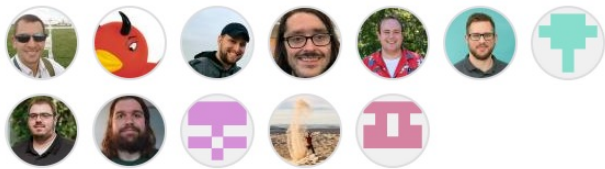


Atmospheric data Community Toolkit

Contributors 12



Atmospheric data Community Toolkit (ACT)

► Python library for working with time-series data from atmospheric research instrumentation

Discovery

IO

ACT

Plotting

Utilities

Corrections

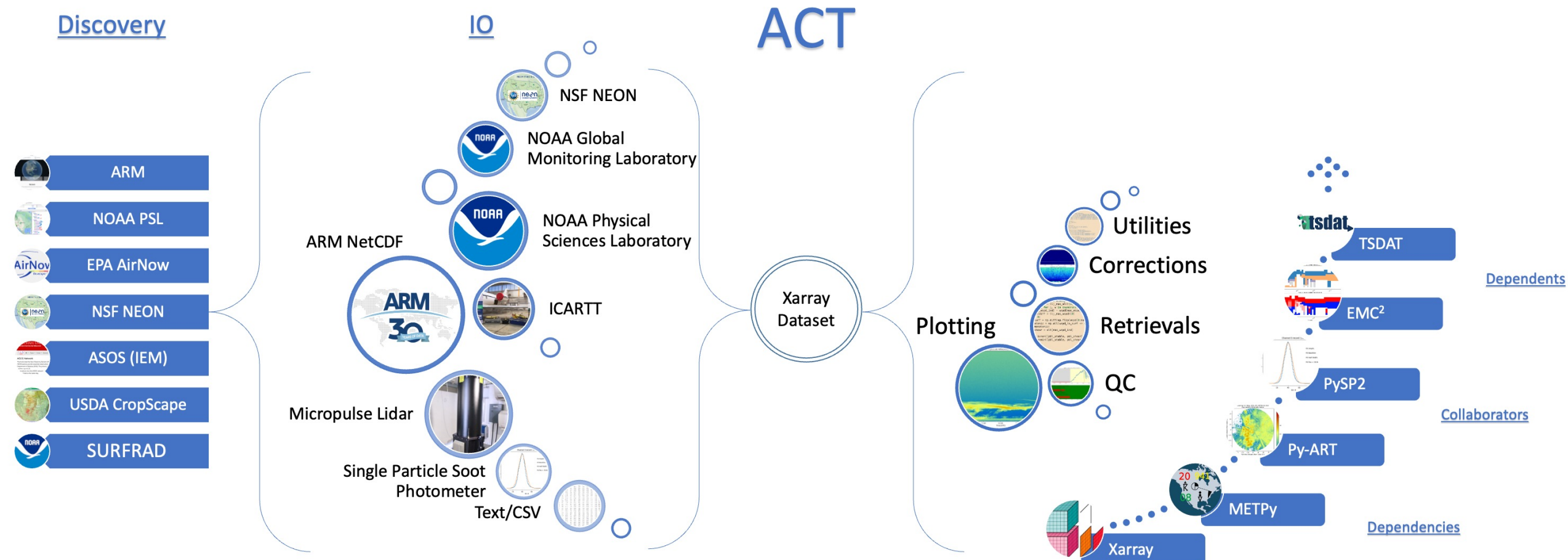
Retrievals

QC

Dependents

Collaborators

Dependencies

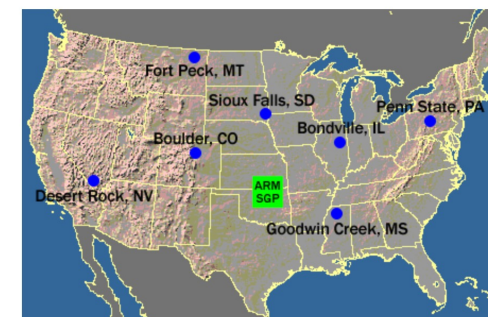


- ▶ ARM's Live Data Webservice
- ▶ NOAA's Physical Sciences Laboratory Profiler Network
- ▶ NSF's National Ecological Observatory Network (NEON)
- ▶ EPA's AirNow
- ▶ Automated Surface Observing System (ASOS)
- ▶ Iowa Environmental API
- ▶ NOAA's Surface Radiation Budget Network



