# ARSET
ANNUAL REPORT
2020

2020 SUMMARIZED

Although 2020 was a year of uncertainties, the Applied Remote Sensing Training program (ARSET) continued to perform. The year began with record-breaking attendance numbers, and amid quarantine restrictions and other obstacles, ARSET was able to adapt and continue offering a wide array of remote sensing trainings. The online format of ARSET trainings proved to be an ideal solution for learners at home and teachers needing remote learning content. Circumstances aside, an increase in the overall demand of accessible remote sensing trainings was seen, with attendance numbers roughly doubling those of the year prior. The year was also characterized by breakthroughs into new topic areas, new partnerships, and new audiences.

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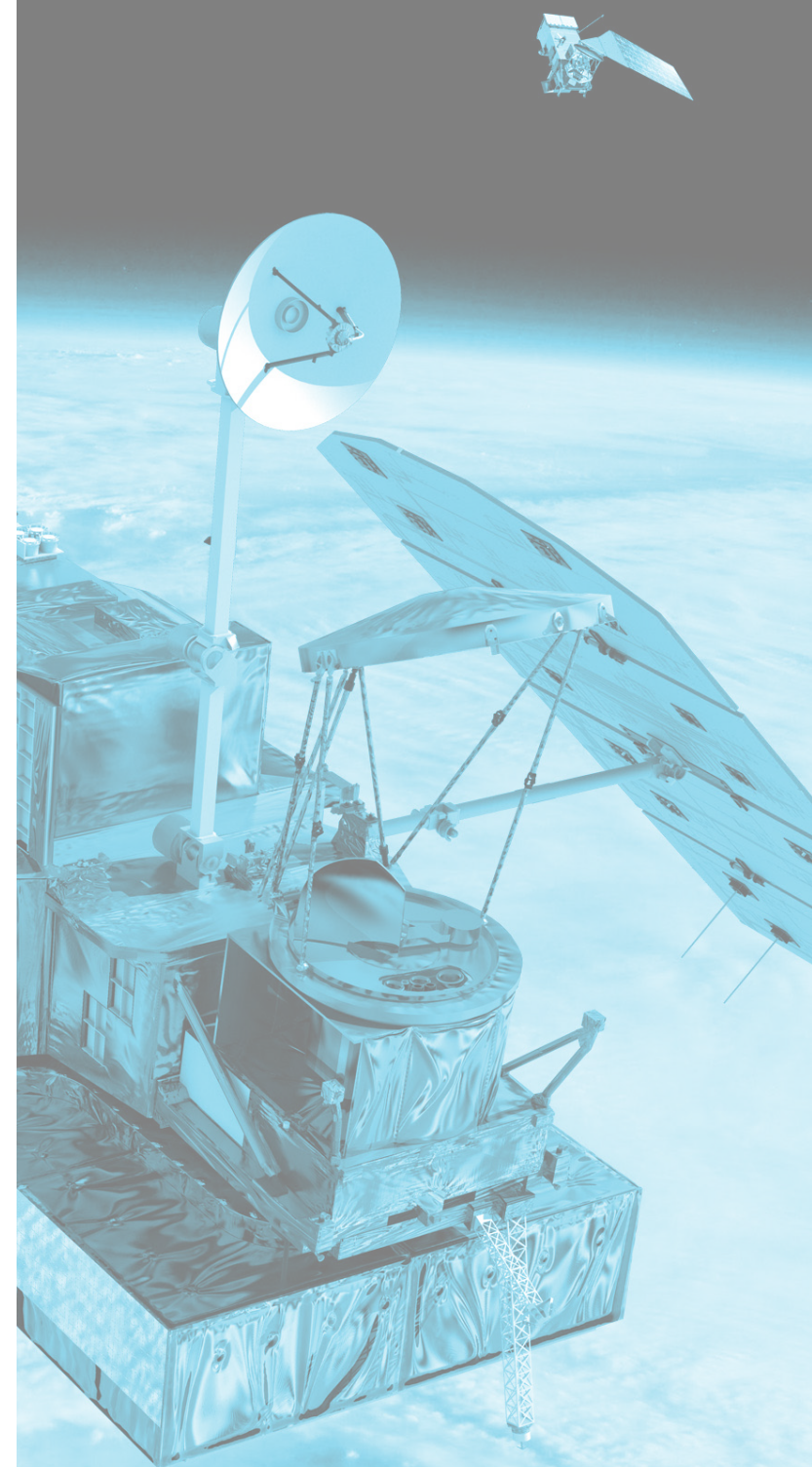
2020 FIGURES AND STATISTICS

