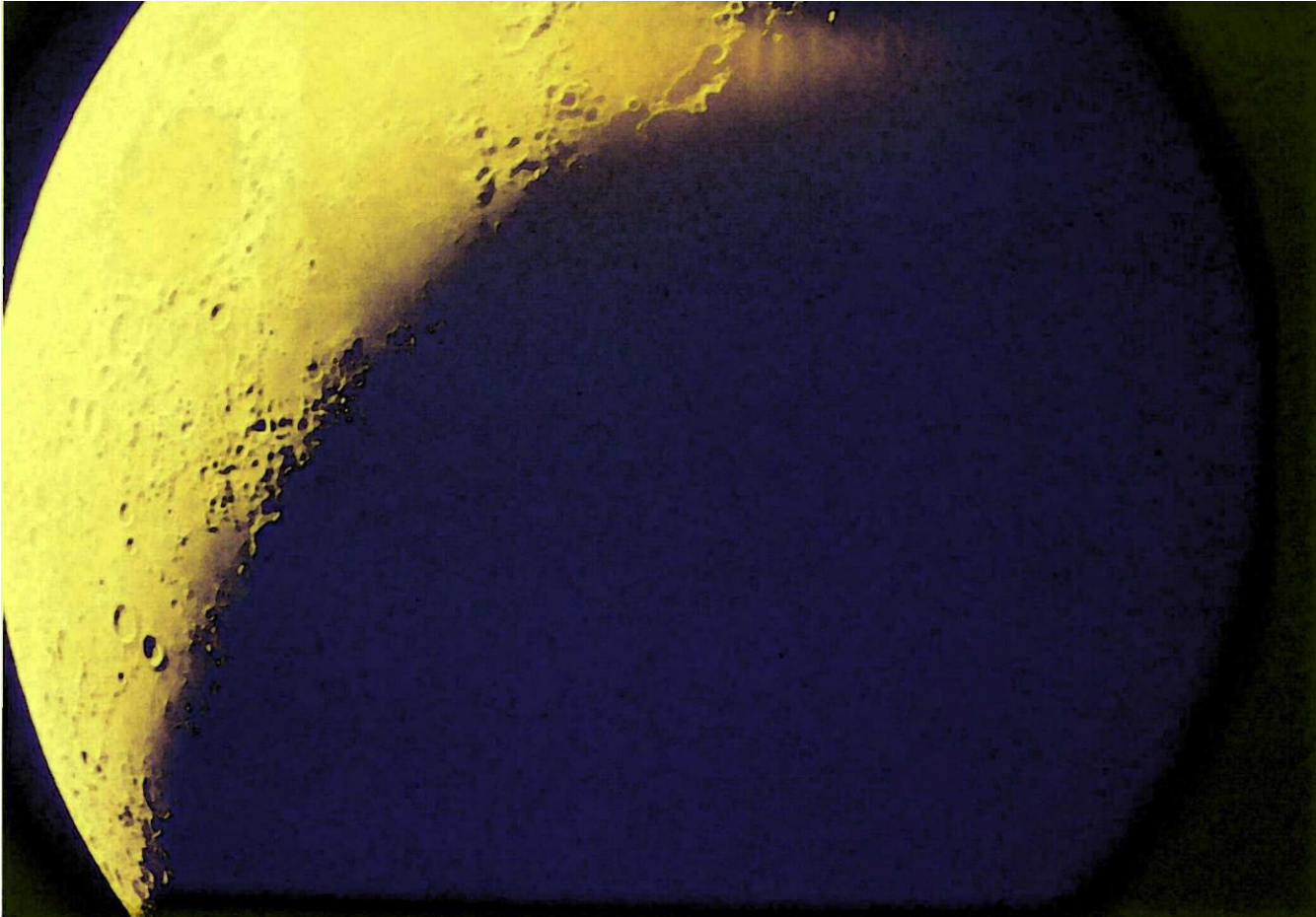
Moon - Processed image

Prime focus, F/15.1, 1/60 sec exposure, Photo Editor RGB balance used to reduce blue component of RGB to 3% but some contrast lost!



Moon - Processed image

Prime focus, F/15.1, 1/60 sec exposure, Photo Editor RGB balance used to reduce blue component of RGB to 3% with Watercolour effect!