SURFRAD Site Information

For information about a specific station within the SURFRAD network, click on its location on the map below, or use the links at the bottom of this page:



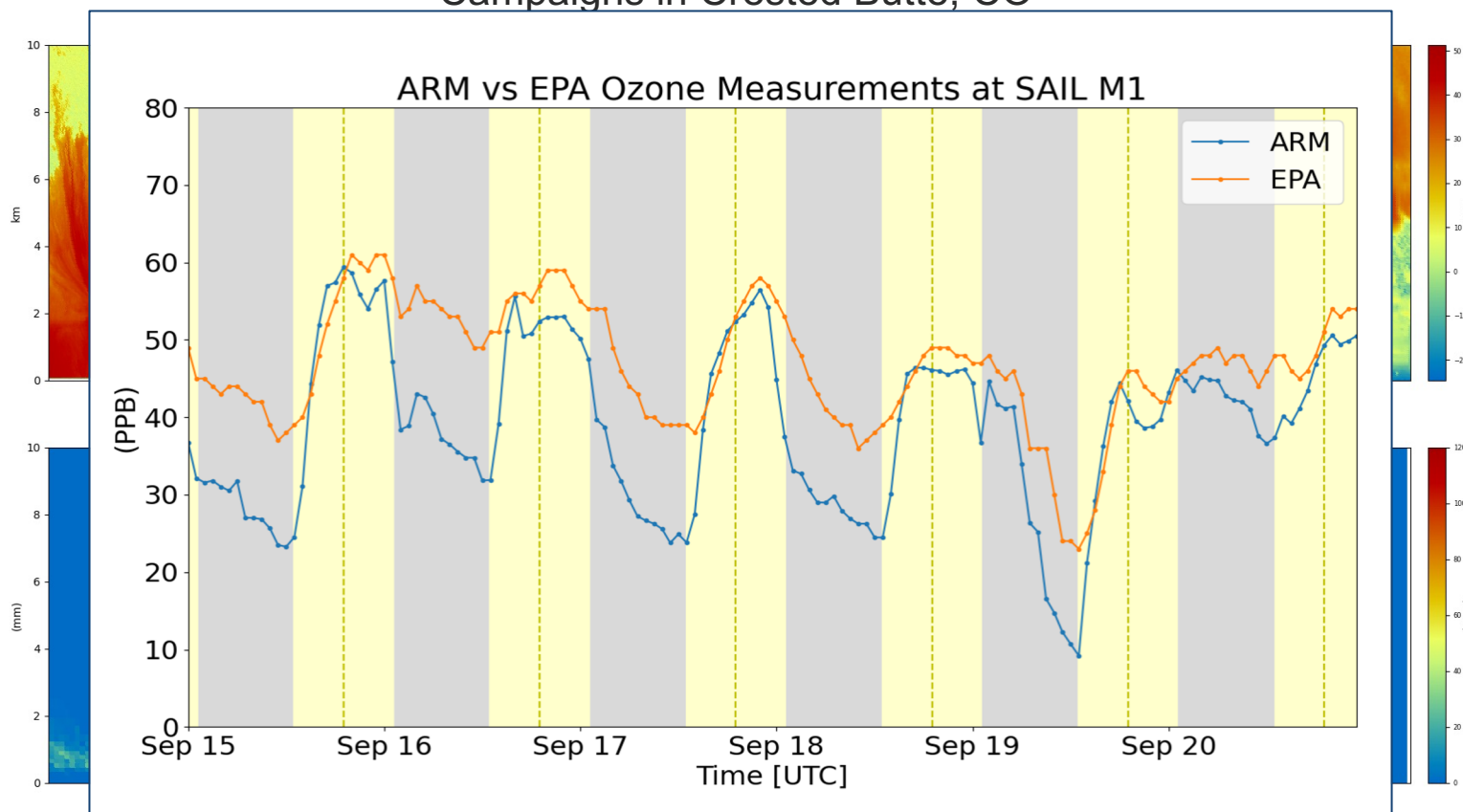
Code	Name	Latitude	Longitude	Elevation	Time Zone	Installed
BND*	Bondville, Illinois	40.05192° N	88.37309° W	230 m	6 hours from UTC	April 1994
TBL	Table Mountain, Boulder, Colorado	40.12498° N	105.23680° W	1689 m	7 hours from UTC	July 1995
DRA	Desert Rock, Nevada	36.62373° N	116.01947° W	1007 m	8 hours from UTC	March 1998



