

ALABAMAVIEW 2020 - 2021



ALABAMAVIEW 2020 - 2021 ACTIVITIES

- The major activity for 2020-2021 was the continued development of Alabama Environmental Awareness YouTube channel
 (https://www.youtube.com/channel/UC43YJ2HG3flUmH Gvp5Ldu1Q). This program promotes the awareness and application of Remote Sensing in the state of Alabama

 Meet our Team
 - $\circ \quad \text{Introduction to Remote Sensing}$
 - o Landfills in Alabama A Remote Sensing Approach
 - o Introduction to Remote Sensing Indices
 - Solar Power Potential in Alabama
 - Remote Sensing to Assess Potential Rainwater Harvesting
 - Urban Expansion Parts 1 and 2
- The YouTube channel, Facebook group and Instagram was shared with groups such as:
 - the Greater Birmingham Alliance to Stop Pollution (GASP) - <u>https://gaspgroup.org/</u>
 - Little USA Solar Farm -<u>https://www.littleusa.solar/</u>
 - RePicture <u>https://www.repicture.com/students</u>
 - Alabama Interfaith Power and Light: <u>https://www.alabamaipl.org/</u>
 - Southeast Climate and Energy Network: <u>https://www.scen-us.org/</u>
- One of the most important parts of this project has involves the training of graduate and undergraduate students in utilizing RS methods for environmental applications. The Directors of AlabamaView meet with students on a weekly basis to discuss ideas and work progress. Students we have trained include:
 - o Megha Shrestha
 - o Pooja Patel
 - Austin Barnhard
 - o Katherine Koons
 - o Austin Bush

A facebook page was maintained to promote the work, activities, and videos created for Alabamaview. All the videos are promoted through this page:

https://www.facebook.com/AlabamaEnviron Awareness/?view public for=100846665005 207 to reach out to many. The page is also shared with Alabama citizens so they know about Alabama environment and how remote sensing can be used to assess and evaluate various aspects of Alabama's environment.

	AlabamaEnvironAwaren	ess Education		Send Ema	91 - C
Home Events R	eviews About Mon	-	all thed	O Message	۹
About	See All	@	Creato	Post	
Q 2050 Beard Ea Autorn, AL 30	nes Collestan 1812	Photo/Video	Q Check	in 🏄 1	Tag Friends
0	•	Alabama Erwin Inne 18-0 Tutorial - SUAS to Asse Multi-fumily Measures	orment Awarene Iss Rainwater Har	ss Channel resting Potential	 I for Urban
We post weekly vid environmental issue Alabama state and technique called ren it can be used to un	ecs about is prevalent in also videos about a mote sensing and how sderstand such issues.	What is Rainwate	inwater H	arvesting	(RH)
49 people like this i	including 11 of your	Physical Approach	1	100	



Earth Day Extravaganza

AlabamaView is a member of the AmericaView Consortium, a nationally coordinated network of academic, agency, non-profit, and industry partners and cooperators that share the vision of promoting and supporting the use of remote sensing data and technology within each state. AmericaView is funded by USGS grant agreement G18AP00077.



BENEFITS TO ALABAMA

The videos are created to raise awareness among Alabama citizens about the environment and how RS can be used to access, evaluate, and communicate such information. Research using Auburn library resources, google scholar and google search were conducted to find topics and relevant information. Scripts were created and needed RS analysis were conducted. Required logos and graphs were created using Adobe illustrator and PowerPoint. After the audio was recorded for the script, the video was stitched together using Premiere Pro.

RS Indices videos provides an overview of different types of available measures which help in determining the health of vegetation, the growth of a city, the conversion of wetland to forest land etc. These indices can be used by Alabama resource managers to understand the growth and type of vegetations, analyze the growth of the city and predict future expansion, understand the available wetlands, and water resources and plan proper management practices for sustainable future.

Alabama has a huge potential for solar power generation, but Alabama's available policies and programs are not favorable to utilize this potentiality of solar power. This video created – Solar power potential in Alabama - can help the Alabama resource managers to understand and then use it to promote solar power generation to the citizens and the policy makers.





Solar power potential youtube clip





ALASKAVIEW 2020 - 2021



ALASKAVIEW 2020 - 2021 ACTIVITIES

AlaskaView developed an open access online introductory course on **Image Analysis** and re-run a course on **Remote Sensing of Wildfires (RSW)** geared toward beginners in geospatial field. The courses are running on **edX.org** (a global nonprofit online education and learning platform) since July 28, 2021 and Aug. 17, 2021, respectively.

<u>GIS Image Analysis</u> <u>Remote Sensing of Wildfires</u>

Goal: Introduce remote sensing science and applications through image analysis and wildfire application—a problem that is worsening with climate warming and best addressed using remote sensing.

Both courses are self-paced (consisting of video lectures, illustrations, interactive exercises, and quizzes).







Map showing Image Analysis learner locations.

Course instructors surveying wildfire burn severity and shooting footage for the course.

This activity meets the objective 4 of the USGS/NLI "developing online educational materials that are immediately actionable by teachers or students with a minimal implementation curve".

Student support: Two graduate students received salary support and contributed to the course development as coinstructors. Also, we offered two AV fellowships (1x\$1000; 1x\$500) to support and promote geospatial research at University of Alaska Fairbanks. Below are the student project titles:

- Assessing the effects of wildfire on beaver dams in a boreal ecosystem, interior Alaska
- Earthquake hazard assessment of the Castle Mountain Fault

ALASKAVIEW CONSORTIUM MEMBERSHIP



Federal consortium members identified above do not receive funding from AmericaView.

AlaskaView is a member of the AmericaView Consortium, a nationally coordinated network of academic, agency, non-profit, and industry partners and cooperators that share the vision of promoting and supporting the use of remote sensing data and technology within each state. AmericaView is funded by USGS grant agreement G18AP00077.



BENEFITS TO ALASKAVIEW

As a result of activities and support of AmericaView the State of Alaska have benefited as follows:

Enrollment in Image Analysis: This online course has been benefitting Alaskans and global students alike. The learners include Alaskan university students and faculty, state and tribal agencies workforce.

Total enrollment 1806 (as of Dec. 2021) from 131 countries. Female: 35%; Male: 65%.

Learners age statistics: 31% are below 25; 53% are between 26 and 40; 16% are over 41.

Learners education level: 11% high school diploma or less; 45% college degree; 40% advanced degree.

In 2019, the participants of *Alaska Summer Research Academy* (ASRA) [middle school] and *Upward Bound College Bound* (UBCB) [high school] program benefitted from two remote sensing application workshops focused on wildfires and coastal erosion. Along with introduction to remote sensing students also received hands on training on QGIS, Google My Maps, and GEE operations.

We offered two fellowships to support and promote geospatial research at University of Alaska Fairbanks.

Public Outreach: AKView participated in the 2019 Annual Science Potpourri event organized by University of Alaska Fairbanks' College of Natural Science and Mathematics. Exhibit included: Augmented Reality Sandbox, 3D printers, Landsat board games, NASA posters, USGS Landsat Science booklets.

Consortium Development: Collaborated with UAF eCamups, edX.org, NSF Alaska EPSCoR program, and U.S. Fish and Wildlife Service.



Middle-school student participants of 2019 Alaska Summer Research Academy working on a forest fire burn scar and burn severity mapping from pre- and post-fire Landsat images.



High-school student participants of 2019 Upward Bound College Bound program working on a lab on coastline erosion along Alaska's northern coastline.

Below pictures were taken during 2019 Science Potpourri event, EOD celebration, and ASRA student visit to EPSCoR VisSpace at University of Alaska Fairbanks campus.



These activities meet the objectives 2 and 4 of NLRSEORA 2018 grant: "establishing strategic partnerships to develop and deploy remote sensing applications through collaborations involving university research teams and K-12 schools" and "developing materials for an educational and training workshop".

AlaskaView Principal Investigator: SANTOSH PANDA UNIVERSITY OF ALASKA FAIRBANKS 907-474-7539 SKPANDA@ALASKA.EDU



http://www.sites.google.com/view/alaskaview

Facebook.com/ArcticRemoteSensing



ARKANSASVIEW 2020 - 2021



ARKANSASVIEW 2020 - 2021 ACTIVITIES

- In 2020 2021, ArkansasView continued working on its multi-year "remote sensing usability" project. The main objective of this project was to increase the remote sensing and geospatial reproducibility and replicability capacity in Arkansas and beyond.
- ArkansasView refined the web-based "remote sensing usability" database (https://gw.cast.uark.edu/) and added a new Python workflow for Earth Engine. Users can now visit the database and explore, query, and reproduce several remote sensing workflows using widely available data and geoprocessing tools. We focused on Python because of its popularity in the remote sensing and GIScience community.
- A new video (AmericaView GitLab: Why version control? https://www.youtube.com/watch?v=TinsQaMRNAM) was created and posted on YouTube, highlighting the wonders of using version control in remote sensing and geographical information science.
- ArkansasView provided online demonstrations of Gitlab workflows to OhioView and OregonView.
- Dr. Mohamed Aly co-chaired the GSA 2021 NC/SC Joint Section Meeting, and sponsored research by ArkansasView was presented at the conference.



A brief introduction to version control in remote sensing and GIScience on YouTube, developed by Jason Tullis: (https://www.youtube.com/watch?v=TinsQaMRNAM).



An example of our workflows. A wildfire susceptibility map of Arkansas developed by Siam & Aly using random forest.

-|90%|+ X|D|ề ඞ © ਏ ⊂ ⊟ ∞ @ / Q O A https: ☺ 👱 💿 💋 🔮 ≡ View Workflows A geoprocessing and workflow 1 of 1 Administrato Sep 2021 Combet Combet (primary) Landsat 8 enhancement using Earth Engine Python API May 2021 fou may be interested in working with Google Earth Engine using Python (as opposed to JavaScript). A Jupyter notebook included in this workfit hrough the process of selecting a relatively cloud-there Landsat B scene and visualizing it using a two-standard deviation linear contrast stretch. relations late for the use of Google's Claboratory for Collaboration, access to Landsat Mendata In Earth Engine, and mage download. ist stretch. The

ArkansasView is a member of the AmericaView Consortium, a nationally coordinated network of academic, agency, non-profit, and industry partners and cooperators that share the vision of promoting and supporting the use of remote sensing data and technology within each state. AmericaView is funded by USGS grant agreement G18AP00077.



(GW or "Gigawatt") tool published in 2020 and refined in 2021. The detailed steps for published workflows are available through this link: (https://gw.cast.uark.edu/).

BENEFITS TO ARKANSASVIEW

- Our multi-year project dedicated to remote sensing reproducibility and replicability focused on the development of a conceptual model and database and the deployment of an AmericaView GitLab with usability examples from Arkansas. This year, we focused more on the high-quality use of AmericaView GitLab and Python in the development of Earth Engine API for Python workflows and engaged four additional StateViews. The web development was conducted using GitLab and new workflows were added with help from Dr. Jason Tullis, Dr. Mohamed Aly, and Dr. Chris Angel from the Center for Advanced Spatial Technologies (CAST) at the University of Arkansas.
- ArkansasView collaborated with four other StateViews interested in participating in the AmericaView GitLab. More lessons are learned from this collaboration and the GitLab site now holds content shared by individual members of participating StateViews interested in interchanging both public and private source controls (codes, project files, etc.) that can benefit from high quality version control.
- Two ArkansasView interns (Abdullah Al Saim and Mahmud Afroz) were trained by Dr. Mohamed Aly in summer 2021. Both interns were graduate students in the MS Geography program at the University of Arkansas. They supported the development of our geospatial database, and the first intern (Abdullah Al Saim) finished his MS research: machine learning & big data analyses for wildfire & air pollution incorporating GIS & Google Earth Engine. The outcomes from his wildfire study can help in fire prevention and preparedness to save lives and reduce economic loss in Arkansas.

← → 🕸 😌 − 100% +	×ା∿ୋ≌ ପ୍ତା≨	èс⊟∞ @ ⁄ ۹	O A https://gitlab.com/americaview		ជ
₩ GitLab 🛛 ≡ Menu				Search or jump to	(
MmericaView		C AmericaView			
* Group Information * Issues * In Merge requests * Packages & Registries		AmericaView Group ID: 7671143 This group includes "StateView" subgrou observation education for the Americas a	ps affiliated with AmericaView (https://am Ind beyond.	ericaview.org) and is dedicated	to Earth
		Subgroups and projects Shared projects	Archived projects	Search by name Nam	ne ~
		ArkansasView This group includes affiliates of A	krkansasView (https://arkansasview.org) and is	dedicated to Earth observatio	30 ∏ 8 8 6
		□ W IowaView ⊕ This group includes affiliates of le	owaView (https://www.iowaview.org) and is ded	icated to Earth observation e	10 月0 路1
	> Direction > Dire	DhioView (http://www.ohioview.org) and is dedi	cated to Earth observation ed	10 月1 路2	
		> C OregonView This group includes affiliates of C	DregonView (http://research.engr.oregonstate.e	du/parrish/oregonview) and is	00 □ 1 <u>86</u> 2
		> 🗈 🤯 UtahView 🕀 This group includes affiliates of U	JtahView (https://utahview.org) and is dedicate	d to Earth observation educati	30 ∏ 4 856

AmericaView GitLab (<u>https://gitlab.com/americaview</u>) showing the currently participating StateViews, including ArkansasView, IowaView, OhioView, OregonView, and UtahView. This GitLab site holds codes and project files shared by participating StateViews.

ARKANSASVIEW CONSORTIUM MEMBERSHIP









ArkansasView Principal Investigator: Dr. Mohamed Aly University of Arkansas 479-575-3185 aly@uark.edu



Center for Advanced Spatial Technologies (CAST) J. William Fulbright College of Arts and Sciences University of Arkansas, Fayetteville, AR 72701



CALIFORNIAVIEW 2020 - 2021



CALIFORNIAVIEW 2020-2021 ACTIVITIES

CaliforniaView's vision is to promote and advance remote sensing education within the state of California utilizing predominantly USGS Landsat data sets to solve societal problems. It has become the state's go-to remote sensing educational resource since 2012. In GY 2020, CaliforniaView has made great efforts to train and promote the applications of satellite and UAV technology in natural resource management and precision agriculture, in addition to the continuation of advancing remote sensing education across multiple disciplines.

Engaging students in project-based research enhanced by deep learning and "big data". CaliforniaView supported one Geography PhD student to develop deep learning approaches for mapping tree mortality and building footprint with high resolution imagery. A master student was trained to investigate the drivers rapid spread of large wildfires in California with a machine learning model. Another PhD student developed an automatic workflow to detect vineyard water stress using a machine learning model to combine UAV Imagery and weather data. Together they trained 8 undergraduate students.



Variation of vineyard leaf water status predicted with a machine learning model driven by UAV multispectral imagery and weather data.



(a) Damaged building footprints on daily fire progression map from MODIS/VIIRS. (b) Building footprint mapping with deep learning.

Promoting interdisciplinary collaboration on deep learning and its applications. CaliforniaView hosted about 9 zoom meetings to engage faculty and researchers from five departments at UC Davis, Cooperative Extension specialists, key industry partners such as SeeTree, Jain Irrigation, and Hortau, for open discussions. Key topics included tree level multi-sensor and multi-scale monitoring, yield prediction, and tree health forecasting, with deep learning. These resulted in closer collaboration across disciplines and fruitful discussion on proposals to

Student training on UAV/drone remote sensing technology. CaliforniaView co-sponsored UC DroneCamp and demonstrated drone technology advances and applications in various topics. Funding support was provided for selected DroneCamp participants from the under-represented communities. We also supported campus-wide drone user groups, UCD Drone Club, and MapTime. A drone lab was further refined on flight planning and image processing.



CaliforniaView is a member of the AmericaView Consortium, a nationally coordinated network of academic, agency, non-profit, and industry partners and cooperators that share the vision of promoting and supporting the use of remote sensing data and technology within each state. AmericaView is funded by USGS grant agreement G18AP00077.



BENEFITS TO CALIFORNIA

California has experienced the most destructive wildfires in the past five years. As the most diverse and productive agricultural state, it also faces the challenge of minimizing water and N use while maximizing the yield. CaliforniaView's activities contributed to facilitate data-driven management for sustainable natural resource and agriculture by

- Providing demonstration and guidance to state agencies and the specialty crop industry on satellite and UAV remote sensing technology and AI capabilities.
- Training students to equip next generation workforce with remote sensing foundations and tools.
- Relaying the power of multi-scale remote sensing framework and workflow for upscaling drone-based sensing with high resolution satellite imagery, to support better-informed decision making across scales.
- Educating broader audience about the benefits and advances of remote sensing and AI applications.
- Building the bridge between private companies and end users via partnership.





(a) Ecosystem monitoring and machine learning based fire risk prediction to help fuel management prioritization for fire hazard reduction. (b) UAV technology for water stress mapping to improve vineyard irrigation management. (c) EOD activity on campus.

CALIFORNIAVIEW CONSORTIUM MEMBERSHIP





COLORADOVIEW 2020 - 2021



COLORADOVIEW 2020 - 2021 ACTIVITIES

Evapotranspiration (ET) is comprised of evaporation and transpiration measurements for a total water and energy flux exchange from the land surface to the atmosphere. Over a specific region, it can be used as an indicator of the ecosystem's health, hydrologic cycle, agricultural processes, and water dynamics. In Colorado, the ET measurements can be used for vegetation health and drought indices as well as irrigation schedules and agriculture planning.

One of ColoradoView GY20 HIAs is to analyze the long-term dynamics of ET in Colorado. ColoradoView scientists and a student intern contribute to the work. The USGS Landsat Analysis Ready Data (ARD) ET dataset between 2000 and 2018 is also aggregated into annual and monthly averages over four land cover types (i.e., shrubland, cropland, grassland, and forest). Other than forest, the other three land cover types show slight increasing annual ET over the 19-year period. Peak ET years are asynchronous across the four land use types. The ET difference between individual land cover types is quantified by KL-divergence of their probability distributions. The grassland has the most similar trend and averages to the overall Landsat data followed by forest and shrubland with the cropland land cover having the largest divergence from the total Landsat trend. For the seasonal ET patterns, although there are differences in details, all land use types show peak ET in summer months and minimum ET in winter months.

