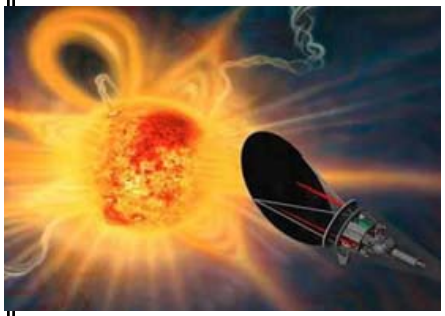
DISTINGUISHED LECTURER SERIES

VCU
MECHANICAL ENGINEERING

From Kitty Hawk to the Southern Highlands: The Exploration of Mars by Airplane



Dr. Joel Levine
NASA Langley and College of William and Mary

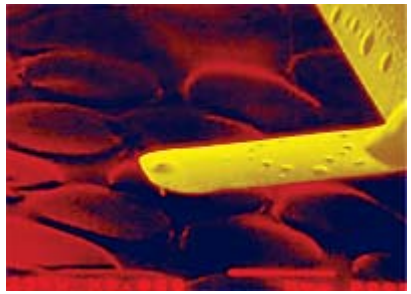
29 January 2007
Social Hour: 11:30-12:00 noon
Seminar: 12:00–1:00 pm
Room 105
Engineering Building

ABSTRACT

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). 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. 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. The talk will conclude with a discussion of the proposed NASA Aerial Regional-scale Environmental Surveyor (ARES) of Mars Mission, a robotic, rocket-powered, controllable airplane. ARES will fly about a kilometer above the surface of Mars, cover hundreds of kilometers of distance, and look for signs of present-day life on Mars by searching for gases of biogenic origin in the atmosphere. The, next step in the robotic exploration of Mars, ARES, will also search for reasons that the atmosphere and climate changed so drastically.

BIO

Dr. Levine is a Senior Research Scientist at NASA Research Center. He received his PhD from the University of Michigan in Atmospheric Science. Dr. Levine is also an Adjunct Professor of Physics at the College of William and Mary. Dr. Levine's areas of research are the origin and evolution of planetary atmospheres, atmospheric photochemistry and the non-equilibrium thermodynamic sources of atmospheric gases, measurements of atmospheric trace gases from aerial platforms, and the use of aerial platforms to study planets. He has authored and co-authored more than 150 peer-reviewed journal articles, book chapters and reports. Dr. Levine has been engaged in many NASA research projects including Aerial Regional-scale Environmental Surveyors.



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