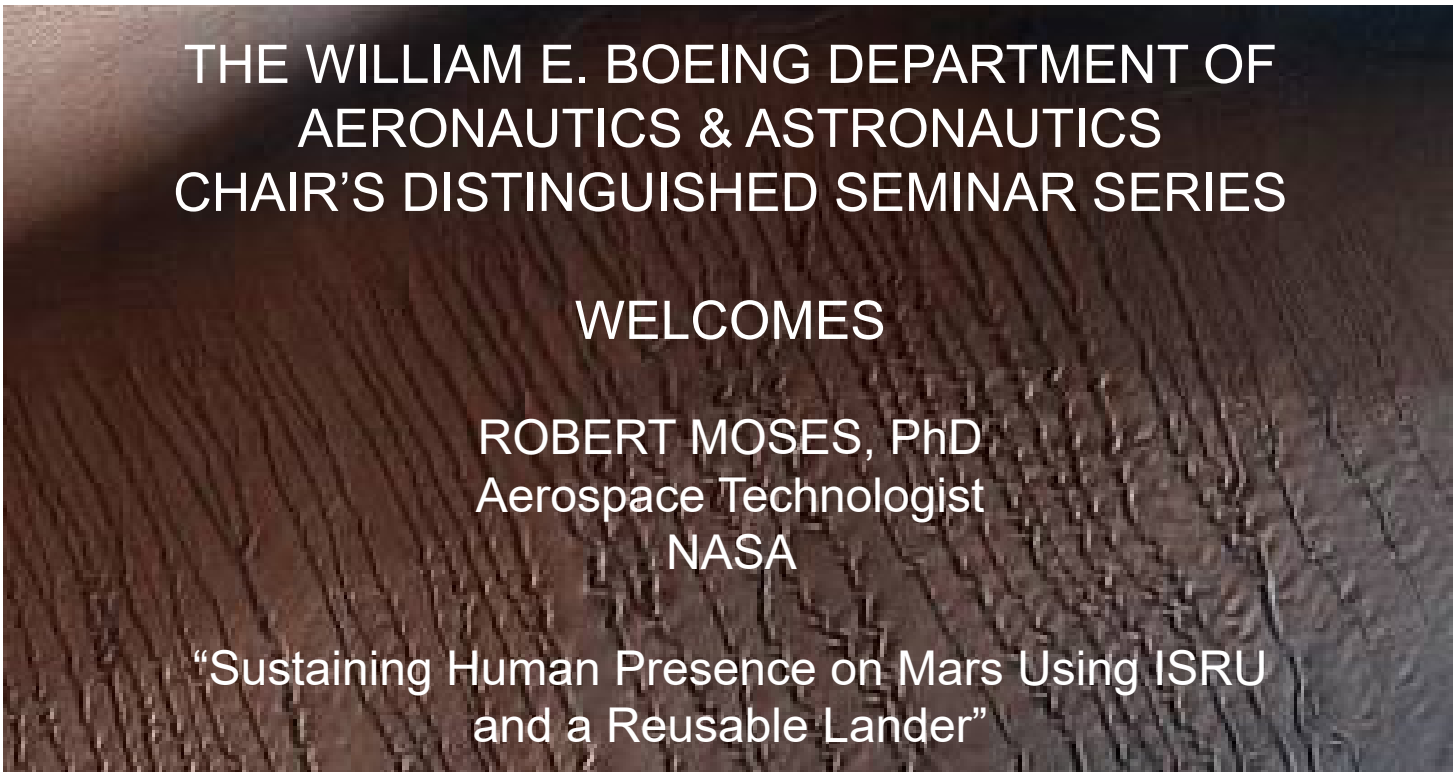

THE WILLIAM E. BOEING DEPARTMENT OF AERONAUTICS & ASTRONAUTICS CHAIR'S DISTINGUISHED SEMINAR SERIES

WELCOMES

ROBERT MOSES, PhD
Aerospace Technologist
NASA

"Sustaining Human Presence on Mars Using ISRU and a Reusable Lander"