Bable of contents > Surger feature Contents > Madits All mark Forction Statistics functions Batterist Statements If Partices from the state state state state states	~	+ Code + Text
<pre>smaps rease Concernse Made AdD mark AdD mark AdD mark AdD mark Function Desires functions Constreme services and the service of the ser</pre>	able of contents	
Constants: Statistics functions Mades: AdD mark Function Statistics functions Statistics functions If a function statistics_pric_const(is_base, bods, scales)) Courte Genoreby Statistics functions Statistics functions If a function statistics_pric_const(is_base, bods, scales)) Courte Genoreby Statistics functions Web Courte Genoreby Statistics functions Statistics functions Statistics functions Courte Genoreby Statistics functions Statistics functins Statististics functions	Image/Feature Collections	former a la
Mails: ADD math Function: Panetics function: Braines function: Braines: Br	Constants	 Statistics functions
Allo mank Function Sunits functions Sunits fu	Masks	
<pre>/ The second secon</pre>	ARD mask	[]
Smith Statistics Smith Sta	E autore	<pre># function statistics_get_count(in_Image, Bods, scale=30) (def statistics_get_count(in_Image_Bods_scale))</pre>
Batters Nucleone area : b_large_reducedge[on] Gardy Digram area : b_large_reducedge[on] Control Generally area : b_large_reducedge[on] Control Generally area : b_large_reducedge[on] Outlook ensistence of wald data area : b_large_reducedge[on] Charles ensistence of wald data area : b_large_reducedge[on] Charles ensistence of wald data area : b_large_reducedge[on] Charles findame officiene dif statistic_get_med(m_large_m_ben, table) Charles findame officiene dif statistic_get_med(m_large_m_ben, table) Maid Oay area : b_large_reducedge[on] Conside findame officiene dif statistic_get_med(m_large_m_ben, table) Conside findame officiene table_get_reducedge[on] Conside findame officiene table_get_reducedge[on] Conside findame officiene table_get_reducedge_local_state Conside findame officiene table_get_reducedge_loc	Functions	in_Image = ec.Image(in_Image)
Bingle Gry Freinbererer, Hossier, Control, D., Contry Generative, State (Control, D., States, States,	Statistics functions	area = in_Image.reduceRegion(
Courty Georetry iscale-scale, 500, fiscle, Widd Dame and bilaiteit Obtake statistics of widd dates and bilaiteit Obtake statistics of widd dates and bilaiteit Obtake statistics of widd dates and bilaiteit Double statistics of widd dates of class of bilaiteit and bilaiteit Double statistics of bilaiteit and bilaiteit Statistics of bilaiteit and bilaiteit Could bilaiteit and bilaiteit <t< td=""><td>Single Day</td><td>reducer=ee.Meducer.count(), geometry=Bods_first()_geometry().</td></t<>	Single Day	reducer=ee.Meducer.count(), geometry=Bods_first()_geometry().
Vide Dame: matrixisticity Checks entered wind Ancetors in too Latt checks entered index and calls sati Ancetors in too Latt Costs finance of wind Ancetors in too Latt checks entered index and calls sati Ancetors in too Latt Costs finance of wind Ancetors in too Latt in	County Geometry	scale=scale, #30, #scale,
Check sensitions of whid dates and clists in to me.List).wilked).prf(0) Constant feature objections def statistics_prf_memor(h_longs, bois, scale)) Deport Markins table an environment if statistics_prf_memor(h_longs, bois, scale)) Deport Markins table def statistics_prf_memor(h_longs, bois, scale)) in_longs, resc.pre(h_longs) Discion if statistics_prf_memor(h_longs, bois, scale)) in_longs, resc.pre(h_longs) if statistics_prf_memor(h_longs, bois, scale)) in_longs, resc.pre(h_longs, bois, scale)) if statistics_prf_memor(h_longs, bois, scale))	Valid Dates	maxPixels=1e13
dames and calls stall Anterior in too a call stall Desters inform contection Sectors in foot calls stall Deports Markets stallers Sectors in foot calls stall All Day Sectors in foot calls stall Owner best stall Sectors in foot calls stall Sectors Sectors in foot calls stalls Sectors Sectors in foot calls stal	Checks existence of valid).values().get(0)
Obsets industriction def statistic_get_week(ic_lower, bok, state)) Departs Markets table as any def statistic_get_week(ic_lower) Mail Day reduce-text, shader, mess(), statistic_get_week(ic_lower) Oracle texture, shader, mess(), statistic_get_week(ic_lower) def statistic_get_week(ic_lower) DBSD reduce-text, shader, mess(), statistic_get_week(ic_lower) DBSD reduce-text, shader, statistic_get_week(ic_lower) DBSD reduce-text, shader, statistic_get_week(ic_lower) DBSD reduce-text, shader, statistic_get_week(ic_lower) DBSD reduce-text, shader, statistic_get_week(ic_lower) DBSD reduce-text, shader, st	dates and calls stat functions in to ee List	
Exponent Matrices table as der Im_Linger_=er_charg(in_Linger) der der Im_Linger_=er_charg(in_Linger) der der Verwähl pårter expost och verwähl pårter der der State der Verwähl pårter der Verwä	Creates feature collection	<pre>def statistics_get_mean(in_Image, Bnds, scale):</pre>
off reference.statics.mess(), Aud Day generativalids,first(), generativ(), constant result, and the statistics, generativ(), statistics, generativ(), constant result, and the statistics, generativ(), statistics, generativ(), constant result, generativ(), results, generativ(), constant, generative(), results, generative(), constant, generative(), statistics, generative(), constant, generative(), statis,	Evocrte Matrice table on	<pre>in_Image = ee.Image(in_Image) </pre>
Abad Day genetative/biols.first().genetaty(). consistencessi jama consistencessi jama consistencessi jama consistencessi jama check asset status consistencessi jama check asset status consistencessi jama disclose status consistencessi disclose status consistencessi disclose status consistencessi disclose status consistences	.08V	reducer=ee.Reducer.mean(),
onder envelopient pån och sender som en envelopient och som en envelopient och som en envelopient och som en envelopient och som en envelopient en envelopie	Multi Day	<pre>geometry=Bnds.first().geometry(),</pre>
emotions in a second se	create retrainal nath and	scale-scale,
DEBUG return man index asset inter; dif statilite_priv_medias(in_lange, both, scale): fiscion dif_statilite_priv_medias(in_lange) index asset inter; network fiscion dif_statilite_priv_medias(in_lange) index asset_inter; network intitie_priving network intitie_priving network	exports csv's).values().get(0)
<pre>check asset status def statistics_pet_welfam(in_image, Bods, scale): fsileses imi_long=res_name(in_image) imi</pre>	DEBUG	return mean
<pre>def statistic_get_wellow(L_hang, budy, scale):</pre>	check asset status	
<pre>B Section in_length = etc.hege(in_lengt) and in = hit_hege(restrict(in_lengt)) and in = hit_hege(restri</pre>		<pre>def statistics_get_median(in_Image, Bnds, scale):</pre>
<pre>netlin = iii, lage / relatively joint reprint a lage / relatively joint reprint a lage / relatively joint sectors a lage / relatively joint return median def statistics.get.510 Dev(in_Samps, Bods, scale): in_lamps = re.lamp(f(lamps)) 510, dev = in_lamps(relatively)</pre>	Section .	<pre>in_Image = ee.Image(in_Image)</pre>
<pre>genetry-binds.first[].genetry(), scilestale, and/scilestale].ulust).get() return mails and statistics.get().genet().seep. Bok, scile): is_legg = re.legg().legg) 34(_bv = is_legg().set().seep)</pre>		reducer-ee Beducer median().
scalescale, marbinistici).value().pet(0) return median def attrictics.pet.Std Dav(in_lampe, Bods, scale): in_lamps = re.mar(in_lampe) Std_dev = in_lamper.contentpion(geometry=Bnds.first().geometry(),
andials-tell].alate().get() return mallar def tellsing get() Stor((s.Suge, Bok, scale)) for tellsing = re. tosag((s.Lueg)).get(-re. in.lunger.contemption(scale=scale,
).valus().get(0) return median def statistics.get.Std_Dev(in_Image, Body, scale): im_Image = ee.hamg(in_Image) Std_Dev = im_Image:reductArgin(maxPixels=1e13
return messam def statistics_get_Std_Dov(in_Dauge, Ends, scale): in_Energe = ee.Energe(in_Energe) Std_Dev = in_Energe.reduceErge(in)).values().get(0)
<pre>def statistics_get_Std_Dev(in_image, Bnds, scale): in_Image = ee.Image(in_image) Std_Dev = in_image.reduceRegion(</pre>		recurn median
<pre>in_Image = ee.Image(in_Image) Std_Dev = in_Image.reduceRegion(</pre>		def statistics get_Std_Dev(in_Image, Bods, scale):
<pre>Std_Dev = in_Image.reduceRegion(</pre>		<pre>in_Image = ee.Image(in_Image)</pre>
		<pre>Std_Dev = in_Image.reduceRegion(</pre>
requer-ee.Reducer.stdDev(),		reducer=ee.meducer.stdUev(),
EXALENSED 6		Prote-Prote;

Screenshot of a Google Colab notebook for deriving statistics of Actual Evapotranspiration (ET) in Colorado (data source: USGS Landsat Analysis Ready Data)

O Code 💿 Im	es 🗈 Pull requests 💿 Acti	ons 🖾 Projects 🖾	Wiki () Security
P master •	Go to file	Add file * Code •	About
😡 maosi-chen Up	date README.md	on Oct 14, 2020 🗿 18	No description, website provided.
i figure	add sample figures	14 months ago	Beadme
trainer	Initial commit (data_preprocess,	layer14 months ago	th MIT License
gitignore	add sample figures	14 months ago	Balance
D UCENSE	Initial commit	15 months ago	Nonsesson in Million
B README.md	Update README.md	14 months ago	Create a next release
E README.md		1	
Source- Convolu	Augmented Par ition version 2 (tial SAPC2)	No packages published Notion year fort package Languages
Source- Convolu	Augmented Part ation version 2 (S	tial SAPC2)	No asclages published Publick your first package Languages
Source- Convolu Table of Co	Augmented Par ition version 2 (! ontents	tial SAPC2)	No packages published Publish your free package Languages
Source- Convolu Table of Co Samples Citation	Augmented Part ation version 2 (S pontents	tial SAPC2)	No packages published holicit your test package Languages Python 1330%
Source- Convolu Table of Co · Samples · Clation · Code Contr	Augmented Part Ition version 2 (Sontents	tial SAPC2)	No packages politiked Public your for package Languages
Source- Convolu Table of Co • Samples • Citation • Code Contr • License	Augmented Part ation version 2 (Sontents	tial SAPC2)	No sockage: published Nation your for package Languages
Source- Convolu Table of Co - Samples - Citation - Code Contr - Elcense Samples	Augmented Pari ition version 2 (S pontents butors	tial SAPC2)	No sockgot published Rubbing our for published Languages
Source- Convolu Table of Co Samples Catation Catation Code Contr Decesse Samples	Augmented Part ition version 2 (Sontents	tial SAPC2)	No actops publied hard your for period Languages
Source- Convolu Table of Co Castion Code Coste Caster Samples	Augmented Part Ition version 2 (S ontents	tial SAPC2)	No package published hade your her package Languages Pythen 1020%

Screenshot of the public github webpage of the source code for the missing pixel reconstruction paper

In GY20, ColoradoView also finalized the missing pixel reconstruction project and published its source code on github. As of November 2021, the missing pixel reconstruction paper published in October 2020 has more than 2000 abstract views and 1100 full-text views.



Annual averages and uncertainties of USGS ARD ET over key ecosystems (shrubland, cropland, grassland, forest) in Colorado from 2000 to 2018

Monthly averages of USGS ARD ET over diverse ecosystems (shrubland, cropland, grassland, forest) in Colorado from 2000 to 2018

ColoradoView is a member of the AmericaView Consortium, a nationally coordinated network of academic, agency, non-profit, and industry partners and cooperators that share the vision of promoting and supporting the use of remote sensing data and technology within each state. AmericaView is funded by USGS grant agreement G18AP00077.



BENEFITS TO COLORADO

- Provided the student interns the opportunity to engage in real research projects, through which they learned
 - processing of Remote Sensing imagery using Google Earth Engine scripts;
 - programming in a team environment;
 - o statistical techniques; and
 - how to write summary reports / present findings for scientific investigations.
- Analyzed temporal and spatial patterns of ET in Colorado, providing researchers, policy makers, and stakeholders with the water stress condition in Colorado in the past two decades.
- Published the source code of the deep learning model that fills gaps of Remote Sensing images with the help of another collocated complete image. The source code facilitates the satellite image repairing applications.
- Promoted Remote Sensing (RS) education through lectures (Physical Geography) at Colorado State University. The lectures included several projects. The project on Google Earth teaches students a powerful way to present stories on any topic that involves geophysical elements including RS images. The project on assembling a weather station allows students to review/digest what they learned about weather, climate, solar energy, etc. and to see their measurements' real-world impact – improving weather forecast accuracy specific to their local areas.





The missing pixel reconstruction work was tweeted by NREL EcoPress.

COLORADOVIEW CONSORTIUM MEMBERSHIP



Federal consortium members identified above do not receive funding from AmericaView.

ColoradoView Principal Investigator: Dr. Wei Gao

USDA UV-B Monitoring and Research Program Natural Resource Ecology Laboratory, Colorado State University Fort Collins, Colorado 80523 wei.gao@colostate.edu 970-491-3600

COLORADO

https://www.coloradoview.org/



CONNECTICUTVIEW 2020 - 2021



CONNECTICUTVIEW 2020 - 2021 ACTIVITIES

The goals of ConnecticutView are to further the awareness and promote the use of remote sensing technology, from space borne sensors to ground based systems, within the state of

Connecticut. To meet these goals, ConnecticutView engages in various academic and outreach activities targeted at the education of K - 12 students, undergraduate students, graduate students, and the public. In addition, remote sensing technology is used to develop data and information that address specific issues within Connecticut.

Water Clarity Estimation: During the project year of 2020-

2021, ConnecticutView has further focused on the development of multi-temporal (2015 – 2020) water clarity estimates based on Landsat satellite imagery reflectance characteristics of surface waters in the state. In addition to water clarify analysis, we have involved in developing a Story Map for sharing and visualizing our findings. Water clarity is a measure of how far light can penetrate through the water column of a body of water, and is indicative of poor water quality. The causes of poor water quality are numerous, but generally related to high population density and associated development and other anthropogenic activities adjacent to water bodies.

Connecticut is a water rich state with over 5,000 lakes, ponds and reservoirs with surface areas over five acres in size. Although Connecticut governmental agencies, non-profit

measure water clarity on select lakes, most lakes and ponds 2019. This image is part of a multi-temporal dataset of water clarity remain unmonitored resulting in the inability of these agencies estimates for the state analyzing surface waters for the summer and groups to identify potential problems and act on them. Analysis of satellite imagery in multi-temporal fashion afford lakes and ponds that might require further investigation. the ability to systematically estimate water clarity of all sizable surface water bodies throughout the state to provide a means to track changes in water quality over time and identify potential problems that can become the focus of remediation efforts. Results of the multi-temporal analysis is now shared via an ESRI Story Map.

Estimated Water Clarity Depth < 2.0 2.5 3.0 3.5 4.0 > 4.5 m 3.00

organizations, and citizens monitoring groups regularly Example of water clarity estimate for Connecticut from September months of June – September over the years 2015-2019. These data will allow for the monitoring of changes in water clarity and highlight



Connecticut Lake Water Quality

Connecticut Lake Water Quality Story Map.

ConnecticutView is a member of the AmericaView Consortium, a nationally coordinated network of academic, agency, non-profit, and industry partners and cooperators that share the vision of promoting and supporting the use of remote sensing data and technology within each state. AmericaView is funded by USGS grant agreement G18AP00077.



BENEFITS TO CONNECTICUT

While small in area, Connecticut is a diverse state. Connecticut has an abundance of forest, numerous water bodies, and the state borders the Long Island Sound, an ecologically important estuary into which a majority of Connecticut watersheds drain. Connecticut also has a high population density with its associated urban and suburban development, road networks, and golf courses. As such, remote sensing technology can serve as a valuable tool to assist in the monitoring and management of the diverse Connecticut landscape and help educate the citizens on the impacts of human activities on the earth, both locally and globally. Imagery can also serve to highlight the beauty of the planet on which we live.

- Provide remote sensing based informational and data products that address issues specific to Connecticut to improve monitoring and management of the landscape.
- Expose K-12 students to remote sensing technology and provide educational outreach programs and materials.
- Provide quality imagery through "Our Earth Revealed" satellite image exhibit to expose the public to local and global landscapes.



satellite image exhibit at the Connecticut GIS Day Conference on November2 17, 2021.



We have printed several art pieces capturing Arctic tundra landscapes

CONNECTICUTVIEW CONSORTIUM MEMBERSHIP

ConnecticutView collaborates with various partners on a per-project basis. Current partners include:

UCONN Natural Resources and the Environment



LICONN UNIVERSITY LIBRARIES HARTFORD

Yale Institute of Water Reso



ConnecticutView Principal Investigator: Dr. CHANDI WITHARANA UNIVERSITY OF CONNECTICUT 860-486-8732

CHANDI.WITHARANA@UCONN.EDU



www. https://ctview.uconn.edu



Delaware View 2020 - 2021



DELAWARE VIEW 2020 - 2021 ACTIVITIES

Our activities during 2020-21 focused on expanding K-12 social studies curriculum and enhancing teacher capacity to utilize geospatial technologies in their classrooms.

Thinking Geographically Using Geospatial Data to Encourage Exploration and Ask Probing Questions about Place

Activity One: Drs. Tracy DeLiberty and Mary Schorse co-led a geospatially-focused seminar with nine K-12 teachers from New Castle County, Delaware. This seminar series showed teachers how to create and access geospatial data and use geospatial analysis as a tool for disciplinary instruction. Seminar leaders presented 14 sessions with each seminar introducing core concepts underlying geospatial technologies. Activities and lessons provided opportunities for teachers to think through the concepts and engage in hands on learning with various ArcGIS Online applications. Teachers learned how to ask important placed-based questions, became familiar with the latest geospatial technologies, and practiced identifying and analyzing geospatial datasets.

Each teacher created a grade specific teaching unit tested in their classrooms during the spring 2021 school year. Mapping native plants had 2nd grade students capturing and mapping data on species in their backyards using the Survey123 application. These activities contribute to the USGS Objective 4 Advancing Education and Training by supporting remote sensing science instruction in K-12 grades.



DelawareView is a member of the AmericaView Consortium, a nationally coordinated network of academic, agency, non-profit, and industry partners and cooperators that share the vision of promoting and supporting the use of remote sensing data and technology within each state. AmericaView is funded by USGS grant agreement G18AP00077.





9 teachers participated in the Seminar.

Our second activity expanded the use of imagery and geospatial analysis tools within Delaware's High School Geography 18-week curriculum titled *"Geography in the Modern*" World". The curriculum was developed in 2017 by a state-wide teacher cohort to provide instructional resources in geography curriculum that engage current (as opposed to historical) contexts. The five standardsbased units of the course were updated to expand the use of GIS and remotely sensed imagery. Students learn how to track and make data collected using GPS, analyze change over time through image analysis, and dig deeper into spatial analysis using GIS technology. Student interns helped to update standards' background materials and insert interactive maps using a story map platform.

BENEFITS TO DELAWARE

Delaware View focused its efforts this past year on advancing Earth observation education by interacting with K-12 students and educators, University of Delaware students, and GIS professionals through the following activities:

- GIS DAY Celebration Christina Marsett was recognized as an educator instrumental in furthering the use of geospatial data and analysis in the classroom. She presented the use of GIS to reinforce geography standards in her 9th grade social studies courses. A Career Panel of 4 GIS professionals provided students with advice to prepare and be successful in the working world.
- Visualization/Map Design Competition Highlighted winners for achievements in the art and science of mapping geospatial data.
- 2 University of Delaware students further developed their geography concepts and geospatial skillset learned by brainstorming fun and interactive ways to teach geography and develop activities using geospatial data and analysis.
- **Professional Presentations** given at the Delmarva GIS Conference and National Center for Geographic Education Annual Conference.

DELAWARE VIEW CONSORTIUM MEMBERSHIP



Tracy DeLiberty Delaware View Pl



Lee Aiken Climatology Doctoral Candidate



Mary Schorse Delaware Center for Geographic Education



Izzi Hanna Environmental Studies Senior









GIS Day Career Panel moderated by

Bridgette Kegelman (Geography BA senior winner.







