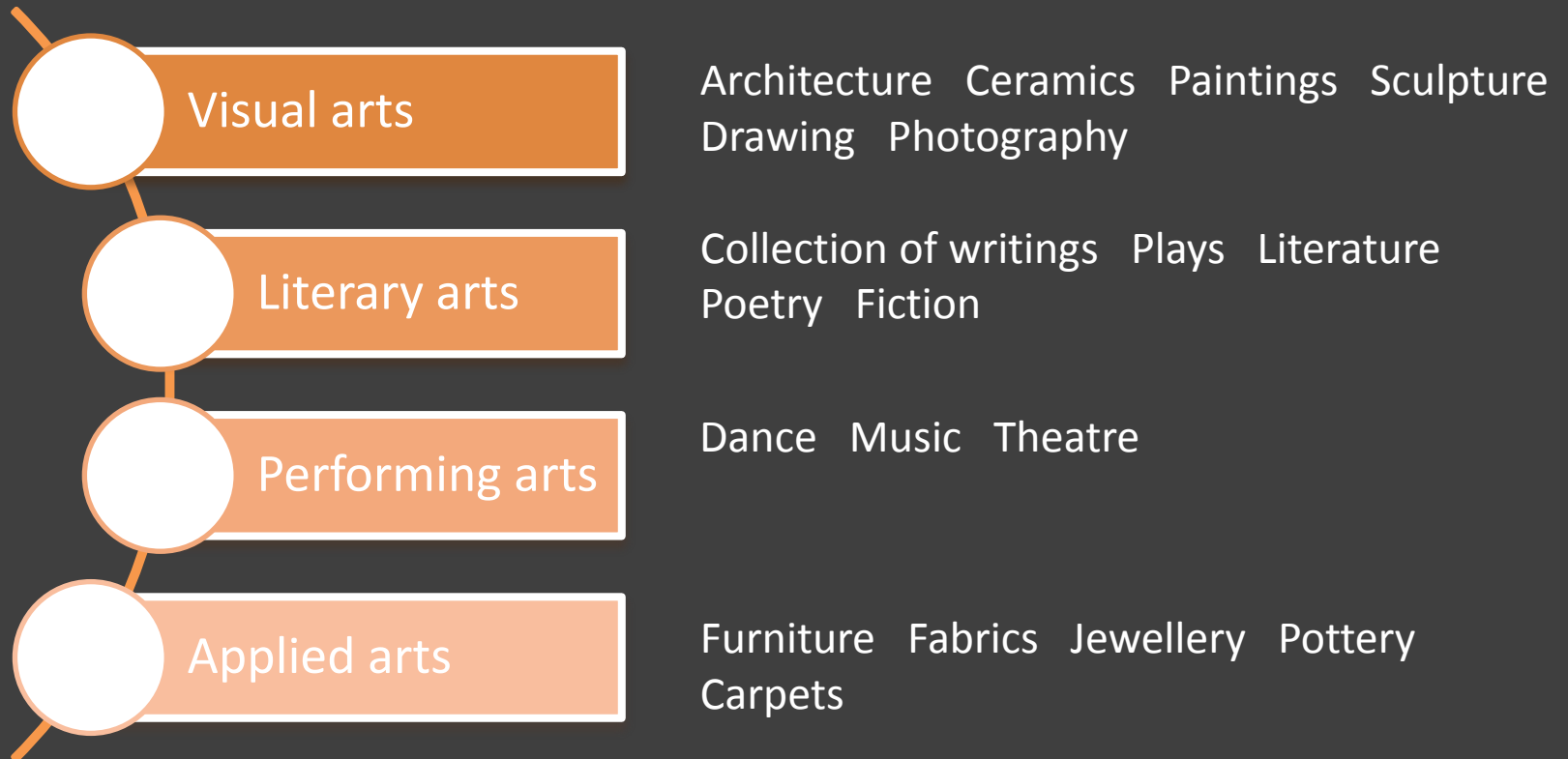# Astrophotography

Art or Science

Introduction

- What is Art and Science

- What is astrophotography

- The difference between astrophotography and photography

- Examples of images taken using different colour mapping

- Creativity within nebula images

- How colours can be scientific

- Personal responsibility

- Stacking changes images in their context

- Asteroids are science

ART

the expression or application of human creative skill and imagination, typically in a visual form such as painting or sculpture, producing works to be appreciated primarily for their beauty or emotional power.

Art

Visual arts

Architecture   Ceramics   Paintings   Sculpture Drawing   Photography

Literary arts

Collection of writings   Plays   Literature Poetry   Fiction

Performing arts

Dance   Music   Theatre

Applied arts

Furniture   Fabrics   Jewellery   Pottery Carpets

Science

the intellectual and practical activity encompassing the systematic study of the structure and behaviour of the physical and natural world through observation and experiment.