27,425
PARTICIPANTS TRAINED

9,767
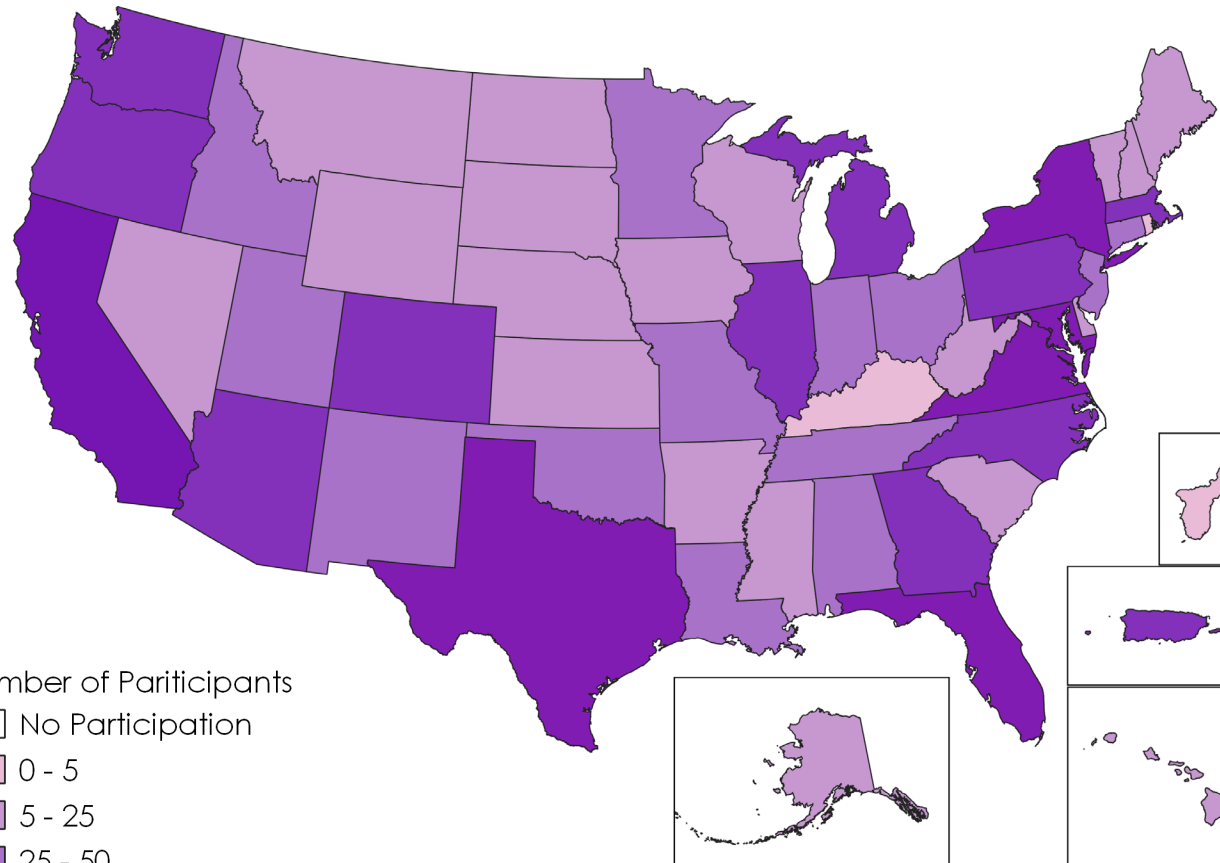CERTIFICATES OF COMPLETION

6,245
