

# AMERICAVIEW AND ITS LANDSAT CONNECTION

By Russell G. Congalton, Roberta Lenczowski, Lisa Wirth, and Christopher McGinty

## What is AmericaView

AmericaView, a 501(c) (3) non-profit education and research organization, is a nationally organized, state-based consortium with more than 20 years of experience advancing the availability, timely distribution, education, and widespread use of remote sensing data and technology. AmericaView is divided into individual StateView members, with each hosted by a university in the corresponding state. Currently, there are 41 StateViews (see Figure 1) each led by a StateView Director who facilitates their state-based consortia. Combined, the StateViews consist of more than 300 local, state, and regional members with a directive of advancing the widespread use of remote sensing data and technology through education and outreach, workforce development, applied research, and technology transfer. Each StateView delivers remote sensing related educational, research, and operational products and services that meet the needs of the local, state, and regional communities that it serves. The success of AmericaView is a direct result of the power of collegiality and of the power of the AmericaView network.

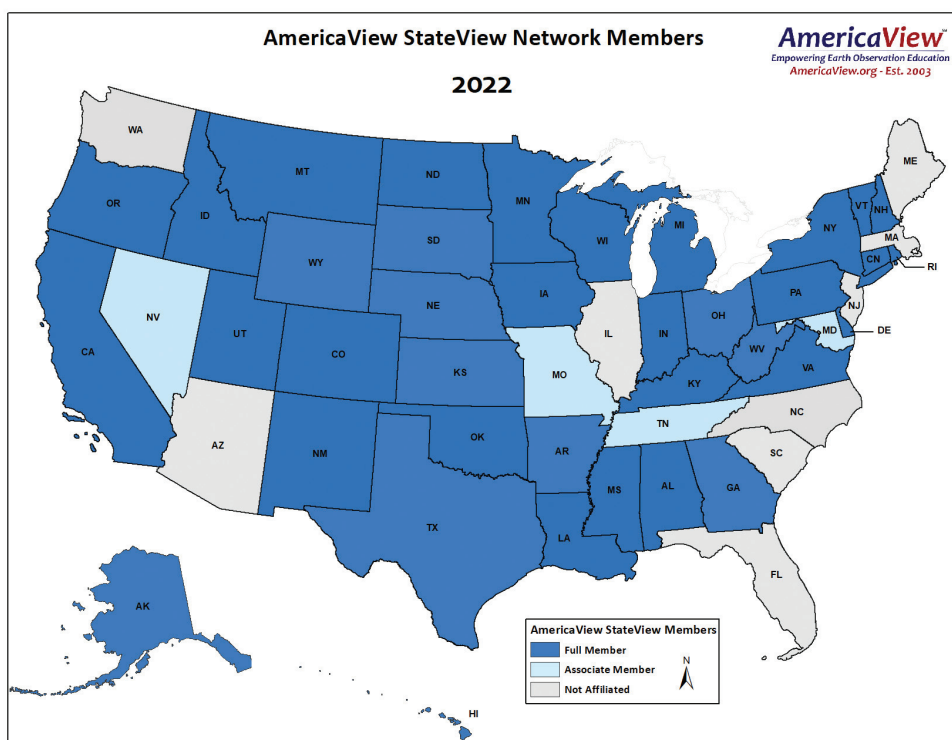


Figure 1. Distribution of StateViews as part of the AmericaView national consortium. Associate members are recent additions that are currently building their state consortium.

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## A Brief History

The concept of a national consortium to advance the adoption and use of remote sensing technologies and products at the state level was conceived in 1998 with the establishment of OhioView. One of the goals of OhioView was a partnership with the USGS Earth Resources Observation and Science (EROS) Data Center to ingest Landsat imagery and distribute it widely and effectively to the member institutions and to all the citizens of Ohio. Given the early success of OhioView, expansion to the national level was authorized by the United States Congress and achieved through the creation of AmericaView. Funding for AmericaView has since then been provided through the USGS National Land Imaging (NLI) Program National Land Remote Sensing Education Outreach and Research Activity (NLRSEORA). AmericaView was incorporated as a non-profit in 2003 beginning with 10 founding members (Arkansas, Georgia, Kansas, Mississippi, Ohio, South Dakota, Texas, West Virginia, Wyoming, and Nebraska).

From the outset of the consortium's incorporation, its pursuit of extending appreciation for and use of remote sensing has intentionally been inclusive of all. Provisioning access to and distribution of public domain Landsat imagery underpinned the earliest memorandum of understanding in 2002 between USGS and AmericaView. AmericaView, through its StateView members, has persistently sought and collaboratively nourished lasting education and research partnerships, networking their distributed academic perspectives. As a result of these activities, today an ever-expanding spectrum of users can properly apply remotely sensed imagery and its analysis to a wide variety of challenging issues. In an era focused on diversity, equity, and inclusion with belonging as an outcome, the last twenty years of AmericaView's active presence has bridged a time when only a privileged-few were using Landsat to a time when the "free and open" policy and effective academicians' training continue to overcome barriers to imagery access and use. All can belong to the community of contributors and benefactors.