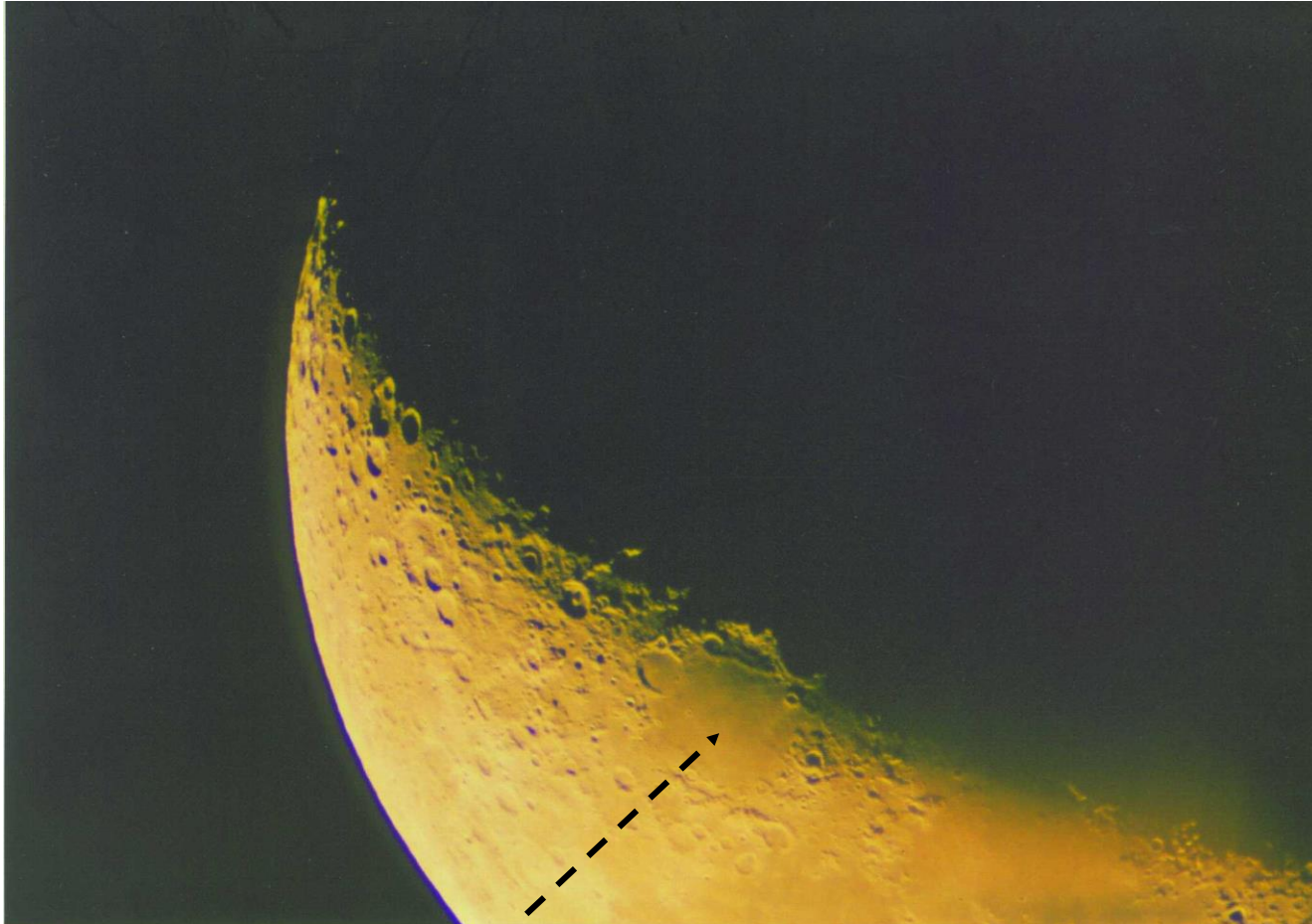
Moon

Prime focus, 1/60 sec



Moon - processed

Previous image with blue component reduced (10%?)



Mare Nectaris

Moon

Prime focus, 1/125 sec?, underexposed!



Eyepiece Projection



⌘ Camera directly coupled to telescope

- T Ring and Camera Adapter

⌘ Telescope eyepiece required “in-line”

- Eyepiece provides image magnification

⌘ Focussing more difficult

- Image less bright due to being magnified

⌘ Telescope guiding desirable

Here's How it Works...

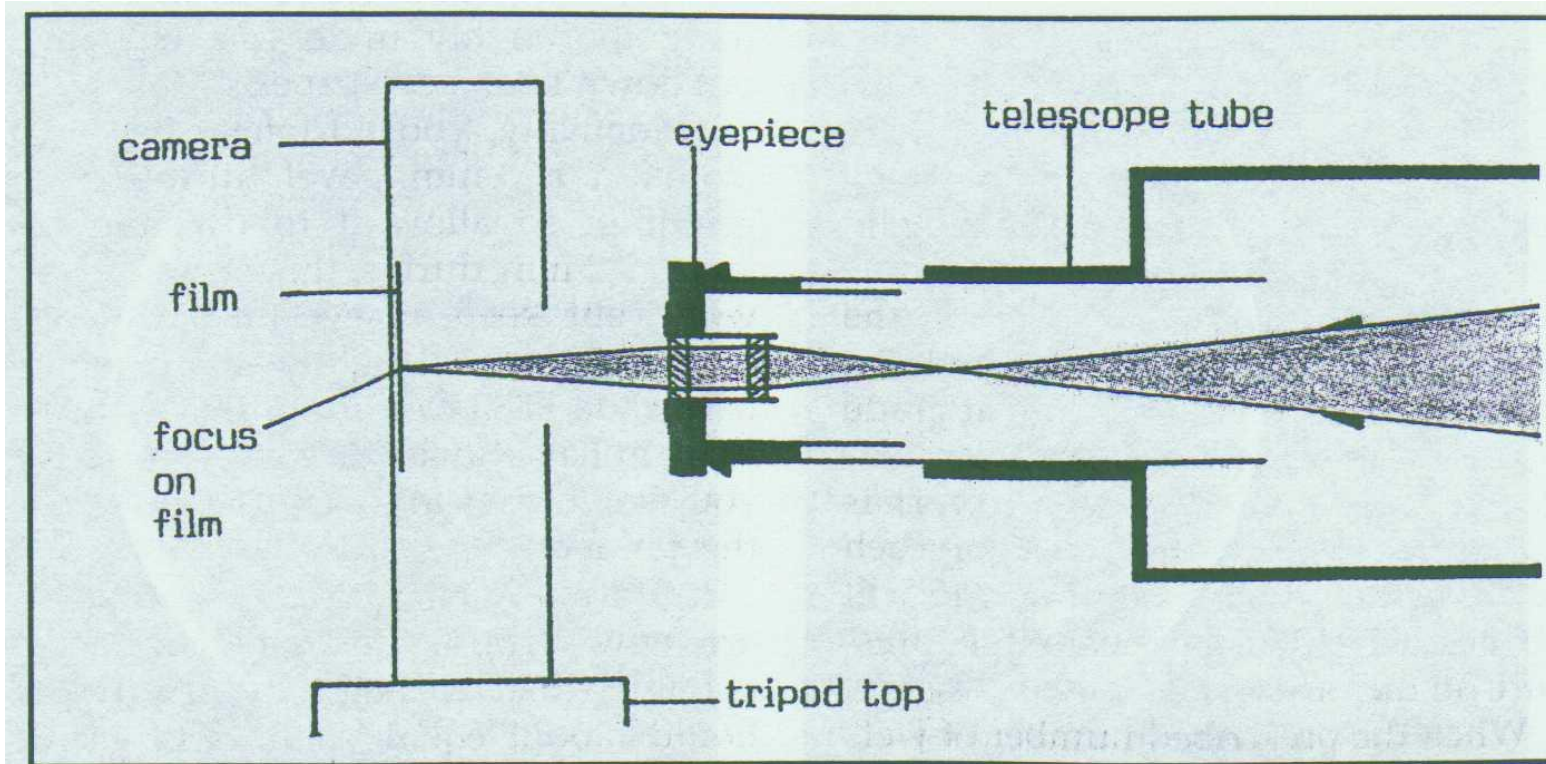


Diagram 2: The arrangement of the eyepiece projection method.

