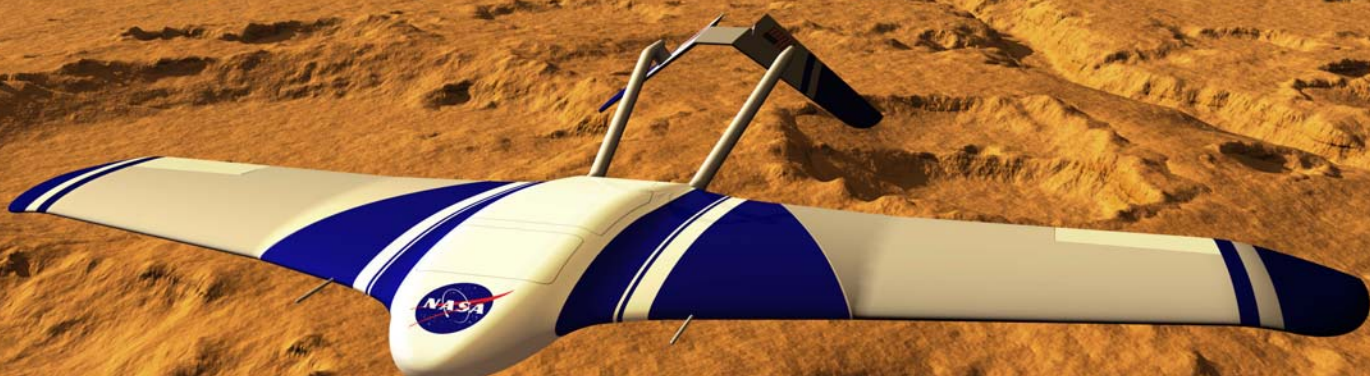


Robotic, Powered Airplanes for Planetary Exploration

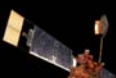

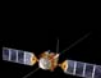

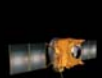






An Exciting New Platform



Planetary Airplanes: A New Platform for Planetary Science & Exploration

Autonomous airplanes open a new realm of planetary science discovery. The unique near-surface perspective, regional-scale coverage, and controlled survey capability offered by these platforms enable a new class of science and exploration, complementing and extending the Mars Exploration Program.

- Bridges critical scale and measurement gaps of remote sensing and surface exploration
- Simultaneous, in-situ and remote, regional-scale measurements of the atmosphere, surface, and interior of Mars
- Pattern flying to conduct atmospheric, aeromagnetic, gravimetric, geologic, or astrobiologic surveys
- High-resolution imaging, spectroscopy, crustal magnetism, and atmospheric composition & structure measurements
- Direct and simultaneous, in-situ measurement of atmospheric chemistry and surface-atmospheric coupling
- Scout for future robotic and human mission sites

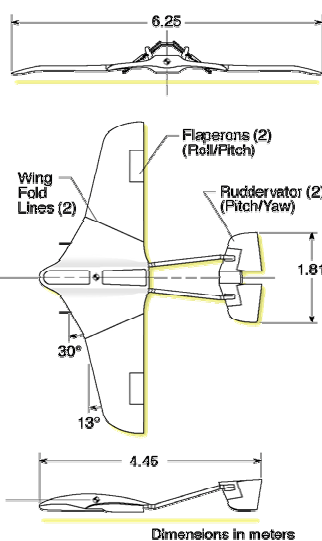
Remote Sensing	1997	1999	2001	2003	2005	2007	2009	2011
Global Scale								
Limited Resolution	MGS		Odyssey	ESA	MRO		MTO	
Planetary Airplanes								
Regional Scale, >500 km								
High Resolution								
Surface Exploration	Pathfinder			MER		Phoenix	MSL	
Large Scale, < 1 km								
Very High Resolution								

Unexplored Regime

Airplanes
Filling a Critical Science Gap

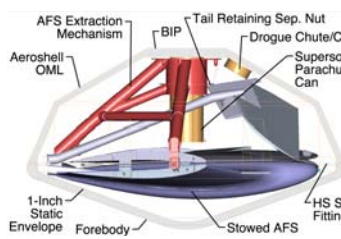
Planetary Airplane Risk Reduction and Technology Development

First flight of an airplane on Mars will be proposed to NASA's Science Mission Directorate, Mars Scout program, in 2006. Mission implementation is based on a 2011 launch and the flight on Mars in 2012. Reducing risk in the critical areas of aeroshell extraction, airplane unfolding, transition to level flight, development and validation of the flight controls system, and validation of the propulsion system are being addressed through the Planetary Airplane Risk Reduction (PARR) project. Funding for PARR is provided from the Vehicle Systems Program within NASA's Aeronautics Research Mission Directorate.



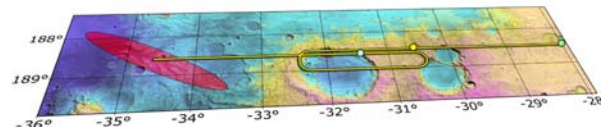
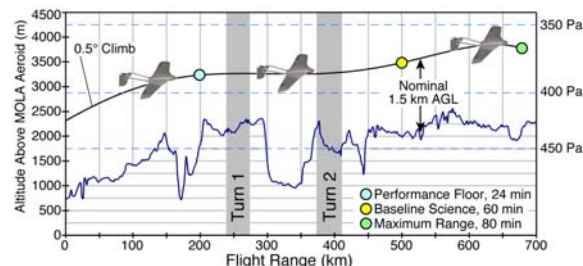
Baseline Configuration

Mass: 150 kg Wet / 101 kg Dry
Wing Span: 6.25 m
Propulsion: Liquid Rocket
Range: 680 km
Cruise Speed: 145 m/sec
Airframe: Composite
Navigation: Inertial, radar, air data



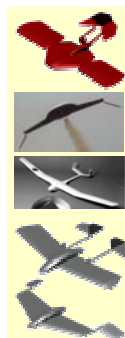
Airplane Folded in the Entry Aeroshell

An airplane configuration which balances the entry aeroshell packaging requirements with the required aerodynamic performance to achieve the necessary science mission range has been baselined.



Pre-planned, Autonomous Mission with Precision Airplane Navigation

Technology Development Program is Funded & Underway



2002: Configuration Selection Studies



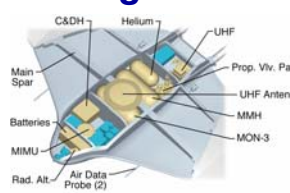
9/19/02: Unfolding & Transition Flight Test at 103,000 feet with 1/2-Scale Airplane (Mars relevant flight conditions)



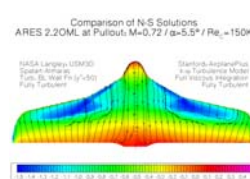
2004: Wind Tunnel Testing (1/4-Scale)



2005-2007: Flight Control System Development



2002-2004: Subsystem Definition and Integration Studies



2002-2008: Computational Aerodynamic Assessments



2003-2005: 1/3-Scale Aeroshell Extraction Demonstrations



Comparison of the Full-Scale drop test airplane with the 1/2-Scale drop test airplane



2006 & 2008: Full-Scale Extraction, Unfolding, & Transition Flight Tests

Contact Information:

Science:
Dr. Joel S. Levine
NASA Langley Research Center
Joel.S.Levine@nasa.gov
(757) 864-5692

Project:
Mr. Paul L. Moses
NASA Langley Research Center
Paul.L.Moses@nasa.gov
(757) 864-3747

For additional information, visit our web site:
<http://marsairplane.larc.nasa.gov>