ORGANIZATIONS REACHED

162
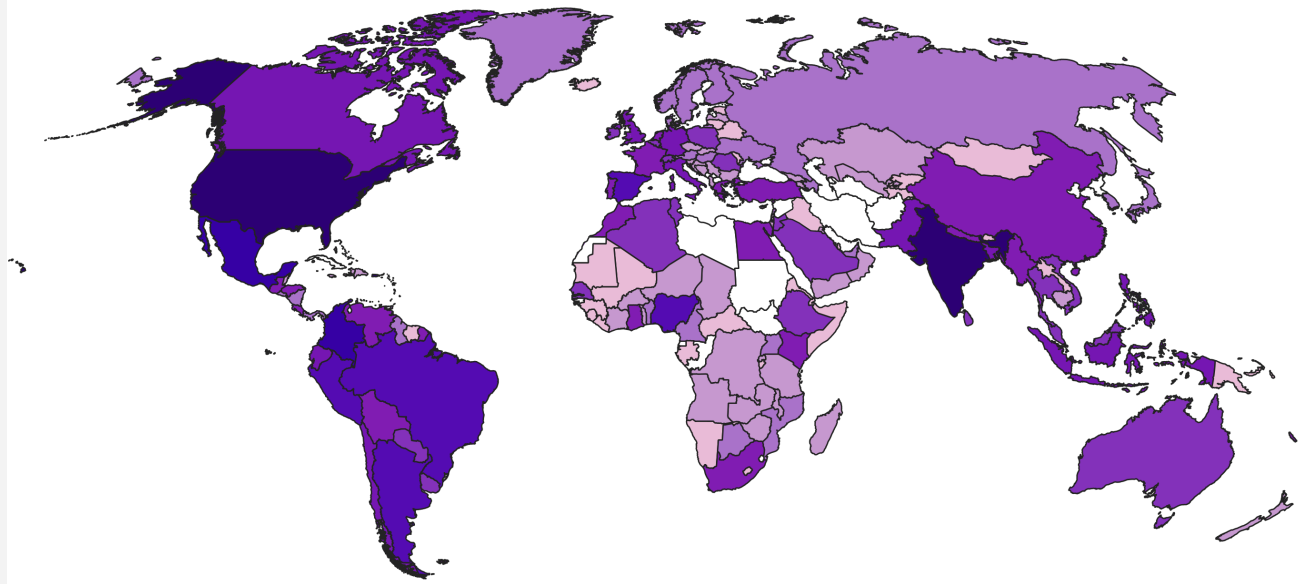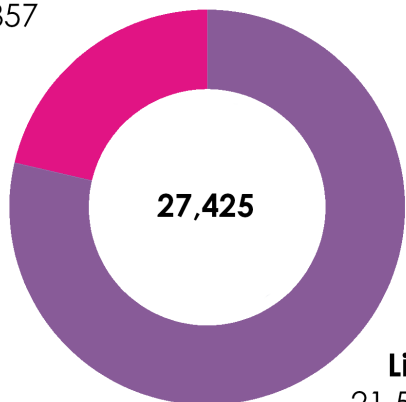COUNTRIES REACHED

