

## The Editor's Corner

**Steve Platnick**

*EOS Senior Project Scientist*

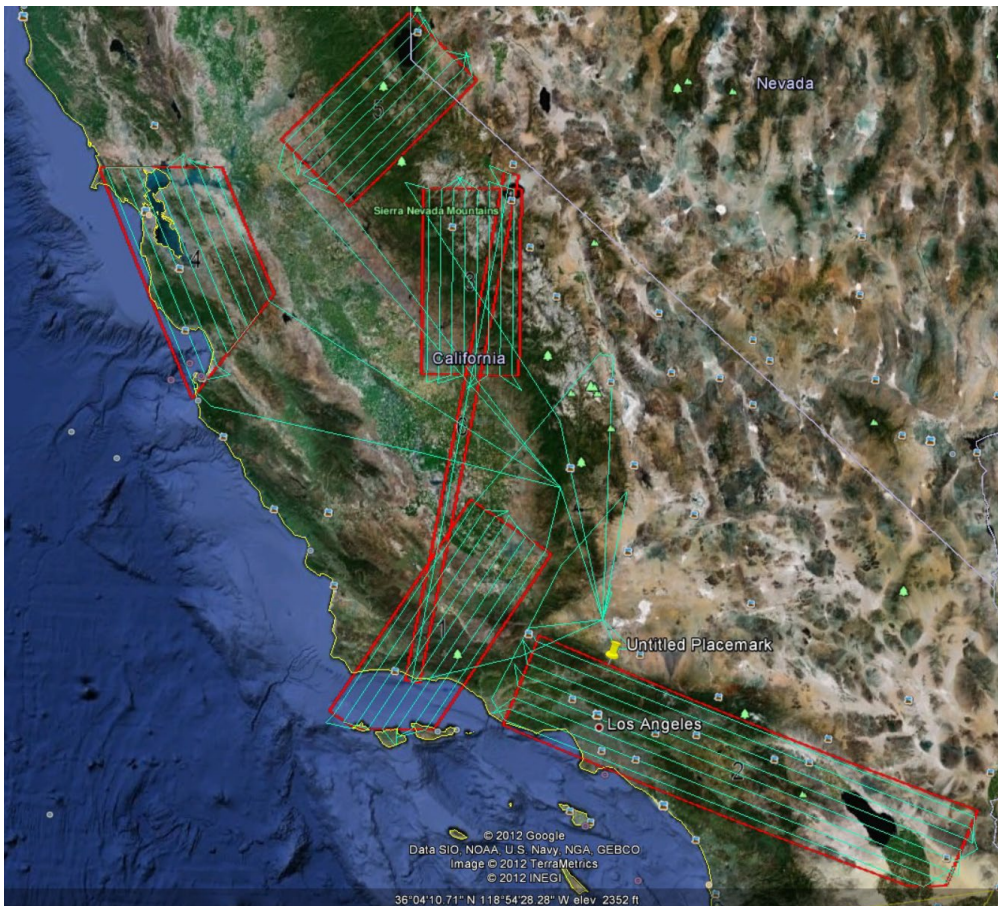
As *The Earth Observer* documented over the past year, NASA continues to excel despite the pandemic. As we begin to emerge from it, there is now a concise vision to guide the program's future mission endeavors. On May 24, NASA publicly announced plans for its next generation *Earth System Observatory* (ESO) where the Earth Science Division will develop a new set of integrated missions to study a broad range of Earth science themes, from climate to weather to disaster mitigation.<sup>1</sup>

The immediate focus of the ESO missions will include starting up projects for four targeted Designated Observables (DOs) identified in the 2017 Earth Science Decadal Survey<sup>2</sup>: Aerosols; Cloud, Convection, and Precipitation; Surface Biology and Geology; and Mass Change. In addition, as noted on the new ESO website ([go.nasa.gov/3wmt4pm](http://go.nasa.gov/3wmt4pm)), "The trailblazer for the observatory is a NASA partnership with the Indian Space Research Organisation (ISRO) that brings together two different kinds of radar systems that can measure changes in Earth's surface to less than a half-inch. This mission, called the NASA-ISRO Synthetic Aperture Radar, or NISAR, will measure some of the planet's most complex processes, e.g., ice-sheet collapse and natural hazards such as earthquakes, volcanoes, and landslides."

