NATIONAL ACADEMIES Sciences Engineering Medicine

Leveraging Commercial Space for Earth and Ocean Remote Sensing: A Dissemination Workshop

June 13-14, 2022

Leveraging Commercial Space for Earth and Ocean Remote Sensing:
A Dissemination Workshop

June 13-14, 2022
National Academy of Sciences Building
2101 Constitution Avenue, NW, Washington, D.C.

Workshop Description

This workshop explores ways to operationalize the findings of the National Academies of Sciences, Engineering, and Medicine report, "Leveraging Commercial Space for Earth and Remote Sensing," a study undertaken by the Committee for the Assessment of Partnership Options for a Small Satellite System for Collecting Scientific Quality Oceanic and Coastal Data (APOSS), sponsored by the Office of Naval Research.

The report describes how commercial advances in satellite system development, launch capability, measurement and information technology, and the New Space economy have led to a paradigm shift in the space industry that U.S. government agencies should leverage to support a wide range of science missions. According to the report, the emergence of small satellites weighing less than 600 kilograms — known as SmallSats — has helped bring about a "New Space ecosystem," within the last decade. This ecosystem is marked by lower barriers of entry and agile commercial organizations with higher risk tolerance and a focus on increased, rapid, and affordable access to space. The report acknowledges that academic, government, and commercial organizations have already demonstrated the capabilities of SmallSats for technology maturation, remote Earth and ocean sensing, and other science missions. Constellations and clusters of SmallSats could provide opportunities for science advancements in coastal and ocean science, gravity research, climate science, and studies of the sun-Earth connection, among other possibilities.

In this vein the report emphasizes that the U.S. government should encourage greater development of less traditional relationships like public-private partnerships (PPPs) as a means for adopting the commercial space industry's technology and volume manufacturing capabilities, and to promote a new national space ecosystem supportive of industry, government, and academic objectives. PPPs and other innovative procurement approaches can enhance national missions focused on communications, remote sensing, dual-use, as well as mission areas focused on scientific data collection in oceanography and monitoring natural and human-made disasters, which have rarely used PPPs.

Taking the report's specific findings (found in the summary chapter and chapter 6) to the next level, this workshop will bring together multiple stakeholders to:

(1) Explore ways to leverage commercial space by conveying the opportunities to address National challenges for scientific and dual-use application interests. It will also examine the nature and capabilities of the rapidly expanding New Space ecosystem, as well as mechanisms to utilize public-private partnerships to enable such missions within the emergent New Space ecosystem.

(2) Look at the economics of space, the role of venture capital, and the capability of new business models to play a role in accelerating mission development through commercialization.

(3) Consider the benefits of the Hybrid Space Architecture (HSA) as an approach to establish a system-level capability for mission operations.

This workshop was developed by a workshop planning committee composed of members of the **Committee for the Assessment of Partnership Options for a Small Satellite System for Collecting Scientific Quality Oceanic and Coastal Data.**

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AGENDA

Monday, June 13, 2022	
Note: Breakfast will not be served at the meeting. ***Location: NAS Building Members Room, 2101 Constitution Avenue, NW, Washington, D.C.***	
9:15 AM	Meeting Room Opens and Check-In
9:45 AM	Opening Remarks - Welcome and Overview of Study Objectives and Report **Dr. Charles Norton**, Interim Chief Technologist, NASA Jet Propulsion Laboratory, **Dr. Reginald Beach**, Program Officer, Office of Naval Research, and **Mr. Steve Battel**, President, Battel Engineering
10:15 AM	**Keynote Speaker - Challenges and Opportunities of Commercial Space** • **Dr. Lindsay Millard**, Principal Director for Space, Office of the Under Secretary of Defense for Research and Engineering **Mr. Steve Battel**, President, Battel Engineering (Chair)
11:00 AM	Break
Session 1 **Description**: This session sets the context for leveraging commercial space by conveying the opportunities to address national challenges for scientific and dual-use application interests. It will explore the nature and capabilities of the rapidly expanding New Space ecosystem, closing with new business model approaches to enable such missions within the emergent New Space ecosystem.	
11:15 a.m.	**Invited Talk - The New Space Ecosystem** *Format: Invited – 30-minute presentation followed by Q&A* • **Dr. Alexander MacDonald**, Chief Economist, Office of the Administrator, NASA **Ms. Catherine Venturini**, Principal Engineer/Scientist, The Aerospace Corporation (Chair)
12:00 PM	**Break** – Please note that lunch will not be offered to the public
1:30 PM	**Panel: National Missions in Science and Dual-Use Applications**, **Dr. Christopher Ruf,** Professor of Climate and Space Science, Department of Climate and Space Sciences and Engineering, University of Michigan (Chair)