GEORGIAVIEW 2020 - 2021



GEORGIAVIEW 2020 - 2021 ACTIVITIES

GeorgiaView's activities are highlighted by two geospatial projects. The first project is the publication of Georgia Landcover Image Atlas (Volume III: Forest Change) to outreach regional offices with the atlas. It focuses on the change of forest lands over the last 20 years. A total of 191 maps were designed using the boundaries of 159 counties, 14 U.S. congressional districts, and 12 regional commissions. The atlas used Landsat imagery from the U.S. Geological Survey, air photos, the Cropland Data Layer (CDL) dataset from the U.S. Department of Agriculture, and the University of Maryland GLAD Lab Global Forest Change Data. The atlas was delivered to 83 local and regional offices in Georgia including the Georgia governor's office, U.S. congressional offices, regional commissions, Georgia forest commission, counties, and county chief rangers. The atlas is freely available in the PDF eBook format at the GeorgiaView website, https://gaview.org.



UWG campus mapping with high-resolution drone photos.



Forest change in Georgia during 2000-2019. The reddish tones indicate where tree loss has occurred.

The second project is the high-resolution orthophoto mapping of the University of West Georgia (UWG) campus using drone imaging. Dr. Seong and four undergraduate students took 3125 photos from seven drone flights in the spring of 2021 and then created a one-inch resolution orthophoto map. Students surveyed ground control points for a high accuracy rectification, and the final map product was delivered to the UWG Planning and Construction Department.

GeorgiaView is a member of the AmericaView Consortium, a nationally coordinated network of academic, agency, non-profit, and industry partners and cooperators that share the vision of promoting and supporting the use of remote sensing data and technology within each state. AmericaView is funded by USGS grant agreement G18AP00077.



BENEFITS TO GEORGIA

GeorgiaView has brought broad impacts to the State of Georgia by promoting geospatial technologies, educating science, and helping decision making about natural resources. The following are testimonials about the Georgia image atlas and student training.

"I want to reach out to say thank you for the Atlas you provided. It is very informative, and we will utilize the imaginary and information to help educate our communities of the impact that urbanization and farming has had to our forest lands. Hopefully our relationship can grow more, we would appreciate any new publications you have in the future. One of the main reasons I chose the profession that I am currently in, was to protect and conserve our woodlands as much as possible." Rick Lane, Chief Ranger, Jenkins/Screven Unit.

"I would like to thank you for the copy of the atlas you sent to our office. Hurricane Michael in 2018 caused us a significant loss in both Decatur and Seminole Counties. I have often looked through google map images to see before and after photos. Many forest acres were being converted to agriculture prior to the hurricane. Since the hurricane many more have been converted to ag fields or orchards. This atlas is a great tool to see how much forest land has changed in the last few years." Bryan Cottles, Chief Ranger, Decatur/Seminole Unit.

"As a new student to the project and field, this is one of my first projects working with the implementation of data using tools such as ArcMap. This project serves as a steppingstone into larger, more substantial careers of the cartographic sphere in which maps continue to serve the significant role as the main tool in geography." Benjamin Shirley, UWG Undergraduate Student.



Outreaching to Congressman Drew Ferguson's Office. Newnan, Georgia. July 2021.



Outreaching to Georgia Governor Office. Atlanta, Georgia. July 2021.



Georgia Land Cover Image Atlas (Forest Change).

GEORGIAVIEW CONSORTIUM MEMBERSHIP





KENNESAW STATE U N I V E R S I T Y

GEORGIA SOUTHER

Skidaway Institute of Oceanography UNIVERSITY OF GEORGIA

> www. https://gaview.org



GeorgiaView Principal Investigator:

Dr. Jeong Seong

University of West Georgia

Phone: 678-839-4069 (Office)

jseong@westga.edu



HawaiiView 2020 - 2021



HAWAIIVIEW 2020 - 2021 ACTIVITIES

Lidar is the most accurate technology for mapping vegetation height. However, the existing airborne lidar data over Oahu (collected in 2013) miss the majority of the Ko'olau Range and a part of the Waianae Range, due to persistent cloud and complex topography. We combined island-wide Landsat-8 cloud-free mosaic (generated from the GY19 activities, <u>https://bit.ly/2ILmzJo</u>) and 2013 lidar data to map vegetation height over Oahu's mountainous areas (OMA). We first estimated vegetation height over lidar coverage areas, then used the data over the overlap areas to create a model of predicting lidar-based height from Landsat imagery, and finally predicted height over mountains using the model and the Landsat-8 mosaic.



Integration of Landstat-8 Cloud-free Mosaic, Airborne Lidar, and Machine Learning for Island-wide Tree height Mapping



Map of Oahu Continuous Tree Height



Maps of Oahu Tree Height in Categories

HawaiiView is a member of the AmericaView Consortium, a nationally coordinated network of academic, agency, non-profit, and industry partners and cooperators that share the vision of promoting and supporting the use of remote sensing data and technology within each state. AmericaView is funded by USGS grant agreement G18AP00077.



BENEFITS TO HAWAIIVIEW

- The only existing statewide map of vegetation height in Hawaii is the LANDFIRE Existing Vegetation (EVH) products. However, this product has several limitations including that 1) it is categorical (based on the average height per vegetation type), and 2) it was derived using only 246 plots, which might be insufficient to represent the vast diversity of vegetation types and structure from the large elevation gradient. Our map is the first of its kind to generate a continuous vegetation height for the forest areas in Oahu using massive airborne lidar-derived vegetation height as the reference.
- This new map (<u>https://bit.ly/3dLqLo7</u>) of vegetation height provides a critical input for understanding the role
 of forests in ecosystem functioning and services (such as water supply, carbon storage, and biodiversity
 conservation) in the island of Oahu, which has the largest population (about two-thirds, or one million, of the
 state residents), attracts the most tourists (about 6.2 million visitors per year), and pristine forests with
 pressure from urban development, agricultural expansion, military operations, species invasion, etc.
- One master graduate student was trained and supported for airborne lidar data processing and vegetation height modeling and mapping.
- One undergraduate student was trained for exploring satellite lidar data for terrain and vegetation use.

Feedback Examples

This is super interesting and very helpful.

Thomas Giambelluca, Director, Water Resources Research Center This is fabulous! Vegetation height data is one of those critical missing pieces we have had for a lot work work here in Hawaii.

Lucas Fortini, Research Ecologist, Pacific Island Ecosystems Research Center

HAWAIIVIEW CONSORTIUM MEMBERSHIP



HawaiiView Principal Investigator:

Qi Chen University of Hawai'i at Mānoa (808) 956-3524 qichen@hawaii.edu



http://hawaiiview.org

www.

https://bit.ly/3lOmoex



ІданоVіеw 2020 - 2021



IDAHOVIEW 2020 - 2021 ACTIVITIES

With IdahoView taking the lead, the Earth Sensors Research Committee (ERSC) completed a UAS Storymap that is available for public viewing. This Storymap highlights stateviews' UAS domain expertise, research, and sensor/platform capabilities. Images and specific examples of education, outreach. and research were coalesced into a StoryMap (see image on right). The StoryMap showcases the diverse use of UAS sensors across urban, agriculture, forestry, and other natural resource sectors. Further, links educational resources to on AmericaView's Youtube channel were included in the StoryMap.



AmericaView

UAS expertise across the nation

June 9, 2021

AmericaView StoryMap highlighting UAS expertise, research, and capabilities across the AV network. https://storymaps.arcgis.com/stories/efc33add7bf34b3d85e9f23896cd2b15



Rail cars along the Kootenai River in northern Idaho, August 2021

IdahoView's 2020-2021 HIA was to complete a for Geohazard Terrestrial Lidar Analysis Identification. Railroad corridors in northern Idaho are subject to landslides, debris flows, and rock fall. These geologic hazards have the potential to severely impact railroad assets, profitability, and public safety, particularly when hazardous materials are transported. Recent slope instability and mass movement in these railroad corridors have affected rail operations and emphasized the need for a detailed understanding of geologic hazards and slope dynamics in this region to prevent river corridor contamination from materials transported in rail cars.

To monitor known landslide hazards LiDAR point clouds can be used to measure change at sites over time. In 2017 we flew LiDAR equipped UAS at sites along the Kootenai and Moyie Rivers in northern Idaho.

To monitor known landslide hazards LiDAR point clouds can be used to measure change at sites over time. We compared recent manned aircraft LiDAR data to data from 2017 that we flew with a LiDAR equipped UAS at sites along the Kootenai and Moyie Rivers in northern Idaho. Using a multiscale model to model comparison, we were able to quantify new mass movement activity at sites along the river corridors.

IdahoView is a member of the AmericaView Consortium, a nationally coordinated network of academic, agency, non-profit, and industry partners and cooperators that share the vision of promoting and supporting the use of remote sensing data and technology within each state. AmericaView is funded by USGS grant agreement G18AP00077.



BENEFITS TO IDAHO

DEMs generated from LiDAR point clouds can be used to identify landslide potential. We are using object-based image analysis (OBIA) with factors that influence landslide potential. For example, slope roughness, curvature, vegetation, aspect and elevation are integrated into a rule-based model. To identify critical slopes these morphological parameters are classified into hazard categories. Further we are exploring machine learning approaches to automate slope stability mapping. Machine learning is a division of artificial intelligence that uses statistical models and algorithms to recognize patterns in data and adapt. This project will continue and also act as a seed grant for future proposal development.

Engaging Students in STEM Activities

It is vital to Idaho's economy to educate a qualified workforce in Science, Technology, Engineering, and Mathematics (STEM) professions. Industries that require STEM are expected to increase in Idaho and across the nation. IdahoView actively engages graduate and undergraduate students in field data collection and the hands-on use of advanced sensors to address issues that impact Idaho's natural resources to aid decision making. Both undergraduate and graduate students are encouraged to participate in the research and communication of results to stakeholders through one-on-one interactions, posters and oral presentations.



Landslide susceptibility map



MS GIS student Dana Drinkall presenting her LiDAR research at a 3 Minute thesis event at ISU (Fall 2021)

IDAHOVIEW CONSORTIUM MEMBERSHIP







IdahoView partners:

- Promote the development of novel tools and techniques that allow translating remotely sensed data into information that is meaningful to decision makers
- Use remote sensing as a means to promote STEM interest and learning
- Seek to expand involvement to incorporate all higher education institutions in Idaho and any other interested parties
- Advance the availability and timely distribution of data by maintaining links to archives of publically available satellite imagery for Idaho
- Encourage the use and scientific application of remotely sensed data from advanced sensors

IdahoView Principal Investigator: Donna M Delparte Idaho State University 208-282-4419

Delparte@isu.edu



http://www.idahoview.org



INDIANAVIEW 2020 - 2021



INDIANAVIEW 2020 - 2021 ACTIVITIES

IndianaView Student Scholarship Program

IndianaView provided scholarships for four and graduate students from the member educational institutions to participate in geospatial projects. Each of the student provided a fact sheet about their project and a testimonial on how the scholarship assisted them.

Examples of activities that the students completed include: developing a deep learning model to classify six common hardwood tree crowns using UAS-RBG imagery; integrating remotely sensed data and crop simulation models to optimize nitrogen fertilization at the field scale; leveraging deep learning to improve satellite data based crop yield estimation using UAS data as side information; and understanding the formation mechanisms and alteration histories of diagenetic features in Gale crater, Mars, using Earth analogs.

Students testimonials show that the scholarship opportunity motivated them to apply remote sensing data in their disciplinary studies, and improved their confidence in using cutting edge technology in field data collection.



The Indiana Statewide Lidar data portal allows users to download and preview ortho images and NDHM, DTM datasets.



Funded by the IndianaView Scholarship, an efficient model was developed to classify hardwood tree crowns using UAS-RGB imagery.

IndianaView mini-grant program

IndianaView provided a means for partner institution to participate in IndianaView via geospatial projects relative to the state of Indiana. Three minigrants were funded during 2021 for researchers at Purdue University and Purdue Fort Wayne. One minigrant project was expanding the Indiana Statewide Lidar data portal to host additional geospatial data products, including Indiana statewide orthomosaic images, web map services for Normalized Digital Height Model (NDHM) and Digital Terrain Model (DTM). All the datasets and services are available here: <u>https://lidar.jinha.org/</u>. The second mini-grant project was to develop an online tutorial for Python programming with remote sensing dataset in ArcGIS Pro. The course information and sample dataset is available here:

<u>https://guides.lib.purdue.edu/DataScience/ArcGISPr</u> <u>o</u>. The third mini-grant project is to support predictive modelling of Kudzu habitat availability in the Great Lakes region.

IndianaView is a member of the AmericaView Consortium, a nationally coordinated network of academic, agency, non-profit, and industry partners and cooperators that share the vision of promoting and supporting the use of remote sensing data and technology within each state. AmericaView is funded by USGS grant agreement G18AP00077.

BENEFITS TO INDIANA

- Supported by the IndianaView, the Indiana Statewide Lidar data portal has expanded its datasets and visualization capabilities. The visit statistics has been increasing consistently.
- The student scholarship program has greatly encouraged students across Indiana educational institutions to apply geospatial information in their specific research areas. This year's scholarships especially encourage student to apply remote sensing in crop management, including Precision Nitrogen Management for corns and crop yield estimation.
- The visits to online tutorial for Python programming in ArcGIS Pro has been increasing since it was available, with an average monthly visit of more than 250.
- IndianaView website hosts online image puzzles for Earth Observation Day (EOD). After the EOD 2021 online puzzle is available, we have received almost 3,000 visits.
- An interdisciplinary post-bachelor certificate program became available at Purdue University from Summer 2021 through the effort of IndianaView program, which includes the participation of seven colleges at Purdue University.
- Led by IndianaView PI, the first Big Ten Academic Alliance (BTAA) GIS Conferences was hosted virtually in fall 2020 with more than 400 participants.
- Supporting the Purdue University Digital Forestry Initiative in data integration and visualization.

A consistent increase in the number of visits to the Indiana Lidar Data Portal ever since it was launched with the support of IndianaView.

Remote sensing calibration assisted strip-based Precision Nitrogen Management for corns.

INDIANAVIEW CONSORTIUM MEMBERSHIP

Purdue University (765) 496-9474 kongn@purdue.edu

IOWAVIEW 2020 - 2021

IOWAVIEW 2020 - 2021 ACTIVITIES

Exploring the Landscape of K-12 GIS and Remote Sensing Education in Iowa

A strong geospatial foundation is a necessity to lay the framework for higher-level geospatial and remote sensing education. During 2020-2021 grant year, IowaView's efforts focused on understanding the current conditions of GIS and remote sensing (GIS/RS) education in K-12 Iowa classrooms. These efforts included an online survey of superintendents and educators, building relationships with other GIS/STEM organizations in the state, and creating an outreach deliverable based on the needs of the survey.

In Spring 2021, IowaView staff surveyed Iowa public school superintendents and K-12 teachers to understand how GIS/RS were currently being used in K-12 school districts and classrooms in Iowa. The surveys also provided a starting point for outreach and a way to assess if there is a need to improve access to available resources, such as Esri's free educational licensing and educational materials, as a way to build a foundation of GIS education throughout the state.

Initial findings from the survey found about 5 % of teachers surveyed are using GIS in their classrooms. GIS users were often introduced to GIS through continuing education workshops. Many non-user teachers commented that they were unfamiliar with GIS and would like more information about it. From these responses, it can be concluded that there is an information gap about what GIS is and how it can be utilized in the classroom. This spring, project staff plan to promote outreach through teacher workshops.

Outreach Activities During the Time of COVID-19

During the 2020-2021 grant year, many of our normal outreach activities during October (Earth Sciences Week/Earth Observation Day) and November (Geography Awareness Week/GIS Day) were not able to occur due to pandemic restrictions. However, IowaView staff chose to pivot and continue to provide content for those special weeks through our IowaView website and blog, as well as though an outdoor, in-person Halloween themed event. **Iowa View Blog**

For Earth Science Week 2020, staff blogged every day, sharing content that fit with the daily theme as well as specific lowa-related resources on that theme. Similar blogging efforts were employed during Geography Awareness week. Visit the <u>lowaView website</u> and search *Earth Science Week 2020* and *Geography Awareness Week 2020* for actual blog posts.

Spirits in the Gardens

lowaView staff participated the annual ISU Reiman Gardens *Spirits in the Gardens* event featuring a self-guided pathway with hundreds of carved pumpkins as well as "meet-the-scientist" opportunities along the way. We shared posters featuring remote sensing and GIS and gave away educational materials.

lowaView is a member of the AmericaView Consortium, a nationally coordinated network of academic, agency, non-profit, and industry partners and cooperators that share the vision of promoting and supporting the use of remote sensing data and technology within each state. AmericaView is funded by USGS grant agreement G18AP00077.

BENEFITS TO IOWA

 The primary goal of the K-12 GIS education survey was to better understand the current use of GIS in K-12 classrooms as well as understanding barriers to using GIS. This information is beneficial to lowaView, the lowa Geographic Information Council, the State of lowa, and other entities to help understand ground conditions and better target educational resources. A summary of the major findings of the study are available: https://tinyurl.com/K-12GISspring2021summary

One of the finding of the K-12 GIS education survey was that many teachers have never been formally exposed to GIS and are curious about it. In response, IowaView staff created a Story Map for Iowa K-12 educators to explore the basics of GIS, provide examples of how to use it in the classroom, and some hands-on introductions to tools for the classroom (ArcGIS Online, GeoInquires, and Story Maps). View the Story Map: https://tinyurl.com/GISEducatorResources

- Through blogging outreach efforts, IowaView served 375 users with 499 pageviews during the weeks surrounding Earth Science Week (Oct 4 – Oct 24, 2020.) Similarly, the blog served 285 users with 412 pageviews in the weeks around Geography Awareness Week (Nov 8 – Nov 28, 2020).
- During the session at Spirits in the Gardens, there were over 250 visitors of all ages. We presented posters of aerial imagery of Ames and Reiman Gardens dating from the 1930s to 2019 as part of their 25-year anniversary. Participants enjoyed seeing change over time as Ames has urbanized over the last ninety years. Staff gave out 65 goodie bags with AmericaView posters, USGS trading cards, and Earth as Art bookmarks and booklets.

IOWAVIEW CONSORTIUM MEMBERSHIP

The mission of the lowaView consortium is to increase the knowledge and use of remote sensing and other geospatial technologies for the benefit of the citizens of Iowa, through education, research and service. IowaView supports the collection and management of publicly accessible remote sensing data archives (ortho.gis.iastate.edu) which includes current and historic imagery, LiDAR elevation and other datasets useful for research and education. Collaborators come from several departments at ISU as well as from public agencies and organizations.

https://www.iowaview.org

IowaView Principal Investigator: Robin McNeely, GIS Facility Manager Iowa State University 515-294-2087 mobes@iastate.edu

An example of promotion efforts on the IowaView blog during Earth Science Week 2020

IowaView program manager Amy Logan presenting remote sensing posters at Spirits in the Gardens

State Coordinator: Amy Logan <u>amylogan@iastate.edu</u>

www.