50
US STATES REACHED

Self-Guided
5,857

27,425

Live
21,568

GEOGRAPHIC REACH

Number of Pariticipants
- No Participation
- 0 - 5
- 5 - 25
- 25 - 50
- 50 - 100
- 100 - 250
- 250 - 500
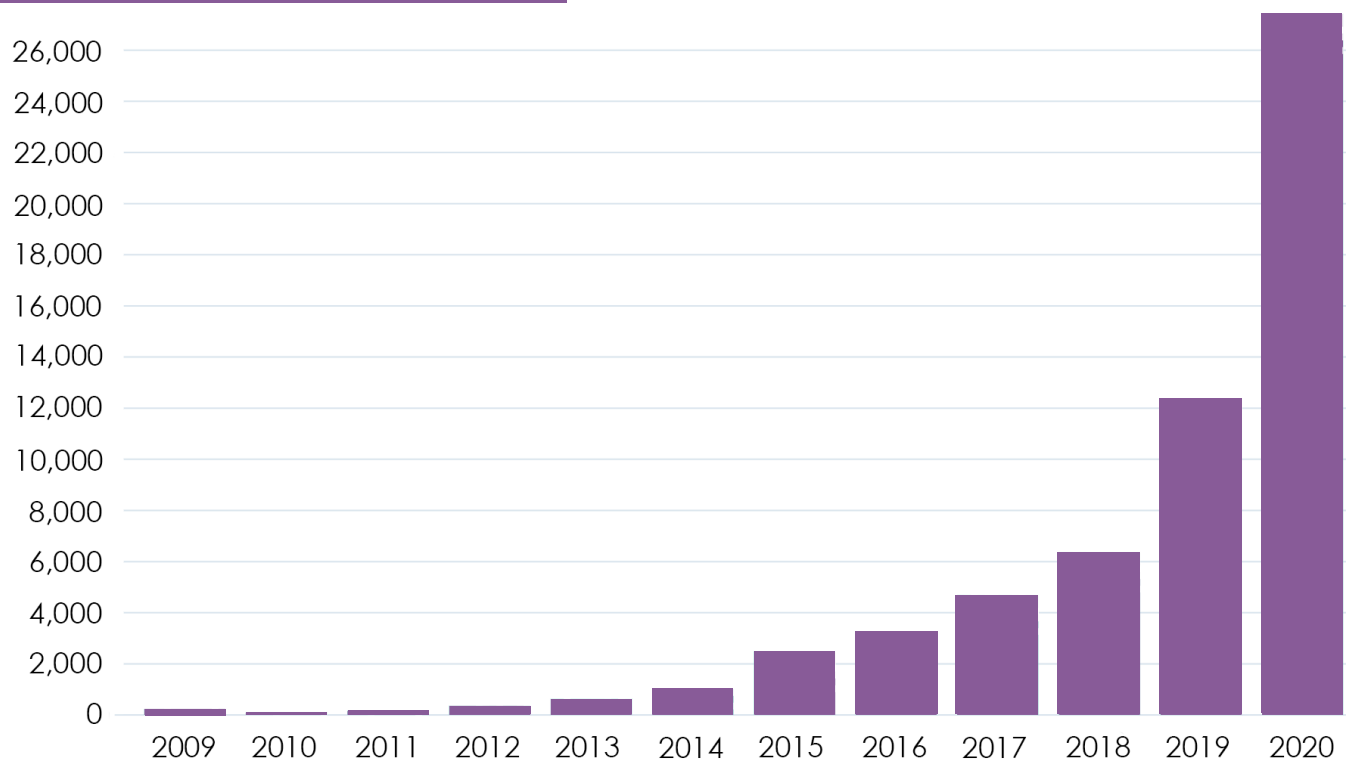- 500 - 1000
- 1000 - 2000
- 2000+