Moon

Eyepiece projection, shorter tube, manual B exposure (guessed!)



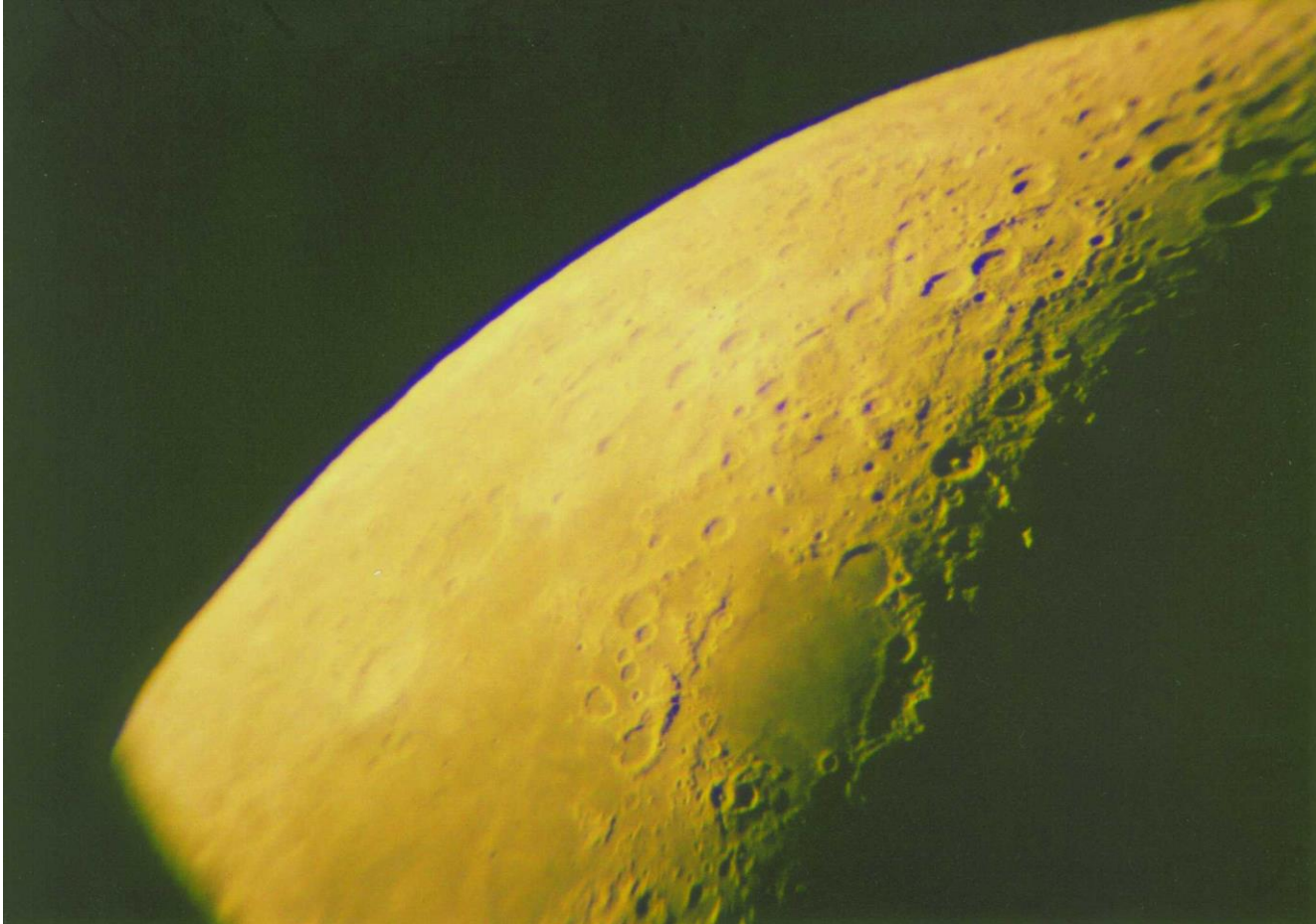
Moon

Eyepiece projection, shorter tube, manual B exposure (guessed!)



Moon

Eyepiece projection, shorter tube, manual B exposure (guessed), blue component reduced (10%?)



Moon

Eyepiece projection, longer tube, B exposure, focussing more difficult.
More sophisticated image processing package may reveal detail!



Developing and Processing!

Glenariffe Forest Park, Co Antrim, Northern Ireland



Over to Mike...

A thick, horizontal yellow brushstroke that spans most of the width of the slide, positioned directly below the text 'Over to Mike...'. It has a textured, hand-painted appearance with some darker and lighter yellow areas.

Part 3 - Other Photographs...



