



WYOMINGVIEW REMOTE SENSING ACTIVITIES 2014 - 2015



INTEGRATING LANDSAT IMAGES IN K-8 CLASSES



Word cloud generated using responses provided by second graders when asked what new things they learned about water after seeing photos taken from space

WyomingView, as part of its Earth Observation Day activities, has been working with teachers to incorporate Landsat and other images in science classrooms. In 2014-2015, these activities expanded to include the 2nd and 3rd grades. WyomingView also published a highlight article in Photogrammetric Engineering & Remote Sensing (PE&RS) that described the entire process from contacting K-8 teachers to presenting the material in classrooms.

Indian Paintbrush Elementary School teachers invited the WyomingView PI to present and discuss satellite imagery related to water to students in the 2nd and 3rd grades. Water is part of the state core-curriculum, and introducing these images was intended to increase the understanding of concepts learned from books and other materials.

Several Landsat and MODIS images that showed changing water levels in Wyoming reservoirs and the Aral Sea, impacts of drought in California, and impacts of pollution in Lake Erie (algal bloom) were introduced in the 2nd grade classroom. Students provided feedback about what they learned from viewing these images and subsequent discussions.

Describing the value of these images, Genee Witte, one of the second grade teachers said, *"It was very exciting and extremely helpful for the second graders to see the images ... It helped build their background knowledge of the changes the lakes, etc. undergo. ... Having the images shown to the students helps them to retain the information! They are able to keep that image in their mind and add to their background knowledge."*

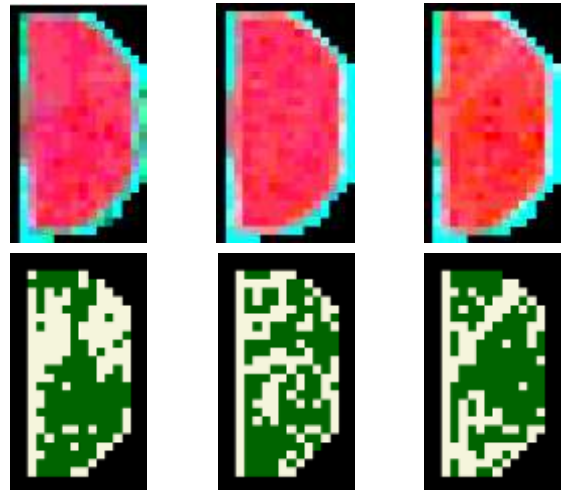
MAPPING CROP GROWTH WITH LANDSAT IMAGES

WyomingView interns worked with agriculture producers to visualize crop growth patterns. Variations in crop growth can, for example, be due to soil conditions, nutrients, and damage. Producers are interested in identifying problem areas in order to implement remedial actions such as adding organic matter and fertilizer.

Students enrolled in the applied remote sensing course who had contacts with agricultural producers through family or employment were introduced to this opportunity. These students obtained information about the crops.

WyomingView downloaded the Landsat images and the interns processed them and generated crop growth information for each field. Students were trained in image processing and information extraction. Producers obtained valuable information about crop growth patterns in their field(s).

One of the producers from Wheatland, WY, commented that *"Being able to see the watering approach as it really happened tells me where and when we were on or off the actual needs of the plants. It showed me areas that I need to water slower for optimal plant growth."*



False color Landsat images (top row) from 2009, '10, and '11 highlights variations in crop growth as different intensities of red. Based on these differences crop growth for this Wheatland farm was identified as either above (green) or below (tan) average growth (bottom row). Changes in crop growth pattern can be related to past management practices, and also provide insights for future management practices. Courtesy: Blake Balzan (FY2014 WyomingView intern).

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.



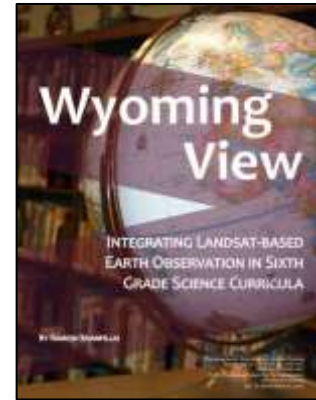
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BENEFITS TO WYOMING

The number of middle school students who are introduced to remote sensing applications and satellite images continues to grow. These images are helping the students to better understand the content in their science classes.

The WyomingView PI works with individual teachers to identify course content that is suitable for introducing remotely sensed images. Several approaches have been tried over the past several years.

Lessons learned from introducing Landsat images in sixth grade social science curricula were published as a highlight article in PE&RS. This paper also provided information on best practices for those interested in introducing Landsat or other remotely sensed data in their classrooms.



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Six of the nine WyomingView interns (FY2014) after presenting their research at WY Undergrad Research Day

Nine University of Wyoming students were part of the FY 2014 WyomingView internship program. Interns received training to process Landsat images and extract information to address resources management issues.

Seven interns presented their findings at the 2015 Wyoming Undergraduate Research Day.

WyomingView internships contributed to training the future work force in technology (STEM) areas.

- WyomingView interns worked with agricultural producers in the state to generate crop growth information using Landsat images.
- This information was provided to farmers who can use them for identifying problem areas that need further attention. These images will help them to better manage their fields and optimize inputs such as irrigation, fertilizers, and pesticides.
- The student projects highlight the value of multi-temporal Landsat images for crop growth monitoring in Wyoming.
- This activity is aimed at addressing the information needs in Wyoming using Landsat data and applied research.

WYOMINGVIEW CONSORTIUM MEMBERSHIP

USDOI-Bureau of Land Management, Cheyenne, WY

USDA-Natural Resource Conservation Service, Casper, WY

USDA-Forest Service, Golden, CO

State Engineers Office, Cheyenne, WY

Wyoming Game & Fish Department, Cheyenne, WY

Wind River Environmental Quality Commission, Ft. Washakie, WY

SkyTruth Inc. Morgantown, WV

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