Visualizations

- ▶ Once data are downloaded and read in to an Xarray Dataset, the rest of the ACT library can easily be used across organizations to explore the data

ARM and NOAA Radar and Disdrometer Data from the SAIL and SPLASH Campaigns in Crested Butte, CO
 ARM and EPA Ozone Measurements from Crested Butte, CO



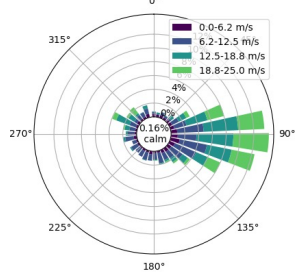
ACT blog post by
Zach Sherman



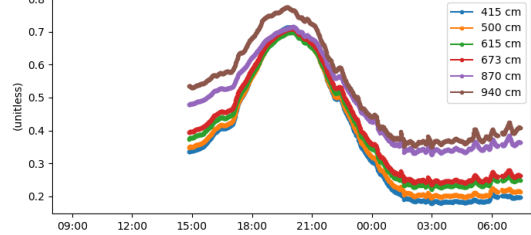
Visualizations



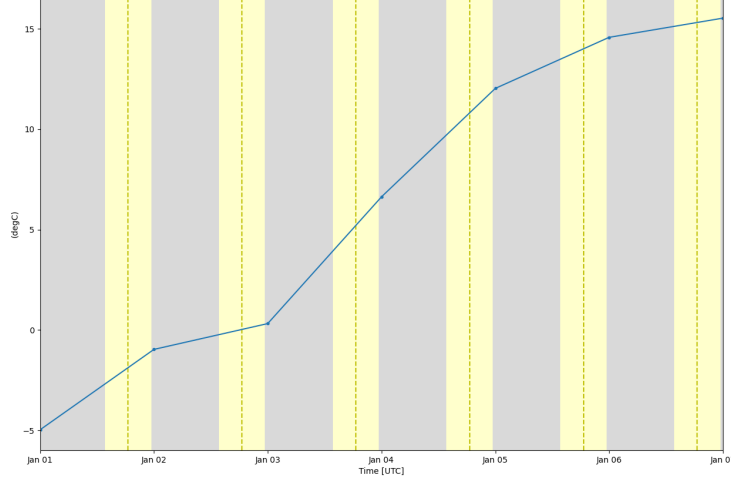
twpsondwnpnC3.b1 on 20060119



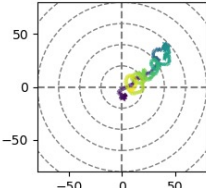
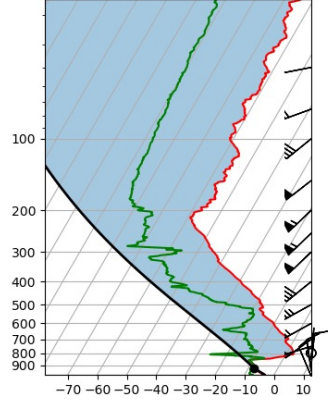
nsasurfspealb1mlawerC1.c1 surface_albedo_mfr_narrowband_10m on 20160609



sgpmetE13.b1 temp_mean on 20190101

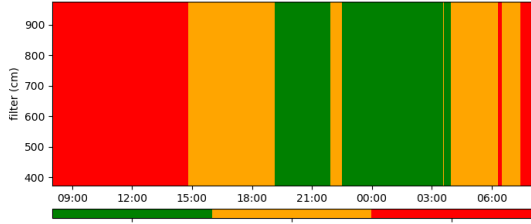
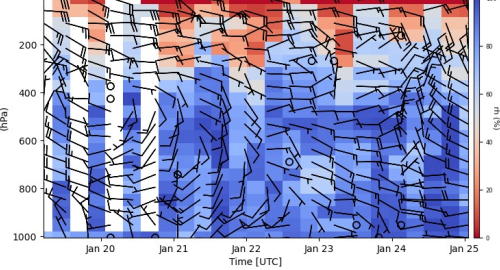


sgpsondwnpnC1.b1 on 20190101

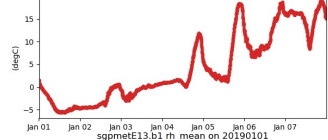


Lifted Index: 28.43
 SBCAPE: 1.07
 SBCIN: 0
 MUCAPE: 0
 MUCIN: 0
 LCL Temp: -8.08
 LCL Pres: 926.53