⌘ Paddy O'Sullivan

⌘ James Appleton

⌘ Nick Sullivan

Hale Bopp Shots



⌘ Paddy O'Sullivan

Hale Bopp

SLR, Tripod and Cable Release



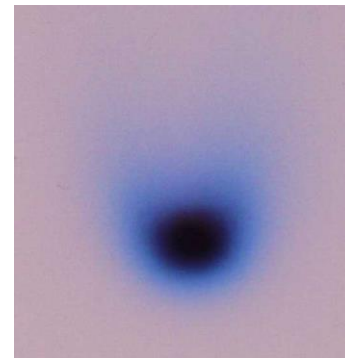
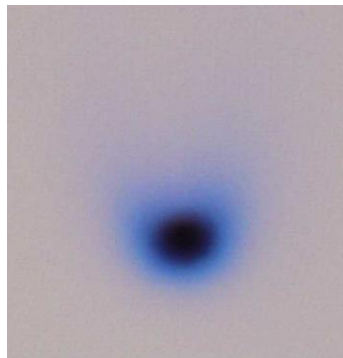
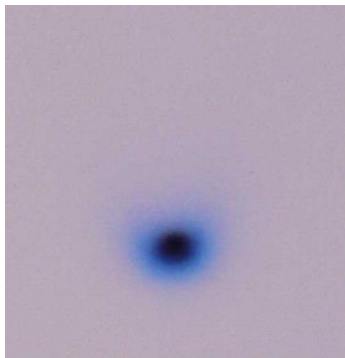
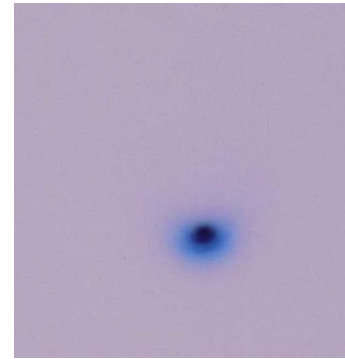
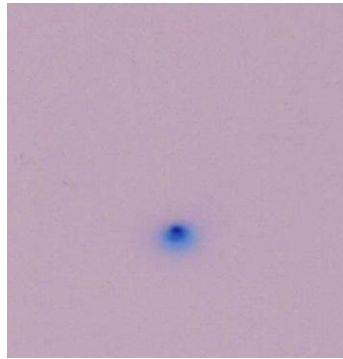
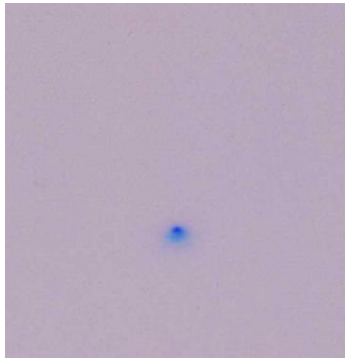
Hale Bopp Montage 1/2

SLR Camera Coupled to OASI Main Telescope



Hale Bopp Montage 2/2

SLR Camera Coupled to OASI Main Telescope, Image Negatives



First Attempts with Starlight Express MX916 CCD Camera...



⌘ Shots from James Appleton

Moon

10 August 2000 20:03 UT, Southern limb, Meade prime focus, 0.01 sec exposure, ND filter - 90%?, Contrast stretch & unsharp masking

⌘ Raw Image



⌘ Processed Image



M13 in Hercules

11 August 2000 21:13UT, Meade prime focus, 1 min exposure, Contrast stretch & unsharp masking,

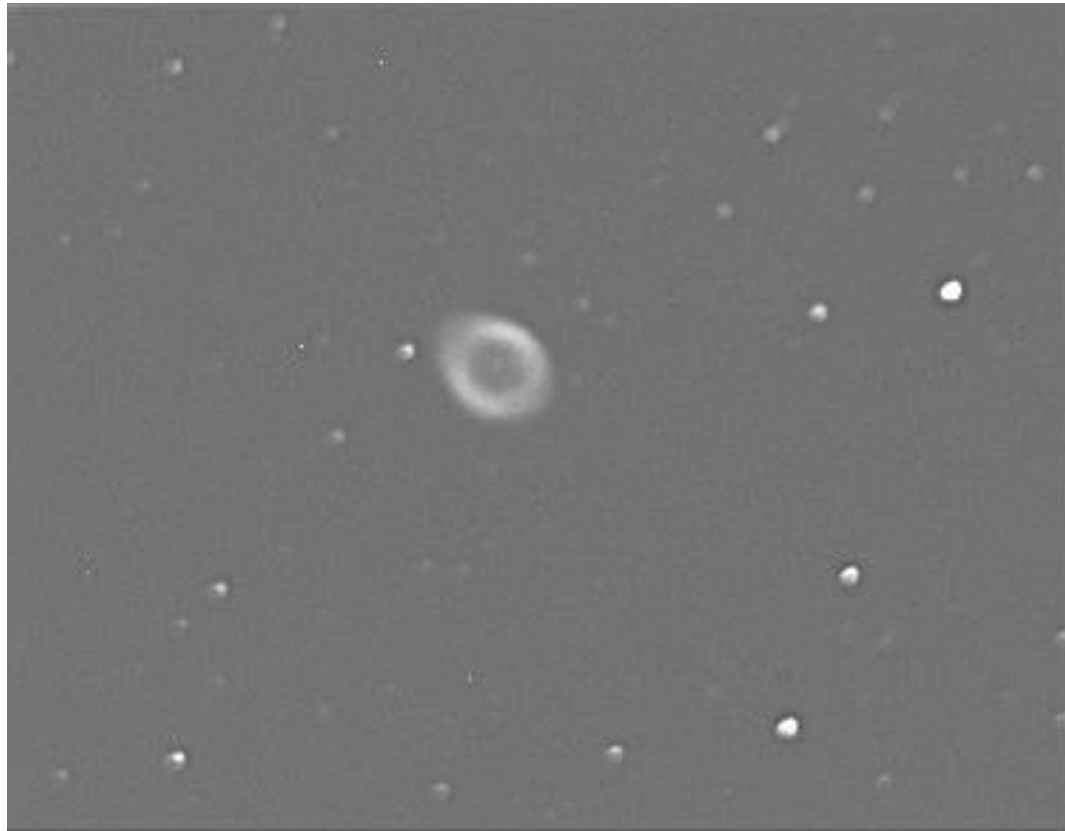
⌘ Tracking problem seen on unprocessed image