KansasView 2020 - 2021

KANSASVIEW 2020- 2021 ACTIVITIES

In GY20 KansasView created three online tools to visualize and explore remote sensing data and remote sensing derived products for GIS and non-GIS users alike for use in education, outreach, research, and conservation efforts.

In GY20 KansasView developed an ArcGIS Online (AGOL) Dashboard for the Potential Wetland Area (PWA) database to make the data publicly available to visualize and explore (upper right). Development of a statewide wetland database utilized LiDAR data and was a collaborative effort among multiple state and federal agencies, including KansasView.

KansasView also developed an AGOL web mapping application to provide users the ability to explore and visualize the National Science Foundation's National Earth Observation Network (NEON) Airborne Observation Platform (AOP) remote sensing data collected at the KU Field Station (KUFS) along with Sentinel-2, Landsat 8, and aerial image services (mid right). KansasView previously supported processing of tiled NEON AOP data to create data mosaics that were then made available through the online tool.

Lastly, KansasView developed the Sentinel GreenReport application leveraging Google Earth Engine to measure and monitor vegetation across the United States. There are four maps created from the Sentinel-2 archive. 1) Greenness Maprepresents NDVI, which is a surrogate for photosynthetically active plant biomass, for a user-defined composite period; Difference Map 1-compares NDVI to the previous composite period within the same year to illustrate recent vegetation change; Difference Map 2-compares NDVI to same period from the previous year to examine year-over-year vegetation change; Difference Map 3-compares current NDVI to the average NDVI from previous years to examine vegetation change relative to the recent average. These maps can be used for a wide range of applications such as crop monitoring and disaster assessment (lower right).

KansasView is a member of the AmericaView Consortium, a nationally coordinated network of academic, agency, non-profit, and industry partners and cooperators that share the vision of promoting and supporting the use of remote sensing data and technology within each state. AmericaView is funded by USGS grant agreement G18AP00077.

The dashboard shows the mapping of potential and likely wetlands along with a dynamic summary of spatial extents of each class. <u>https://ku.maps.arcgis.com/apps/dashboards/168959bac666442</u> fb155b50ffa813064

The Viewer shows the 2019 LIDAR Hillshade draped over a one of NEON's vegetation indices for the experimental plots at the KUFS. <u>https://ku.maps.arcgis.com/apps/webappviewer/index.html?id=</u> <u>65508da0ffcc461abfba22fa7b54cda7</u>

Difference Map 3 shows the hardest hit crops in brown and orange from the Derecho Windstorm on Aug. 11,2020, in Iowa. <u>https://water2019.users.earthengine.app/view/greenmapkbsupd</u> ated

BENEFITS TO KANSAS

KansasView maintains connections with Kansas stakeholders and consortium members for potential collaborations in outreach, education, and research.

KansasView is represented at the GIS Policy Board, a consortium for promoting geospatial technology, acquiring critical geospatial datasets, and funding database development that support the mission and objectives of the Kansas Water Office. Over the years, many of these agencies have provided joint funding for projects partially funded by AmericaView.

KansasView awards mini scholarships to students at partner institutions to support remote sensing related education and research activities. In GY20, KansasView awarded 24 mini-scholarships to Haskell students to support education in remote sensing and geographic information systems.

KansasView participated in the annual Ecoystems of Kansas Summer Institute to educate Kansas biology and environmental science teachers on resources to integrate remote sensing and GIS into their classrooms.

Students from Haskell Indian Nations University learned to process UAS imagery to generate a 3D model for an external project to advocate to move "Big Red Rock" back to indigenous land.

One of eight ESRI Story Maps developed by students who received mini scholarships from KansasView. This Story Map describes the importance of the Haskell wetland. <u>https://www.arcgis.com/apps/Cascade/index.html?appid=ee0c38733</u> a5a4298ab32e0120f693b1d

KANSASVIEW CONSORTIUM MEMBERSHIP

UNIVERSITY

Federal consortium members identified above do not receive funding from AmericaView.

KansasView Principal Investigator: Dr. Dana Peterson University of Kansas 785-864-1510 dpeterson@ku.edu

http://www.ksview.org

KENTUCKYVIEW 2020 - 2021

KENTUCKYVIEW 2020 - 2021 ACTIVITIES

KentuckyView has been working on inland water quality and quantity mapping using Landsat imagery for the State of Kentucky for several years. During the current year, a research collaboration program, Ohio River Integrated Geospatial Interinstitutional Network (ORIGIN) including KentuckyView, OhioView and West VirginiaView, was established to monitor the Ohio River for mapping water quality and harmful algal blooms (HAB) events using multispectral and hyperspectral remote sensing, and other geospatial techniques. Drs. Anita Simic Milas from OhioView, Haluk Cetin from KentuckyView, and Aaron Maxwell from West VirginiaView coordinated the ORIGIN program. Kentuckyview also established collaborations with researchers at the Goddard Space Flight Center of NASA, and several USGS offices including Oklahoma-Texas Water Science Center, Fort Worth, TX, the USGS Ohio Kentucky Indiana Water Science Center (OKI-WSC), Louisville, KY, and Murray Field Office of OKI-WSC, Murray, KY. During the current year KentuckyView specifically focused on HABs prediction and monitoring. HABs are defined as algae overgrowths in aquatic systems, some of which produce dangerous toxins in fresh and/or marine waters affecting human health and the environment. Landsat-8 and Sentinel-2 datasets, and Google Earth Engine (GEE) were used for such efforts. Climate parameters, LULC characteristics, nutrient supply processes and urban sprawl, landscape metrics and primary productivity have been used to examine characteristics of HAB events that occurred in 2015 and 2016 for predictive modeling of HABs. These prediction parameters and models have been ranked based on their importance for weighted overlay models.

Mini-grant program: A Mini-grant program was established to increase collaboration among consortium member institutions, and their researchers and students. Dr. Oluwabunmi Dada of MSU received funding for a project entitled "The Spatial Pattern of Industrial Pollution and Water Quality Issues in Kentucky."

Earth Observation Day and Earth Day activities: A virtual Earth Observation Day (EOD) event was held at MSU on October 13, 2020. Two Keynote speakers, Dr. Bassil El Masri of MSU and Dr. Patricia Kambesis of Western Kentucky University, and the KentuckyView PI Dr. Cetin gave presentations. There were 34 participants at the event.

K-12 outreach activities: The MSU student chapter of ASPRS met two times to establish plans to work with K-12 students on a common geospatial project; however, due to the Covid19 issues, the activities were postponed.

State-wide undergraduate and graduate student fellowships: The winners of the 2021 undergraduate award in the amount of \$500 were Ms. Amber Harland-Bennett, MSU and Mr. Clint Cornelison, MSU. The winner of the 2021 graduate award in the amount of \$1,000 winner was Ms. Grace Embree, University of Louisville. The students would use their fellowship monies for their research.

KentuckyView is a member of the AmericaView Consortium, a nationally coordinated network of academic, agency, non-profit, and industry partners and cooperators that share the vision of promoting and supporting the use of remote sensing data and technology within each state. AmericaView is funded by USGS grant agreement G18AP00077.

Toxic Release Inventory. Mini-grant, Dr. Dada

BENEFITS TO KENTUCKY

KentuckyView is a member of the AmericaView Consortium, a nationally coordinated network of academic, agency, non-profit, and industry partners and cooperators that share the vision of promoting and supporting the use of remote sensing data and technology within each state. KentuckyView currently comprises 12 member institutions and agencies. As KentuckyView continues to grow we expect that additional universities, colleges, non-profit organizations, and state and federal agencies will add their knowledge, experience, and shared goals to ours as we seek to improve life for citizens throughout the Commonwealth. The primary focus of KentuckyView is on the use of images collected from remote sensors, as well as other geospatial technologies, to support K-16 education, applied research, and public outreach. The Kentucky Spectral library has been utilized to help process satellite data, such as Landsat 8.

KentuckyView has conducted research on soil moisture, water quality and quantity, and harmful algal blooms. For the state of Kentucky, these projects inform the water research community and improve understanding the environmental conditions which allows Kentucky to manage the water resources more efficiently.

We are developing workshop modules to improve K-16 education in the state. Also, more assessment tools have been developed. Remote sensing education and outreach activities, such as workshops, story maps, Earth Observation Day, Earth Day, and GIS Day presentations, have helped inform and educate teachers, students, and the public in Kentucky.

KENTUCKYVIEW CONSORTIUM MEMBERSHIP

- *Murray State University MARC and the* Department of Earth and Environmental Sciences (official member of record)
- Morehead State University
- Kentucky Division of Geographic Information
- Kentucky Geological Survey
- Eastern Kentucky University Department of Geography
- Jefferson Community and Technical College
- Kentucky State University
- University of Kentucky College of Agriculture
- Western Kentucky University Department of Geography and Geology
- University of Louisville Center for Geographic Information Sciences
- Northern Kentucky University History and Geography Department

Federal consortium members identified above do not receive funding from AmericaView.

LOUISIANAVIEW 2020 - 2021

PROMOTING THE BENEFITS of Remote Sensing Science and Applications

Hurricane Ida....."Caskets, vaults still displaced"

Emergency Response Working within an informed collaborative network to acquire imagery and data through LouisianaView's consortium partnerships supporting geospatial emergency responders.

BENEFITS TO LOUISIANA

2nd Year Virtual..... Hurricane Season Workshop for Emergency GeoSpatial First Responders

This annual workshop, held in early June each year, played out its twenty-second (22nd) year as our second virtual workshop. Through the cooperation of the LouisianaView consortium members and co-sponsored with the local USGS liaison, this workshop was offered free to everyone interested in up-to-date information on data availability for the geospatial emergency responder. Two Hundred and twenty-five (225) Geospatial First Responders from more than 20 different countries attended this workshop held June 3, 8-10, 2021 via Zoom from the UL Lafayette Regional Application Center. This 4-day virtual workshop hosted 21 speakers from multiple Federal, State and Private Response Teams, each presenting their data, websites, links, and contacts while also fielding questions live from those in attendance, proving again and again what a cohesive and informed network of geospatial responders can mean to the inhabitants and economic base within Louisiana, the Gulf of Mexico region and the Caribbean.

Document Link: https://drive.google.com/file/d/1HhQTfWyLTza8mpSo_o4QWSaeQLq8sA2Y/view?usp=sharing
LouisianaView is a member of the AmericaView
Consortium, a nationally coordinated network of
academic, agency, non-profit, and industry partners
and cooperators that share the vision of promoting
and supporting the use of remote sensing data and
technology within each state.
AmericaView Website:
https://drive.google.com/file/d/1HhQTfWyLTza8mpSo_o4QWSaeQLq8sA2Y/view?usp=sharing

Adjusting to a Virtual audience:

- Small Groups
- Individual Interaction
- Targeted Audiences
- Targeted Events
- On-Line Presentations

Creating new style in Face Mask Protection Landsat Style!

Earth As Ar

2021 ASPRS Annual Conference 2021 National Imagery Summit Landsat 9 Launch Preparation

<image>LouisianaView Consortium Membership LouisianaView Principal Investigato: R. Brent Yantis University of Louisiana at Lafayette University of Louisiana at Lafayette

337-344-8882

yantis@louisiana.edu

MarylandView 2020 - 2021

MARYLANDVIEW 2020 - 2021 ACTIVITIES

On July 13, 2021, MDView helped the Department of Community Planning and Development, City of Westminster, MD collect satellite and UAS imagery to evaluate tree conditions along the Main Street. We provided them with NDVI, LST, and DEM products and helped city managers better understand how different types of land uses and tree species affect surface temperature in the approximately 17 acres of Downtown Westminster.

Meeting with the Department of Community Planning and Development staff members to evaluate tree conditions for the City of Westminster, MD using UAS imagery. →

↑ Aerial view of Fox Hollow golf course

In July 2021, MDView visited Country Club of Maryland and Fox Hollow golf courses and helped property managers collect UAS imagery to evaluate grass conditions. We provided NDVI, LST, and DEM products and did a presentation on how to evaluate grass health conditions using geospatial technologies.

In October 2021, MDView organized two field trips. One field trip visited the USGS Water Science Center in Catonsville, MD. This opportunity allowed students to learn how water resources are managed and protected in the Chesapeake Bay using geospatial data and field measurements. The other one was a virtual field trip at NASA Goddard Space Flight Center. Students interacted with NASA scientists and learned much knowledge on NASA's EOS program and how remote sensing has been used by scientists to study global climate change.

MarylandView is a member of the AmericaView Consortium, a nationally coordinated network of academic, agency, non-profit, and industry partners and cooperators that share the vision of promoting and supporting the use of remote sensing data and technology within each state. AmericaView is funded by USGS grant agreement G18AP00077. ↑Aerial view of the Country Club of Maryland golf course

> Field trip at the USGS MD-DE-DC Water Science Center→

← Virtual field trip at NASA Goddard Space Flight Center

MDView organized a workshop for geography students at Towson University on October 28, 2021, to get hands-on experience with UAS and field data collection. Students practiced flying a quadcopter UAS and taking multispectral and thermal aerial imagery for a local residential area. Fieldwork like this is often more engaging than lectures and help students gain more interests into real-world remote sensing applications.

← UAS imagery and field data collection workshop

BENEFITS TO MARYLAND

- Satellite and UAS-based remote sensing technologies have been heavily promoted among local government agencies and small businesses in Maryland to raise public awareness about the benefits of remote sensing.
- More undergraduate and graduate students have been involved in field trips and other educational
 opportunities related to geospatial technologies. In Fall 2021, students were able to attend a virtual tour at
 NASA Goddard Space Flight Center as well as visit the USGS Water Science Center to learn more about how
 remote sensing has been used by federal research and development agencies to study climate change, water
 resources, and environmental protection.
- Maryland students gain more hands-on experiences for UAS imagery and field data collection, as well as realworld applications through remote sensing fieldwork.
- Local agencies and businesses are now able to request data, service, and educational materials for geospatial technologies through our new MarylandView website.
- The preliminary results from an ongoing research project that aims to study long-term ecological and environmental conditions for the Chesapeake Bay Watershed reveal that increasing urbanization over the past three decades caused accelerated deforestation, degraded air quality, decreased evapotranspiration, and increased surface temperature.

MARYLANDVIEW CONSORTIUM MEMBERSHIP

Department of Community Planning and Development, City of Westminster, MD

Country Club of Maryland Golf Course

Fox Hollow Golf Course

USGS MD-DE-DC Water Science Center

Federal consortium members identified above do not receive funding from AmericaView.

MaryandView Principal Investigator:

Dr. Chuyuan "Carter" Wang

Towson University

410-704-3973

cwang@towson.edu

wp.towson.edu/marylandview/

MICHIGANVIEW 2020 - 2021

MICHIGANVIEW 2020 - 2021 ACTIVITIES

As a state-member of the AmericaView consortium, MichiganView strives to promote Earth observation science within the State of Michigan. MichiganView's primary goal is to develop strategic partnerships with organizations around the state to develop easy to use tools, tutorials, and activities that advance remote sensing and geospatial technology education.

Much of MichiganView's effort has focused on working with schools to help students develop geospatial literacy. By exposing students to remote sensing and geospatial technologies at a young age, MichiganView hopes to spark interest in science and technology career pathways, especially in populations that are typically underrepresented in STEM-related fields. Developing relationships with schools in underserved areas is a priority for MichiganView, and direct collaboration with educators has resulted in useful activities that augment existing curricula. Integrating Earth observation into science and social studies units, rather than presenting it as a standalone topic, has proven to be an effective strategy for establishing partnerships with teachers who have limited capacity for extra lessons.

MichiganView also works with citizen-scientists and non-expert professionals on Earth science related topics, providing expertise at workshops and virtual meetings. Tutorials which utilize open-source software such as QGIS and cloud-computing environments such as Google Earth Engine are shared at MichiganView's website (www.michiganview.org). MichiganView also maintains a list of remote sensing resources and a curated archive of Michigan-centric imagery.

April, July, and October cloud-free composites of Michigan's Upper Peninsula created with a MichiganView Google Earth Engine Tutorial

Screenshots of tools created by MichiganView in 2020-2021. The image on the left shows an ESRI StoryMap created to teach 4th graders the difference between absolute and relative location. The image on the right is from a Google Earth Engine code snippet designed to introduce users to synthetic aperture radar image interpretation and analysis.

MichiganView is a member of the AmericaView Consortium, a nationally coordinated network of academic, agency, non-profit, and industry partners and cooperators that share the vision of promoting and supporting the use of remote sensing data and technology within each state. AmericaView is funded by USGS grant agreement G18AP00077.

BENEFITS TO MICHIGAN

- MichiganView activities developed for K-12 students are designed to help educators meet science and social studies standards set by the Michigan Department of Education.
 - As part of a unit to teach 4th grade students to "think like a geographer" they participated in an activity that introduced them to reading maps, interpreting air photos, and understanding cardinal directions.
- Lab exercises created for community students utilize freely available remote sensing data, such as imagery from the Landsat archive.
 - Environmental science students at Washtenaw Community College used Landsat 8 images to understand how different surfaces reflect near-infrared light.
- MichiganView develops tutorials for open-source software that help organizations integrate remote sensing technology into their projects.
 - A stratified random point sampling tutorial implemented in QGIS was presented at a workshop on wetland mapping to help scientists collect data for a large-scale collaborative mapping project.

A class from University Preparatory Academy in Detroit during a scavenger hunt designed with MichiganView.

Students used air photos to find changes in the neighborhood around their school.

MINNESOTAVIEW 2020 - 2021

MINNESOTAVIEW 2020 - 2021 ACTIVITIES

MinnesotaView undertakes education and outreach activities in remote sensing through the offering of workshops. The broad goals of these activities are to help stakeholders use remote sensing and to enhance public appreciation of the importance of remote sensing. We particularly focus our efforts on outreach to users and potential users of remote sensing data and methods. The awareness of remote sensing has increased dramatically in Minnesota over the last several years, but there are numerous opportunities to further increase use, and to help ensure that such use is consistent with accepted best practices.

MinnesotaView also supports the development, distribution and application of geospatial information derived from remote sensing data for mapping, monitoring and analysis of land and water resources. Key activities in recent years have been mapping water clarity for over 10,000 Minnesota lakes and completing land cover/use maps for Minnesota (see figures on this page). Our remotely sensed data products can be viewed on our recently revised data portals:

Land Cover/Use of Minnesota mapped using Landsat imagery

Water Clarity Data Portal: <u>https://lakes.rs.umn.edu</u> Land Data Portal: <u>https://z.umn.edu/landcover</u>

Mixed land cover in Woodbury, MN

Lower Red Lake area with cropland, forest, wetland and lakes.

MinnesotaView is a member of the AmericaView Consortium, a nationally coordinated network of academic, agency, non-profit, and industry partners and cooperators that share the vision of promoting and supporting the use of remote sensing data and technology within each state. AmericaView is funded by USGS grant agreement G18AP00077.

Conversion of rural landscapes to urban and suburban land uses (e.g. Woodbury, MN in the figure to the left) results in increasing amounts of impervious surface area. Imperviousness affects the amount of runoff to streams and lakes and is related water quality of surrounding lakes and streams, to urban heat island effects, habitat degradation and fragmentation, and aesthetics of landscapes.

The University of Minnesota's Remote Sensing and Geospatial Analysis Laboratory has completed classifications of land cover and impervious surface area of the state and for the Twin Cities metro area over several decades. Classification using Landsat Thematic Mapper data enables quantifying the spatial and temporal patterns of impervious surface area over large geographic areas at modest cost.

