Deep Space

A BRIEF INTRODUCTION TO DEEP SPACE ASTRONOMY

FOREWORD

Deep space is the stuff beyond our solar system, therefore pretty much everything that exists, excluding 8 planets, an average star, a number of rocks, chunks of ice and bits of stuff not yet consumed by the Sun. The other side of the solar system seems deep enough to me, but if we left Earth today at the speed of light it would be about 4 years before we got to the next thing we observe, the start of the region we define as “Deep Space”, and we would still be in our own galaxy.

Some may argue that astronomy is all about the deep space stuff, and that would be a fair call, as we grow up looking at stars more than planets, and even the planets look like the stars to the naked eye. With a good telescope and a camera, the images that can be produced from the deeper regions of our galaxy are true art.

The answers to the creation of the Universe lay within the matter of deep space and that is what drives science to reach further and further into the space time continuum.

Introduction

Observing deep space is a little more challenging than much of our solar system. Distances are large and the only things we can practically see are stars and stuff that is illuminated by them. Planets orbit many stars and we find more and more as we keep looking. Their detection relies on calculating subtle changes in light and the gravitational shifts shared by suns and planets.

If you are at a dark skies site you will notice just how many stars there are. When you start observing with binoculars you very quickly realise you were missing many as there is a limit to what level of magnitude you can see with the naked eye. You will then look through the eyepiece of a telescope and see that within a small arc of space there are as many stars as you may have ever observed in the entire night sky.

As we increase magnification, we start to see clusters of stars seemingly tightly bunched as if they are on top of each other. We know this is not reality but the scale is now mind blowing. We now start to record the images and stack frames of data and the nebulae show their glory. It is an endless process that trades time for beauty and creates the images that draws the unconverted to the world, or should I say, Universe of astronomy.

The Objects of Deep Space

There are billions of deep space objects and with the aid of star charts, we can find the main objects of interest reasonably quickly. There are a number of catalogues that define the objects but the main ones I use are Messier and NGC (New General Catalogue).

Stars are the basis of pretty much everything we observe. They are either the direct observation or they provide the light that makes other things visible. There is however a limit to how much time you want to spend looking at a single light source so we will mostly view the stars in a collective form. The science behind the stars is great to know but we could spend a lifetime on that without ever looking at one.

Constellations: the naked eye is good for observing constellations as they cover a wide area of the night sky. Constellations are patterns of stars that humans named (personalised) many years ago. They continue to be a corner stone to our observations providing a way of navigating our way around the sky.

Clusters: to the naked eye you may see a smudge in the sky, as if you can't quite focus on a star, however what you are actually observing is a large number of stars that appear close together on the celestial plane. When observed with a telescope they will reveal that they are actually many stars; a cluster.

Nebulae: these giant clouds of dust are where new stars and galaxies start their lives. There are many good examples that appear as "smudges" in the sky but reveal their hidden beauty with telescopes and astrophotography.

Milky Way Spiral Arm: the band of light that we see across the night sky is a spiral arm of our galaxy. Our galaxy is known as a spiral galaxy and this is one of those arms. It is about 106,000 lights years across and stretches a reasonable distance across the night sky. It is an easy object to photograph due to its size and brightness.

Galaxies: everything that we observe when it comes to the stars are objects that are within our own galaxy. There are billions of galaxies throughout the Universe and a number of them are visible in the night skies. They will have their own array of beautiful objects but we observe them as a singularity.

The science that governs our solar system holds true to all of the Universe. Our study of our Sun provides the information that governs all the stars. Our planets were formed by the same matter that all planets are formed from and how a solar system works is governed by the universal laws of physics.

We do look for answers in deep space but as an astronomer I will, for now, enjoy the beautiful and interesting things it has to offer that we don't have in our solar system.

Summary
Deep space offers the most to see, but in many ways, offer the least to talk about; a *picture is worth a thousand words*, has never been so true.

A selection of image taken with a DSLR camera on an equatorial mount and with an Unistellar eVscope digital telescope.