2

2020 FIGURES AND STATISTICS

PARTICIPATION BY YEAR

2,921
ACADEMIC INSTITUTIONS

1,121
PRIVATE COMPANIES
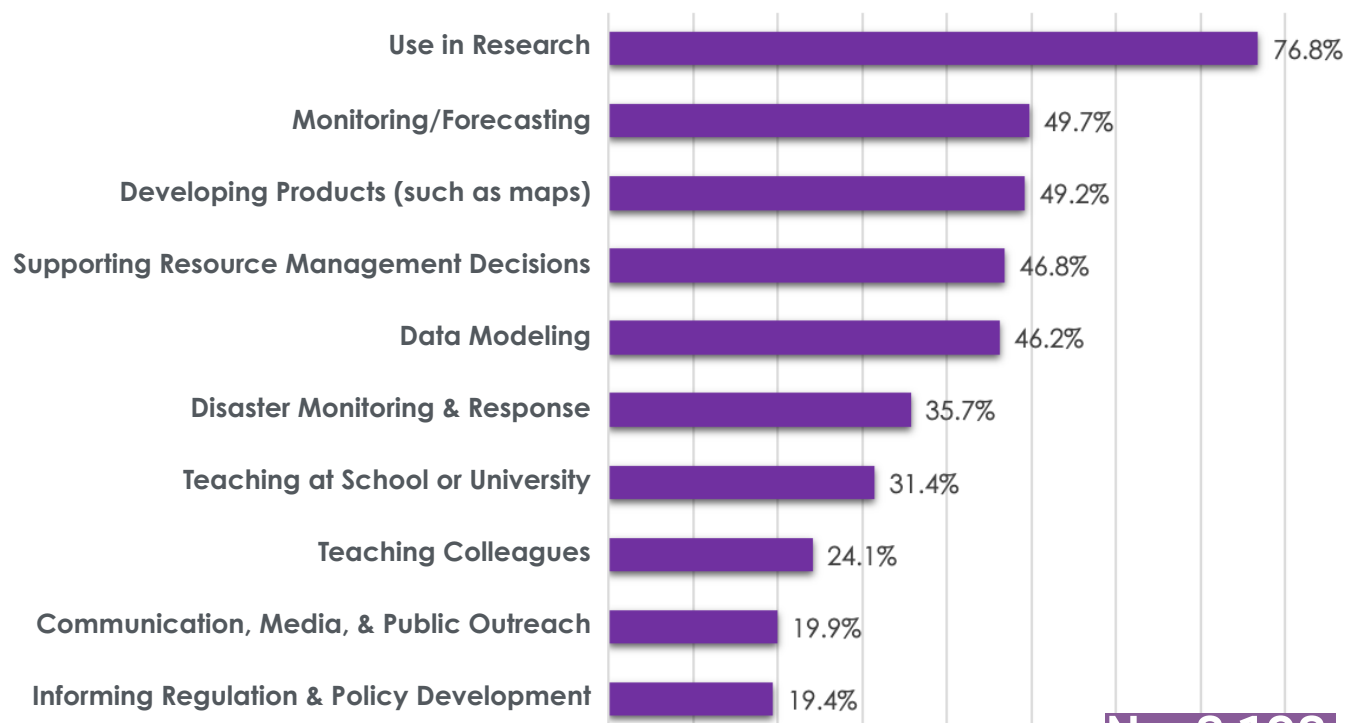
995
FEDERAL/CENTRAL GOV ENTITIES

927
NON-PROFIT/NGOs

223
LOCAL GOV AGENCIES

122
US STATE AGENCIES

16
TRIBAL ORGANIZATIONS

INTENTIONS TO USE SKILLS GAINED IN ARSET TRAININGS

Category	Percentage
Use in Research	76.8%
Monitoring/Forecasting	49.7%
Developing Products (such as maps)	49.2%
Supporting Resource Management Decisions	46.8%
Data Modeling	46.2%
Disaster Monitoring & Response	35.7%
Teaching at School or University	31.4%
Teaching Colleagues	24.1%
Communication, Media, & Public Outreach	19.9%
Informing Regulation & Policy Development	19.4%

N = 8,198

*Data does not include the last two trainings of 2020. Data represents the three top choices chosen by participants.

CUTTING-EDGE TRAININGS

ARSET maintains close relationships with many scientists and user working groups at NASA. As a result, the program is able to offer timely trainings that include cutting-edge or critically important technologies. This year ARSET delivered trainings including two of these technologies: the GRACE-FO mission, which uses changes in gravity to measure groundwater, and NASA's Black Marble night lights data, a global dataset derived from the VIIRS instrument on the Suomi-NPP satellite. ARSET also offered its first training demonstrating the use of Jupyter Notebooks in MODIS to VIIRS Transition for Air Quality.

GRAVITY RECOVERY AND CLIMATE EXPERIMENT FOLLOW ON (GRACE-FO)

The GRACE-FO mission is comprised of a pair of satellites with a microwave and laser rangefinder measuring slight variations in distance between the two. This pair of satellites is capable of detecting changes in terrestrial water by measuring fluctuations in gravitational pull.

In June ARSET offered a lightning-style training designed to answer the demand and interest in technologies that support water resources management. The webinar provided an overview of the GRACE and GRACE-FO missions, groundwater data availability, and their applications in the monitoring and management of water resources.

CLICK HERE TO VIEW THE TRAINING
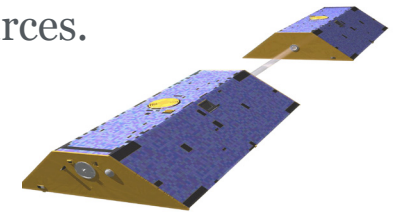
NASA's "BLACK MARBLE" NIGHT LIGHTS DATA

At night, satellite images of Earth capture a uniquely human signal - artificial lighting. Remotely-sensed lights at night provide a new data source for improving our understanding of interactions between human systems and the environment. NASA has developed the Black Marble, a daily calibrated, corrected, and validated product suite, so night light data can be used effectively for scientific observations. Black Marble is playing a vital role in research on light pollution, illegal fishing, fires, disaster impacts and recovery, and human settlements and associated energy infrastructures.

This year ARSET offered an online, introductory training showing users how to acquire, correct, and apply these observations for a variety of purposes and how to create a time series of images.