MinnesotaView was established in 2008 and is working with state agencies and universities in Minnesota to advance remote sensing research and application, education and outreach. The Consortium is led by the University of Minnesota's <u>Remote Sensing and Geospatial Analysis Laboratory</u>, and includes the <u>Minnesota Geospatial Information Office</u>, the <u>Minnesota Pollution Control Agency</u>, and <u>Minnesota Department of Natural Resources</u>.

BENEFITS TO MINNESOTA

An ongoing focus of MinnesotaView is offering workshops on remote sensing to Minnesota stakeholders. We have developed a large amount of workshop content for lidar, object-based image analysis, and Unmanned Aircraft Systems (UAS). UAS operations and applications are increasingly of interest for a variety of stakeholders, including the Department of Natural Resources (DNR) Forestry group, DNR's Resource Assessment group, the MN Pollution Control Agency's wetlands and water scientists, county land management agencies, and many others. In the 2019-2020 grant year, we conducted two workshops for stakeholders around the state.

The images to the right depict data products derived from our research. The top image shows the structure of a forest plantation, colored by height (red is taller). Such a dataset is useful for management planning, monitoring of tree health, and forest inventory studies. The bottom image is a highresolution photo of a forest canopy in northern Minnesota, near Ely.

MinnesotaView performs substantial remote sensing research outreach. We believe it is vital that stakeholders and the public see the results of our work.

Photo-derived point cloud of a plantation forest in Minnesota

Drone image of a forest research stand in northern Minnesota

MINNESOTAVIEW CONSORTIUM MEMBERSHIP



MISSISSIPPIVIEW 2020 - 2021



MISSISSIPPIVIEW 2020 - 2021 ACTIVITIES

MississippiView was established in 2003 and is led by the Mississippi Mineral Resources Institute (MMRI) at the University of Mississippi. We promote and facilitate geospatial data usage, research, and collaboration among the geospatial community in Mississippi while fostering national and international cooperation.

Our high impact activity (HIA) involved the creation of introductory remote sensing laboratories with a Mississippi focus. From fluvial to forest to field, the state of Mississippi has diverse land use/land cover and landforms. These can bring possibilities of geohazards such as flooding. These laboratories allow the student to explore basic remote sensing concepts while engaging with imagery of familiar locations and places of historic interest.

This HIA supported graduate students to develop these laboratories, continue to develop their remote sensing skills, as well as promote the use of ArcGIS Pro, Landsat, and Sentinel-2 imagery with collaborators.



Student research focused on water quality monitoring of oyster reefs in the Mississippi Gulf Coast using Landsat and Sentinel data in Google Earth Engine. Note the sediment load coming from surface water runoff in Spring 2018.



Cover prints of the introductory remote sensing laboratory exercises. These had a focus on locations of interest in the state of Mississippi.

In addition to the creation of educational materials, active research, MississippiView is engaged in active research and developing partnerships within the state to promote use of geoinformational data and tools.

One ongoing project is developing geospatial tools to monitor water quality for the health of oyster reefs in the coastal waters of Mississippi.

MississippiView is a member of the AmericaView Consortium, a nationally coordinated network of academic, agency, non-profit, and industry partners and cooperators that share the vision of promoting and supporting the use of remote sensing data and technology within each state. AmericaView is funded by USGS grant agreement G18AP00077.



BENEFITS TO MISSISSIPPI



- Flooding and groundwater withdrawal are of utmost importance to the state of Mississippi. Monitoring these processes lead to a more effective response to a natural disaster and better management of a valuable resource.
- Applications using a variety of the spaceborne, aerial, and terrestrial-based sensors are taught to students of Mississippi and support applied research in the state.
- Other projects include the use of satellite imagery to monitor habitat of gulf coast oysters. Oysters are an important resource to the Mississippi Gulf Coast. Landsat data is used to monitor water quality parameter such as turbidity, thermal and land use change in upland watersheds. Results from the research supporting our HIA and non-HIA.







Floodplain visualization using relative elevation models (REMs) of flood prone areas.



Using terrestrial laser scanning (TLS) and aerial LiDAR in combination with high-resolution imagery, ground subsidence methods are investigated to benefit the flood prevention infrastructure of the state.

MISSISSIPPIVIEW CONSORTIUM MEMBERSHIP

MississippiView is engaged in developing partnerships within the state. We have teamed with outreach efforts from the University of Mississippi's School of Engineering, School of Education and School of Applied Sciences to provide spatial data and aerial/satellite imagery to support student learning and research.

We have continued to work with students from Rust College in Holly Springs, Mississippi



MississippiView Principal Investigator: Lance D. Yarbrough, Ph.D., P.E. University of Mississippi 662-915-7498 Idvarbro@olemiss.edu



MISSOURIVIEW 2020 - 2021



MISSOURIVIEW 2020 - 2021 ACTIVITIES

The increasing availability of geospatial data converged with recent advancements in artificial intelligence, machine learning, and cloud infrastructure offers the potential for breakthroughs in science, policy, and national security. To broaden the use of Earth Observation data and demystify machine learning and AI for remote sensing application, the development of easy-to-use teaching materials are necessary.

During 2020 – 2021 reporting period, we have developed three teaching materials for K-12 and college level courses (https://missouriview.github.io). These materials include: Missouri as Art, Forest Conservation with AI, and Water Disparity and Levee Management. These training modules are designed to promote the use of geospatial data and contribute to the mission of AmericaView by advancing K-12 and college education.

Additionally, MissouriView consortium students and faculty presented 29 posters at Geo-Resolution national conference held at Saint Louis University; GIS Day @SLU



St. Louis region featured in Missouri as Art teaching materials that were created satellite imagery.



Lake of the Ozarks from satellite. 💧



AI for forest conservation in Africa



Len small levee breach.

MissouriView is a member of the AmericaView Consortium, a nationally coordinated network of academic, agency, non-profit, and industry partners and cooperators that share the vision of promoting and supporting the use of remote sensing data and technology within each state. AmericaView is funded by USGS grant agreement G18AP00077.



- We used creative combinations of visible and infrared light imagery from Landsat and other available satellite imagery data to introduce remote sensing with selected views of farmland, forests, rivers and streams, built environment, and cloud cover as artistic qualities of Earth's land features. This module can be used to teach fundamentals of remote sensing concepts to college students, high school teachers and students. <u>LINK</u>
- Forest Conservation with AI
 - This is a 2-week course module on teaching AI for forest conversation, ideal for undergrad and graduate courses. Through codes, presentation, and an assignment provided in the module, students learn how to create a tropical forest map using U-Net as the segmentation algorithm with WorldView-3 imagery. <u>LINK</u>

Water Disparity and Levee Management

 Inconsistent levee management is a major water equitability issue along the Mississippi River that is causing environmental disparities for underrepresented communities. This project studied the issue of water equity along the Mississippi river, centered around levee maintenance and management using drone-based LiDAR and RGB photogrammetry. <u>LINK</u>



BENEFITS TO MISSOURIVIEW

- Missouri as Art teaching material was created using creative combinations spectral bands of Landsat and Sentinel-2 satellite data. It provides intuitive teaching material for K-16 and the general public and promotes public knowledge of Earth Observation.
- Forest Conservation with AI is a two-week class module that benefits undergraduate and graduate courses to teach AI/ML applications with a practical example of deforestation mapping. Open-source code, tutorials, instructor solutions with power point presentation are provided as part of the manual.
- Water Equity project will provide excellent introduction to LiDAR and Photogrammetry techniques that can benefit undergraduate and graduate-level courses highlighting the issue of levee management in terms of water equity.
- As a first-year pilot project, our activities brought together major universities and innovation hubs in St. Louis metro region and provided a bi-state (Missouri and Illinois) platform for collaboration.



MissouriView member meeting held at SLU.



Changes in evergreen forest and agriculture explaining the impact of human activities to tropical forests.

MISSOURIVIEW CONSORTIUM MEMBERSHIP



Vasit Sagan

Saint Louis University

314-977-5156

Vasit.Sagan@slu.edu



MontanaView 2020 - 2021



MONTANAVIEW 2020 - 2021 ACTIVITIES

MontanaView successfully completed the High Impact Activity "Fellowships for undergraduate and graduate students conducting applied remote sensing projects." The goals of this activity were to 1) support students and provide encouragement and resources for them to pursue a career in geospatial sciences and remote sensing; and 2) benefit the state of Montana by providing information, data, and analysis that will improve the management of natural resources. MontanaView awarded 10 fellowships (\$1,500 each) to students at six institutions across Montana.

The following is a list of the students and their institutions, project titles, and mentors (in parentheses):

- Brenna Hatch, University of Montana, Using UAV imagery to monitor endangered Asian elephants and their habitat in the Khaling Duar Forest Reserve (Dr. Anna Klene)
- Shira Ellenson, University of Montana, Arctic greening: 25 years of tundra biomass change from in-situ and remotely sensed observations (Dr. Anna Klene)
- Erik Killian, Montana State University, Using remote sensing to improve large scale barley emergence measurement (Dr. Jennifer Lachowiec)
- Sasha Loewen, Montana State University, Data intensive adaptive management in organic agriculture (Dr. Bruce Maxwell)
- Ninad Bhagwat, Montana Tech University, Estimating the snowmelt derived runoff in the upper Missouri River basin with snowmelt runoff modeling (Dr. Xiaobing Zhou)
- Quinn Powell, Montana Tech University, A miniaturized radar sensor and GPS system integrated to an Unmanned Aerial Vehicle (Dr. Xiaobing Zhou)
- Chris Fryett, Montana State University Billings, Changes in landscape and environmental testing at the Billings regional landfill (Dr. Joe Hoover)
- Margaret Anderson, University of Montana Western, Lateral channel migration on beaver dominated streams: California Creek, southwest Montana, USA (Dr. Arica Crootof)
- Jenniffer LaCounte, Salish Kootenai College, Salish place names for CSKT's forest management areas (Dr. Robert Kenning)
- Rachel Tom, Salish Kootenai College, Engaging the public with sustainable forest management projects through remote sensing (Dr. Robert Kenning)

Students presented their work at the MontanaView Annual Fellowship Meeting on April 25, 2021, and submitted a final written report to MontanaView and the identified project stakeholder(s).





Drone (left) and electronic components (right) of a miniturized radar sensor and GPS system integrated to a UAV by Quinn Powell for his MontanaView remote sensing fellowship project.

MontanaView is a member of the AmericaView Consortium, a nationally coordinated network of academic, agency, non-profit, and industry partners and cooperators that share the vision of promoting and supporting the use of remote sensing data and technology within each state. AmericaView is funded by USGS grant agreement G18AP00077.



MONTANAVIEW 2020 - 2021 ACTIVITIES

MontanaView supported graduate student Zach Fighter of Montana State University, on his research titled "Multi-scale analysis of *Ventenata* control treatments on the Crow Reservation." *Ventenata dubia* is an invasive winter annual grass that impacts plant community diversity and forage production. Zach's project aims to test the integration of two herbicides and an organic soil amendment for controlling *Ventenata*. Vegetation response to treatments will be measured with in-situ field measurements as well as with multi-scale remote sensing, from the leaf-level with a handheld spectroradiometer, to the plot-scale with a multispectral sensor on a drone, to the landscape-scale with multispectral satellite observations. The expected outcomes of the study are to determine effective management methods and to understand the spectral and temporal responses of *Ventenata* to treatments.



Invasive winter annual grass Ventenata dubia in Montana.

*

Top: Zach Fighter (right) and Scott Powell (left) flying a drone at a field site on the Crow Reservation, Montana. Bottom: Zach Fighter (right) and Jane Mangold (left) applying herbicide treatment to a plot.



MONTANAVIEW CONSORTIUM MEMBERSHIP

(406) 994-5017 spowell@montana.edu





NEBRASKAVIEW 2020 - 2021



NEBRASKAVIEW 2020 - 2021 ACTIVITIES

The NebraskaView program explored the use of airborne imagery for urban forestry applications that included mapping urban tree canopy distribution and classification of specific tree species types. The urban forest canopy mapping project was done in conjunction with a Nebraska Environmental Trust (NET)-supported project that partnered with three cities in Nebraska (Lincoln, South Sioux City and Waverly) to develop urban forest canopy maps for their respective communities from USDA National Agricultural Imagery Program (NAIP) multispectral imagery. The tree species classification activity was a preliminary, exploratory project to assess the feasibility of multi-temporal hyperspectral imagery to identify and map specific tree species with urban forests.

The goal of NebraskaView activities is to develop practical applications and advanced the use of remote sensing for urban forest management within the State.

Results:

- Urban forest canopy maps over the cities of Lincoln, South Sioux City and Waverly.
- Preliminary tree species classification results using single and multidate, hyperspectral imagery for UNL's East Campus.
- Provided remote sensing training and research experience for a graduate student for the urban forest mapping activity and undergraduate honors student for the tree species classification study.



- Fraxinus pennsylvanica
- Picea pungens
- Pinus nigra
- Quercus macrocarpa

Initial tree species classification results over UNL's East Campus using airborne hyperspectral imagery.



NebraskaView is a member of the AmericaView Consortium, a nationally coordinated network of academic, agency, non-profit, and industry partners and cooperators that share the vision of promoting and supporting the use of remote sensing data and technology within each state. AmericaView is funded by USGS grant agreement G18AP00077.



Urban tree canopy map over an area of Lincoln, NE produced from USDA NAIP multispectral imagery.

BENEFITS TO NEBRASKA

The mission of NebraskaView is to ensure *that Nebraskans make full use of satellite and airborne imagery, aerial photography and other geospatial data products through technologies such as geographic information systems (GIS) and remote sensing.*

Specific benefits of Nebraska View to the State include:

- Support decision makers in evaluating and selecting the most appropriate remote sensing imagery and other spatial data for a specific application.
- Demonstrate the value of remote sensed data and assist in developing applications.
- Providing remote sensing education and training to students, professionals and others in the general public.



Damien Niyonshuti, NebraskaView summer intern, helping with installation of airborne hyperspectral sensor used to collect imagery for tree species classification work.



1-meter airborne hyperspectral image over UNL's East Campus used in the tree species classification activity

NEBRASKAVIEW CONSORTIUM MEMBERSHIP



City of Lincoln, Nebraska Parks and Recreation



Nebraska Forest Service



The Nebraska Environmental Trust



University of Nebraska-Lincoln Community and Regional Forestry Program

Federal consortium members identified above do not receive funding from AmericaView.

NebraskaView Principal Investigator: Dr. Brian Wardlow University of Nebraska-Lincoln 402-472-6729 bwardlow2@unl.edu







NewHampshireView 2020 - 2021



NewHampshireView 2020 - 2021 Activities

Our High Impact Activity for this year was a pilot study to evaluate our ability to map riparian habitat with imagery of differing spatial resolutions. The challenge with using moderate resolution imagery has been that the spatial resolution is too coarse to adequately distinguish the relatively small riparian habitat from the upland habitat. Our study included an area in northern New Hampshire and included imagery from Landsat 8 (30 m pixels), Sentinel 2 (10 m pixels), and the National Aerial Imagery Program (NAIP) combined with field data sampling for use as the reference data. The map classes used were four upland classes: conifer forest, deciduous forest, mixed forest, and grass/shrubland; and four riparian classes: conifer forest, deciduous forest, mixed forest, and grass/shrubland. Four dates of imagery were acquired for both the Landsat 8 and Sentinel 2. These dates were early May (representing leaf-off conditions), mid-June (representing early leaf-on conditions), late August/early September (representing full leaf-on conditions), and October (representing senescence). boundaries were determined Riparian from а combination of USGS hydrography data and elevation data generated from lidar imagery (see figure 1). Each date of imagery was classified separately using an objectbased image analysis approach. In addition, a multitemporal analysis was performed to see if the accuracy of the resulting maps could be improved. Analysis was conducted both for the 8 map classes (4 upland and 4 riparian) as well as collapsing the 8 into 2 classes (upland vs. riparian.

	REFERENCE					
		Riparian	Upland	Total		
МАР	Riparian	53	47	100		
	Upland	38	62	100		
	Total	91	109	58%		

Figure 2. Error matrix for the collapsed upland vs. riparian multi-temporal analysis for Sentinel 2 imagery.

NHView is a member of the AmericaView Consortium, a nationally coordinated network of academic, agency, non-profit, and industry partners and cooperators that share the vision of promoting and supporting the use of remote sensing data and technology within each state. AmericaView is funded by USGS grant agreement G18AP00077.





Figure 1. Thematic map of the multi-temporal Sentinel 2 analysis.

Results of this pilot study have shown:

- The higher spatial resolution imagery produces better results (higher thematic map accuracies).
- The best single dates for mapping all 8 classes are May (leaf off) and October (senescence).
- Neither spatial resolution (30 m or 10 m) produced very high accuracies (mostly ranging from 35 – 50%)
- Even collapsing the analysis to just upland vs. riparian map classes did not improve the accuracy all that much (see figure 2).
- Higher spatial resolutions need to be tested.

BENEFITS TO NHVIEW

- We completed our work evaluating the use of very high-resolution imagery for forest edge detection and were able to very effectively and efficiently monitor changes the forest landscape caused by landscape fragmentation that directly impact the ecology of the area. This technique will provide the means for natural resource managers, wildlife biologists, conservation planners, and others to make better decisions about their land.
- NHView continued the lead role in the University GeoSpatial Support Center (GSC) after the departure of the GeoScience librarian. This facility provides consulting and workshops on remote sensing and geospatial analysis to students, staff, and faculty. Most of the consulting and workshops was conducted virtually, but successfully.
- NHView funded an undergraduate intern to work in the Basic and Applied Spatial Analysis lab (BASAL) to aid our research resulting in a poster presented virtually at the UNH Undergraduate Research Conference in April 2021.



Field data collection is a necessary part of evaluating the results from any image analysis.

NHVIEW CONSORTIUM MEMBERSHIP



Very high spatial resolution image of riparian habitat in the fall (leaf color change)



Undergraduate intern measuring the diameter of a large tree.

- Department of Natural Resources & the Environment, UNH The Basic and Applied Spatial Analysis Lab (BASAL) conducts basic research on spatial data uncertainty/map accuracy and applied research applying the tools of remote sensing, GIS, and spatial data analysis to solve natural resource problems.
- NH GLOBE Partnership, UNH Carries out GLOBE teacher training in atmosphere, land cover, hydrology, soil and earth system science with a focus on land cover mapping and geospatial technologies.
- EOS-EarthData, UNH

 A digital library of Earth science data that serves scientists, educators and the public.
 NH GRANIT GIS Repository, UNH
- A cooperative project to create, maintain, and make available a statewide geographic data base serving the information needs of state, regional, and local decision-makers.
- **Diamond Library, UNH** The library maintains an extensive map and aerial photo collection for NH and houses the GeoSpatial Support Center.
 - Forest Watch, UNH A New England environmental education activity using field, lab, and satellite data analysis methods for assessing the state-of-health of local forest stands.
- **Cooperative Extension, UNH** Offers short courses in geospatial technologies including GIS, GPS, and field mapping.
- Dartmouth College
- NH Planning Commissions

NewHampshireView Principal Investigator:
Dr. Russell G. Congalton
University of New Hampshire

(603) 862-4644

russ.congalton@unh.edu



www.

http://www.nhview.unh.edu



New MexicoView 2020 - 2021



New MexicoView 2020 - 2021 Activities

New MexicoView saw a realignment, new direction and new coordinator this year as Ken Boykin and Carol Campbell coordinated to transition the *StateView Program Development and Operations* for the state of New Mexico beginning in October of 2020. Attending virtual monthly meetings together and discussing goals and accomplishments of the program at the state level made for a smooth transition. Ken retired from FW&CE at NMSU in December 2020 and Carol Campbell, an Associate Professor and Department Head of Geography at NMSU, stepped in as coordinator in April 2021. Best wishes, Ken!