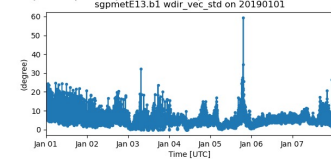
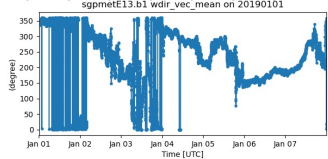
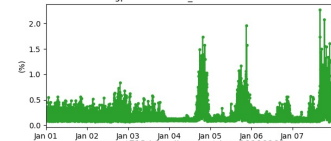
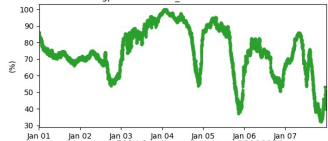
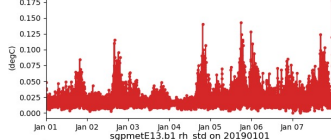
sonde_darwin on 20060119



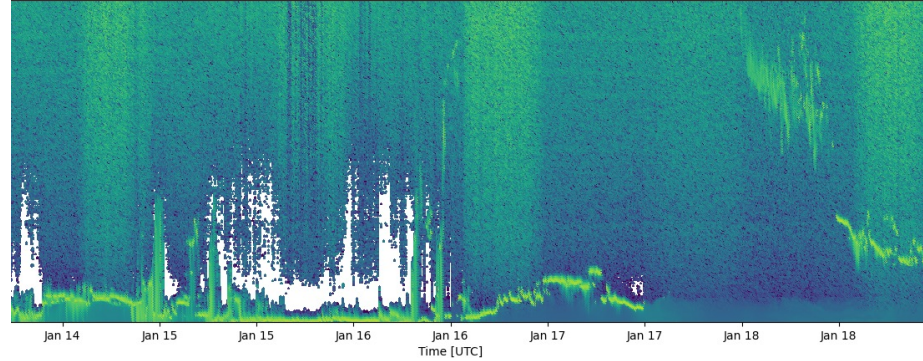
sgpmetE13.b1 temp_mean on 20190101



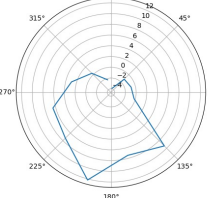
sgpmetE13.b1 temp_std on 20190101



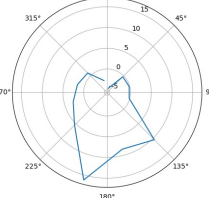
sgpcei1C1.b1 backscatter on 20170114



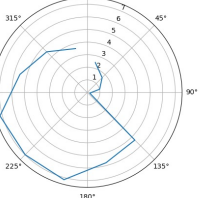
Mean of temp_mean (degC) by wdirc_vec_mean from 20190101 to 20190107



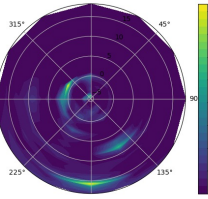
Median of temp_mean (degC) by wdirc_vec_mean from 20190101 to 20190107



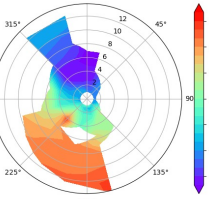
Standard Deviation of temp_mean (degC) by wdirc_vec_mean from 20190101 to 20190107



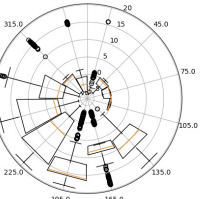
Heatmap of temp_mean (degC) by wdirc_vec_mean from 20190101 to 20190107



