

### **How Rare Is Earth? – Dr. Stephen Eastmond (60 minutes)**

*Experience the rarity and beauty of our planet Earth's position within our Solar System and within the Milky Way Galaxy. This introductory astronomy show features a tour of the night sky under the Planetarium dome, giving an orientation of the more prominent constellations and our North Star.*

Meets 3<sup>rd</sup> Grade Next Generation Science Standards (NGSS) In Area 3 as follows:

PS2A: Forces and Motion: Show demonstrates the force of gravity and planetary motion

- ✓ The effects of the sun's gravitational pull on the planets that orbit it
- ✓ Our moon's gravitational effect on the Earth's orbit around the sun, and its effect on the ocean tides
- ✓ Additionally covers pattern prediction: When a past motion exhibits a regular pattern, future motion can be predicted from it.  
(Planetary orbits and Comets)

PS2B: Types of Interactions

- ✓ Gravity
- ✓ Tidal
- ✓ Orbital

Meets 5<sup>th</sup> Grade Next Generation Science Standards (NGSS) In Area 5 as follows:

PS2B: Types of Interactions: Show demonstrates the force of Earth's gravity on nearby objects

- ✓ Earth's gravitational pull on our Moon
- ✓ Our moon's gravitational effect on the Earth's orbit around the sun, and its effect on the ocean tides

ESS1A: The Universe and its Stars: Show demonstrates the scale of our Solar System

- ✓ Distance from the Sun to Earth
- ✓ Distance from the Earth to the Moon
- ✓ Distance from the Earth to the nearest Star outside our Solar System

ESS1B: Earth and the Solar System: Show demonstrates the orientation and orbit of the Earth, Moon and Planets

- ✓ Planetary orbits around the sun
- ✓ Earth's orbit around the Sun and the Moon's orbit around the Earth
- ✓ The ecliptic and paths of the Sun, Moon and Planets through Constellations
- ✓ Earth's axial tilt and seasons
- ✓ Position of Earth in Galaxy (Goldilocks Zone)

### **What Color is Your Planet? – Mr. Bob Menn (1.15 minutes)**

*Discover how astronomical observations of planets and stars have given us clues to their composition and environments. As we visit the planets of our solar system, the show covers science curriculum, presenting topics such as the nature of gravity; how time is measured with the orbits of the planets around the sun; what we know about comets; what is an eclipse; why the moon has phases; and how do we measure the distance between planets and stars in space. What Color is Your Planet also reveals how we are now citizens, not just of the Earth, but of the entire solar system.*

Meets 2<sup>nd</sup> Grade Next Generation Science Standards (NGSS) as follows:

ESS1.C: The History of the Planet Earth: The show presents how the Earth has changed over time.

- ✓ Internal geological changes and external forces, have affected the shaping of our planet: Volcanoes, bombardment from space by meteors and comets.
- ✓ Many of these changes happened very slowly over long periods of time. Some changes, such as comets strikes, led to dramatic and rapid changes, such as extinction of plants and animals, such as dinosaurs.

ESS1.C: Earth Materials and Systems: The show demonstrates how water and wind have shaped the Earth's environment.

- ✓ Water played a major role in the creation of continents and oceans on Earth.
- ✓ The wind and weather also shape the earth through erosion and rain storms. Earth is contrasted with conditions on Mars

ESS2.C: The Roles of Water in Earth's Surface Processes. The show demonstrates how water plays a major role in the surface processes of the Earth.

- ✓ Water is found in oceans, lakes and rivers as a liquid and as a solid in ice. Ice is commonly found in glaciers and at the poles.
- ✓ Water is a necessary component for life.

Meets 3<sup>rd</sup> Grade Next Generation Science Standards (NGSS) as follows:

LS2.C: Ecosystem Dynamics, Functioning, and Resilience: The show demonstrates the effect of environmental changes.

- ✓ The show discusses how environmental changes can lead to changes in temperature and other factors. Environmental changes affect how life forms adapt to survive. Some life forms no longer exist on Earth, like dinosaurs.