CLICK HERE TO VIEW THE TRAINING

MULTILINGUAL TRAINING RESOURCES

In 2020 ARSET made large strides in offering multilingual education. The program offered its first live Air Quality training in Spanish, released its first trilingual training, and began offering participant surveys in Spanish. Aside from these accomplishments, the training materials for every training offered this year were diligently translated so ARSET could offer them in both English and Spanish.

FIRST EVER `TRILINGUAL` TRAINING

ARSET released its first ever trilingual training this year. *Using UN Biodiversity Lab for Conservation* aired in English, Spanish, and French, reaching 2,280 students, practictioners, and researchers worldwide. This training was done in collaboration with the UN Development Programme and highlighted the uses of the UN Biodiversity Lab web application and how it can help users understand, monitor, and meet UN Sustainable Development Goals and related initiatives at the local, regional, and global levels. This was ARSET's first training offered in French and the program hopes to offer more in the future.
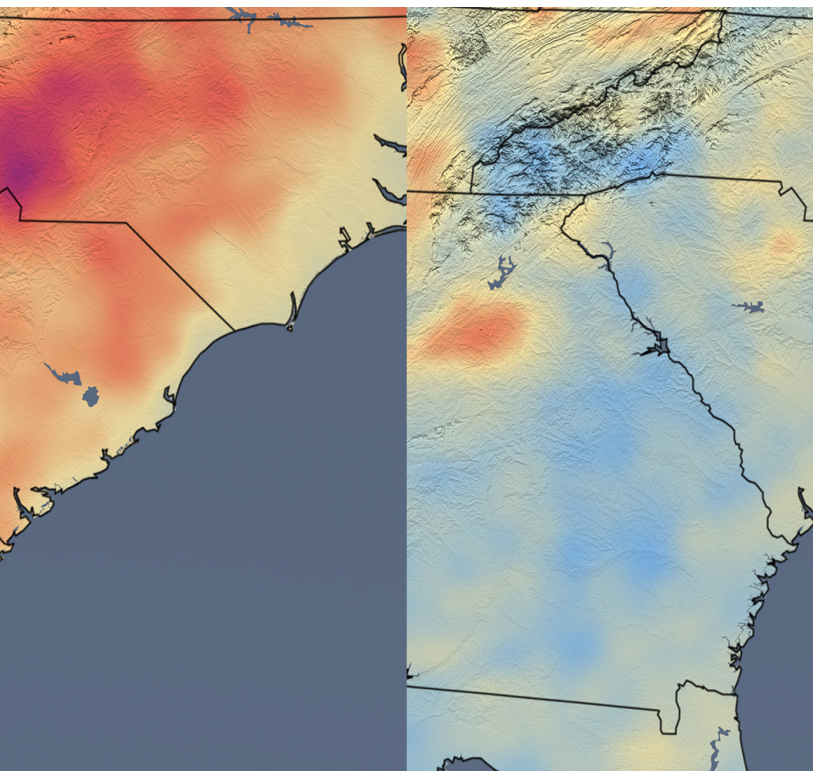
FIRST AIR QUALITY TRAINING IN SPANISH

In light of the COVID-19 pandemic and the economic downturn, remote sensing came into the spotlight as changes in pollution levels were observed. In response to these events, ARSET answered the call of public curiosity by offering *An Inside Look at how NASA Measures Air Pollution*. The training aired in both English and Spanish, becoming the first Air Quality training offered bilingually, and reached over 2,000 participants in 96 countries and 46 US States.

END USER HIGHLIGHT

SARA STRACHAN
## IDAHO DEPT. OF ENVIRONMENTAL QUALITY

Sarah Strachan, with the Idaho Department of Environmental Quality, has used knowledge gained from ARSET trainings to build an application with updated, near real-time satellite data that provides up-to-date situational awareness on wildfires and smoke. This application - The Idaho Wildfire Smoke Portal - exemplifies how ARSET trainees are integrating NASA resources into decision-support environments.