Mean of temp_mean (degC) by wdirc_vec_mean from 20190101 to 20190107

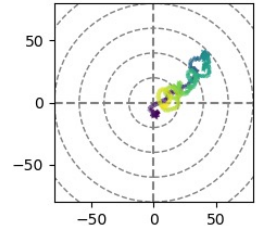
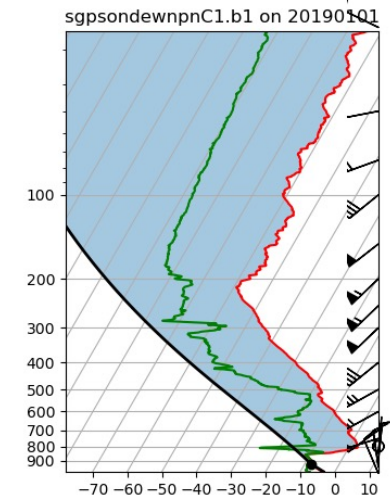
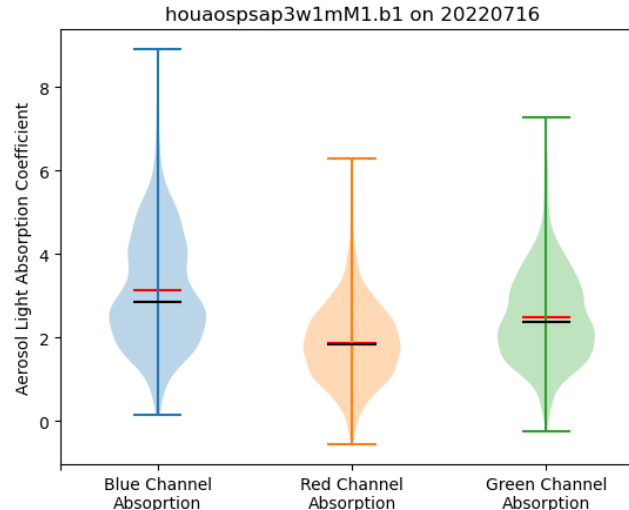
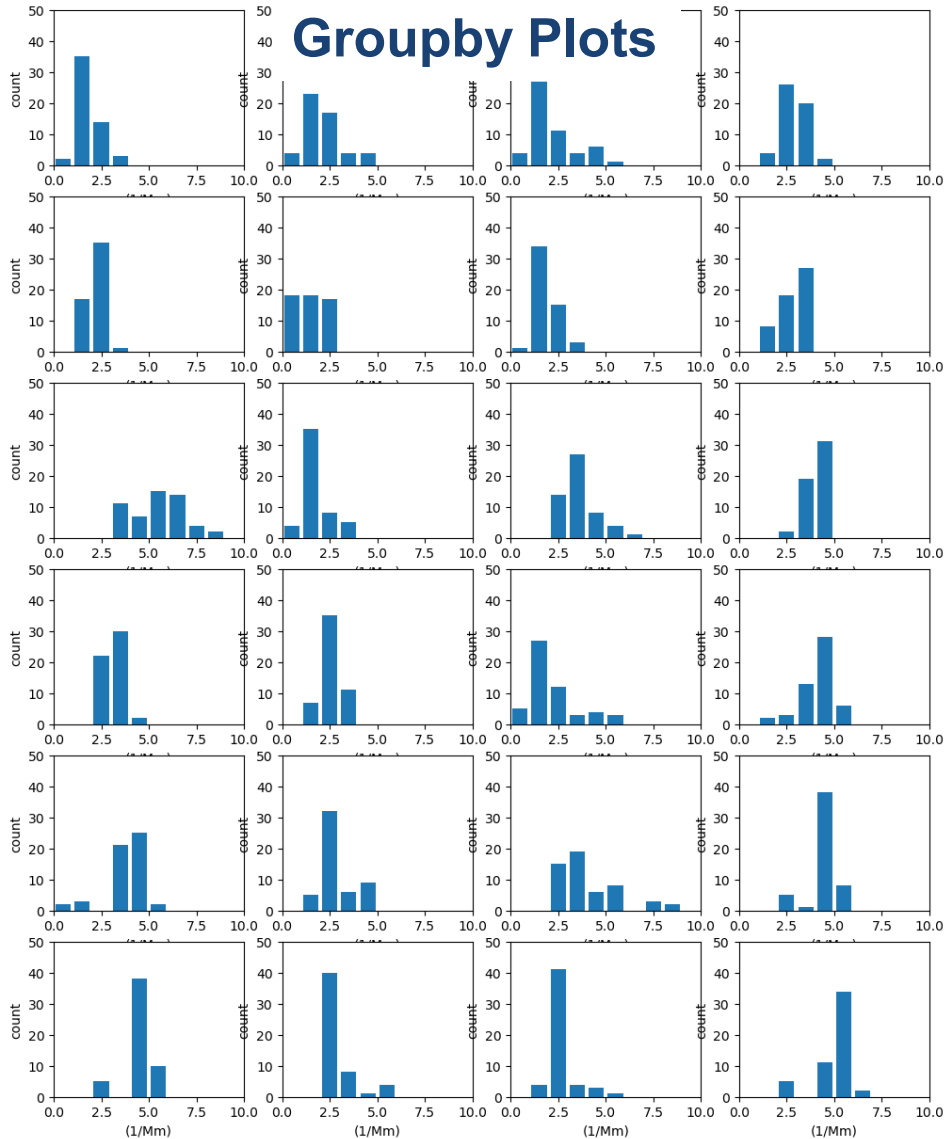


