

# The New Frontier

## Series 1

### Episodic breakdown

#### **Episode 1 - From There To Here**

Series introduction and the study of Earth from orbit. The sky above is littered with stars and countless galaxies. It is where we come from and where we are destined to return. The first phase of this journey is complete, now commences the second, with robotics, advanced technologies and sheer daring we are now going where before we only dreamt.

#### **Episode 2 - Return To The Moon**

The Moon, our closest celestial companion. Our indispensable dance partner through the cosmos. Lighting our night sky and gently tugging at our shores. Few have walked on her surface, though her allure remains strong, once again we are glancing her way with renewed interest and with a view to return very soon.

#### **Episode 3 - The Inner Worlds**

They orbit between us and our Star, the inner worlds; hidden within the sun's glare often only visible at sunrise or sunset. Venus the first and brightest star in the evening sky, and Mercury fleeting across the solar disk. They are half of our solar system's terrestrial planets yet we know so little. As we begin to take a closer look at our companions they are posing more questions than answers.

#### **Episode 4 - Next Stop Mars**

It has fired our imaginations for millennia, Mars, the God of War and the source of Man's science fictional demise. We know the dry barren planet was once flowing with vast reservoirs of water, the sky thick and filled with clouds and the tantalizing possibility of life. It is the only other place in our solar system than Man might one day call home.

#### **Episode 5 - The Planet Makers**

From the beginnings of our Solar System four and half billion years ago there remains tantalizing clues to its evolution; remnant debris: asteroids and comets. They vary in size from grains of dust to mountain sides, footballs to planetoids. They were the building blocks of the planets and perhaps carry the origins of life itself. Now within our grasp these rocks of ice and dust are ready to give up their secrets.

**Episode 6 - The Ice Giants**

Beyond the asteroid belt lay the ice giants, some can be seen with the naked eye, others only glimpsed once by a passing probe. We are again sending cameras to the edge of the solar system giving us new insights into the evolution of our worlds.

**Episode 7 - The Moons of Olympus**

These are the the Moon's of the gas giants. Each a unique and mysterious world of its own. Some have oceans of water, geysers of Sulphur or atmospheres of plastic. Some are just now being seen at the outer rim of our solar system, all are worthy of much more scrutiny.

**Episode 8 - The Sun**

It powers the machinery of nature; our weather, encourages and sustains life on land and at sea. When it sets in the West it reveals to us its many billions of sibling stars populating the night sky. We study our Sun closely, and like a Rosetta stone it can reveal the secrets of all the other stars above.

**Episode 9 - Exo Planets**

As scientists and astronomers peer closer at nearby stars with ever more fidelity they are discovering planets; exo planets, worlds outside our own solar system. With technological advances and improved techniques scientists are discovering more and more worlds every day. With confidence scientists now calculated there could be as many as 40 billion Earth like planets in our Milky Way galaxy alone.

**Episode 10 - Edge of the Universe**

The night sky is a time machine. The further we look out into the universe the further back in time we reach. What we see in the night sky is only a small percentage of the contents of the Universe, most is dark matter and dark energy we know it exists; however its nature eludes us for the moment.

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# The New Frontier

## Series 2

### Episodic breakdown

#### **Episode 1 - The Astronauts**

One hundred kilometres above the Earth's surface lies an invisible frontier: the edge of space. This is the Karman Line, the boundary between our planet's atmosphere and what lies beyond. What does it take to cross that line?

#### **Episode 2 - Getting There**

Launching payloads into space is a very difficult task, historically rocket launches are the proverbial 'swords into ploughshares' Missiles designed to carry atomic warheads now send satellites and probes into the solar system. Ironically it's one of the few exploits Mankind undertakes that doesn't occur in nature.

#### **Episode 3 - Orbit**

The International Space Station is undoubtedly the jewel in the crown of low Earth orbit; observation post, research lab and class room. Equally however there are many other assets orbiting Earth that are even more important to our everyday lives; delivering communications, weather observation, global positioning and resource management the list is growing with every year.