⌘ Ran Meade Smart procedure twice to improve polar alignment prior to taking image and processing



M57 Ring Nebula in Lyra

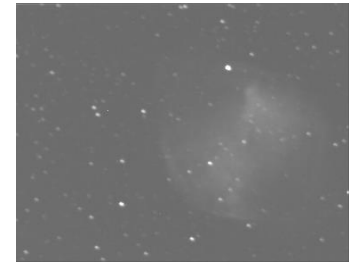
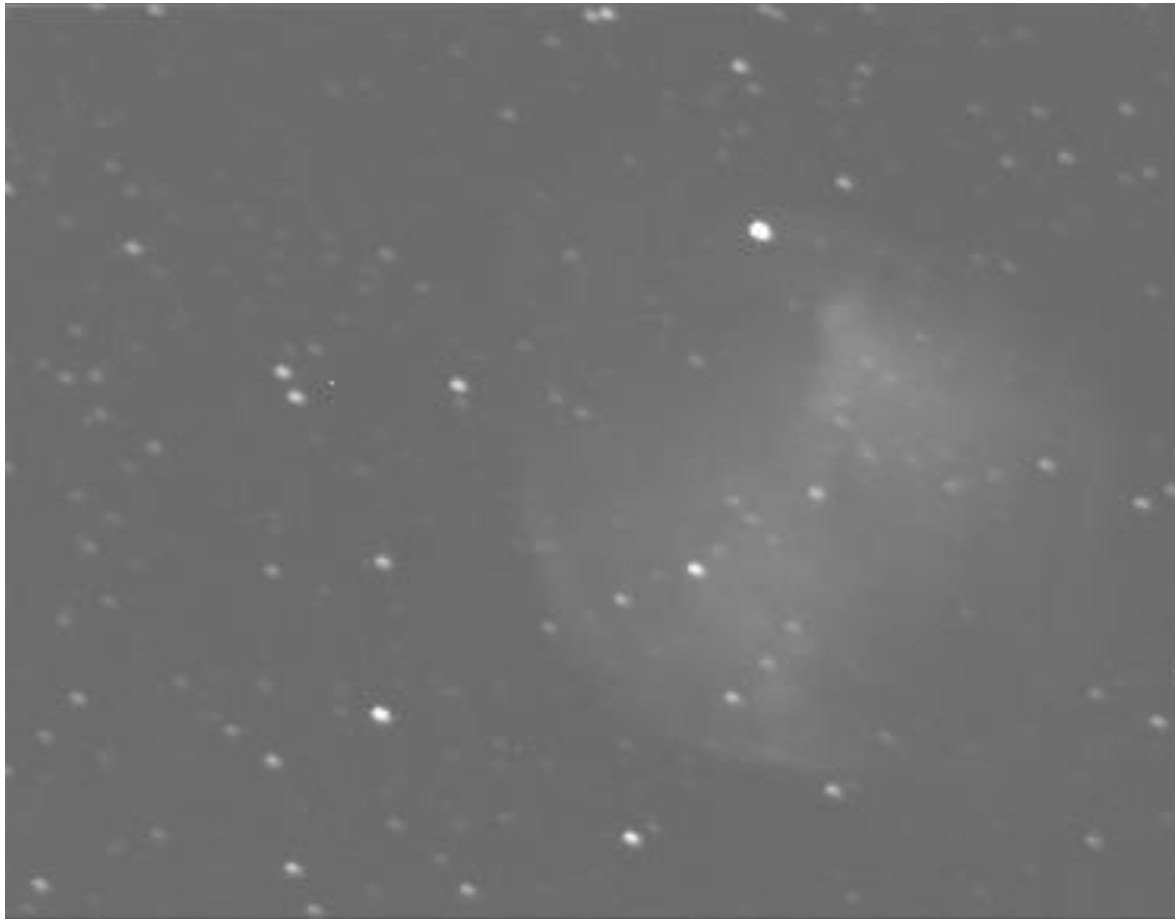
11 August 2000 21:13UT, Meade prime focus, 1 min exposure, Contrast stretch & unsharp masking