Today, AmericaView is a locally facilitated and nationally coordinated consortium that has grown to 41 StateView members (see Figure 2). AmericaView StateView directors include

some of the foremost remote sensing scientists and educators in the nation, editors of major journals, authors of key remote sensing textbooks, and directors of major research laboratories. These remote sensing professionals impact the Earth science community in a wide variety of areas including, but not limited to, environmental monitoring; water quality, quantity, and utility studies; plant-phenology studies; natural resource management; traditional and precision agriculture; and disaster response and risk reduction. Collectively, the AmericaView directors are responsible for millions of dollars of competitive grants, lead quality research programs nationally and internationally, and have successfully disseminated their research outcomes through publications, presentations, and the Internet.

AmericaView powerfully facilitates the sharing of educational materials and research results through its national website, AmericaView.org, which shares remote sensing resources openly and freely to anyone who has interest. AmericaView's social media presence, including Twitter, LinkedIn, and YouTube, reach thousands of educators, students, decision makers and scientists across the nation and around the world. Metrics collected over the past decade indicate a broad interest base with hundreds of thousands of visits and revisits, from the merely curious to the sophisticated user. The volume of imagery and other geospatial data, training tutorials, StoryMaps, and articles that are viewed and/or downloaded through the website underscores the value of this information and the contribution AmericaView is making to the geospatial community and beyond.

AmericaView's national organization includes three committees: Education/Outreach, Strategic Planning, and Earth Sensors and Research. Each committee is chaired by a StateView member and composed of StateView consortium members. These committees align closely with key objectives of the USGS NLI NLRSEORA program. Through the committees, AmericaView has established working groups that have the ability to respond rapidly to specific topics of interest or organizational needs. For example, the Education/Outreach committee organized a STEAM (Science, Technology, Engineering, Arts, and Math) event reaching out to Baltimore County, MD middle schools to learn about remote sensing (Figure 3).



Figure 2. The AmericaView national consortium during the 2022 Annual Meeting in Fort Collins, Colorado (May 4, 2022)

## The Landsat Connection

Members of AmericaView have been part of the Landsat community since the very beginning. To list a few examples, IndianaView Director Emeritus, Larry Biehl, along with Dr. David Landgrebe, from the Laboratory of Applications of Remote Sensing (LARS) at Purdue University, has been the driving force of the MultiSpec image processing software. Dr. James Merchant, KansasView Director Emeritus, of the Kansas Applications of Remote Sensing (KARS) lab was also an early Landsat researcher. South Dakota State University (home of SouthDakotaView) has had a synergistic relationship with the USGS EROS Center since the creation of this Landsat facility. Dr. Marvin Bauer, MinnesotaView Director Emeritus, was a research agronomist from 1970 – 1983 with LARS at Purdue University where he had key roles in the design, implementation, and data analysis of major agricultural remote sensing experiments with NASA and USDA. Dr. James Campbell, VirginiaView Director Emeritus, is the author of Introduction to Remote Sensing (Guilford Press), a leading remote sensing textbook. NewHampshireView Director Dr. Russell G. Congalton was a pioneer in assessing the accuracy of maps derived from Landsat imagery and continues this work to this day.

The connection between AmericaView and Landsat remains strong today as evidenced by the efforts made by StateView members in the areas of education, outreach, and applied research:

### Education

StateView's have educated thousands of undergraduate students in the use of remote sensing and other geospatial technologies. In addition, hundreds of graduate students have conducted research projects using remote sensed imagery including Landsat that have been presented at conferences, published in scientific journals, and documented as theses and dissertations. Finally, tens of thousands of K-12 students have been introduced to Landsat and other remotely sensed imagery by hundreds of teachers trained by AmericaView members. Figure 4 shows the number of participants in activities over just the last 3 years ending in September of 2021. Most of these activities were accomplished while the Covid-19 pandemic was raging.

In addition, there are a large number of specific projects conducted by each state that clearly demonstrate AmericaView's impact on geospatial education. For example, Dr. Ramesh Sivanpillai, WyomingView Director, has worked with students and local ranchers using Landsat imagery on family lands, <https://bit.ly/WYViewLandsat>. MontanaView has worked with Native American students to use remotely sensed imagery to study the impacts of invasive grass species on tribal lands. Finally, the Education Committee has worked to identify places that remote sensing and other geospatial activities can be inserted into state earth science curriculum requirements which will ease the burden on teachers.



Figure 3. Middle school students from Baltimore County, MD working on a giant floor puzzle during a STEAM event held in Baltimore, MD. AmericaView Executive Director Chris McGinty can be seen kneeling over the puzzle to help while WyomingView Director Ramesh Sivanpillai helps in the background.