<sup>1</sup> To learn more about ESO, see [www.nasa.gov/press-release/new-nasa-earth-system-observatory-to-help-address-mitigate-climate-change](http://www.nasa.gov/press-release/new-nasa-earth-system-observatory-to-help-address-mitigate-climate-change). The quote from NASA Administrator Senator Bill Nelson on page 2 is taken from this release.

<sup>2</sup> The 2017 Earth Science Decadal Survey's "Thriving on Our Changing Planet: A Decadal Strategy for Earth Observations from Space" can be downloaded from [www.nap.edu/catalog/249abl38/thriving-on-our-changing-planet-a-decadal-strategy-for-earth](http://www.nap.edu/catalog/249abl38/thriving-on-our-changing-planet-a-decadal-strategy-for-earth).

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For the past nine years, NASA has conducted successful Western Diversity Time Series airborne campaigns across the state of California. The latest of these campaigns took place from February–April 2021. The NASA ER-2, equipped with the MASTER and AVIRIS-C airborne simulators, conducted a series of high-altitude flights observing the five large-area blocks and one long transect within the state of California and its immediate surroundings. These blocks cover a substantial fraction of the state and provide an excellent cross-section of California's terrestrial and marine systems. Results obtained from these flights are a unique asset for research and applications communities in the Golden State seeking to understand the influence of a changing water cycle on a variety of natural and human-dominated ecosystems. These data are also foundational for upcoming NASA missions such as EMIT (a Venture Class mission) and Surface Biology and Geology Change (an Earth System Observatory mission/Designated Observable).  
**Image credit:** NASA.

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Beyond the DOs, the 2017 Decadal Survey also classified several additional targeted observables as Explorers (mid-size missions); these include greenhouse gases, ice elevation, ocean surface winds and currents, ozone and trace gases, snow depth and snow water equivalent, terrestrial ecosystem structure, and atmospheric winds. The plan is for three of these to be competitively selected for development into Earth System Explorer missions that will be part of the ESO.

The ESO will be built with application and user community needs being an upfront part of each mission, and with improved access through an integrated open science initiative to accelerate data usage. As mentioned on the Earth Science Division website, "NASA's Open Source Science strategy is the key to bringing the data from these missions together into a single observatory to help understand the Earth as a system and accelerate our ability to use this understanding."<sup>3</sup>

**NASA Administrator Senator Bill Nelson** stated: "Over the past three decades, much of what we've learned about the Earth's changing climate is built on NASA satellite observations and research. NASA's new Earth System Observatory will expand that work, providing the world with an unprecedented understanding of our Earth's climate system, arming us with next-generation data critical to mitigating climate change, and protecting our communities in the face of natural disasters."

In addition to initiating development of ESO, NASA's FY22 President's budget also includes support for the

continued cadence of Venture Class solicitations as well as for the PACE and CLARREO Pathfinder missions.

To learn more about the ESO, there is a four-minute "Science in Seconds" segment that features **Thomas Zurbuchen** [NASA Headquarters—*Associate Administrator for the Science Mission Directorate*] and **Karen St. Germain** [NASA Headquarters—*Director of the Earth Science Division*] that can be viewed at [www.youtube.com/watch?v=aasS2rbxH\\_w](http://www.youtube.com/watch?v=aasS2rbxH_w).