	Format: Panel – 5-minute presentations followed by Q&A Observations and applications of national significance within various agencies that are addressable with SmallSat mission capabilities will be presented. The discussion will explore the trades and benefits of SmallSats and the opportunity for commercial industry to contribute toward efficient and sustainable application solutions. • **Mr. Josep Roselló**, Head of Earth Observation Technology Coordination, European Space Agency (Virtual) • **Mr. John Paul Parker**, Intelligence Community Space Executive and National Intelligence Manager for Space Intelligence, Office of the Director of National Intelligence • **Mr. Lawrence Friedl**, Director, Applied Sciences Program, Earth Science Division, NASA • **Mr. Tim Walsh**, Acting Director, Joint Polar Satellite System Program, NOAA
2:15 PM	**Roundtable: The New Space Economy and New Business Models, Mr. Jonny Dyer,** CEO and Co-Founder, Muon Space (Chair**)** *Format: Roundtable – Moderator introduction with managed discussion (opening statements encouraged)* This roundtable will examine and discuss industry trends, economics, and business models where New Space activities are disrupting the business of space development as well as the near-term and long-term implications of this trend and the current and future ecosystem for mission development. • **Ms. Carissa Christensen**, Chief Executive Officer and founder, BryceTech • **Dr. Alexander MacDonald**, Chief Economist, Office of the Administrator, NASA • **Dr. Chris Boshuizen**, co-founder of Planet Labs (Virtual)
3:00 PM	Break
3:15 PM	**Invited Talk – The TROPICS Mission** *Format: Invited – 30-minute presentation followed by Q&A* • **Dr. William Blackwell**, Associate Group Leader of the Applied Space Systems Group, MIT Lincoln Laboratory **Dr. Charles Norton,** Interim Chief Technologist, NASA JPL (Chair)
4:00 PM	Community Open Discussion, **Dr. Charles Norton and Mr. Bruce Yost** (Chair) *Format: Open Forum – Moderator introduction with attendee open discussion* This session will allow workshop participants to interact within an open forum to review the session themes, raise and answer questions, and to discuss how to grow the greater community of future mission developers seeking to leverage commercial space for their mission objectives in Earth and ocean remote sensing.
5:00 PM	Closing Remarks, **Dr. Charles Norton** and **Mr. Steve Battel**
5:15 PM	Adjourn