PS2A: Forces and Motion: The show demonstrates the force of gravity and planetary motion

- ✓ The effects of the suns gravitational pull on the planets that orbit it
- ✓ Our moons gravitational effect on the Earth's orbit around the sun.
- ✓ Additionally discusses the magnetic field created by the spinning molten iron core of the Earth and how this field allows atmosphere and water to remain on the planet, which sustains life (contrasted with Mars, which lost its magnetic field, which caused the loss of its water and atmosphere).

PS2B: Types of Interactions

- ✓ Gravity
- ✓ Orbital
- ✓ Magnetic

Meets 5<sup>th</sup> Grade Next Generation Science Standards (NGSS) In Area 5 as follows:

PS2B: Types of Interactions: Show demonstrates the force of Earth's gravity on nearby objects

- ✓ Earth's gravitational pull on our Moon

- ✓ Our moons gravitational effect on the Earth's orbit around the sun, and its effect on the ocean tides

ESS1A: The Universe and its Stars: Show demonstrates the scale of our Solar System

- ✓ Distance from the Sun to Earth
- ✓ Distance from the Earth to the Moon
- ✓ Distance from the Earth to the nearest Star outside our Solar System

ESS1B: Earth and the Solar System: Show demonstrates the orientation and orbit of the Earth, Moon and Planets

- ✓ Planetary orbits around the sun
- ✓ Earth's orbit around the Sun and the Moons orbit around the Earth
- ✓ The ecliptic and paths of the Sun, Moon and Planets through Constellations
- ✓ Earth's axial tilt and seasons
- ✓ Position of Earth in Galaxy (Goldilocks Zone)

**A Tour of Our Solar System** – NASA Astronomer Patricia Sullivan (60 minutes)

*NASA Astronomer, Patricia Sullivan guides you through a stunning visual and musical Tour of Our Solar System; from the International Space Station, to our Moon, out to the planets, beyond the boundary of our Galaxy, and out into the unknown edges of our Universe. This unique educational experience shares a “one world, in this together” approach to learning.*

*(Saturday evening shows are followed with “Night Sky Live” with a guided orientation of the celestial objects visible that evening. Weather permitting)*

Meets 3<sup>rd</sup> Grade Next Generation Science Standards (NGSS) In Area 3 as follows:

PS2A: Forces and Motion: Show demonstrates the force of gravity and planetary motion

- ✓ The effects of the suns gravitational pull on the planets that orbit it
- ✓ Our moons gravitational effect on the Earth's orbit around the sun, and its effect on the ocean tides
- ✓ Additionally covers pattern prediction: When a past motion exhibits a regular pattern, future motion can be predicted from it.  
(Planetary orbits and Comets)

PS2B: Types of Interactions

- ✓ Gravity
- ✓ Tidal
- ✓ Orbital

Meets 5<sup>th</sup> Grade Next Generation Science Standards (NGSS) In Area 5 as follows:

PS2B: Types of Interactions: Show demonstrates the force of Earth's gravity on nearby objects

- ✓ Earth's gravitational pull on our Moon
- ✓ Our moons gravitational effect on the Earth's orbit around the sun, and its effect on the ocean tides
- ✓ Earth's gravitational pull on others objects in orbit around it: The International Space Station and Satellites

ESS1A: The Universe and its Stars: Show demonstrates the scale of our Solar System

- ✓ Distance from the Sun to Earth
- ✓ Distance from the Earth to the Moon
- ✓ Distance from the Earth to the nearest Star outside our Solar System

- ✓ Definition of Solar System vs. Galaxy vs. Universe (Deep Field Hubble is observed)

ESS1B: Earth and the Solar System: Show demonstrates the orientation and orbit of the Earth, Moon and Planets

- ✓ Planetary orbits around the sun and variations in speed
- ✓ Earth's orbit around the Sun and the Moons orbit around the Earth
- ✓ The ecliptic and paths of the Sun, Moon and Planets through Constellations
- ✓ Earth's axial tilt and seasons

PS1A: Structure and Properties of Matter: Show demonstrates the effects of solar activity

- ✓ Solar flares and Coronal Mass Ejections
- ✓ Speed of solar wind through space
- ✓ Effects of solar wind entering Earth's atmosphere (Aurora Borealis/Northern Lights)

(\*College level presentation for extra credit Astronomy 109 & 110 and high school students) (Can be presented at lower level as well)