Despite COVID-19's continued impact on in-person meetings, NASA's 20+ year Southern Hemisphere Additional Ozonesondes (SHADOZ)<sup>4</sup> project has continued to make progress over the last year. The GSFC SHADOZ leadership team has come up with an innovative way to strengthen connections even when in-person gatherings are impossible—via virtual Regional SHADOZ Meet-Ups. To date, three of these Meet-Ups have taken place. Meanwhile, in November 2020, NASA and LAPAN signed an agreement to resume SHADOZ ozonesonde launches at the Watukosek, Java, Indonesia station (active 1998–2013). Also in 2021, the SHADOZ project is working with two formerly inactive stations (Watukosek, Java, Indonesia and San Cristobal, Galapagos, Ecuador) on restarting regular ozonesonde launches through renewed international partnerships.

SHADOZ will have a leadership transition later this year. **Anne Thompson** [GSFC], who has been PI of

<sup>4</sup> To learn more about the history and accomplishments of SHADOZ, see "SHADOZ at 20 Years: Achievements of a Strategic Ozonesonde Network" in the September–October 2019 issue of *The Earth Observer* [Volume 31, Issue 5, pp. 4–15—[go.nasa.gov/2RRAxOe](http://go.nasa.gov/2RRAxOe)].

<sup>3</sup> See [science.nasa.gov/earth-science](http://science.nasa.gov/earth-science).

SHADOZ since its inception in 1998, transitioned in June to emeritus status at GSFC after a 26-year career as a NASA employee; **Ryan Stauffer** [GSFC] will be her successor. Stauffer started working with ozonesondes in 2010, when Thompson, then a professor at Penn State University, was his PhD advisor. He came to GSFC in 2016, working first as a NASA Postdoctoral Program Fellow, and is now a civil servant. Congratulations to Thompson and best wishes to Stauffer in his new leadership role. Turn to page 12 to learn more about the three Regional SHADOZ Meet-Ups and other recent project activity.

Meanwhile, from February through the beginning of April 2021, the NASA Airborne Science Program completed another successful Western Diversity Time Series airborne campaign across the state of California. These flights marked nine years of campaigns by NASA's high-altitude ER-2 aircraft carrying the Airborne Visible/Infrared Imaging Spectrometer-Classic (AVIRIS-C) and MODIS/ASTER Airborne Simulator (MASTER) instruments. The observation targets continue to be five large-area blocks and a long transect within the state of California and its immediate surroundings—see map on page 1. These blocks cover a substantial fraction of the entire state and provide an excellent cross-section of its terrestrial and marine systems. The powerful combination of visible to shortwave infrared imaging spectroscopy from AVIRIS-C and multispectral thermal infrared imagery from MASTER has captured change in multiple ecosystems across a wide range of elevational gradients through pre-drought, drought, early post-drought, and now back to drought conditions. The resulting data are a unique asset for research and applications communities seeking to understand the influence of a changing water cycle on a variety of natural and human-dominated ecosystems in one of the most biologically-diverse states in the Nation.

This unique time series serves as a vital precursor for both the upcoming Earth Surface Mineral Dust Source Investigation (EMIT)<sup>5</sup> on the International Space Station and the Surface Biology and Geology DO—discussed earlier. The fact that NASA successfully conducted the last two campaigns in 2020 and 2021 during a pandemic speaks to the incredible commitment and professionalism of the air and ground crews at AFRC, and the instrument teams at JPL and ARC.

One consequence of the ongoing COVID-19 pandemic has been the lack of in-person scientific meetings and events. NASA's Science Support Office (SSO, organizationally part of the EOS Project Science Office) has a long history of organizing domestic and international

NASA exhibits (e.g., AGU Fall Meeting, JpGU, Earth Day). While there was some ability to participate in these exhibits virtually prior to March 2020, it tended to be the exception rather than the rule. It has been said that “necessity is the mother of invention,” and this certainly proved true over the past year as virtual participation took a leap forward with organizations adopting virtual platforms to conduct meetings as well as exhibit activities.

NASA (including SSO staff) began thinking about how it might implement its own virtual conference platform to better allow the agency to host online meetings and events. In August 2020, the SSO began working closely with the Office of the Chief Information Officer's (OCIO) Web Service Office to conduct a thorough review of several candidate platforms. The analysis included a platform security assessment to ensure that all NASA data and security requirements were met and to minimize the collection of personal information. As a result of this review, on April 20, the NASA Web Service Office officially announced Communiqué<sup>6</sup> to be the NASA virtual event platform.