2020 COLLABORATIONS

Offering high-quality, cutting-edge remote sensing training is a collaborative effort. ARSET establishes key relationships that allow the program to maximize its potential to create trainings that will be useful, practical, accessible, and relevant. Some key collaborators this year were the National Oceanic and Atmospheric Administration (NOAA), the UN Development Programme (UNDP), and for the first time ever the US Geological Survey (USGS). The NASA DEVELOP program also contributed presentations.
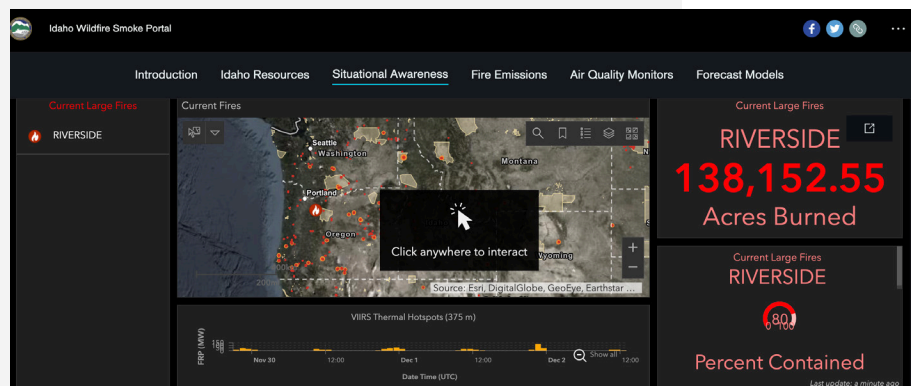
CLICK TO SEE THE ← APP
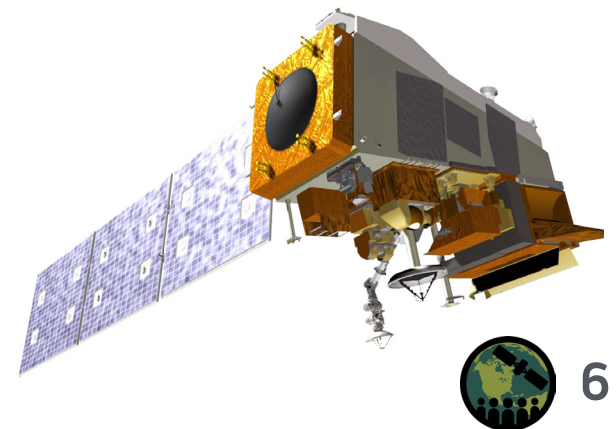
TRAINERS

AMITA MEHTA, Ph.D.

ERIKA PODEST, Ph.D.

SEAN McCARTNEY

2020 DISASTERS TRAININGS

SATELLITE REMOTE SENSING FOR URBAN HEAT ISLANDS
INTRODUCTORY   ONLINE

INTRODUCTION TO NASA'S "BLACK MARBLE" NIGHT LIGHTS DATA
INTRODUCTORY   ONLINE   BILINGUAL

"

[After taking the training] I can calculate urban heat island intensity with time-series data and I can compare different methods for computing UHI with the method that I learned from this course... I am going to write a scientific paper on the UHI effect in Saudi Arabia, so I can use all the materials that were obtained from this course.

(Survey response, January 2021;
Faculty, Saudi Arabia)

TRAINING HIGHLIGHT

SATELLITE REMOTE SENSING FOR URBAN HEAT ISLANDS

This training addressed the use of remote sensing in determining where "hot spots" of land surface temperature are located in urban areas, why these areas are experiencing increased temperature, which populations are most vulnerable, and ways to mitigate the effects through adaptive land use planning.

TRAINERS

PAWAN GUPTA, Ph.D.

MELANIE FOLLETTE-COOK, Ph.D.

ANA PRADOS, Ph.D.

2020 HEALTH & AIR QUALITY TRAININGS

AN INSIDE LOOK AT HOW NASA MEASURES AIR POLLUTION
INTRODUCTORY   **ONLINE**   **BILINGUAL**

MODIS TO VIIRS TRANSITION FOR AIR QUALITY APPLICATIONS
ADVANCED   **ONLINE**

"

It is hard to highlight only one single greatest benefit [of AR-SET]. The combination of essential background, theory, as well as very practical examples and guidance helps make the ARSET program one of the most immediately useful webinars I have had the opportunity to attend.

(Survey Comment, June 2020;
Non-Profit Employee, United States)

TRAINING HIGHLIGHT

AN INSIDE LOOK AT HOW NASA MEASURES AIR POLLUTION

With the world's eyes and media coverage turned to recent global changes in air pollution, this two-part webinar series provided a primer for the novice and a good refresher course for all others. Participants learned which pollutants can be measured from space, how satellites make these measurements, the dos and don'ts in interpreting satellite data, and how to download and create your own visualizations.