Science
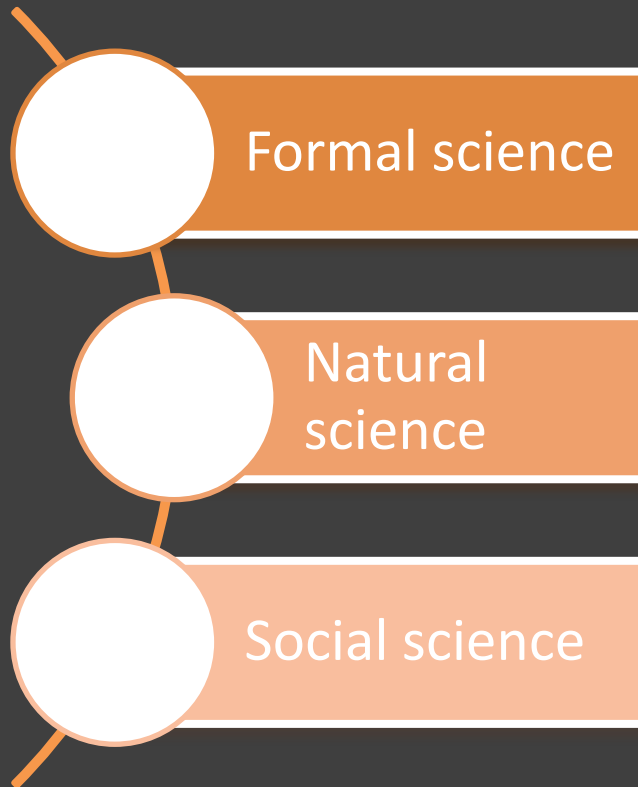
Formal science

Logic   Mathematics   Statistics

Natural science

Physics   Chemistry   Biology   Earth science
Space science

Social science

Economics   Sociology   Political science
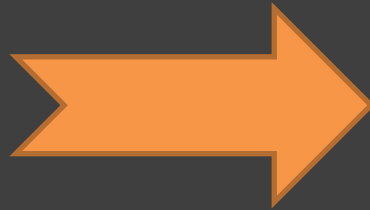Psychology

Links between Art and Science

- Analytical
- Concrete
- Empirical evidence
- Can be proven

Science

- Creative
- Passion
- Abstract
- Argument / discourse

Art

- Creativity required to make scientific breakthroughs
- Visual art has been used to document the natural world

Links between Art and Science

What is Astrophotography?

Taking a photograph of an object in space.

- RGB image
- Hubble Space Telescope (HST) palette
- Bi colour
- Some targets are better suited to certain filter combinations

The difference between Astrophotography and photography

We can see what we photograph

We can easily see manipulation / creativity

Even in photography though there is 'cheating the lens' – Skin toning, body shaping
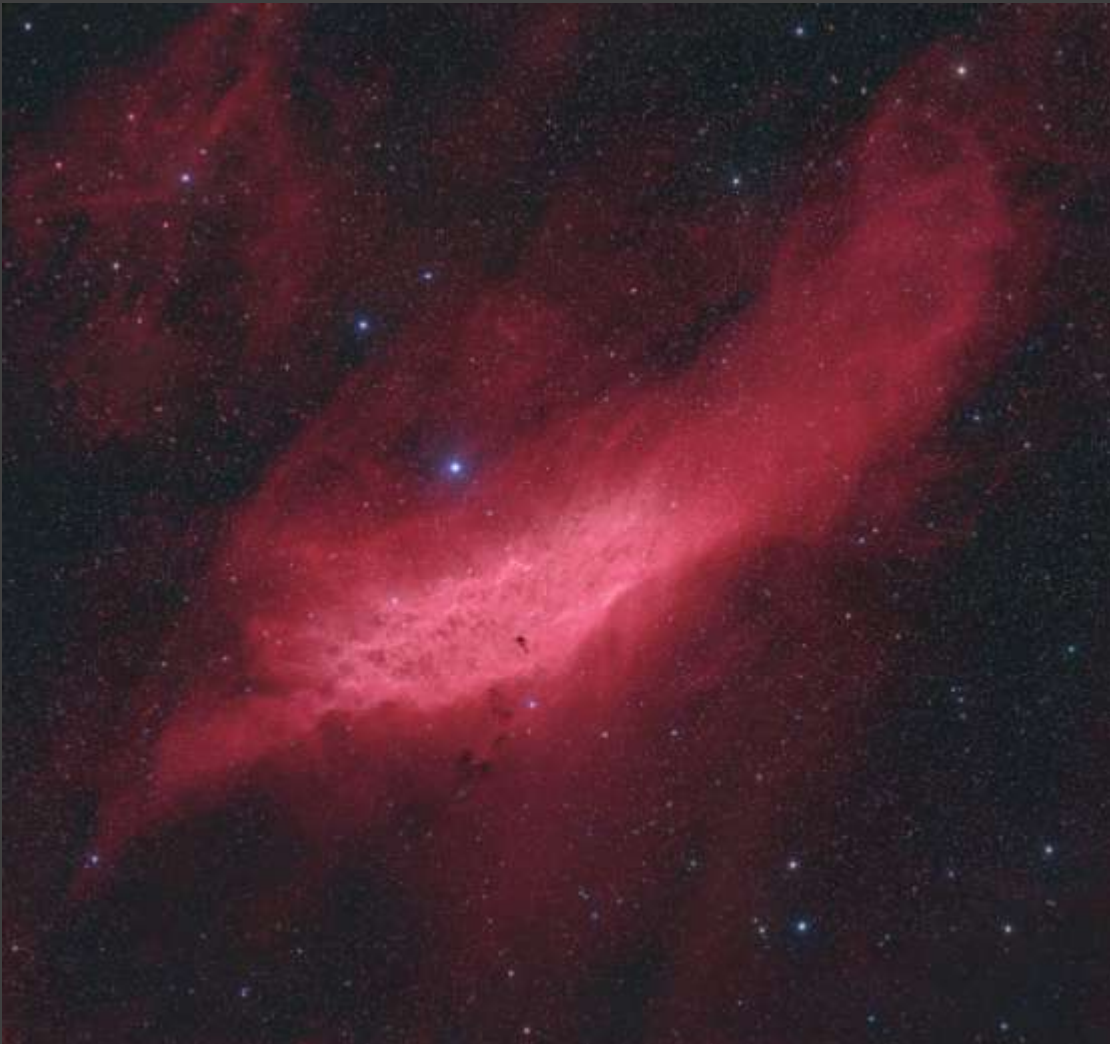
NGC1499 (California nebula)