#### **Episode 4 - Shore To Shore**

Our seafaring nature has translated well to the space age, seeking to sail out into the unknown in search of riches of one kind or another. While Europe and Asia continue their interest in the resource rich Moon, The United States and NASA have set their sights on nothing less than manned missions to Mars. Can they manage to go shore to shore on the most dangerous of unknown seas, deep space.

#### **Episode 5 - Mars: Adapt or Leave**

As the latest successes and failures come and go Mars continues to give up her secrets. Invisible clouds are revealed with ultraviolet light and the search for the source of methane continues with ExoMars. As we prepare to land humans on the red planet, getting there is one thing; staying long term is another, can we really conquer this planet?

#### **Episode 6 - Emissaries**

Our solar system is vast, from our own star the Sun to Earth is nearly 150 million kilometers or 1 Astronomical Unit. Jupiter is 5.2 AU distant and Pluto up to 48AU, the solar system extends far beyond this into interstellar space. We humans cannot yet travel that sort of distance, however we can and do send our robots and probes in our place; and the results are astounding.

### **Episode 7 - Danger Asteroids Ahead**

The question often rises is the cost of space exploration really worth it? Could the money be better spent elsewhere. If so one space program would have to remain. The planetary defence program, to locate identify and deflect a wayward asteroid from hitting Earth and destroying our civilization because at last count there were 15,000 possible dangerous candidates close to Earth.

### **Episode 8 - First Light**

For an instrument first developed as recently as the 17<sup>th</sup> century, the telescope has travelled a long way. The latest version of the once-humble telescope will be going a lot farther - carrying us ever closer to the first light that ever bathed the Universe in which we live.

### **Episode 9 - Stars Above**

Stars are a bit like human beings. They can be warm or cold, they come in all kinds of shapes and sizes... and, let's face it, they can be dim or bright. And recent discoveries suggest that the number of stars in our galaxy alone, the Milky Way, may exceed 200 billion. Just what are these citizens of the night sky?

### **Episode 10 - The Dark Side**

Perhaps that American politician was right. There are indeed things we know we don't know. For instance, cosmologically speaking, we know we don't know much - and certainly not nearly enough - about two of the enduring mysteries of the Universe. Dark Matter and Dark Energy, it's little wonder that scientists are devoting so much grey matter and energy of their own to finding out as much as they can.

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# The New Frontier

## Series 3

### Episodic breakdown

#### **Episode 1 - Living in Space.**

How do astronauts cope with living in space? The unique environment, the lack of taste in their food and the smell of canned air all contribute to the stresses of living and working in space.

#### **Episode 2 - Atmosphere.**

Climate change and pollution are having dire consequences for the atmosphere of our planet, this episode updates the latest technology and science looking into the health of our air.

#### **Episode 3 - Flight Status.**

The latest updates on the new space hardware about to launch us into the next generation of space flight some rockets and capsules are on time others not so fortunate.

#### **Episode 4 - Invasion Mars.**

The EXO Mars and Curiosity continue their scientific discoveries as we prepare new missions both robotic and manned to the Red planet Mars.

#### **Episode 5 - Juno, Cassini and Beyond.**

The Cassini space craft has completed its mission over Saturn, Juno has reached its target and has commenced its scientific observations of the giant planet Jupiter. and New Horizons speeds on it its next encounter at the edge of the solar system.

#### **Episode 6 - Slingshot.**

Sending probes throughout the solar system is a mathematicians dream and an engineers nightmare, sling shotting probes around other planets to arrive at their destination, we checkout the latest probes about to slingshot about the solar system.

#### **Episode 7 - Living Planet.**

With continuous observation of earth from orbit scientists have built a data set over time that reveals much about how the Earth breaths and life sustains itself on this living Planet.

#### **Episode 8 - Cosmic collisions.**

Cosmic and x rays, these mysterious and highly powerful particles from deep space are being investigated to finally discover where they come from.

#### **Episode 9 - Gravity.**

LISA pathfinder, has led the way for a space based gravity wave detector, what are gravity waves and why are they so hard to detect?

#### **Episode 10 - Interface.**

The Ionosphere, where the Earth interfaces with space, is little understood, it effects radio communications, GPS signals and satellites alike, it changes between day and night and is influenced from space and from Earth, new satellites have been launched to study this zone.

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