

Applications of Future NASA Decadal Missions for Observing Earth's Land & Water Processes

Jeffrey C. Luvall¹ Simon Hook² Molly E. Brown³ Maria A. Tzortziou^{4,3} Mark Carroll⁵ Vanessa M. Escobar⁵, Ali Omar⁶

¹ Marshall Space Flight Center, ² JPL, ³ Goddard Space Flight Center, ⁴ Univ. of Maryland, ⁵ Sigma Space Corp., ⁶ Langley Research Center

National Aeronautics and Space Administration



July 2016
Delta II



Launch ~2019
Vehicle TBD



Launch ~2023
Vehicle TBD

Phase

Phase C/D entered ~12/2012

Design and Development - This phase involves building the hardware and software, testing and verification, and ends with the launch of the satellite.

Phase B

Definition - The definition phase converts the preliminary plan into a technical solution. Requirements are defined, schedules determined, and teams established around hardware. Science Definition Teams are competed and teams are chosen for each instrument and algorithm; the Science Team Leader is chosen.

Phase A

Preliminary Analysis - The definition phase converts the preliminary plan into a technical solution. Requirements are defined, schedules determined, and teams established around hardware. Science Definition Teams are competed and teams are chosen for each instrument and algorithm; the Science Team Leader is chosen.

Mission Objective

To collect altimetry data of the Earth's surface optimized to measure ice sheet elevation change and sea ice thickness, while also generating an estimate of global vegetation biomass.

A satellite-based optical instrument designed to provide the most advanced hyperspectral visible (VIS) and short-wave infrared (SWIR) observations ever collected of the world's pelagic and coastal ecosystems. Both atmospheric retrievals of aerosols and clouds and earth surface characteristics will be imaged.

A global mission to study the world's ecosystems and provide information on natural disasters such as volcanoes, wildfires and drought. HyspIRI will be able to identify the type of vegetation that is present and whether the vegetation is healthy. The mission will provide a benchmark on the state of the world's ecosystems against which future changes can be assessed. It will also assess the pre-eruptive behavior of volcanoes and the likelihood of future eruptions as well as the carbon and other gases released from wildfires.

Applications

NASA Applications Program Areas:

Ecological Forecasting, Water Resources, Agriculture, Climate, Oceans

Applications: Ice mapping for navigation, Monitoring sea level changes, Elevation of water surface for reservoir storage estimates, Forest canopy heights & biomass, Forest insect outbreaks, Determination of fuel loading in forests to accurately model/predict forest fire behavior.

NASA Applications Program Areas:

Oceans, Disasters, Ecological Forecasting, Health & Air Quality, Water Resources, Climate

Applications: Fisheries- monitoring productivity & biodiversity, monitoring/modeling toxic Plankton outbreaks, Human impacts on coastal zones, water quality monitoring, oil spill monitoring, Air quality measurements of particulate matter (pm), volcanic ash,

NASA Applications Program Areas:

Disasters, Ecological Forecasting, Health & Air Quality, Water Resources, Agriculture, Climate, Oceans

Applications: Scheduling irrigation, monitoring the extent & condition of coral reefs, monitoring the environmental factors important in the distribution & life cycle of disease vectors, land use & productivity, monitoring volcanic activity & outgassing, determining forest health, coastal waters productivity,

Applications Community Building Activities

Early adopter product & application workshops, Applications Traceability Matrix. Engage the community of decision makers who will benefit from incorporating mission products into their decision support systems. Early Adopter applied research presented, Mini focus groups feedback loops and articles in thematic journals. Publication of test. Data feedback and results. Large Policy workshop to discuss the decision making process of existing Early Adopter research.

Workshop conducted with targeted science communities to communicate key model, observation and applied science opportunities and requirements. Newsletters, articles and other communication strategies to expand the community of potential. Applications Working Group established, member of (Science Definition Team) SDT designated as leader.

Website establishment and database of user community individual begins. Application Plan written and posted to website. "important society decisions that will be made with mission science products". Early Adopters Identified, Call for Proposals and collaboration with test data. Thematic groups are created and Focus groups are planned.

Partners/Decision Support Systems

National Ice Center, US Forest Service, US & State Departments of Agriculture, US Coast Guard,

EPA, Federal Aviation Administration, NOAA.

Sebal North America, Western Governors Association, NOAA's Center for Coastal Monitoring & Assessment, Pan American Health Organization, USDA,

Mission Application Representatives & Mission Website

Molly E. Brown, molly.e.brown@nasa.gov
<http://icesat.gsfc.nasa.gov/icesat2/index.php>

Maria Tzortziou, maria.a.tzortziou@nasa.gov, Ali Omar, ali.h.omar@nasa.gov
<http://neptune.gsfc.nasa.gov/osb/index.php?section=241>

Simon Hook, simon.j.hook@jpl.nasa.gov, Jeffrey Luvall, Jluvall@nasa.gov
<http://hyspiri.jpl.nasa.gov/>

References:

- Brown, Molly E, Vanessa M Escobar, Josef Aschbacher, Maria Pilar Milagro-Pérez, Bradley Doorn, Molly K Macauley, and Lawrence Friedl. 2013. "Policy for Robust Space-Based Earth Science, Technology and Applications." *Space Policy* 29 (1) 76–82
- PACE NASA Mission Science Definition Team, 2012, "A Report of the Pre-Aerosol, Clouds, and ocean Ecosystem (PACE) Mission", 271 pp. http://dsm.gsfc.nasa.gov/pace_documentation/PACE_SDT_Report_V8_9-04-2012-2.pdf