New MexicoView HIA's for 20-21 included meeting and connecting with researchers and groups affiliated with New MexicoView through Ken (on-going), and a transition of the website to a new platform (close to publishing). April 2021 also invited locals to Celebrate Earth Day by joining the first NMSU-EarthDayBioblitz-2021 (Figure 1). Though still with pandemic restrictions, it was a great dry-run of organizing a citizen science event (Figure 2.).

Continuing the translation of the EOD poster to Spanish will remain a goal for New MexicoView. I joined the AmView Education & Outreach committee just in time to contribute slightly to final edits of the EOD poster for 2021: *Viewing Water from Space*. See the Spanish version poster front below, Figure 3, and the corner of the poster back game board Spanish translation: jugo de mesa, Figure 4



Figure 1. NASA EOD Poster 2021 Viendo el Agua desde el Espacio.



Figure 2. Zoom of upper corner of the back of the NASA EOD 2021 poster: game board. Spanish translation: jugo de mesa.



Figure 1. Area shown in pink NMSU Earth Day Bioblitz 2021 encompassing NMSU campus and golf course.



Figure 2. Location of observation report for NMSU-EarthDayBioblitz-2021. April 21-24, 2021

Outreach to distribute copies of both versions of the EOD posters will include sharing with the NMSU Department of Language & Linguistics, NMSU College of HEST's Teachers Teaching Teachers group, local Hispanic community centers, the Museum of Nature & Science, Las Cruces, NM. Citizen science efforts are on-going.

New MexicoView is a member of the AmericaView Consortium, a nationally coordinated network of academic, agency, non-profit, and industry partners and cooperators that share the vision of promoting and supporting the use of remote sensing data and technology within each state. AmericaView is funded by USGS grant agreement G18AP00077.



BENEFITS TO NEW MEXICO

- April 2021 saw the hosting of the NMSU Bioblitz and Earth Observation Earth Day event.
 - o 6 observers
 - 85 observations
 - a diverse group including students, faculty and staff ages 19-60 years
- GLOBE Observer activities (GO)
 - Associated with Bioblitz advertised on the iNaturalist site.
 - Observations within the posted boundary (shown on page one) and student GO posts as far away as El Paso, TX.
 - GO observations of land cover and trees obtained by faculty and students in classes on EOD, GIS Day, and during Geography Week.

NMSU-EarthDayBioblitz-2021 made for an excellent test run to get the process started, meet potential collaborators, and introduce staff to the protocols of timing, organizing, hosting, and advertising a citizen science event.

Viewing water from space is the perfect game to engage New Mexico communities: citizens, scientists, students, and researchers.



Figure 5. NMSU Geography students play the game on the back of the NASA EOD 2021 poster: *Viewing Water from Space* in a campus lobby.

Two geography grad assistants sit at front. Left is Otis A., right is Pablo V., and on his right, Ryan B., geography senior.



Dirty and clean water tokens can be seen in front of the players.

NEW MEXICOVIEW CONSORTIUM MEMBERSHIP











NEW MEXICO SPACE GRANT CONSORTIUM









Federal consortium members identified above do not receive funding from AmericaView.

New MexicoView Principal Investigator: Dr. Carol Campbell New Mexico State University 575 646-6480 geobird@nmsu.edu



http://newmexicoview@nmsu.edu

Facebook.com/New MexicoView

@New MexicoView

@New MexicoView

E



New YorkView 2020 - 2021



New YorkView 2020 – 2021 Activities

During GY20, New YorkView (NYView) worked with the New York State (NYS) Department of Environmental Conservation (DEC) Water Hub to support an ongoing water quality project aimed at using satellite imagery to derive chlorophyll-a concentration in NYS lakes. As a foundation for this project, NYView synthesized existing research relevant to characterizing lake water quality and developing a categorization scheme for NYS lakes. A graduate student funded by NYView and DEC reviewed the literature to develop an annotated bibliography of lake assessment methodologies based on satellite imagery, with a particular focus on sensors that researchers have integrated with Sentinel-2 imagery. The review reported different atmospheric correction approaches applied, and documented the range of multi-band indices used to estimate chlorophyll-a. This analysis has formed a foundation for continued work using historical water



quality data, satellite images, and statistical analyses to estimate chlorophyll-a concentration for lake types that vary based on parameters such as depth, clarity, and phosphorus. The NYS DEC aims to create an operational lake water-assessment tool. The project will compare tools such as Google Earth Engine with alternatives such as ArcGIS.

An example of the Pivot-table dashboard used to extract water characteristics of NYS lakes to facilitate assessment of lake trophic state.

The second component of study in GY20 focused on spatial and temporal characterization of wetlands in NYS. This work provides a foundation for expanding study in this area during GY21. During GY20 a graduate student developed



A Sentinel-2 image of Basic Creek Reservoir, in Albany County NY.

imagery. Experimentation considered the utility of a range of input data types, including both spectral and spatial data from Landsat and Sentinel sensors and features derived from those data such as multi-spectral indices texture. The and research also tested selection of parameters for segmentation to support object-based



a workflow for classifying types of wetland in NYS using remotely sensed

Segments derived from Sentinel-2 imagery (on left), with classified map (on right).

classification, and explored the influence of training sample design on classification accuracy. In the example shown above, image segments were derived from Sentinel-2 visible and near-infrared bands. Classification subsequently used features for these objects derived from Sentinel-2 (image bands, indices, and texture features), as well as features from Sentinel-1 and other radar missions, and topographic characteristics derived from a digital elevation model.

New YorkView is a member of the AmericaView Consortium, a nationally coordinated network of academic, agency, non-profit, and industry partners and cooperators that share the vision of promoting and supporting the use of remote sensing data and technology within each state. AmericaView is funded by USGS grant agreement G18AP00077.



BENEFITS TO NEW YORK STATE

As part of the AmericaView Consortium, NYView has supported the application of remote sensing data and products to solve challenges in New York State (NYS) since 2009. Remotely sensed imagery provides a unique opportunity to observe the ground surface from above. This imagery supports a wide range of applications in NYS including analyzing land use and land cover change, quantifying water quality, characterizing vegetation dynamics, planning or monitoring urban growth, and supporting emergency response.

NYView initially focused on facilitating access to diverse remote sensing data and products, and supporting collaborative research, teaching, and outreach among consortium members. Since becoming a full member of AmericaView in 2014, NYView has supported training of high school teachers, undergraduate and graduate students, and used Landsat change pairs from sites across the state to demonstrate applications of remote sensing data for visitors at the New York State Fair. NYView has developed video modules and



The reservoir of the Mount Morris Dam in the Genesee River in Letchworth State Park.

lab exercises to support use of the cloud-based Google Earth Engine platform. In addition to the



Rich Lake from Goodnow Mountain at the Adirondack Ecological Center in Newcomb, NY.

important education focus described above, NYView has also performed research that has explored the integration of airborne lidar and Landsat data to quantify forest aboveground biomass as well as investigating the utility of remote sensing and spatial analysis to assess trends in vegetation extent and vigor along riparian corridors. Ongoing research projects focus on using remote sensing data to support assessment of water quality in lakes and characterizing change in wetlands over time.

New YorkView Consortium Membership

Current NYView consortium members include: the State University of New York (SUNY) College of Environmental Science and Forestry (ESF), the Institute for Resource Information Sciences (IRIS) at Cornell University, SUNY Fredonia, and SUNY Plattsburgh. NYView aims to continue to support collaboration and enhance remote sensing activities across the state. Interested researchers and users of remote sensing data should visit the NYView webpage (www.esf.edu/nyview) or contact the NYView Principal Investigator for more information.



ljquack@esf.edu



North DakotaView 2020 - 2021



NORTH DAKOTAVIEW 2020 - 2021 ACTIVITIES

Remote Sensing Analysis of Brine Spills in the Bakken Formation Region of Western North Dakota. One of the primary activities of NDView during this time period was the investigation of brine spills in western North Dakota from oil and gas development. This research was focused on updating an earlier NDView project.

- Promotion of undergraduate and graduate research skills. Two student interns investigated the history of oil and brine spills in ND from 2013 to 2021, and conducted research on the geospatial distribution of these spills. Landsat satellite imagery was used to create a Canopy Response Salinity Index (CRSI) to better show the locations of brine spills and their effect upon vegetation.
- Advance Education and Training, Technology Transfer, and Outreach. Student research focused on advanced analysis of geospatial data to detect hotspots for brine spills based on volume. and changes over time.



Brine spill data from 2013 - 2021.



CRSI values before and after brine spill. Bottineau County, ND (Patel 2020). Red areas indicate the most impacted areas.

North DakotaView is a member of the AmericaView Consortium, a nationally coordinated network of academic, agency, non-profit, and industry partners and cooperators that share the vision of promoting and supporting the use of remote sensing data and technology within each state. AmericaView is funded by USGS grant agreement G18AP00077.





North Dakota landscape from MODIS imagery, August 22, 2020. The northwestern part of the state is the most active for oil and gas development.



Brine spill hotspot analysis for all months (2013-2021).



Brine spill hotspot analysis during June, July and August (2013-2021).

BENEFITS TO NORTH DAKOTA

- NDView provided scholarships for undergraduate and graduate students at the University of North Dakota for research and training in remote sensing related areas. Students conducted research in duck nesting habitat, vegetation monitoring and ice patch archaeology.
- NDView led a field trip for K-12 teachers on the 1997 Red River Flood. Satellite images were used to demonstrate the extent of the flood, and damages. The teachers were part of the ND Geographic Alliance GeoFITT workshop in June 2021.
- NDView continued to provide support to local middle school teachers for online resources for remote sensing and geospatial learning during the Covid-19 pandemic.
- NDView provides access to specialty software for training and analysis on remote sensing data from satellites, aircraft, UAS and ground-based sensors.



Student assessing ground cover for phenocam study (near Arvilla, ND).



NDView sponsored field trip for K-12 teachers (Grand Forks, ND and E. Grand Forks, MN).





ОнюView 2020-2021



OHIOVIEW 2020-2021 ACTIVITIES

OhioView Remote Sensing Workshops

OhioView member universities Youngstown State University, University of Toledo, Bowling Green State University, Kent State University, Central State University, and University of Dayton presented two workshops for a combined approximately 100 participants on February 5 and 26, 2021. Pls from each university presented a section of the workshop that covered a variety of remote sensing and geospatial topics that used freely available software and data. Due to Covid-19, this workshop was held online and thus opened to participants from across the country throughout AmericaView.

OhioView Teacher Training

Three Ohio teachers participated in OhioView professional development to learn how to incorporate satellite imagery and GIS analysis through Multispec and ArcGIS Online. During the summer of 2021 the teachers collaborated with high school students who were part of the University of Texas STEM Enhancement in Earth Science (SEES) Program. The teachers will use the techniques they learned in their classrooms in the 2021-2022 school year.

Water Quality Monitoring and Education

Bowling Green State University (Dr. Anita Simic Milas) was part of the ORIGIN (Ohio River Integrated Geospatial Interinstitutional Network) program in collaboration with KentuckyView and West VirginiaView. The goal was to establish a network to monitor water quality and involve undergraduate and graduate students in mapping in conjunction with the Spatial Literacy in Remote Sensing (SPLIT) program at BGSU.

OhioView is a member of the AmericaView Consortium, a nationally coordinated network of academic, agency, non-profit, and industry partners and cooperators that share the vision of promoting and supporting the use of remote sensing data and technology within each state. AmericaView is funded by USGS grant agreement G18AP00077.



Participants in the OhioView Remote Sensing workshops joined online via Zoom to receive instruction on multiple types of remote sensing applications using freely available software and data.

SPLIT S	SPLIT Ren 3 subscribers	note Sensing				
HOME	VIDEOS	PLAYLISTS	CHANNELS	ABOUT	Q	
Uploads 🕨	PLAY ALL					
	26:52		14:18		Conception Concernent Review - Index concernent - Index concerne	25:53
SPLIT RS Basics o Learning # 14	f Machine	SPLIT RS SPatial LITerac Remote Sensing: SPLIT	y SPLIT RS Education	OhioView al Proiects	SPLIT RS GRAS	S GIS and or beginner
38 views • 11 months	ago	52 views • 11 months ago	20 views • 1	1 months ago	62 views • 1 year a	ago
				SPLIT - SPat Remot	ial LITeracy te Sensing	CEPLIT CE
- H. 4				SPLIT thi	rough ART	ант () эти ••• • • • • • • • • •

ORIGIN / SPLIT students created YouTube videos in the 'SPLIT Remote Sensing' channel to educate the public and students about mapping algal blooms by using various remote sensing software and visualization techniques.



BENEFITS TO OHIO

- Initiated in 1997, OhioView is a consortium of universities in Ohio dedicated to furthering education, research, and workforce training in Earth Observation Science. OhioView is overseen by a Board of Directors made up of Pls from several of the universities in the consortium. Many OhioView schools participate in the OhioView Software Pool, by which the member schools contribute to a central fund dedicated to purchasing specialized remote sensing software at a significant cost savings to each school. This software enables the classwork, educational efforts, and research conducted by OhioView universities.
- The OhioView "Remote Sensing on a Shoestring" workshops served approximately 100 faculty, students, and workforce members over two days. Instruction included using Earth Sciences Missions imagery in Google Earth Pro (Dr. Bradley Shellito), normalized difference calculations of Sentinel-2 data using Multispec (Dr. Joseph Ortiz), land cover classification of Sentinel-2 imagery using QGIS (Dr. Anita Simic Milas), classification using Google Earth Engine (Dr. Umesh Haritashya), ground validation using the NASA Globe Observer app (Dr. Kevin Czajkowski), and estimating evapotranspiration using Landsat imagery and QGIS (Dr. Sakthi Subburayalu). There were also short guest presentations by Peder Nelson and Brian Campbell from the NASA Earth Science Education Collaborative.
- One of the longest running OhioView initiatives is the SATELLITES (Students and Teachers Exploring Local Landscapes to Interpret the Earth From Space) Program. This is offered yearly to K-12 teachers (particularly middle and high school level) in Ohio. and provides teachers and students with hands-on, inquiry-based science and STEM education using geospatial technologies. This year the students presented at a virtual conference through the GLOBE Midwest Collaborative.
- The ORIGIN program established a network of institutions, researchers and students who would develop algorithms for monitoring water quality issues such as algal blooms.
- The SPLIT Remote Sensing research-educational cascade model supported water quality related research and offered high school and university students the opportunity to gain hands-on field remote sensing research skills. This model was also funded by the NSF.
- Regional partners include NASA Glenn Research Center and the Old Woman Creek State Nature Preserve.



K-12 SATELLITES students at the GLOBE Midwest Collaborative Conference present their investigation how weather affects the speed of their slide in the playground.



Participants at the online OhioView Remote Sensing workshops receive instruction on using Google Earth Engine for imagery classification.



Participants in the OhioView Teacher Training program use a remote-controlled TerraRover with an infrared sensor on it to observe the temperature of sports fields.

E

OhioView Principal Investigator: Anita Simic Milas Bowling Green State University 1.419.372.4035 asimic@bgsu.edu



http://	/www.ohioview.org
---------	-------------------





OKLAHOMAVIEW 2020 - 2021



OKLAHOMAVIEW 2020 - 2021 ACTIVITIES

The proposed HIA for GY20 was to publish a peer-reviewed fact-sheet on the potential and availability of remote sensing technologies, data, and services to help farmers in Oklahoma better adopt remote sensing in their daily operations. Based on the survey of a wide range of literature on the applications of remote sensing in agriculture and natural resources, a question driven outline was developed (see below). The authors of the fact-sheet worked on the following questions depending on their expertise to develop a draft of the fact-sheet.

- What is remote sensing (definition and examples of remote sensing)?
- How does remote sensing work (principles of remote sensing: active vs. passive and platforms of remote sensing)?
- How can remote sensing be used in agriculture and natural resources specifically (examples of how remote sensing is used in agricultural and natural resource applications)?
- What are the considerations when using remote sensing in agriculture and natural resources (spatial, temporal and spectral resolutions)?
- What are the current datasets and tools available for using remote sensing in agriculture and natural resources (common freely available remote sensing datasets and tools)?

The goal of this fact-sheet is to convey the potential of remote sensing in agriculture and natural resources to farmers in the state of Oklahoma. The factsheet used plain and easy to understand language to explain important remote sensing concepts. Well-recognized sources about remote sensing concepts were used to answer these questions with appropriate citation. For example, one figure from the National Aeronautics and Space Administration (NASA) was used to explain the difference between passive and active remote sensing (Fig. 1). The authors also developed several ways to explain other important concepts in remote sensing. For example, the authors used different images of Oklahoma State University Stillwater campus to illustrate the concept of spatial resolution (Fig. 2).



Fig. 1 Diagram of passive sensor versus an active sensor. Credit: National Aeronautics and Space Administration Applied Remote Sensing Training

OklahomaView is a member of the AmericaView Consortium, a nationally coordinated network of academic, agency, non-profit, and industry partners and cooperators that share the vision of promoting and supporting the use of remote sensing data and technology within each state. AmericaView is funded by USGS grant agreement G18AP00077.



OKLAHOMAVIEW 2020 - 2021 ACTIVITIES



Fig. 2 Imagery of Oklahoma State University Stillwater campus at 30×30 m (from Landsat 8), 10×10 m (from Sentinel-2), 1×1 m (from National Agriculture Imagery Program (NAIP)), and sub meter resolution (from Google Earth).

BENEFITS TO OKLAHOMA

(405) 744-9168

yuting.zhou@okstate.edu

- Trained one graduate student on how to conduct literature review
- Enhanced the collaboration among consortium members
- Increased the awareness of the potential of remote sensing among faculty across the university
- Explained important concepts in remote sensing using common language and easy to understand examples
- Provided a list of datasets and tools available for using remote sensing in agriculture and natural resources
- Encourage farmers adopt remote sensing in their operations to increase profitability

OKLAHOMAVIEW CONSORTIUM MEMBERSHIP





OREGONVIEW 2020 - 2021



OREGONVIEW 2020 - 2021 ACTIVITIES

OregonView led an initiative to document requirements, capabilities, and opportunities for **Landsat bathymetric mapping**. Many coastal regions around the world are entirely lacking in bathymetry, the underwater equivalent of topography. The lack of bathymetric data hinders analysis of coral reefs and other ecologically-sensitive nearshore habitats, as well as coastal inundation modeling, wetlands studies, and a range of related coastal science and management activities.

Landsat 8, in combination with other remote sensing data, such green-wavelength laser altimetry from NASA's ICESat-2, can be used to generate nearshore bathymetry for many coastal regions. OregonView is helping promote and enhance this emerging use of remote sensing data.



Satellite-derived bathymetry for Western Australia, generated by an OregonView-supported student.