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### Total Individuals Educated in 2018-19, 2019-20, and 2020-21

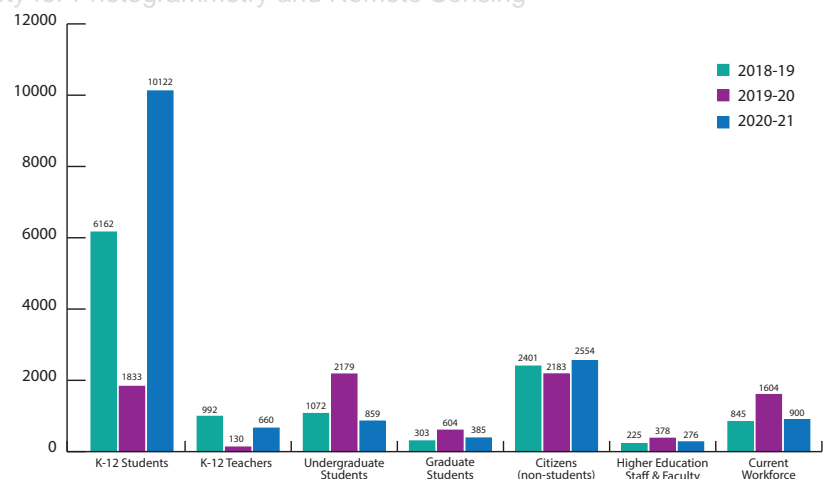


Figure 4. The numbers of individuals educated by various StateView activities over the last three year periods (October 2018-September 2019, October 2019-September 2020, October 2020-September 2021).

### Outreach

Each year many AmericaView members participate in Earth Observation Day, an ongoing event as part of the American Geosciences Institute's Earth Science Week. Partnering with USGS and NASA, AmericaView members work to create a poster that demonstrates some themes related to earth observation from Landsat imagery. The back of the poster has a game that is designed to be fun while introducing learners of all ages to remote sensing.





Figure 5. An example of Earth as Art. Kevin Gallagher (near the center of the picture with the sports coat and one foot on the puzzle) USGS Core Science Systems Associate Director and other USGS and local participants assemble a floor puzzle, part of the AmericaView Earth as Art traveling exhibit.

Other outreach projects include a recent Google Earth Tour of the History of Landsat developed by UtahView State Coordinator, Ellie Leydsman McGinty. This history of Landsat was also presented as a GeoBytes Seminar through the American Society for Photogrammetry and Remote Sensing.

Developed by an increasing number of StateView's, a particularly effective outreach activity that has become increasingly popular with the public is Earth as Art. Figure 5 shows the Earth as Art exhibit that was presented at the Lompoc Library, California as part of the Landsat 9 launch events in September of 2021. In addition to the imagery shown on the easels is the large Earth as Art floor puzzle of Santa Barbara County.

### Applied Research

AmericaView StateView's are very active in applied research that benefits their state or region. Some projects have been conducted jointly between universities within a state or sometimes in conjunction with other interested StateView's while others have been performed by a single university. One example of a StateView creating information that has become increasingly valuable and popular for local groups within the state of Georgia is a series of atlases generated from Landsat imagery that have various themes including forest change, croplands, and land cover <https://gaview.org/drupal893/>.

StateView applied research is extremely diverse based on the needs of that state. For example, OregonView has conducted research on shallow bathymetric mapping using Landsat 8 and ICESat-2 and the creation of the DEMs by fusing Landsat 8/Sentinel-2 and ICESat-2. ColoradoView has worked on missing pixel reconstruction using Landsat 8 ARD LST products. AmericaView's Program Director, Lisa Wirth, used Landsat 7 data to identify groundwater upwelling within an Interior Alaska glacially-fed river. These areas serve as prime spawning habitat for fall chum salmon, an important salmon species for subsistence. Recently, HawaiiView completed the first ever cloud-free mosaic of the state. Given cloud issues in Hawaii producing a cloud-free image is a major and extremely useful accomplishment.

Recently, the Earth Sensors and Research Committee coordinated an effort to produce a StoryMap showing the various



Figure 6. Looking to the future.

sensor capabilities and expertise of each StateView <https://bit.ly/AVSensors>. In addition, a second StoryMap was created to demonstrate research expertise of each StateView <https://bit.ly/AVResearch>. Together, these StoryMaps demonstrate the diversity of research being conducted within AmericaView while providing a plethora of information for those who want to know more about the uses of remotely sensed imagery.

### Final Thoughts

As we celebrate the 50th anniversary of Landsat, it is worth looking back and seeing how far we have come. It is easy to be impressed by the overwhelming number of technological advances that have occurred since Landsat 1 was launched back in 1972. In many ways, computers were still in their infancy and our ability to process the amazing imagery acquired was extremely limited. There is no doubt that the AmericaView consortium has played a significant role in not only remotely sensed research, but perhaps even more importantly, in providing the imagery and the knowledge of how to use this imagery to an ever-expanding audience of school children, college students, professionals, local and state agencies, and the public.

As we look to the future (see Figure 6), more than ever we need remotely sensed imagery to aid in increasing awareness of the many environmental issues that are threatening the planet we call home. Our ability to map and monitor the Earth in real time with efficiency and accuracy has never been more important. AmericaView and the synergies created by the collegial consortium of StateViews will and must continue to bring remote sensing and other geospatial technologies, education, outreach, and research to everyone, especially the younger generations.

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