



COLORADOVIEW 2020 - 2021

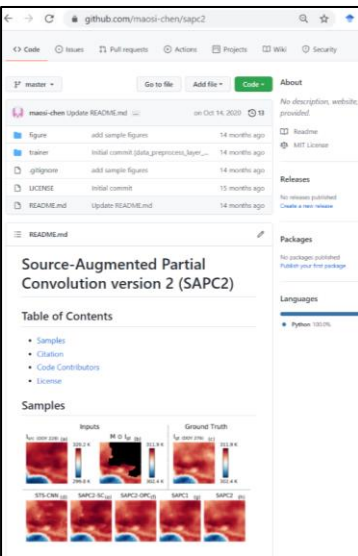


COLORADOVIEW 2020 - 2021 ACTIVITIES

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.

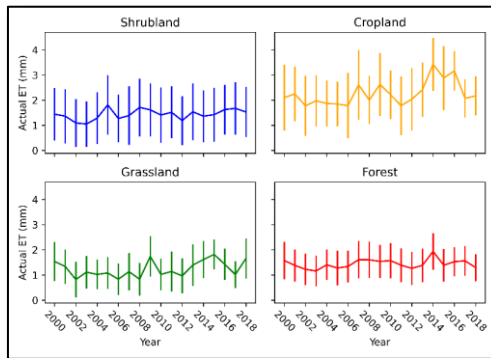
One of ColoradoView GY20 HIAs is to analyze the long-term dynamics of ET in Colorado. ColoradoView scientists and a student intern contribute to the work. The USGS Landsat Analysis Ready Data (ARD) ET dataset between 2000 and 2018 is also aggregated into annual and monthly averages over four land cover 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.

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

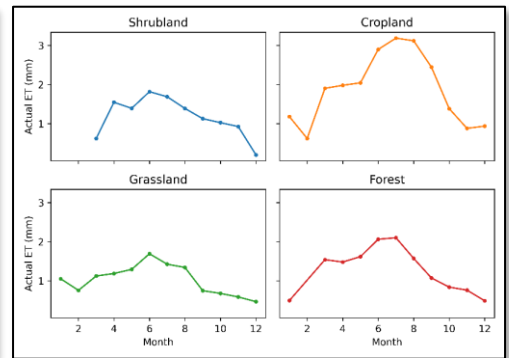


Screenshot of the public github webpage of the source code for the missing pixel reconstruction paper

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.



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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;
 - 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 reported on Warner College of Natural Resources Colorado State University webpage.



The missing pixel reconstruction work was tweeted by NREL EcoPress.

COLORADOVIEW CONSORTIUM MEMBERSHIP



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

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