OregonView PI, Chris Parrish, served as Coastal Processes Lead for the NASA Surface Topography and Vegetation (STV) Incubation Team. Leveraging the STV study results, combined with new analysis of Landsat bathymetric mapping capabilities, and the master's thesis work of OregonView-supported graduate student, Ben Babbel, OregonView has documented the current **state-of-the-art and future recommendations for bathymetric mapping with Landsat**.

Another major activity of OregonView and Oregon State University graduate student, Selina Lambert, was the development of the **Earth Observation Day game**: *Rivers: Our National Water Resource*. In collaboration with AmericaView and NASA partners, Selina designed the gameplay and content and created a virtual (Tabletopia) version of the game. Hundreds of copies of the game have been distributed to AmericaView members and partners to provide a fun, interactive introduction of use of remote sensing data in managing natural resources.



Earth Observation Day game board.

OregonView is a member of the AmericaView Consortium, a nationally coordinated network of academic, agency, non-profit, and industry partners and cooperators that share the vision of promoting and supporting the use of remote sensing data and technology within each state. AmericaView is funded by USGS grant agreement G18AP00077.



BENEFITS TO OREGON

OregonView is active in education and outreach events related to natural resource management, citizen science, and benefits of remote sensing. Highlights from the past year have included presentations by OregonView State Coordinator, Peder Nelson, at the Oregon GeoFest Workshop, the ASPRS and URISA GIS-In-Action conference, and OhioView Presents: *Remote Sensing on a Shoestring Workshop*. Additionally, OregonView partnered with the ASPRS Student Chapter on a 2021 Earth Observation Day Celebration.





2021 workshop presentations given by OregonView State Coordinator, Peder Nelson.

Earth Observation Day Celebration.

OREGONVIEW CONSORTIUM MEMBERSHIP

The OregonView consortium membership comprises leaders in the remote sensing and geospatial information communities within Oregon and extends across the government, commercial and academic sectors. Member organizations include: Oregon Department of Parks & Recreation (OPRD), USGS Forest & Rangeland Ecosystem Science Center, Oregon Framework Implementation Team (FIT), Oregon Geospatial Enterprise Office (GEO), Portland State University (PSU), Oregon State University (OSU) College of Engineering, College of Forestry, and College of Earth, Ocean, and Atmospheric Sciences.



Federal consortium members identified above do not receive fundina from AmericaView.





www.

http://research.engr.oregonstate.edu/parrish/oregonview



PENNSYLVANIAVIEW 2020 - 2021



PENNSYLVANIAVIEW 2020 - 2021 ACTIVITIES

PennsylvaniaView (PAView) is working with the Pike Run Watershed Association on an outdoor classroom. Pike Run, a fourth-order stream in eastern Washington County, Pennsylvania, is a tributary to the Monongahela River. Its course begins at the headwaters in West Pike Run Township and winds through mostly rural and minor residential areas to its outflow between Coal Center and California Boroughs. Pike Run's proximity to California University of Pennsylvania (CalU) makes it an ideal "outdoor classroom" for university courses in Earth Sciences and Geospatial Technology. Students will use existing remote sending imagery and geographic data to create a watershed evaluation map and continue undergraduate research. Students used a mobile colorimeter to expand water quality parameters testing, then performed distributed, self-selective testing using multiple mobile test kits throughout the watershed. They tested for pH, conductivity, iron, copper, aluminum, and hardiness. Due to COVID - 19, the team could not host the Watershed Symposium. Instead, the team created videos on the use of the materials and supplies, including a discussion of the testing results. These videos were uploaded to the Geology Club YouTube Channel to be used in class and eventually for the public. This data was uploaded into the ArcGIS Online account, and next year there will be a data visualization site for the public to examine the results.



Pike Run Tests Sites and Watershed.



Data on ArcGIS Online



Students in the field.

cyclomedia

Lauren Roberts is using the mobile test kits to test for pH, conductivity, iron, copper, aluminum and hardiness. She will presenting her results at a Spring 2022 Conference

PennsylvaniaView began a partnership with Cyclomedia (LIDAR and 360-degree georeferenced photographs). California University of Pennsylvania students created lessons using the Cyclomedia Map service in their Environmental Applications of GIS course, which was evaluated by the Cyclomedia team. The top two exercises (Event Planning and Fire Safety) were published on the PennsylvaniaView site.

Make sure you change your caption.

PennsylvaniaView is a member of the AmericaView Consortium, a nationally coordinated network of academic, agency, non-profit, and industry partners and cooperators that share the vision of promoting and supporting the use of remote sensing data and technology within each state. AmericaView is funded by USGS grant agreement G18AP00077.



BENEFITS TO PENNSYLVANIAVIEW

PennsylvnaniaView's projects are not just focused on southwestern Pennsylvania. We are a consortium of members throughout the Commonwealth of Pennsylvania. Our primary goal is to educate the public about remotely sensed imagery and provide any information in a public forum. Here are a few examples:

- 1) Villanova University As part of a senior thesis project at Villanova University, undergraduate student Lauren Sage worked with Professors Jennifer Santoro and Steven Goldsmith to map and understand patterns of invasive plant spread at Riverbend through imagery and fieldwork. Lauren took field measurements of invasive species in a series of meter-square plots on the property and quantified the cover of these species across the preserve.
- 2) Bucknell University used imagery and spatial data to predict Hotspots for Sediment Erosion in Turtle Creek Watershed. Lewisburg. Faculty and students completed this research.



Riverbend study area in Gladwyne, PA



The six locations where carpet squares were place in Turtle Creek Watershed





RHODE ISLANDVIEW 2020 - 2021



RHODE ISLAND VIEW 2020 - 2021 ACTIVITIES

Rhode IslandView Story Map raises Landsat awareness in the Rhode Island natural resource community.

The Landsat satellites have provided continuous coverage of the entire earth for 50 years which is unmatched by any other satellite data archive. These data are freely available through the USGS and are used throughout the world for a wide variety of applications especially for detecting changes in the landscapes over time. While Landsat is well known to the global remote sensing community, it is often underappreciated by the broader geospatial community, natural resource professionals, and the general public.

With AmericaView support, the University of Rhode Island recruited and mentored two graduate research assistants to create a Story Map to tell the story of the ongoing Landsat program. The Story Map provided basic information about remote sensing, gave the historical background of the Landsat program, described the characteristics of Landsat data, discussed example applications, and provided instructions on how to access the data. The Story Map was geared toward a non-technical audience to make it approachable to a broad community of professionals and the general public. The Story Map is publicly available through the Rhode IslandView website (see below).



Story Map of Landsat in Rhode Island



The Rhode IslandView website

The Rhode IslandView website was relaunched in 2021.

While the website was down for maintenance, Rhode IslandView took the opportunity to overhaul the website to improve its functionality. The newly updated website provides convenient access to the goals, activities, and products of Rhode IslandView.

The Rhode IslandView website is at https://riview.uri.edu/.

Rhode IslandView is a member of the AmericaView Consortium, a nationally coordinated network of academic, agency, non-profit, and industry partners and cooperators that share the vision of promoting and supporting the use of remote sensing data and technology within each state. AmericaView is funded by USGS grant agreement G18AP00077.



BENEFITS TO RHODE ISLAND

The Landsat Story Map will make Landsat more accessible and enticing to the GIS community, natural resource managers, and the general public in Rhode Island. It features examples of easily recognized geographic features and applications of Landsat in Rhode Island. The Story Map is geared toward a non-technical audience but includes instructions to show GIS practitioners how to find and download Landsat data from the GLoVis website. The description of Landsat data focuses on the practical information needed to determine appropriate uses of the data. The Story Map will enable natural resource and other professionals to better appreciate and utilize the important resources that the Landsat program offers.

The Rhode IslandView activities supported two graduate research assistants during the summer of 2021. They gained valuable experience in learning how to find Landsat data and work with it using Environmental Systems Research Institute (ESRI)'s ArcGIS Pro software. The students developed skills in creating ESRI story maps and communicating technical remote sensing material to a nontechnical audience. They will bring the skills and knowledge gained to their professional communities upon entering the workforce.



Rhode IslandView website



Outreach material on Rhode IslandView website

RHODE ISLANDVIEW CONSORTIUM MEMBERSHIP

THE UNIVERSITY **OF RHODE ISLAND**



United States Department of Agriculture

RIGIS



Federal consortium members identified above do not receive funding from AmericaView.

Rhode IslandView Principal Investigator: Dr. Y.Q. Wang University of Rhode Island 401.874.4345 yqwang@uri.edu



https://riview.uri.edu



SOUTH DAKOTAVIEW 2020 - 2021



SOUTH DAKOTAVIEW 2020 - 2021 ACTIVITIES

South DakotaView (SDView) is focused on remote sensing education and outreach to students, educators, and current workforce personnel across South Dakota. SDView activities during this past year include:

• K-12 Teachers Workshop

This past year's SDView High Impact Activity was a workshop titled *South Dakota as Art*. SDView partnered with numerous schools from around the state to provide instruction on creating artwork using Landsat imagery. The one-day online workshop was conducted via Zoom to 15 teachers on May 25th, 2021. The workshop covered South Dakota Department of Education Standards for the sciences and arts and how they apply to STEAM education. This activity supported the curricula, workshops, technology transfer and outreach portions of NLRSEORA Objective 4. The primary goal of the workshop was to provide teachers with methods to introduce remote sensing into the K-12 classroom.

Selected topics covered by the South Dakota as Art workshop included:

- o Background on Landsat and the USGS Earth as Art program.
- Technical background: Platform types, resolution, Landsat band combinations, EMS, imagery and landscape descriptions.
- Open-source software: MultiSpec, GIMP, Google Earth, and 7Zip.
- Primary data acquisition USGS websites: Earth Explorer and GloVis.



Conference presentation of SD as Art.



By Melissa Sagmoe, Camelot Int. School SD as Art Workshop.

South DakotaView is a member of the AmericaView Consortium, a nationally coordinated network of academic, agency, non-profit, and industry partners and cooperators that share the vision of promoting and supporting the use of remote sensing data and technology within each state. AmericaView is funded by USGS grant agreement G18AP00077.

South Dakota Statewide GeoSpatial Conference (Online)

- o June 16-17, 2021.
- Presented a talk on the *SD as Art* workshop and showed images that were created by the K-12 teachers.
- $\circ\quad$ Served on the conference committee.
- Open to the public (177 registered attendees and 3 vendors).
- ASPRS Annual Conference (Online)
 - o March 29 April 2, 2021.
 - Panel member: *America View Empowering Remote Sensing Education*.
 - Presented a talk on education outreach experiences and workshop activities to promote remote sensing and geospatial technologies.
- 52nd Annual South Dakota State Geography Virtual Convention
 - o March 5-6, 2020.
 - Students presented *SD as Art* projects.
 - Open to the public (>70 virtual visitors).
- Two \$1000 mini-grants
 - Competitively awarded to graduate students for projects involving geospatial technologies.





Group picture via Zoom of the South Dakota K-12 teachers attending the South Dakota as Art workshop.

BENEFITS TO SOUTH DAKOTA

- K-12 Teacher Workshop The one-day online South Dakota as Art workshop provided teachers with a basic description of remote sensing, platforms, and types of imagery. Tutorials with hands-on applications were used for MultiSpec and other software. Goals: promote STEAM education, provide SD teachers with methods to use remote sensing in classrooms, access imagery from USGS EROS Center, research and display the diverse beauty of the state.
- Conferences / Conventions SDView and consortium partners hosted statewide geospatial conference. The biennial conference provides a venue for the state's geospatial community to present, learn, and connect with others in the state and for students to present their research and projects.
- Minigrants Provided support for student research on topics such as:
 - Precision AG which is of special importance to the ag industry in SD.
 - Monitoring Health of the Black Hills forests from satellite imagery which is essential for SD forest ecosystems.



Mini-grant support for Precision AG study.



Mini-grant support for graduate student research of Limber Pine in the Black Hills.

SOUTH DAKOTAVIEW CONSORTIUM MEMBERSHIP



South DakotaView Principal Investigator:

Dr. Bruce Millett

South Dakota State University

605-688-4833

Bruce.Millett@sdstate.edu



http://www.sdview.org



TEXASVIEW 2020 - 2021



TEXASVIEW 2020 - 2021 ACTIVITIES

TexasView recognizes the impact on outreach and education through the *Earth as Art* exhibitions hosted by StateViews in recent years. TexasView has developed exhibition materials for *Texas as Art*, with the intent of displaying the exhibition in cooperation with TexasView partner institutions over the next several years. The exhibit will focus on 10 ecoregions of Texas defined by Texas' Department of Parks and Wildlife (TPWD).

This project engages multiple collaborators, including the TPWD, Texas' network of Regional Educational Service Centers (RESCs), the Fa Fa Gallery (host of the first exhibit January – February 2021) and the Sibley Nature Center (host of the second exhibit March – June of 2021). The exhibit highlights the applications of satellite imagery across a broad range of challenges that affect Texas' ecoregions. Focusing on Texas State parks "brings the challenges home" and makes the exhibit relevant for diverse venues.

Texas as Art has been disseminated through presentations in person (five); virtually (nine, including the 2021 South Dakota Geospatial Conference); and through walking tours of the physical exhibit (five). Proposals have been submitted to four new venues at partner institutions; Sul Ross State University will host the third exhibit January through March of 2022.



Texas as Art image of Wichita Falls and Lake Arrowhead State Park area; fire scars from the drought-related 2011 fire season are brick-red spots marking the grasslands in the Rolling Plains ecoregion.



Change pair showing shrinkage of Lake Arrowhead during prolonged drought in north Texas 2008 - 2012

Development of materials for and participation in training of educators

continues. The virtual workshop from GY2019, designed to guide Earth and Environmental teachers at Middle and High School levels towards resources that enable them to easily integrate exciting satellite imagery, image-based animations, supporting videos, literature, and learning activities into curriculum, was offered again at two new ESCs. **"Integrating Satellite Imagery, Animations, and Videos into Your Curriculum: Developing a Portfolio of Resources and Topical Units**" offers resource elements from TexasView, NASA, the U.S. Geological Survey, NOAA and the U.S. Forest Service to form the foundation for a portfolio of teaching tools for classroom or distance teaching. Examples of topic-specific resource units were shared. Standards correlations were available for multiple subjects and grade levels.

New resources were developed for the workshops, including an interactive landform identification scavenger hunt based on Texas as Art images, and a new "Which is Which" exercise using Texas as Art images. A virtual exhibit available through new partner The Sibley Nature Center gives access to the Texas as Art images for teachers to use in their classrooms, and access to multiple learning activities and new assessments that accompany the activities. All of the new activities are tied to state standards and are available in formats for use both virtually and face-to-face.

TexasView is a member of the AmericaView Consortium, a nationally coordinated network of academic, agency, non-profit, and industry partners and cooperators that share the vision of promoting and supporting the use of remote sensing data and technology within each state. AmericaView is funded by USGS grant agreement G18AP00077.



BENEFITS TO TEXAS



I have an image a flat plateau covered with round playa lakes filled with water because of recent rainfall and runoff. A river cuts a deep canyon into the plateau.



I have a diagram illustrating how rainfall sinks through a playa lake into the ground, recharging the groundwater in an aquifer.

- Teachers have new, engaging, and flexible teaching resources including standards-based units that integrate •
 - Easily accessible imagery from vetted NASA and USGS websites that are continuously updated 0
 - Informative short content videos from NASA, NOAA, USGS, National Geographic, and other vetted sites 0
 - Grade-appropriate short readings that offer graphs, photographs, and references for unit extensions 0
 - Activities with assessments that are keyed to state standards for multiple grade levels
- The illustration above is from the scavenger hunt that teachers use with students while visiting or virtually viewing the Texas as Art exhibit. It links with a TPWD video and lessons about playa lake rehabilitation projects.
- Most activities are available in multiple formats including games, interactive quizzes, and lessons. •
- Imagery is associated with state-managed lands and linked to Texas Parks and Wildlife educational resources.

TexasView Consortium Membership

Established in 2002, the TexasView Remote Sensing Consortium consists of thirteen university partners distributed across the state. Members include universities large and small, public and private. TexasView members work closely with state, regional and local agencies to promote remote sensing at all levels.

TexasView is founded on the concept of free and public exchange among its members of data, information and knowledge concerning the Earth and its processes, as observed by remote sensing and GIS technologies, for education, research, and local government applications.



Rebecca L. Dodge, Ph.D.

Midwestern State University

404-784-8615

rebecca.dodge@msutexas.edu





UTAHVIEW 2020 - 2021



UTAHVIEW 2020 - 2021 ACTIVITIES

UtahView is hosted by the Remote Sensing/GIS Laboratory in the Quinney College of Natural Resources at Utah State University in Logan, Utah. Dr. R. Douglas Ramsey is the UtahView Principal Investigator and Ellie Leydsman McGinty is the UtahView State Coordinator. During GY20, UtahView (1) developed a series of introductory Landsat Analysis Ready Data (ARD) videos, (2) created a series of Landsat infographic posters, and (3) continued to expand and exhibit the Utah As Art map collection.

The Landsat ARD videos were developed to provide an overview of Landsat data products and to highlight the use and application of ARD. The videos consist of three parts and are available on YouTube.

- 1) An Introduction to USGS Landsat ARD Products Part 1
- 2) An Introduction to USGS Landsat ARD Products Part 2
- 3) An Introduction to USGS Landsat ARD Products Part 3

A series of Landsat infographic posters were created in response to a request by the USGS to develop some materials that could be used for education and outreach. Four posters were developed. They are presently hosted on the AmericaView website.

- 1) Landsat Missions
- 2) Landsat Collections
- 3) Landsat Products
- 4) Landsat Analysis Ready Data

The Utah As Art map collection, a localized version of the <u>USGS Earth As Art program</u>, uses Landsat and Sentinel-2 imagery to create maps that increase geographic awareness and literacy, demonstrate one of the many values of satellite imagery, and display the diverse landscapes of Utah. During GY20, UtahView exhibited this map collection at two locations in Davis County, Utah, for the Davis Arts Council. The Utah As Art map collection was displayed at the Snow Horse Art Gallery at the Davis Conference Center from June 1, 2021 to August 30, 2021 and then at the Snow Horse Art Gallery at the Intermountain Layton Hospital from September 1, 2021 to November 30, 2021.

UtahView is a member of the AmericaView Consortium, a nationally coordinated network of academic, agency, non-profit, and industry partners and cooperators that share the vision of promoting and supporting the use of remote sensing data and technology within each state. AmericaView is funded by USGS grant agreement G18AP00077.



UtahView Landsat Analysis Ready Data (ARD) videos.



UtahView Landsat infographic poster – Landsat Missions.



Utah As Art exhibit at the Davis Conference Center in Layton, Utah.



BENEFITS TO UTAH

One of the overarching objectives of UtahView is to develop educational materials and to participate in events that promote and further the understanding of geospatial science and applications. Through these GY20 activities, UtahView has continued to support this objective. The Landsat ARD videos provide an easily accessible resource to students and professionals to learn about the basics of an invaluable Landsat data product. The Landsat infographic posters provide a great deal of information to anyone wanting to learn more about the Landsat missions, Landsat satellites and sensors, Landsat collections and collection tiers, Landsat data and science products, and Landsat ARD products. The Utah As Art map collection serves as a visual and aesthetically pleasing educational resource to a wide audience. The recent Utah As Art exhibits in Davis County, Utah, allowed the map collection to be viewed by conference attendees, participants of public events and private gatherings, healthcare workers, and the general public. In addition to these exhibits, UtahView created a map of Santa Barbara County, California, for the events associated with the Landsat 9 launch. This map was used to print a large-format puzzle which served as an interactive educational activity in Lompoc, California.







