

Online Support for Centre Assessors (OSCA)

Controlled Assessment Support

Reference Material: Exemplar 3

GCSE in Astronomy

5AS02 - Unit 2

Issued: 2012/13

PREFACE

Exemplar Use

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Notes on the Exemplar

Please note that:

- The original portfolio work has been reformatted and condensed to reduce the file size and document downloading time.
- The portfolio exercises are original candidate work and may contain grammatical errors and spelling mistakes.
- Some items may have been removed altogether, please refer to the notes by the Principal Moderator for specific references.

Principal Moderator's Notes on the Exemplar:

Messier objects Exemplar

Design

In 1771, French astronomer Charles Messier composed a list of astronomical bodies. He did so because he was a comet hunter, and was frustrated by things that resembled, but were not, comets. Originally there were only 45 objects in the list, but by the time Messier published the list, it contained 103 objects. After the death of Messier and his assistant Mechain, others continued to add to the list.

The purpose of this observation is to take pictures or to draw sketches of several Messier objects. The objects I chose are:

- M42 The Great Orion Nebula
- M51 The Whirlpool Galaxy
- M1 The Crab Nebula
- M43 De Mairan's Nebula

I checked on the robotic telescope's website to see when my chosen objects would be in the sky. I found that M42 and M43 were circumpolar from its location and the rest, M51 and M1, were in the sky most of the time, occasionally setting.

I then logged on to the robotic telescope site and submitted several jobs for each object, with a different exposure time for each one, so that I would most likely get a good image back for each one.

Observations

Observation #1: The Whirlpool Galaxy (M51)



Seeing Conditions: Antoniadi I

Time: 01:36 am on 6th April 2011

Observation #2: The Crab Nebula (M1)



Seeing Conditions: Antoniadi I

Time: 23:56 am on 29th March 2011

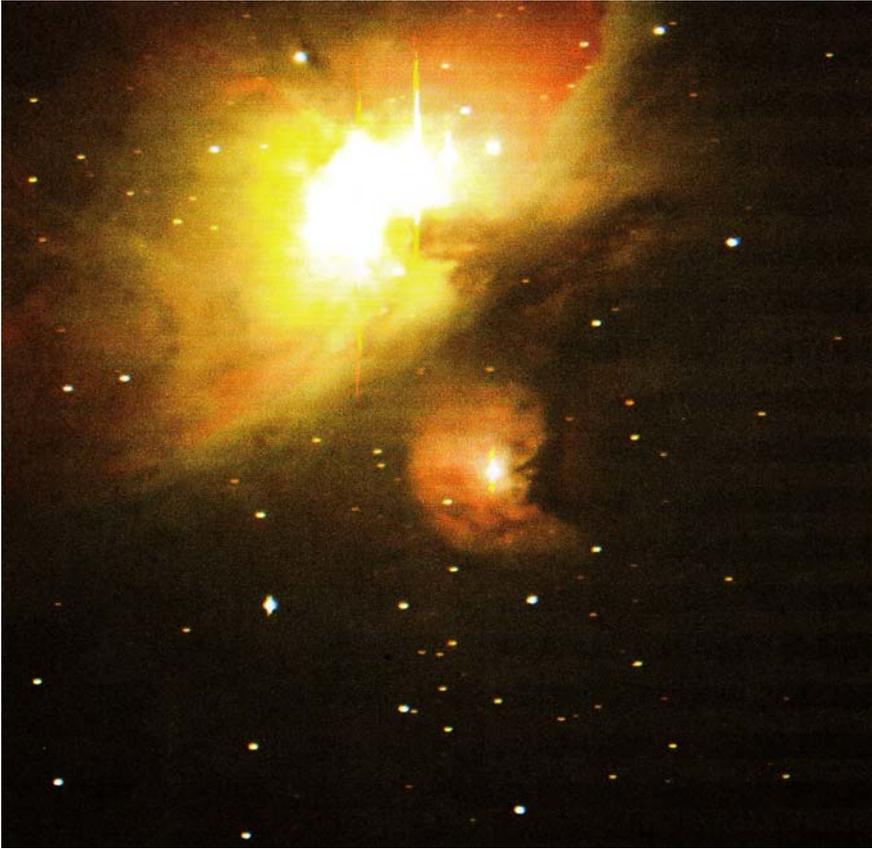
Observation #3: The Great Orion Nebula (M42)



Seeing Conditions: Antoniadi I

Time: 22:27 am on 12th April 2011

Observation #4: De Mairan's Nebula (M43)



Seeing Conditions: Antoniadi I

Time: 22:40 am on 12th April 2011

Analysis

In the Analysis section I am going to compare the images from the robotic telescope with some images taken by the Hubble Space Telescope.

Observation #2: The Crab Nebula (M1)

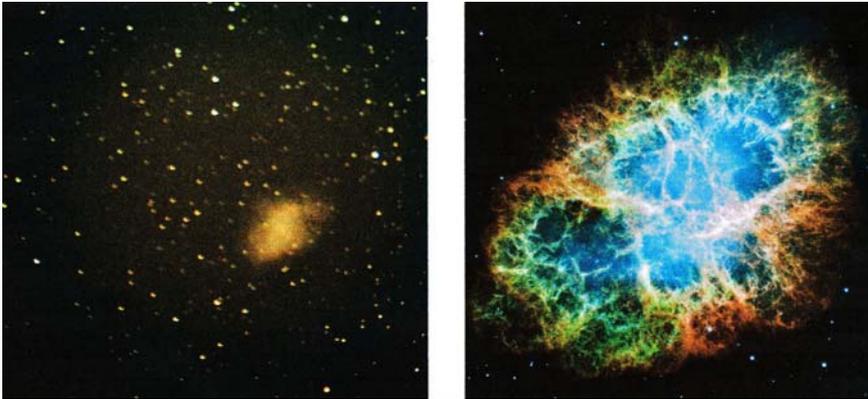


Image: NASA

The HST image is better than my robotic telescope image due to a number of factors. Firstly, the aperture on the HST is 2400mm whereas it is only 400mm. This allows for more detail in the image as the wider lens can take in more light. Secondly, the magnification on the HST is much greater than from my robotic telescope, so a more in-depth view of the subject can be taken.

Thirdly, the HST is in space whereas my robotic telescope is ground-based. This means that the HST does not get interference from the atmosphere (eg clouds etc). Finally the HST is maintained by NASA so more funding can be put into technology, hardware and personnel etc.

Observation #3: The Great Orion Nebula (M42)



Image: NASA

The HST image is, again, better than the robotic telescope image. This is most importantly down to the fact that the aperture of the HST is 2400mm, as mentioned before, whereas the robotic telescope aperture is only 400mm. Also, the HST's magnification is bigger than that of my robotic telescope, allowing more detail to be seen 'close up'.

In addition, my robotic telescope image was accidentally over-exposed when photographing M42, unlike the HST image. As mentioned before, the HST is a satellite and isn't affected by the atmosphere, unlike my robotic telescope.

Evaluation

Overall I think my observations went quite well. However, as I was using a robotic telescope, controlled over the internet, there were certain problems encountered.

Firstly, the robotic telescope had some technical problems one weekend and was unable to take my images. Secondly, it was slow to take some of my photographs (possible because they were not visible straight away).

I also over-exposed a couple of my pictures (*M42 and M43) and you can see some 'light-bleeding'. I could have improved the observations by decreasing the exposure time on these two shots. I could also have ordered my pictures sooner so that I had time to get more images.