HaR(Ha)GB

MCM (Monochrome Colour mapping)

HOO

HaR(Ha)GB

24 x 300s Red, Green and Blue

20 x 1800s Ha

6 pane mosaic

- True colour of stars

- A nebula colour that is based on Ha – Widely accepted as correct for natural colour

- Ha used as a luminance layer

HOO

25 x 1800s OIII
20 x 1800s Ha

Combined as HOO

A traditional bi-colour palette

MCM (monochrome colour mapping)

25 x 1800s Ha

Not assigned to any channel – Photoshop used to 'paint' the colours in.

Designed to mimic a traditional HST (Hubble Space Telescope) palette

What do the images show?

- As close to the natural form as we believe is possible…………
- The extent of the dust and gas…… in the Ha wavelength
- True star colours

- The red area is the Ha details
- The green area is the OIII data
- We could manipulate this to make any colours.
- It would be a true representation of WHERE the relevant gases are

- Only Ha data is used
- Each channel has been colourised by hand to make a pleasing image to the eye.
- It resembles the HST colours
- No scientific basis for the colours

Is this Scientific?

The stars can be calibrated with known star colours in the field of view to ensure that the rest of the image is correctly balanced and presented.

This gives a scientific basis for the colours in the image

Some images are harder to make 'art'

- Galaxies
- Dusty reflection nebula

The colours could be changed if desired, but the facts remain that there is dust. In many cases due to bad calibration this can be destroyed – Is this destroying science?

The HST pallet is traditionally called SHO.

SII – Goes into the Red channel

Ha – Goes into the Green channel

OIII – Goes into the Blue channel

Consider an HST image

Channel assignment

How we can change the image straight away

Predominant green colour

Manipulated colours – To decrease the greens and start with the HST palette colours

Done purely for visual pleasure

Science

What have we achieved?

- Lost the green hue (There's no green in space!!)

