

Thriving on Our Changing Planet

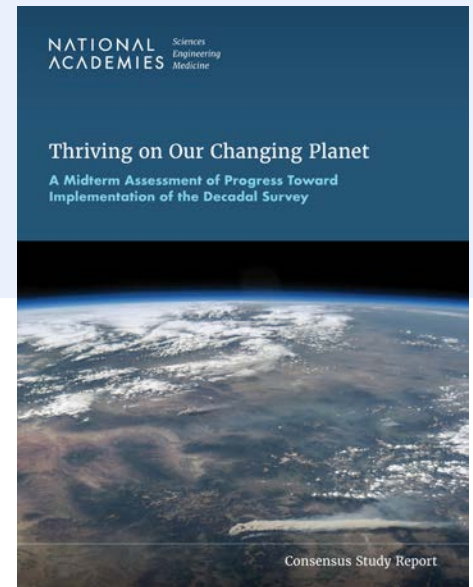
A Midterm Assessment of Progress Toward Implementation of the Decadal Survey

In 2018, the National Academies released *Thriving on Our Changing Planet: A Decadal Strategy for Earth Observation from Space*. The decadal survey identified key science questions and prioritized observational needs to advance U.S. efforts in Earth science and support critical applications such as climate modeling and weather prediction.

In the past few years, the need for actionable data and better scientific information on Earth's interacting systems has increased in urgency, as global climate change accelerates with increasing numbers of extreme weather events. **NASA's Earth Science Division (ESD) has launched innovative science-driven missions that have provided valuable new data and generated significant excitement from the research and applications community. However, NASA has made limited progress toward implementing the new missions recommended by the decadal survey.** These delays can be attributed to cost increases and slowdowns due to the pandemic and other factors, the fact that NASA ESD was asked to significantly expand the Landsat program within a flat budget, and the lack of prioritization of the decadal survey's highest value missions.

At the request of NASA,¹ the National Academies organized a midterm assessment to evaluate progress and recommend actions to meet decadal survey priorities. The report identifies potential strategies for managing the NASA ESD portfolio, recommends ways to maintain programmatic balance and improve alignment with decadal survey priorities, and discusses how to prepare for the next decadal survey.

¹ While the original decadal survey was sponsored by NASA, the National Oceanic and Atmospheric Administration (NOAA), and the U.S. Geological Survey (USGS), the statement of task for this midterm assessment was limited to NASA.



STRATEGIES FOR MANAGING THE ESD PORTFOLIO UNDER CURRENT AND FUTURE BUDGETARY PRESSURES

NASA's fleet of Earth-observing satellites is critical in efforts to monitor the impact of climate change on local communities, improve weather and climate prediction, and document the effectiveness of emission reductions at home and abroad. However, **at current levels of funding, NASA cannot be expected to deliver on the needs for both providing long-term measurement continuity and new observations**, particularly when additional requirements are imposed outside of the decadal survey process.

To accommodate increased costs and added requirements, **the report recommends that missions close to completion be launched without delay while large missions that are still under formulation be descope or delayed**. The descope and delay recommendations are largely in line with actions that NASA ESD took on its own while the report was being finalized.

Moving forward, **investment in the vital work at NASA ESD is essential to ensure NASA can continue to launch new missions, develop innovative instrumentation, and fund critical research**. NASA ESD should continue to articulate the substantial societal value of the integrated Earth observations recommended by the decadal survey and the resources needed to implement them.

In order to conserve resources, NASA has successfully and continuously engaged with international and commercial partners to share mission costs and expand science opportunities beyond what would have been possible by working independently. Given the increasing need for external data to meet national climate priorities, **NASA should continue to work to expand funding opportunities for U.S. investigators to participate in and exploit data from international, interagency, and commercial endeavors**.

MAINTAINING PROGRAMMATIC BALANCE

Unanticipated budget changes have impacted NASA's ability to implement the programs recommended in the decadal survey, and NASA has not followed the decadal

survey's decision rules that prioritize descoping larger missions and focusing on smaller missions to preserve an Earth system view and maintain programmatic balance.

NASA's flight program plans include significant new funding for Landsat Next when compared to decadal survey recommendations. The committee acknowledges the significant challenge of balancing the needs of Landsat users with the priorities of the Earth system science and applications community as a whole. **NASA ESD should pursue funding needed to cover the increase in Landsat Next's scope and budget that was not anticipated at the time of decadal survey**. Otherwise, the increased Landsat Next budget substantially limits resources available to achieve decadal survey priorities.

In the case of budget shortfalls, it is crucial that NASA seek input from relevant advisory committees and communicate expected program impacts, particularly in the case of descoped mission plans, mission delays, and changes in solicitation schedules. **NASA ESD should improve its communication with the research community to provide the rationale for the decisions it makes, particularly in the face of inadequate resources**.

PREPARING FOR THE NEXT DECADAL SURVEY

Looking forward to the next decadal survey, **NASA ESD should take the opportunity to further improve its diversity, equity, inclusion, and accessibility strategies**, including ongoing opportunities for training, principal investigator development, and mission engagement at all career levels. NASA, NOAA, and USGS should work to expand the breadth of stakeholders that actively participate in decadal survey activities and to better engage the Earth system modeling community to understand observation priorities to improve climate projections.

Mirroring the recommendation already formulated in the decadal survey, NASA, NOAA, and USGS should develop a much-needed strategic framework to address the needs for observational continuity in climate observables of national priority. Where appropriate, it should consider international as well as commercial partners.

COMMITTEE ON THE REVIEW OF PROGRESS TOWARD IMPLEMENTING THE DECADAL SURVEY—THRIVING ON OUR CHANGING PLANET: A DECADAL STRATEGY FOR EARTH OBSERVATION FROM SPACE

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FOR MORE INFORMATION

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To read the full report, visit <https://nap.nationalacademies.org/catalog/27743>.

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