COLORADOVIEW 2022 - 2023 ACTIVITIES
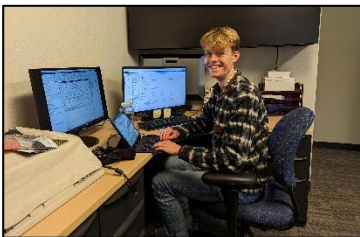
Evapotranspiration (ET) is a measurement of total water moved from the land surface to the atmosphere. As such, ET may serve as an indicator of the ecosystem's health, hydrologic cycle, agricultural processes, and water dynamics in the area of interest. In Colorado, the ET measurements can be used for vegetation health and drought indices as well as irrigation schedules and agriculture planning.

In GY22, we investigated the effects of water stress (indicated by evapotranspiration (ET)) on plant production (indicated by Normalized difference vegetation index (NDVI)) in Colorado (2000-2018). The study finds a significant positive correlation between ET and NDVI across counties. However, the strength of the relationship varies across different land cover types, with the strongest correlations found on croplands and shrublands and weakest on open water.

An example map of the Pearson correlation coefficients between Landsat ET and NDVI at the end of the growing season in Colorado.

The findings of this study have important implications for water management and agricultural production in Colorado. The study provides evidence that ET is a key factor influencing plant growth in the state. This information can be used to develop more effective water management practices that ensure adequate irrigation for crops and other vegetation. The study also highlights the importance of considering land cover type when developing water management strategies.


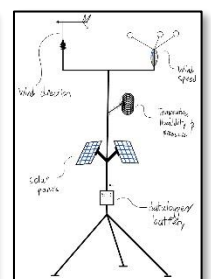*The student intern, Eric Williams, working on the ET-NDVI project*

Another student intern project explored the machine learning approach on retrieval of cloud fractions using instantaneous ground-based shortwave solar radiation measurements in the ultraviolet to near-infrared regions. The explored machine learning models include Linear Regression, Random Forest Regression (RF), and Deep Neural Network (DNN). The preliminary results show that cloud fraction of opaque clouds can be well predicted using both RF and DNN with the validation R^2 greater than 0.95. Accurate retrieval of cloud fractions is important for improving weather forecasting, climate modeling, and renewable energy estimation.
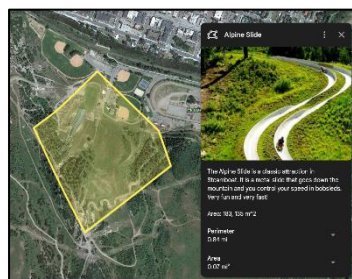
Screenshots of students' (Hanna Velicer and Natasha Zizic) Google Earth Projects on Steamboat CO (left) and Northern Sumatra (right)
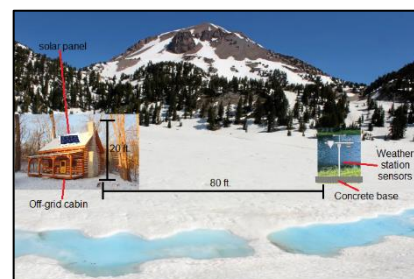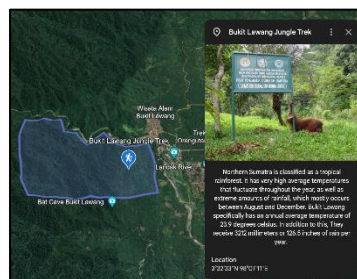
*Weather stations designed by students Benjamin Dauphin (left) and Sam Abrams (right)*

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BENEFITS TO COLORAOD

- Provided the student interns the opportunity to engage in real research projects, through which they learned
  - processing of satellite or ground-based Remote Sensing data using scripts;
  - programming in a team environment;
  - statistical techniques; and
  - summary reports or papers and present findings for scientific investigations.

- Investigated the correlation between ET and NDVI during the growing season in Colorado, empowering researchers, policy makers, and stakeholders with insights on efficient water management and improved agricultural production.

- Promoted Remote Sensing (RS) education through lectures (Physical Geography) at Colorado State University. The lecture includes several projects. The project on Google Earth teaches students a powerful way to present stories on topics that involve geophysical elements including RS images. The project on assembling a weather station allows students to review and process 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.
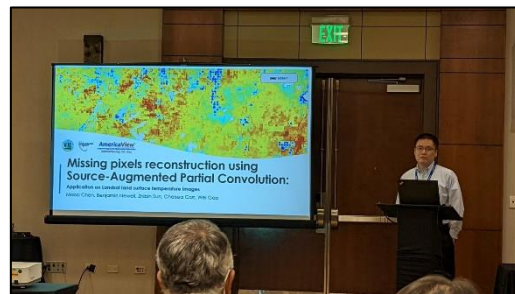
ColoradoView scientist Maosi Chen presented the Landsat missing pixel reconstruction work at PECORA 22 on October 27, 2023, in Denver, CO.

ColoradoView scientist Maosi Chen gave a lecture on Google Earth at Colorado State University.

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

http://www.coloradoview.edu