M27 Dumbbell Neb in Vulpecula

01 October 2000 19:15 UT, Meade prime focus, 90s exposure

Contrast stretch and power law stretch



M31 Andromeda Galaxy

04 November 2000 23:00UT, Meade prime focus, 1m exposure,
Contrast stretch



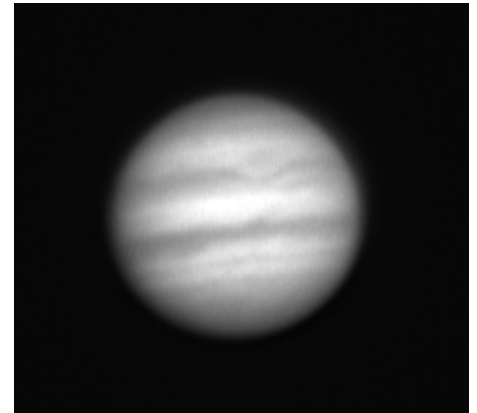
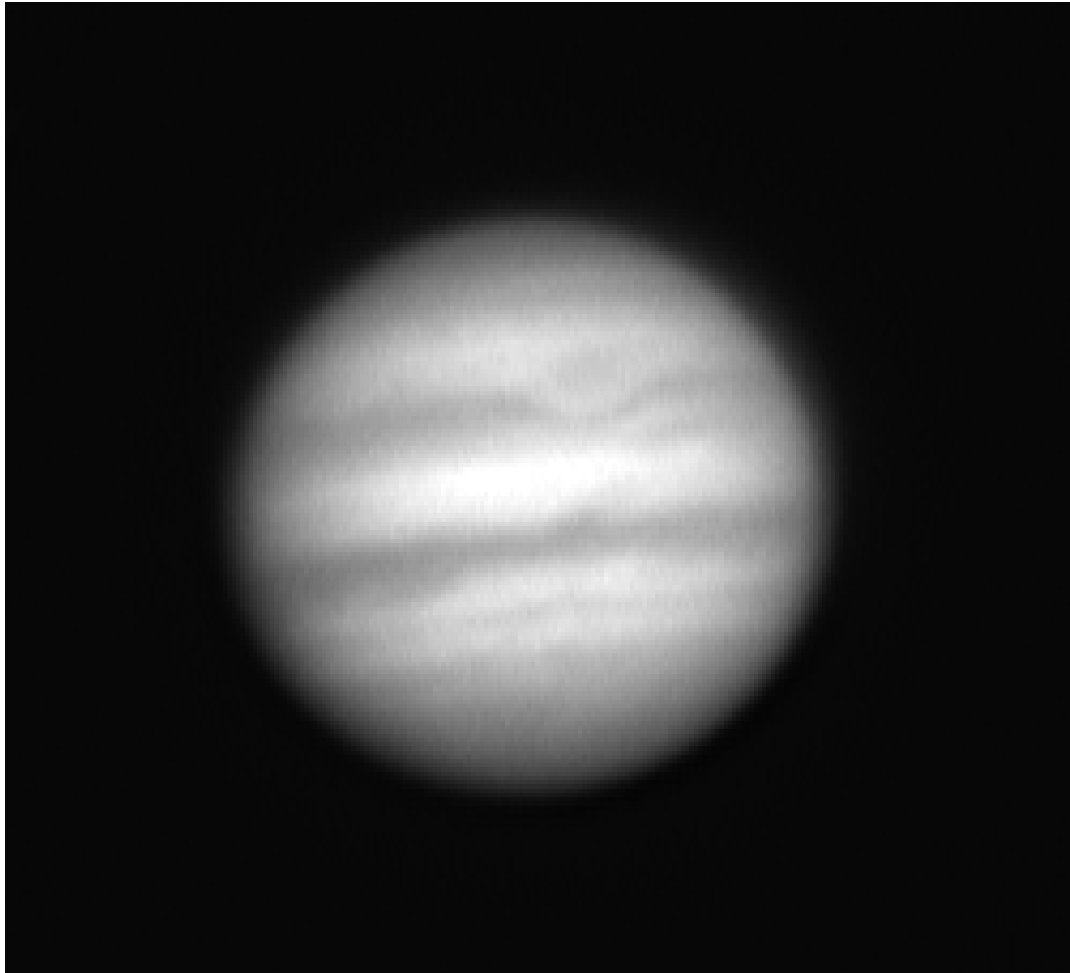
Saturn

05 November 2000 00:30UT, Meade positive projection with 26mm eyepiece, min magnification, 0.01s exposure



Jupiter

05 November 2000 00:15UT, Meade positive projection with 26mm eyepiece, max mag, 0.01s exposure, Contrast stretch and unsharp mask