Tuesday, June 14, 2022	
Note: Breakfast will not be served at the meeting. ***Location: Room 120, 2101 Constitution Avenue, NW, Washington, D.C.***	
9:15 AM	Meeting Room Opens and Check-In
9:45 AM	Opening Remarks – Day-1 Review and Operationalizing the Study Recommendations **Dr. Charles Norton**, Interim Chief Technologist, NASA Jet Propulsion Laboratory, **Dr. Reginald Beach**, Program Officer, Office of Naval Research, and **Mr. Steve Battel**, President, Battel Engineering
10:15 AM	**Keynote Speaker - The New Space Economy and Venture Investment Perspectives** • **Ms. Mandy Vaughn**, CEO and Founder, GXO **Mr. Steve Battel**, President, Battel Engineering (Chair)
11:00 AM	Break
Session 2 **Description:** This session focuses on the economics of space, the role of venture capital, and the capability of public-private partnerships to play a role in accelerating mission development through commercialization and space policy.	
11:15 AM	**Roundtable: Enabling Space-Focused Public-Private Partnerships and Incentivization of Private Investment, Mr. Steve Battel**, President, Battel Engineering (Chair) *Format: Roundtable – Moderator introduction with managed discussion (opening statements encouraged)* This roundtable will examine and discuss the opportunities, benefits, and pitfalls of public-private partnerships for mission development and mechanisms to identify synergies and incentivize private sector investment to achieve mutual goals for scientific and business interests. • **Dr. Jeremy Banik**, Deputy Director, Commercial Systems Program Office, GEOINT Directorate National Reconnaissance Office • **Dr. Laguduva Kubendran**, Lead, Tipping Point and Announcement of Collaboration Opportunity Program, Space Technology Mission Directorate, NASA • **Ms. Caryn Schenewerk**, Vice President, Regulatory and Government Affairs, Relativity Space
12:00 PM	**Break** – Please note that lunch will not be offered to the public
1:30 PM	**Accelerating Mission Development Timelines, Mr. Bruce Yost**, Director of the Small Spacecraft Systems Virtual Institute, NASA Ames Research Center (Chair) *Format: Panel – 5-minute presentations followed by Q&A* Innovative approaches to reduce the time from mission formulation to flight system development and data product generation and dissemination will be discussed from government, industry, and academic perspectives. Topics spanning mission architectures,

	tools, technology flight demonstrations, workforce, community building, product lines, and emergent commercial capabilities will be explored. • **Mr. Christopher Baker**, Program Executive, Small Spacecraft Technology Program, Space Technology Mission Directorate, NASA • **Mr. Jonny Dyer**, CEO, Muon Space • **Mr. Chris Biddy**, Co-Founder and CEO, Astro Digital (Virtual)
Session 3 **Description**: This session explores how the Session 1 and Session 2 themes may impact the development and use of the Hybrid Space Architecture (HSA) as an approach to establish a system-level capability for mission operations. It also engages the emergent user community to address their barriers to entry and identified gaps in infrastructure and technology. The session closes with an open discussion on the Day 2 themes of commercialization, partnerships, capabilities, and open questions across these areas.	
2:15 PM	**Roundtable: The Role and Implications for The Hybrid Space Architecture, Ms. Catherine Venturini**, Principal Engineer/Scientist, The Aerospace Corporation (Chair) *Format: Roundtable – Moderator introduction with managed discussion (opening statements encouraged)* This roundtable will provide an update on the status and directions of The Hybrid Space Architecture and its potential role to provide a community-based architecture that leverages commercial capabilities through a national infrastructure for sustainable remote sensing applicable to government and academic interests. • **Mr. Steven Nixon**, President, SmallSat Alliance • **Ms. Charlene Jacka**, Program Manager, Hybrid Architecture Demonstrations, United States Space Force • **Mr. Kyle Kemble**, Chief, Information Mobility Division, SWAC, United States Space Force
3:00 PM	Break
3:15 PM	**Roundtable: Infrastructure and Technology Needs to Service an Emergent User Community, Dr. Charles Norton**, Interim Chief Technologist, NASA Jet Propulsion Laboratory (Chair) *Format: Roundtable – Moderator introduction with managed discussion (opening statements encouraged)* This roundtable will discuss the scope and scale of infrastructure and technology advancements necessary to enable and sustainably support the remote sensing community and the role and opportunity for commercial industry influence its development, maintenance, and long-term evolution and use. • **Dr. Thomas Yunck**, Founder and Chief Technology Officer, GeoOptics Inc. • **Dr. Scott Palo**, CEO and Founder, Blue Cubed LLC. • **Mr. Henry Martin**, Satellite Sales Executive, Spire Federal
4:00 PM	**Community Open Discussion**, **Dr. Charles Norton and Mr. Steve Battel** (Chair) *Format: Open Forum – Moderator introduction with attendee open discussion*

	This session will allow workshop participants to interact within an open forum to review the full set of workshop themes.
5:00 PM	Closing Remarks, **Dr. Charles Norton** and **Mr. Steve Battel**
5:15 PM	Adjourn