NASA's 2021 Virtual Earth Day Event was the first to use the Communiqué platform—and the results were impressive. The theme of the event was *Connected by Earth*, attracting 10,787 registered attendees from across the globe. The event's live days were April 21–24, with the platform accessible to registered attendees through May 31. Leveraging an incredible amount of teamwork across the agency, 70 individuals worked together to select a diverse group of speakers and stories for the event's live webinars and chat topics. The team collected interactive content to engage attendees from all backgrounds and ages. To learn more about NASA's Virtual Earth Day activities, see the feature article on page 4 of this issue.

The success of the inaugural NASA-hosted virtual event opens the door for future conferences to use the platform. As an example, the agency has confirmed the use of this platform for the upcoming National Space Symposium. ■

<sup>6</sup> To learn more about the Communiqué platform, visit [www.communiqueconferencing.com](http://www.communiqueconferencing.com).

<sup>5</sup> EMIT is an Earth Venture Instrument-4 (EVI-4) selection scheduled to launch to the ISS in 2022. Learn more at [science.jpl.nasa.gov/projects/EMIT](http://science.jpl.nasa.gov/projects/EMIT).



# Connected by Earth: Summary of NASA's 2021 Virtual Earth Day Event

Heather Hanson, NASA's Goddard Space Flight Center/Global Science & Technology, Inc., [heather.h.hanson@nasa.gov](mailto:heather.h.hanson@nasa.gov)

*To celebrate Earth Day 2021, NASA hosted its first virtual Earth Day event... The event attracted 10,787 registered attendees from around the globe.*

**Figure 1.** This graphic depicts the welcome lobby for NASA's 2021 Virtual Earth Day Event, featuring seven rooms [clickable hexagons]. The event featured live content (i.e., webinar events and live chat rooms) from April 21–24 and remained accessible to registered attendees through May 31, 2021. Registration for the event was free and open to the public.  
**Image credit:** NASA

## Introduction

In 2020 the world celebrated the fiftieth anniversary of Earth Day during an unprecedented time as COVID-19 spread around the globe, ushering in widespread stay-at-home orders to help contain the virus. Because NASA could not participate in any face-to-face Earth Day celebrations in 2020, the agency made the decision to shift that year's celebration of Earth Day and similar science outreach conferences from the traditional in-person format—with a variety of hands-on activities to engage the public—to activities that could be carried out fully online. In doing so, NASA encouraged its web and social media followers to appreciate the wondrous beauty of our planet and the extraordinary science that helps us understand how it works—all from the relative safety of home.<sup>1</sup>

One year later, demand continues for online learning and communication tools to support society's seemingly never-ending drive to make online connections. To celebrate Earth Day 2021, NASA hosted its first virtual Earth Day event. The live event days were April 21–24, and the platform remained accessible to registered attendees through May 31, 2021.<sup>2</sup> The event attracted 10,787 registered attendees from around the globe.



The theme of the event was *Connected by Earth*—as we are each part of Earth's gorgeous mosaic. The event was promoted through various NASA social media accounts (@NASA and @NASAEarth), the [nasa.gov/earthday](https://nasa.gov/earthday) website, and various NASA education and public outreach outlets, including personal invitations sent directly to 1575 students in the U.S. On social media (e.g., Facebook and Twitter),

<sup>1</sup> To learn about NASA's home-based Earth Day 2020 celebrations, see "Earth Day at Home with NASA" in the May–June 2020 issue of *The Earth Observer*, **Volume 32, Issue 3**, pp. 4–12—[go.nasa.gov/2SGCu06](https://go.nasa.gov/2SGCu06).

<sup>2</sup> Event registration was free and open to the public through May 31, 2021. While the live components (i.e., webinars, chat, and help desk) were only available April 21–24, attendees could access static content and recorded webinars through May 31, 2021.