TRAINERS

AMBER McCULLUM, Ph.D.

JUAN TORRES-PÉREZ, Ph.D.

ZACHARY BENGTSSON

2020 LAND TRAININGS

USING THE UN BIODIVERSITY LAB TO SUPPORT NATIONAL CONSERVATION AND SUSTAINABLE DEVELOPMENT GOALS

INTRODUCTORY   ONLINE   **TRILINGUAL**

FOREST MAPPING AND MONITORING WITH SAR DATA

ADVANCED   ONLINE   BILINGUAL

UNDERSTANDING PHENOLOGY WITH REMOTE SENSING

INTRODUCTORY   ONLINE

REMOTE SENSING OF COASTAL ECOSYSTEMS

INTRODUCTORY   ONLINE   BILINGUAL

"

The incredible international participation underscored how important ARSET trainings are for teaching people about the use and value of RS [remote sensing] data. Huge interest reflects huge need for more of these.

(Survey Comment, April 2020; Federal Government Employee, United States)

TRAINING HIGHLIGHT

REMOTE SENSING FOR MANGROVES IN SUPPORT OF THE UN SUSTAINABLE DEVELOPMENT GOALS

Mangroves are critical ecosystems, provide coastal protection from storm surges, maintain our climate, control floods, and stabilize coastlines. Therefore, understanding mangrove extent and biomass is essential to managing the sustainability of our water ecosystems. Attendees were exposed to the latest tools for mapping mangrove extent in Google Earth Engine and how these observations can be used to report towards Sustainable Development Goal (SDG) quotas.

TRAINERS

AMITA MEHTA, Ph.D.

ERIKA PODEST, Ph.D.

SEAN McCARTNEY

2020 WATER RESOURCES TRAININGS

APPLICATIONS OF GPM IMERG REANALYSIS FOR ASSESSING EXTREME DRY AND WET PERIODS

ADVANCED   **ONLINE**

SATELLITE REMOTE SENSING FOR AGRICULTURAL APPLICATIONS

INTRODUCTORY   **ONLINE**

GROUNDWATER MONITORING USING OBSERVATIONS FROM NASA'S GRAVITY RECOVERY AND CLIMATE EXPERIMENT (GRACE) MISSIONS

INTRODUCTORY   **ONLINE**   **BILINGUAL**

USING EARTH OBSERVATIONS TO MONITOR WATER BUDGETS FOR RIVER BASIN MANAGEMENT II

ADVANCED   **ONLINE**

"

My area of work is currently involved with analyzing specialist reports, where methods in exploring and using remote sensing in monitoring water use are being employed. These webinars help me to understand the reports generated and I am in a better position to make sound water resource protection decisions. This has led to us developing better response protocols, which include the need for monitoring via remote sensing, for water resource protection and is also driving further research in the use of remote sensing. Thank you.

(Survey Comment, September 2020; Federal Government Employee, South Africa)

TRAINING HIGHLIGHT

USING EARTH OBSERVATIONS TO MONITOR WATER BUDGETS FOR RIVER BASIN MANAGEMENT II

This advanced-level webinar series focused on the use of NASA Earth observations and Earth system-modeled data as they pertain to water budgets in river basins. This series included lectures and hands-on exercises to estimate seasonal freshwater availability in a specific river basin.

PRINCIPAL INVESTIGATOR (PI)
ANA PRADOS, Ph.D.

CIVIL SERVANT MANAGER
MIKE BOSILOVICH, Ph.D.

TRAINING COORDINATORS
BROCK BLEVINS

SELWYN HUDSON-ODOI

COMMUNICATIONS
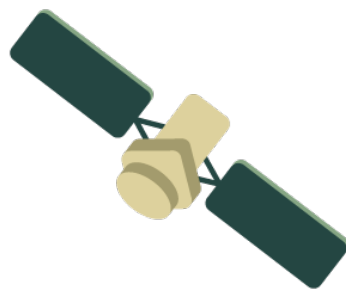JONATHAN O'BRIEN

TRANSLATOR
DAVID BARBATO

PROGRAM EVALUATOR
ANNELISE CARLETON-HUG, Ph.D.

PARTICIPANT CERTIFICATION
MARINES MARTINS

STAY IN TOUCH

ARSET WEBSITE
appliedsciences.nasa.gov/arset

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twitter.com/NASAARSET

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