- Lost some of the fainter nebulosity

- Gained a stronger demarcation between the colours in the core

- Gained magenta stars

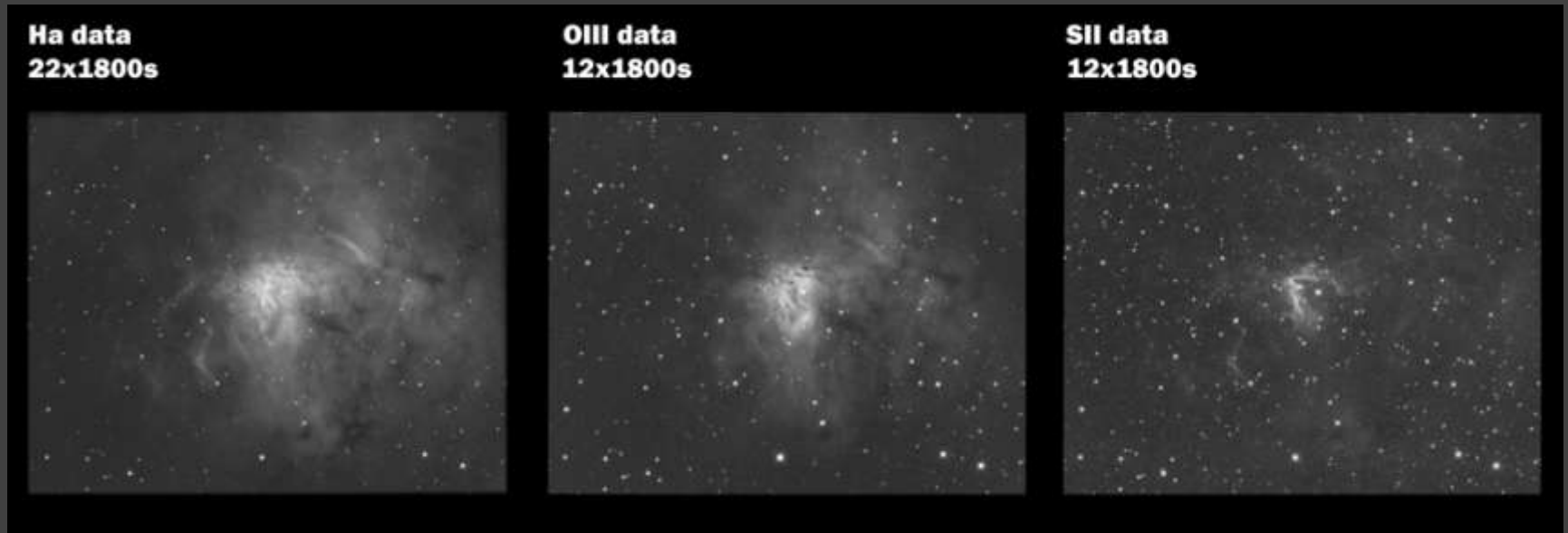- The channels are merged in an agreed way

Art perspective

What have we achieved?

- More pleasing colours

- More contrast

- Colour palette is dependent on the spectator and creators own subjective taste

- We have potentially lost scientific Ha details

The difference in filters

Ha data
22x1800s

OIII data
12x1800s

SII data
12x1800s

This allows you to see the way that the gases are distributed within a nebula.

Assigning these filters to the standard colours will give you a scientific basis for where the colours are within the image

Deciding on colours

- Assigning filters to pre-determined colour channels will give you a fairly automatic starting point.

- The data collected will influence the colours

- At the data collection stage remember that Ha will almost always be dominant. Sometimes the selective colour tool cannot bring out the traditional blues and yellows as the other channels (OIII and SII) are too faint.

- Collect more OIII and SII to assist the final colour allocation.

- Check out other imagers to get some idea of how things can look. If you are doing more traditional RGB images you may need to check whether your data is showing faint dust / Nebulosity or it's Light Pollution gradients or a flats issue

Individual responsibility
Do we have any?

Each of these images is taken from monochrome Ha data and colourised in Photoshop. There is NO scientific basis for the colour distribution

Posting online
Should I care?

- Do I want people to know how the image has been created?

- Am I being honest?

- How can I ensure that people know what the image really is?

- Is this able to be policed?

- Can this affect the view of future astrophotographers?

- Can this affect the 'science'?

Posting online

Do I have a responsibility?

- If you post an image online that is more artisitic than scientific then it should be stated.

- You have no control how that image is then shared across social media platforms.

- Once shared a number of times, this can become THE go to image for people looking at a particular target

- Could this affect the perception of this image over time?

- Could this change how future astrophotograpghers process their images?

Does stacking change the image?

1 exposure at 600s v's 534 exposures

Stacking increases detail….. It's not showing what is not there, but it could be enhancing nebulosity in this case in relation to how bright it should be seen compared to the background. Is this creating a false relationship?

Astrophotography isn't all nice pictures

The science of asteroid hunting

This is undisputable science at work.

I can identify the exact asteroid, I know the location and time. We know the distance, speed and size etc.

There's zero manipulation apart from an automatic stretch to see the asteroid

Amateurs can help science by looking for asteroids that have not been logged or can make additional recordings of known asteroids.

Art or Science?
In conclusion

- We should be honest and open about the data used in an image

- We should give the channel distribution

- If a filter other than Luminance is used as a luminance layer, this should be clear

- If a filter has been added in the colour channels we should say

- Be aware of how your data information can be lost over time and how that could affect the portrayal of the image online

- The internet is a 'forever encyclopaedia' – What you upload will be there forever

2016 in pictures

All images are produced by Sara Wager www.swagastro.com
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Thank you

Sara Wager