Santa Barbara County puzzle in action.



Santa Barbara County puzzle on display.

UTAHVIEW CONSORTIUM MEMBERSHIP

The UtahView consortium membership consists of <u>Dr. R. Douglas Ramsey</u>, Professor in the Quinney College of Natural Resources and Director of the Remote Sensing/GIS Laboratory at Utah State University; <u>Dr. Phoebe McNeally</u>, Research Associate Professor and Director of the <u>DIGIT Laboratory</u> at the University of Utah; <u>Dr. Sowmya Selvarajan</u>, Assistant Professor of Geomatics at Utah Valley University; <u>Ellie Leydsman McGinty</u>, Researcher III in the Remote Sensing/GIS Laboratory and UtahView State Coordinator; and the <u>Utah Geographic Information Council (UGIC)</u>. Collectively, these consortium members bring a wealth of scientific, outreach, and technical experience to the urban, rural, and wildland regions of Utah.





VERMONTVIEW 2019 - 2020



VERMONTVIEW 2020 - 2021 ACTIVITIES



Climate change, development pressure, and invasive species are having an affect on Vermont. VermontView leverages remote sensing technology to quantify changes to Vermont's landscape, which helps to inform resource management decisions. Vermont's high-resolution land cover dataset maps features that are thousands of times more detailed than existing products, with features as small as driveways captured and quantified.



VermontView is leveraging cutting-edge technology and big data analytics to keep Vermont's high-resolution land cover dataset up to date. By leveraging Landsat image products from the USGS and machine learning approaches, VermontView can identify areas where change has occurred and then update the land cover mapping accordingly. This ensures that the maps are not just accurate and detailed, but current.

VermontView is supporting Vermont's efforts to grow and retain a high-tech workforce. With geospatial technology slated to be one of the top 10 growth fields in the coming decades, K-16 outreach activities are crucial in getting Vermont's youth engaged and excited about potential educational and career opportunities. VermontView engages in meaningful activities such as 4H Teen Science Cafes and the Governor's



Vermont's fall foliage is a major driver in attracting tourists to the state. VermontView tracks foliage using remote sensing.



Vermont's high-resolution land cover dataset includes 3D building footprints that are improve 911 response.



Although VermontView's outreach and education efforts moved to a virtual format this past year, dozens of students attended.

VermontView is a member of the AmericaView Consortium, a nationally coordinated network of academic, agency, non-profit, and industry partners and cooperators that share the vision of promoting and supporting the use of remote sensing data and technology within each state. AmericaView is funded by USGS grant agreement G18AP00077.

Institute.



BENEFITS TO VERMONT



Expertise

With no remote sensing professionals employed within state government, VermontView is the resource agencies and elected officials turn to when they need unbiased advice.



VermontView leverages the massive computing infrastructure at the University of Vermont to apply big data analytics to extract actionable information from vast remote sensing datasets.



The Future Workforce

Developing the workforce of the future starts today. VermontView is active throughout the state in K-16 outreach and education, providing students with STEM learning opportunities.



Collaboration

With resources strained we know collaboration is more important now more than ever. VermontView brings people together to solve

VERMONTVIEW CONSORTIUM MEMBERSHIP



VermontView used remotely sensed data to track the impact of this past summer's gypsy moth infestation on forest lands.



3D maps generated from LiDAR are providing new insights into Vermont's forest resources, such as tree counts, which are helping to speed up forest inventories.





VIRGINIAVIEW 2020 - 2021



VIRGINIAVIEW 2020 - 2021 ACTIVITIES

VirginiaView, a longstanding member of the AmericaView Consortium, has contributed to a broad range of activities that bring teachers, students, and the public into contact with remote sensing imagery through learning and educational resources, and an introduction to new applications. Through workforce development opportunities, VirginiaView provides remote sensing education for an array of stakeholders, including students, middle school / high school educators, 2-year college and university faculty and staff, government employees, and private industry. VirginiaView pursues programs to engage Virginia's geospatial educational pipeline.

During 2020-2021, VirginiaView continued to support educational needs of K-14 educators and 4-H, by providing teaching resources and workshops. These resources were developed in partnership with educators, and include drones as a 'hook' to further engage students in remote sensing concepts and STEM. These resources are currently being piloted through 4-H and will be rolled out to precollege classrooms.



New instruction manual provided for 4-H and middle school teachers.

Remote sensing video tutorials were published, and in-person and virtual

workshops were conducted during the 2020 grant year. The workshops provided instruction on remote sensing data acquisition, work flows, drone platforms, and image processing. Our workshops have been attended by Virginia Cooperative Extension (VCE) personnel, local and state government employees, private sector employees, precollege educators, and 2-year and 4-year college faculty.



This precision agriculture instruction manual was developed for 4-H and Middle School Educators

VirginiaView is a member of the AmericaView Consortium, a nationally coordinated network of academic, agency, non-profit, and industry partners and cooperators that share the vision of promoting and supporting the use of remote sensing data and technology within each state. AmericaView is funded by USGS grant agreement G18AP00077. I just wanted to thank you for encouraging me to take your UAV training.... I got my 107 permit and have been flying constantly ever since. The video work from the drone has helped produce more than 35 videos and more [are] on the way. One video won a regional SE US award and the Google Desktop Farm site won a national award. Besides the video work, it has been a helpful tool with crop production questions. It may not be the expensive infrared or LiDAR camera but, it can show a lot with a good color image. Just want to say thanks to you and all who helped with the class prepare us to get certified...!

...I have improved with each video and purchased a second drone.... I am still learning on the job every day to get better at video work. Thanks again and take care.

-M. Parrish, Virginia Cooperative Extension Unit Coordinator & Extension Agent (June 2021)



BENEFITS TO VIRGINIA

- The USGS and other partners completed acquisition of Virginia statewide lidar data in 2018. The Working with Lidar using ArcGIS Pro tutorial book (from GY 2019), and the completion of the video tutorials (GY 2020) supports the needs of community stakeholders who may not have ample expertise to work with these data.
- YouTube instructional videos have been viewed over 443,000 times, with over 39,000 views during GY 2020 alone.
- Video tutorials have been viewed over 13,200 hours, with 1,400 hours watched during GY 2020 alone.
- Over 100 individuals received training during GY 2020. Participants include: precollege educators, community college faculty, 4-year university faculty (including Cooperative Extension), public sector employees, and private sector employees.

Book Description	Pub. Type	Year Pub.	# Copies down- loaded	# Kindle pages read
RS in ArcGIS ArcMap	eBook	2015	516	11,890
Lidar ArcGIS Desktop	eBook	2016	335	17,506
Lidar ArcGIS Desktop	print	2016	70	
RS in ArcMap, 2nd ed	eBook	2017	213	7,997
RS in ArcMap, 2nd ed	print	2017	107	
RS with ArcGIS Pro	eBook	2019	454	32,501
RS with ArcGIS Pro	print	2019	251	
Lidar ArcGIS Pro	eBook	2020	127	9,853
Lidar ArcGIS Pro	print	2020	48	
Total			2,121	79,747



VirginiaView provides workforce development training, and facilitates hands-on experiences for students.

 VirginiaView continues to disseminate remote sensing tutorials on Amazon. These publications have been hugely popular with over 79,000 pages read, and 2,000 copies downloaded. These resources have been well received both in the U.S. and abroad.

VIRGINIAVIEW CONSORTIUM MEMBERSHIP




West Virginia View 2020 - 2021



WEST VIRGINIA VIEW 2020 - 2021 ACTIVITIES

Our first HIA this year focused on the development of free, online course materials relating to geospatial deep learning using Python, PyTorch, R, and ArcGIS Pro. Our new Geospatial Deep Learning Seminar includes:

- Overview of deep learning and working with tensors
- Conceptualization of artificial neural networks (ANNs) and convolutional neural networks (CNNs)
- Loss metrics and methods for assessing model accuracy
- Example use cases and architectures for scene classification, object detection, semantic segmentation, and instance segmentation
- YouTube videos showing workflows in ArcGIS Pro and using code
- Example code and GitHub repo for deep learning using **Python**, **PyTorch**, and **R**



Pixel-level classification using CNN-based deep learning



Extraction of Landsat 8 surface reflectance data at water quality sample point locations using Python and Google Earth Engine

Course website for deep learning seminar

ŀ			Go to file Code -
۲	maxwell-geospatial README Update.		
		Completed SAT6 example	
	PyTorch_UNetPP_wvlcDL		
D	README.md	README Update.	4 months ago

GiHhub Repo for deep learning seminar

Our **second HIA** this year focused on estimating water quality parameters using remotely sensed data and ground sample points. This was the first year of this joint project (**ORIGIN**) with Kentucky View and Ohio View.



Turbidity steam sampling data for four different streams

West Virginia View is a member of the AmericaView Consortium, a nationally coordinated network of academic, agency, non-profit, and industry partners and cooperators that share the vision of promoting and supporting the use of remote sensing data and technology within each state. AmericaView is funded by USGS grant agreement G18AP00077.



AmericaView Website: www.AmericaView.org Christopher McGinty, Executive Director: chris.mcginty@americaview.org Lisa Wirth, Program Manager: lisa.wirth@americaview.org Brent Yantis, Board Chair: rodney.yantis@louisiana.edu

BENEFITS TO WEST VIRGINIA

- Provide educational materials for students and geospatial professionals
- Foster remote sensing education, outreach, and research in the state
- Provide access to LiDAR data via a web app
- Fund software purchases
- Support graduate student travel and data needs
- Provide summer funding for graduate students



Python and PyTorch code for deep learning



WVView courses web page

<YOURSTATE>VIEW CONSORTIUM MEMBERSHIP

Deep learning accuracy assessment methods



West Virginia View Principal Investigator: Aaron Maxwell West Virginia University (304) 293-2026 Aaron.Maxwell@mail.wvu.edu



http://www.wvview.org/



WISCONSINVIEW 2020 - 2021



WISCONSINVIEW 2020 - 2021 ACTIVITIES

WisconsinView is engaged in two "High Impact Activities" (HIAs). The first involves bring satellite-derived flood mapping products from the atmospheric sciences into GIS formats to expand accessibility. This supports the establishment of strategic partnerships across disciplines. To bridge the gap between scientific data and public, we process the maps into our *RealEarth* mapping platform. Once in *RealEarth*, they also become available for sharing in social media. Here are some Blog and Twitter examples that utilize the results of this HIA:



Satellite-derived flood mapping products made available in map services (left two images) and picked-up by social media (right two images).

The Second HIA promotes the use of the *RealEarth* mapping platform among StateView members of AmericaView. Our goal is to assist StateViews in sharing their educational materials and research results by utilizing *RealEarth*. The platform is flexible and works in both web browsers and mobile devices. Mobile devices with locational services give educators an opportunity to put their students "into the data" as an immersive experience. This year PennsylvaniaView developed curriculum specifically to utilize *RealEarth* in the classroom, and WisconsinView used *RealEarth* in a virtual (Zoom) workshop for high school students. This HIA advances education, training, technology transfer, and outreach.



Examples of the RealEarth visualization platform from L to R: web browser, showing fire data from Colorado; iOS mobile app showing a Landsat 8 imager of a river delta; Android mobile app showing geostationary imagery of Australia.

WisconsinView is a member of the AmericaView Consortium, a nationally coordinated network of academic, agency, non-profit, and industry partners and cooperators that share the vision of promoting and supporting the use of remote sensing data and technology within each state. AmericaView is funded by USGS grant agreement G18AP00077.



AmericaView Website: www.AmericaView.org Christopher McGinty, Executive Director: chris.mcginty@americaview.org Lisa Wirth, Program Manager: lisa.wirth@americaview.org Brent Yantis, Board Chair: rodney.vantis@louisiana.edu

BENEFITS TO WISCONSIN

Since its establishment in 2004, WisconsinView has support Earth observation education and outreach across Wisconsin. We do this in the following ways:

- **Presenting** Earth observation data and information at public science events across the State and in local classrooms.
- **Enriching** access to high-value data sets such as LiDAR and aerial photography through a 100TB ftp server.
- **Demonstrating** how to utilize emerging web mapping technologies such as OGC WMTS in workflows by professionals as well as in the classroom.
- **Partnering** with organizations and agencies to leverage expertise and synergies.

We continue to collaborate with other StateViews as we learn from each other and leverage the power of the AmericaView network.



Students enjoy a 3D experience of a terrain model at a museum outreach event in Milwaukee, WI.

« Previous 981 of 1,019 1	ext »	Links
		🖺 Metadata
WROC Aerial M	osaic (WTM) Pepin County, WI 2010 🟵 🖬	I Citation
Created By: Wisconsin Regional Orthoimagery Consortium		
Description:	Ayres Associates was contracted through the North Central Wisconsin Regional Planning Commission (NCWRPC) for the creation of 18-inch R68 DDQQs from the native resolution digital orthophotography from the 2010 Wisconsin Regional Orthoimagery Consertium (WRDC) Imsuer orecram. Filebits occurred in the Sering of 2010 for the	Downloads
	entire State of Wisconsin, resulting in a leaf-off aerial photo product. Re-flights were necessary for the eastern 4 m id Columbia Co., parts of WW Goonto Co, and the south half of Lincoln Co. during the spring of 2011. County mosaics are available as JPEG 2000 files (JP2) at 10r1 compression.	Download Jpeg2000
Collection:	Aerial Imagery	
Subject(s):	Imagery and Base Maps	
Year(s):	2010	
Held By:	WisconsinView	
More details at:	https://gisdata.wisc.edu/public/metadata/WROC_FactSheet_2010.pdf ピ	
-		

WisconsinView partners with the State Cartographers Office to catalog data sets for improved data discovery.

CURRENT WISCONSINVIEW CONSORTIUM PARTNERS



Federal consortium members identified above do not receive funding from AmericaView.

WisconsinView Principal Investigator: Sam Batzli, PhD Space Science & Engineering Center University of Wisconsin-Madison 608-263-3126 :: sabatzli@wisc.edu



 https://wisconsinview.org

 https://ssec.wisc.edu/realearth

 @WisconsinView

 @SSECRealEarth



WYOMINGVIEW 2020 - 2021



WYOMINGVIEW 2020 - 2021 ACTIVITIES

WyomingView conducted *five* educational outreach activities and virtually trained *seven* interns (University of Wyoming undergraduate students).

- All outreach activities were conducted virtually due to restrictions.
- Presenting online posed few challenges such as getting through school's internet firewall, audio and video issues, etc., but eventually all events were completed as scheduled (516 students participated).
- Reached out to high school students in Sheridan, Wyo. This is the first WyView outreach event outside Laramie.

WyomingView PI presented how Landsat and other satellite images are used for tracking algal blooms in waterbodies throughout the US. Aerial and satellite images provided by USGS, NASA, and several state environmental agencies were used for this outreach event (*Number of students: 19*).

Second and Sixth graders learned how diverting the water flowing into Aral Sea created the earth's newest desert. Satellite images of Aral Sea generated by the USGS, and NASA were used as the primary visual aids. (*Number of students: 215 in LMS and 57 Indian Paintbrush ES*).



Eighth graders at LMS, used the ALTA II Spectrometer for measuring reflection of 2 set of leaves in 11 regions of the electromagnetic spectrum. WyomingView PI described how sensors onboard Landsat and other satellites collect similar data that are used for monitoring changes *Landsat images acquired in2019 show algal blooms in Keyhole Res. Wyo. These blooms form under abundant sunlight, temperature, and nutrients.* Place: *Spring Creek Elementary School.* Date: *Sep 23, 2020.*



Three interns were techniques using pre-GY 2019, WyView pure method to identify in differencing water individing international techniques are international to identify in the answ set of preidentify inundated are improvements to the image processing time. Currently we are verify and will be presenting 2022. Remaining international techniques are improvemented with rapid flood mapping

Sample flood map generated with rapid flood mapping technique that identifies newly inundated areas, which will assist emergency management agencies to quickly locate areas that need assistance.

Three interns were trained on *rapid flood mapping* techniques using pre- and post-flood Landsat images. In GY 2019, WyView published a paper that described a method to identify newly inundated areas based on differencing water indices. This year, three interns worked with a new set of pre- and post-flood Landsat images to identify inundated areas. Goal for this year was to make improvements to the existing method and reduce the image processing time and generate inundation maps. Currently we are verifying the products and their accuracy and will be presenting these findings in a conference in 2022. Remaining interns were trained to classify waterbodies and complete literature survey on other rapid flood mapping techniques.

WyomingView is a member of the AmericaView Consortium, a nationally coordinated network of academic, agency, non-profit, and industry partners and cooperators that share the vision of promoting and supporting the use of remote sensing data and technology within each state. AmericaView is funded by USGS grant agreement G18AP00077.



AmericaView Website: www.AmericaView.org Christopher McGinty, Executive Director: chris.mcginty@americaview.org Lisa Wirth, Program Manager: lisa.wirth@americaview.org Brent Yantis, Board Chair: rodney.yantis@louisiana.edu

BENEFITS TO WYOMING

- Past WyomingView interns are currently working federal, state, and local government agencies & in private companies. Past interns have confirmed the value of the training they received as part of the internship
- New testimonials from past interns will be uploaded to: <u>https://wyomingview.blogspot.com/p/then-now.html</u>.
- WyomingView will continue to recruit and train more interns (future workforce development).

SATIONAL IMAGERY SUMMIT: LANDSAT & SOCIETY

S.L

- WyomingView responded to the call from AmericaView/USGS to showcase applications and findings in the 2nd National Imagery Summit. WyomingView PI and three interns presented 4 talks in this event.
 - Two interns highlighted the value of no-cost Landsat images for monitoring vegetation establishment in Wyoming rangelands and their growth over time.
 - Third intern described the differences in phenology of aspen trees that were exposed to different amount of sun light during the growing season.
 - WyomingView PI talked about the selection and training of interns to process Landsat images for various applications.

WYOMINGVIEW CONSORTIUM MEMBERSHIP

WyomingView continues to work with farmers and ranchers to promote remote sensing applications:

- 2020-21, WyomingView was unable to reach out farmers or ranchers because all courses were taught online.
- Hence training interns in rapid flood and water mapping was the primary focus of the GY.
- Two of these interns are currently working for federal agencies in Wyoming and have expressed interest to assist with future disaster mapping efforts.
- Towards the end of this GY (start of fall 2021 semester), we identified students connected to a farmer and a rancher in MT and WY.

Working with farmers and ranchers allows WyomingView to reach out to non-technical users and showcase the benefits of Landsat and other remotely sensed data. Testimonials provided by farmers and ranchers are valued highly by AmericaView and USGS. WyomingView will continue to work with farmers and ranchers.



In this GY, WyomingView received the large format (12 x 13 feet) floor puzzle depicting Landsat mosaic of Wyoming (above). This puzzle will be used in upcoming EOD activities such as Women in STEM, Science Kitchen for high school students, and state GIS meetings. In these events, WyomingView will promote Landsat program and data.

WyView Principal Investigator: Ramesh Sivanpillai University of Wyoming 307 766 2721 sivan@uwyo.edu



http://www.uwyo.edu/wyview



Facebook.com/WyomingView