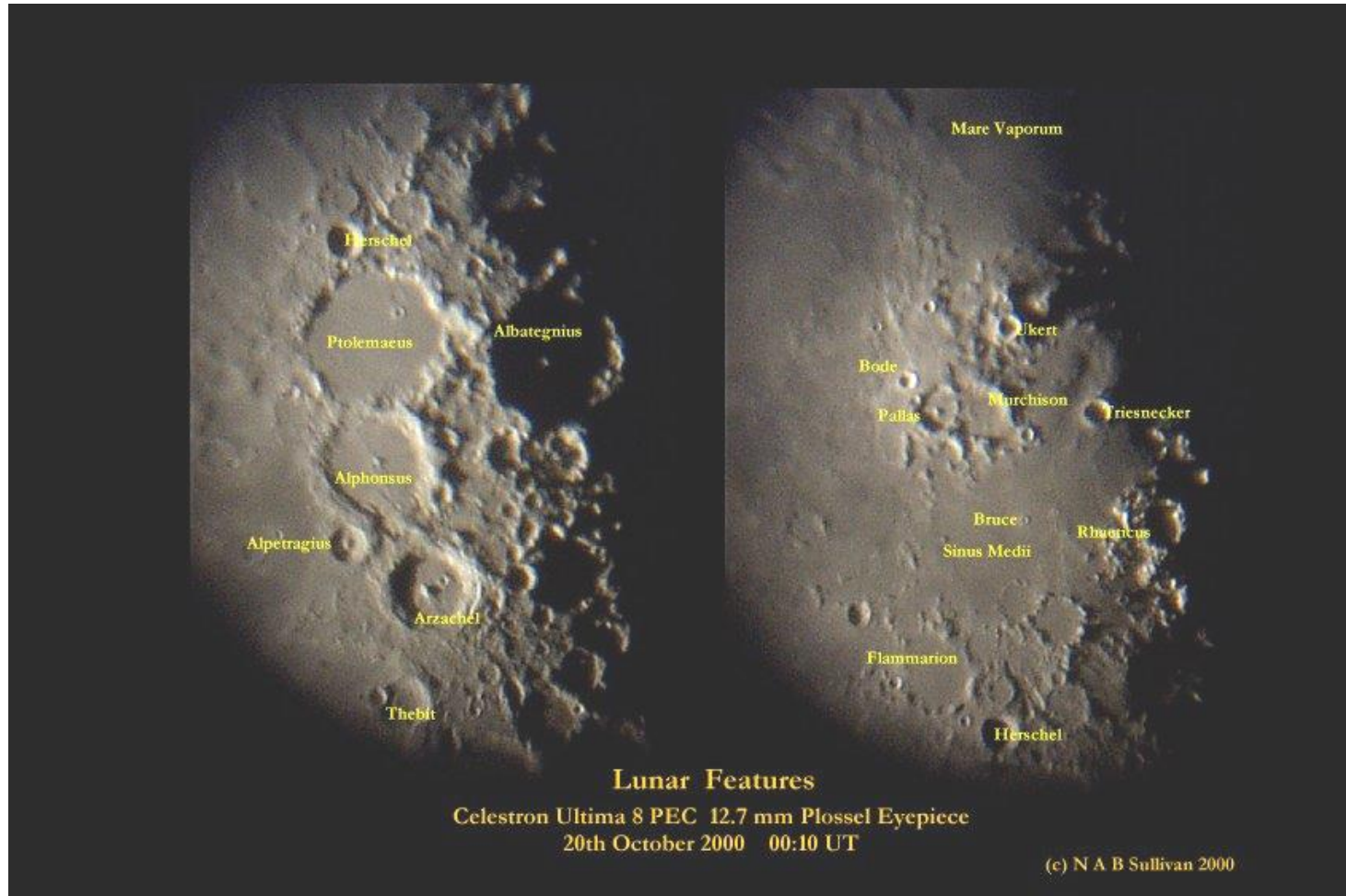


Afocal Digital Photography



⌘ Shots from Nick Sullivan

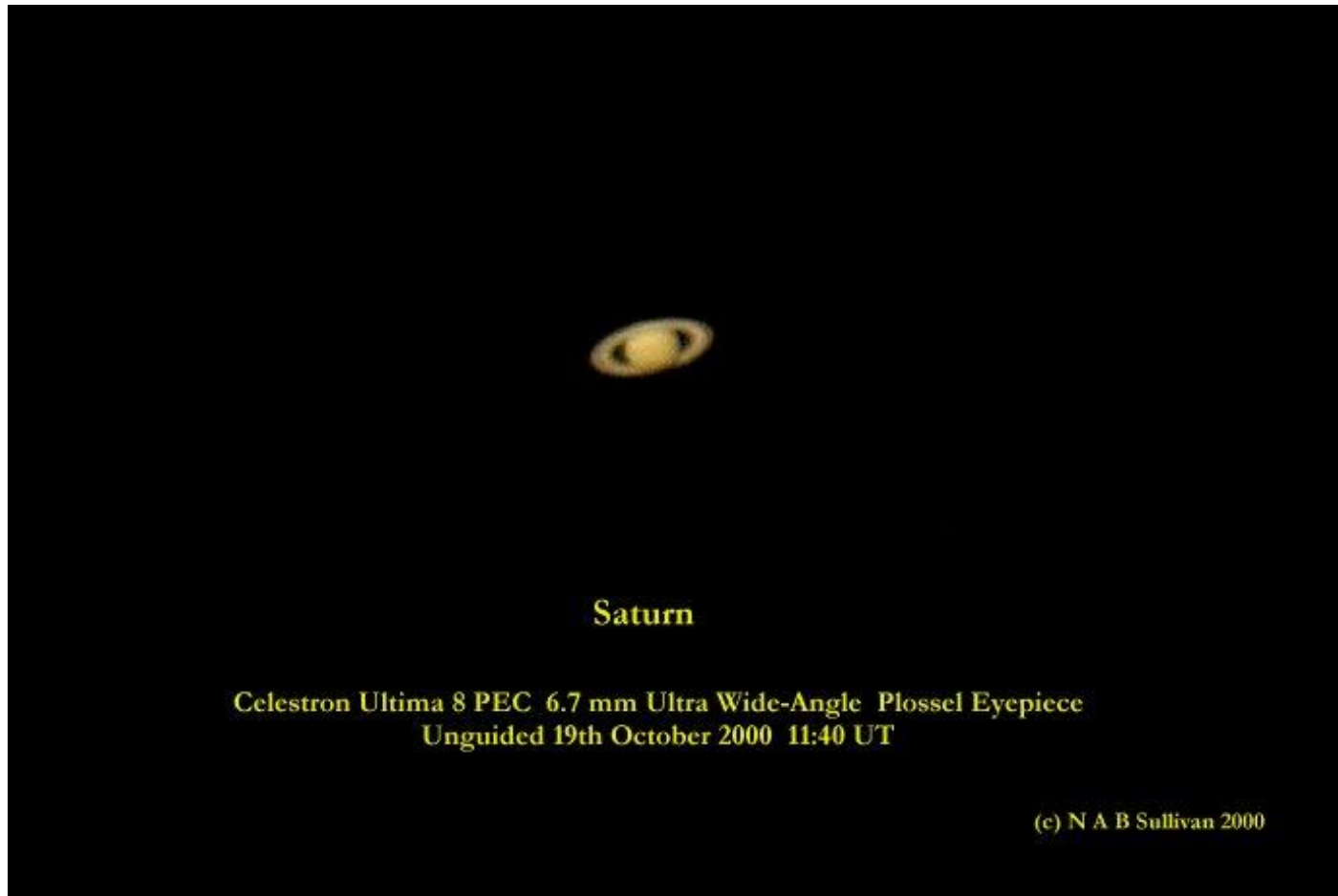
Lunar Features



Jupiter - Transit of Io



Saturn



Sunspots - 1/3



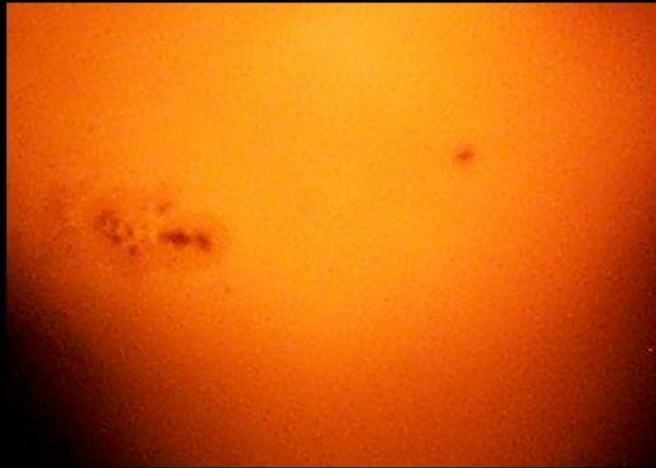
Sunspots - 2/3



Major Sunspot Group

Meade ETX 90 Thousand Oaks Type 2+ Filter 12.4 mm Plossel 23/09/00 16:03 UT

Sunspots - 3/3



12.4 mm Plossel 25/09/00 10:37 UT

(c) 2000 NAB Sullivan



6.7 mm Plossel 25/09/00 10:49 UT

(c) 2000 NAB Sullivan

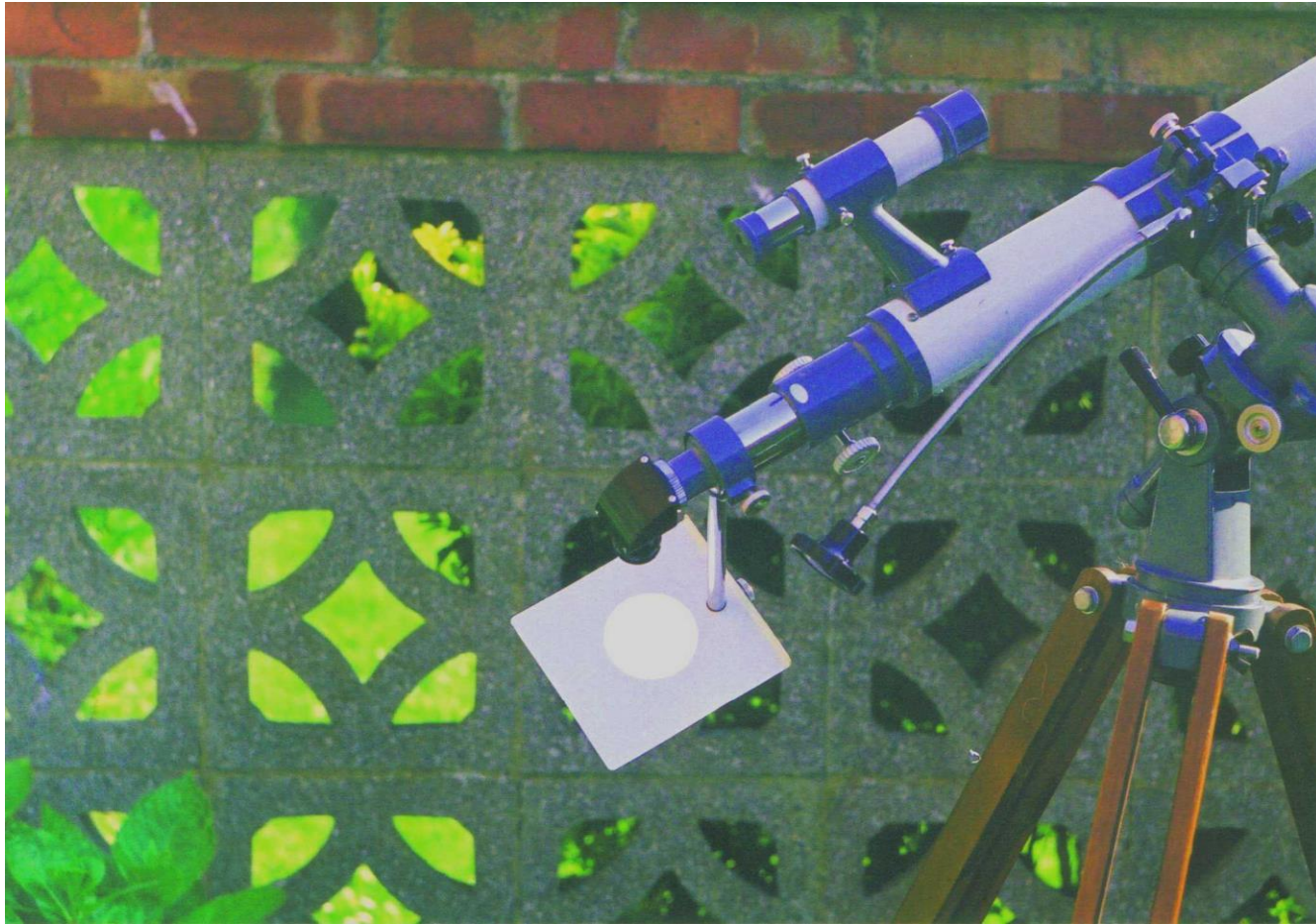
Equipment



Part 4 - Future Project Ideas...