ABSTRACT

This presentation highlights a study of the impact of ISRU, reusability, and automation on sustaining a human presence on Mars, requiring a transition from Earth dependence to Earth independence. The study analyzes the surface and transportation architectures and compared campaigns that revealed the importance of ISRU and reusability. A reusable Mars lander, Hercules, eliminates the need to deliver a new descent and ascent stage with each cargo and crew delivery to Mars, reducing the mass delivered from Earth. As part of an evolvable transportation architecture, this investment is key to enabling continuous human presence on Mars. The extensive use of ISRU reduces the logistics supply chain from Earth in order to support population growth at Mars. Reliable and autonomous systems, in conjunction with robotics, are required to enable ISRU architectures as systems must operate and maintain themselves while the crew is not present. A comparison of Mars campaigns is presented to show the impact of adding these investments and their ability to contribute to sustaining a human presence on Mars. The author also mentions how the Earth's Moon offers an opportunity to test some mission systems prior to insertion into a Mars campaign.

WILLIAM E. BOEING
DEPARTMENT OF AERONAUTICS & ASTRONAUTICS
UNIVERSITY of WASHINGTON

Monday, March 19, 2018
4:00 - 5:00 pm
Guggenheim Hall Rm. 218
UW Campus, Seattle, WA

THE WILLIAM E. BOEING DEPARTMENT OF **AERONAUTICS & ASTRONAUTICS**

Chair's Distinguished Seminar Speaker

Robert Moses, Ph.D.

Aerospace Technologist
NASA

Biography

Bob Moses joined NASA in 1989, contributing to flight test teams developing hardware for shuttle missions. In 1991, he participated in the launch of his first hardware mission onboard Atlantis, STS-37. Following this successful launch, entered a NASA-sponsored graduate program until 1997. Up to 2003, participated in a multi-national aeronautics program to solve and control unsteady aerodynamics on twin-tail fighters, resulting in the redesign of the F-22 and the Joint Strike Fighter. He also created a new entry descent and landing technology called Regenerative Aerobraking to recapture some of the energy lost during aerobraking at Mars. In 2004, he joined the Exploration Engineering Branch at LaRC and won several Agency-level bid proposal opportunities under the Exploration Mission Directorate for "In-Space Assembly of Modular Structures" and "Inflatable Decelerators for Return from the Moon". Shortly thereafter, he joined the Constellation Program Flight Test Office at Johnson Space Center to co-lead the development of the Integrated Flight Test Strategy that created the flight demonstration manifest aimed at retiring risk prior to docking a human-rated Orion with the ISS. Afterward, he remained in the Atmospheric Flight and Entry Systems Branch where he mentors student interns and leads technology development for crewed missions to Mars. Robert worked on an advanced technology project to explore a new energy theory, and to develop radiation protection devices for the in-space habitat under the Radworks Program led by Johnson Space Center. In 2014, Robert joined a small Blue Sky study team to derive a strategy for using In-Situ Resource Utilization and a reusable lander called Hercules to enable crewed missions to Mars by the 2030s. AIAA 2015 4479 and AIAA 2017 5288 illustrate some details of this work.

Robert mentors students at Florida Institute Technology while also working with the Buzz Aldrin Space Institute (BASI) to explore cycling pathways for Earth-Moon and Earth-Mars that sustain human presence.

His Current research focuses on: autonomous site preparations to achieve safety and sustainability prior to astronauts leaving Earth for Mars; ISRU, reusable lander-ascent vehicles, reusable interplanetary transportation including Aldrin Cyclers and other semi-cycler options, in-space assembly to reduce campaign costs for affording safety; and crew health issues and mitigation strategies that affect vehicle designs and campaign architectures; and crew health proposition for fast transits to enable humans to Mars.

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