



MONTANAVIEW 2018 - 2019



MONTANAVIEW HISTORY AND SUCCESSES

The vision for the MontanaView Program is to identify and address the most pressing remote sensing needs in Montana for management of agriculture, range, forest, wild lands, and urban landscapes. MontanaView became a member of AmericaView in 2005. The MontanaView consortium includes a wide range of organizations involved in remote sensing in the State of Montana, including universities and colleges, state and federal governmental agencies, and non-profits. MontanaView regularly uses this wide range of expertise to evaluate the current pressing needs of Montana citizens that relate to or can be addressed with remote sensing technologies.

The consortium has been involved in education at the K-12 and higher education levels. Workshops have been held to train K-12 teachers in how remote sensing can be incorporated into their classrooms and used to meet educational needs and requirements. Undergraduate and graduate students have been supported, adding critical members to Montana's workforce with expertise in modern geospatial tools. Another priority for MontanaView has been to train Montana's current workforce, especially agency personnel, in the most recent geospatial developments. Researcher members of MontanaView have used their expertise to address critical natural resource issues facing Montana.



Aerial photograph of a precision agriculture study site near Bozeman, Montana, acquired from a drone in late summer of 2019.



Bark beetle infestation in Montana



Lynx (photo courtesy of John Squires, United States Forest Service)

MontanaView is currently leveraging its resources with support from the U.S. Department of Agriculture to address the impacts of bark beetles on Montana's forest resources. Traditional mapping has focused on presence or absence of an infestation, which has limited utility for land managers. New developments by MontanaView researchers have added the ability to map infestation severity using many years of Landsat satellite data. This information can guide managers with respect to harvest activities and protective actions.

MontanaView is also working to guide forest management decisions with respect to the endangered Canada lynx. Researchers with MontanaView were able to use freely available Landsat satellite imagery from the U.S. Geological Survey to map both forest species composition and change in forest structure over a 44-year period. These maps were critical for understanding lynx historical forest usage.

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.



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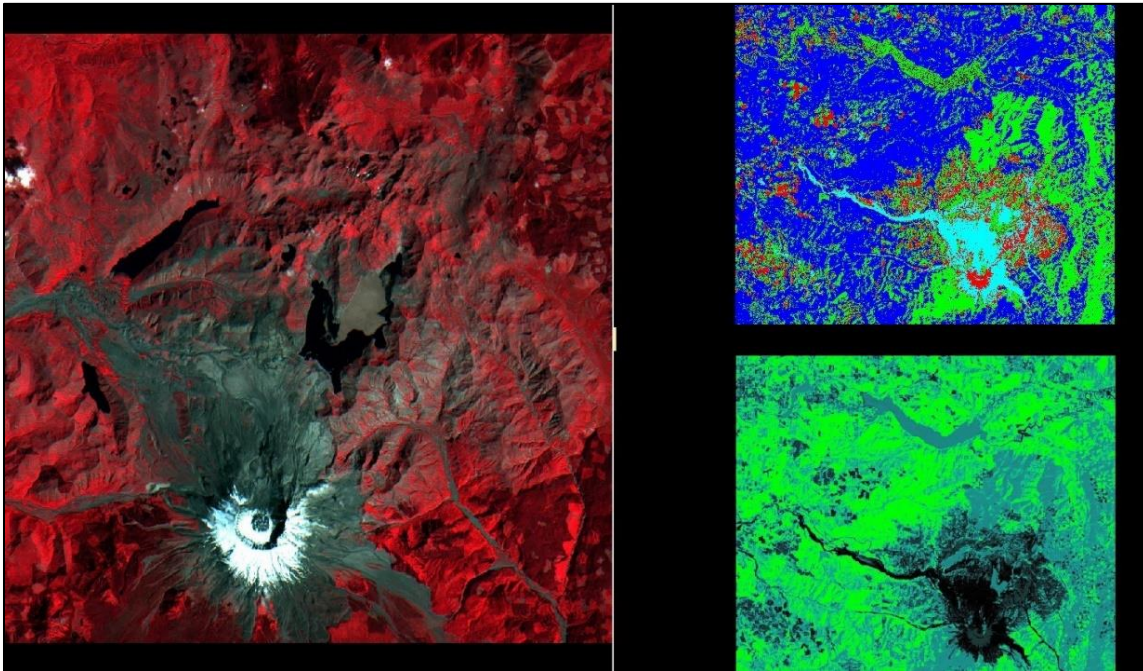
MONTANAVIEW 2018 - 2019 ACTIVITIES

Extraction of biophysical and geophysical information from remotely sensed imagery remains one of the primary applications in remote sensing, whether extracted from single dates, multiple dates within a year to capture phenological changes, or from temporal datacubes. Many software packages exist for this purpose, but commercial software is limited in available statistical methods. Previous research supported by AmericaView has demonstrated the need for approaches that take advantage of the range of machine learning methods now available. MontanaView has developed and made available code in the statistical software R to enable this. Many geospatial software packages, including ArcGIS, QGIS, Imagine, and Google Earth Engine, however, interact better with the Python programming language. Therefore, MontanaView has developed and made available through a web-based download a manual and computer scripts for remote sensing image analysis with Python containing all of the same functionality as the previous R code. This code is open and freely available, and it can be adapted by geospatial scientists for use with Python compatible software or used directly as provided.

Python-Manual

- [Manual for Remote Sensing Image Analysis in Python: Including Agnostic Image Analysis](#)
- [Scripts \(to download, right click and save link as a .py file\)](#)
 - [2.3 Setup](#)
 - [4.1.1 Import Classification Training Data](#)
 - [4.1.2 Import Classification Training Data](#)
 - [4.1.3 Import Classification Training Data](#)
 - [4.1.4 Import Classification Training Data](#)
 - [4.2.1 Import Classification Accuracy Assessment Data](#)
 - [4.2.2 Import Classification Accuracy Assessment Data](#)
 - [4.2.3 Import Classification Accuracy Assessment Data](#)
 - [4.2.4 Import Classification Accuracy Assessment Data](#)
 - [4.2.5 Random Extraction Of Validation Data From Training Data](#)
 - [4.3.1 Importing Continuous Training And Validation Data](#)
 - [4.3.2 Importing Continuous Training And Validation Data](#)
 - [5.1.1 Compare Classification Models](#)
 - [5.1.2 Compare Regression Models](#)
 - [6 Output Final Image](#)

A detailed manual and all necessary scripts have been made available by MontanaView for free download at: <http://www.montanaview.org>



The developed code can be used to analyze a remotely sensed image (in this case, one of Mount St. Helens on the left) and produce either a classified image (e.g., a land cover map shown in the upper right) or an image of a continuous biophysical variable (e.g., a map of biomass as shown in the lower right).

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