A thick, horizontal yellow brushstroke underline that spans the width of the text above it, with a slightly textured, hand-painted appearance.

Solar Projection...



Piggyback Shot of Hale Bopp

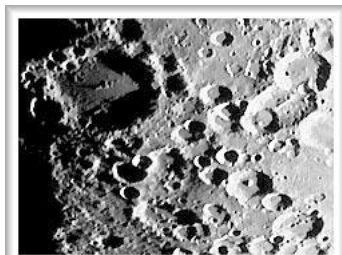
15 mins?, Kodak Ektachrome 400, Orion ST80 F/4, Prime Focus



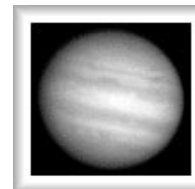
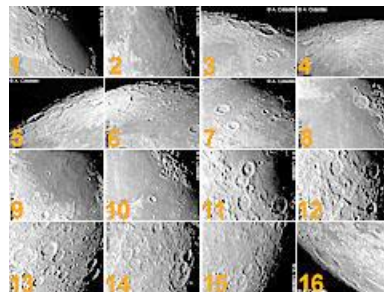
WebCam Astrophotography



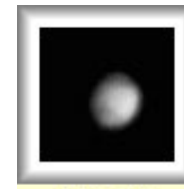
QUICKCAM Astrophotography



MOON



JUPITER



MARS



SATURN



Discussion



⌘ Questions...?

⌘ Feedback...?

⌘ Ideas...?

⌘ Further practical sessions...?

⌘ Future Talk Suggestions

- Advanced film processing techniques
- Electronic image processing using the PC