

# **NASA Langley Research Center/National Alliance of Black School Educators (NABSE) Lecture Series for 2010**

## **WEBCAST SERIES**

### **Lecture 1: Exploring the Planets: Visiting Other Worlds**

**January 29, 2010 1:00 – 2:00 P.M. Eastern Standard Time (EST)**

We will go on a tour of the planets and explore the surface features, atmospheric structure and composition and moon and ring systems of the planet. The planets may be divided into two distinct groups, separated by the asteroid belt. The terrestrial or inner planets (Mercury, Venus, Earth and Mars) have solid surfaces surrounded by atmospheres composed mostly (95%) of carbon dioxide (Venus and Mars) or nitrogen (78%) and oxygen (21%) (Earth). The outer planets (Jupiter, Saturn, Uranus and Neptune) have very thick and massive atmospheres, composed mostly of hydrogen (about 90%), with smaller amounts of helium (10%), no evidence of a solid surface beneath their thick atmospheres and have numerous moons and multiple systems of rings orbiting around them.

### **Lecture 2: The Earth System**

**February 26, 2010 1:00 – 2:00 P.M. Eastern Standard Time (EST)**

The components of the Earth system, the lithosphere (the solid planet), the hydrosphere (the water), the atmosphere (the air) and the biosphere (life) will be discussed. Various processes on the Earth system will be discussed, including the structure of the Earth's interior and surface, the formation of impact craters, volcanism and volcanic craters, the circulation of the atmosphere and oceans, the water cycle (evaporation, condensation and precipitation), the formation of clouds and meteorological phenomenon. The interactions between the components of the Earth system will be discussed.

### **Lecture 3: Earth and Mars: A Tale of Two Planets**

**March 26, 2010 1:00 – 2:00 P.M. Eastern Standard Time (EST)**

Today, Mars is a cold, dry, very inhospitable planet. The thin atmosphere of Mars has a surface pressure of only about 6 millibars (the pressure of the Earth's atmosphere is about 1013 millibars). It is now believed that early Mars was a very hospitable planet with abundant surface water in the form of lakes, rivers and even planetary-scale oceans with an atmospheric pressure comparable to that of the Earth's atmospheric pressure. What caused the very divergent evolutionary paths of Earth and Mars? It is believed that some 500 million years after its formation about 4.6 billion years ago, Mars lost its planetary dipole magnetic field, which protected its atmosphere from the "sand-blasting" effects of the solar wind, the continuous stream of energetic protons, electrons and ions emitted by the Sun into interplanetary space. Once Mars lost its planetary magnetic field, the direct interaction of the energetic solar wind particles with the atmosphere resulted in Mars losing more than 99% of its atmosphere. Once Mars lost the bulk of its atmosphere surface liquid water was no longer stable and was either lost to space and/or migrated to the sub-surface of Mars as frozen water.

## **Lecture 4: Global Warming: Causes and Consequences**

**April 30, 2010 1:00 – 2:00 P.M. Eastern Standard Time (EST)**

The temperature of the surface of the Earth and the other planets is controlled by incoming solar radiation and the outgoing thermal or infrared radiation generated at the surface by the absorption of the incoming solar radiation. As the surface-emitted thermal radiation travels upward through the atmosphere, it is absorbed and then re-emitted by certain atmospheric gases, resulting in an additional warming of the surface. This additional warming is called the “greenhouse effect.” Gases that absorb and then re-emit thermal radiation are called “greenhouse gases.” Carbon dioxide, while only a very minor gas in the atmosphere, is an important greenhouse gas. Measurements indicate that atmospheric concentrations of carbon dioxide are increasing, most likely as a result of certain human activities, like

the combustion of fossil fuels for transportation and energy generation and the burning of vegetation for deforestation and other land-clearing activities. The causes and consequences of global warming will be discussed.

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**View the web casts at the following web site: <http://dln.nasa.gov>**