Boxplot of temp_mean (degC) by wdirc_vec_mean from 20190101 to 20190107

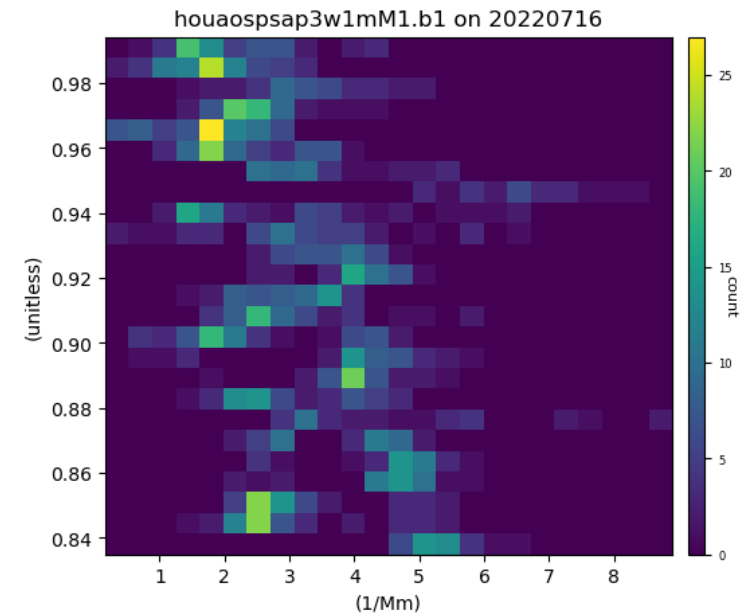
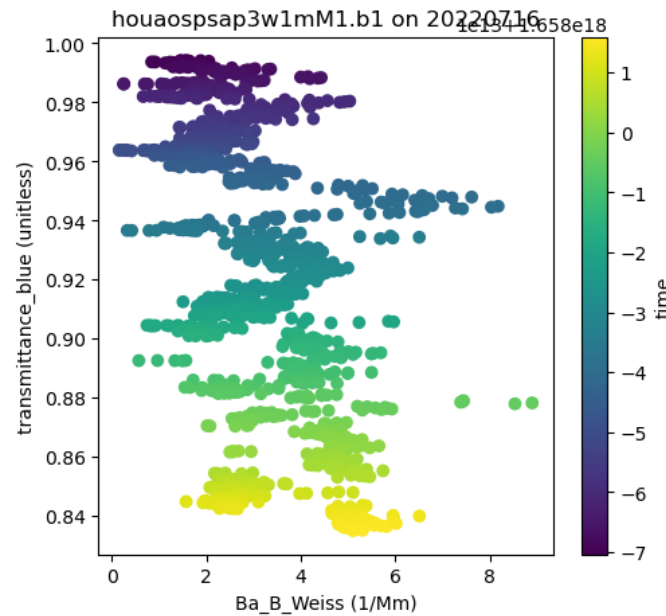


Visualizations – Latest Additions!

Groupby Plots

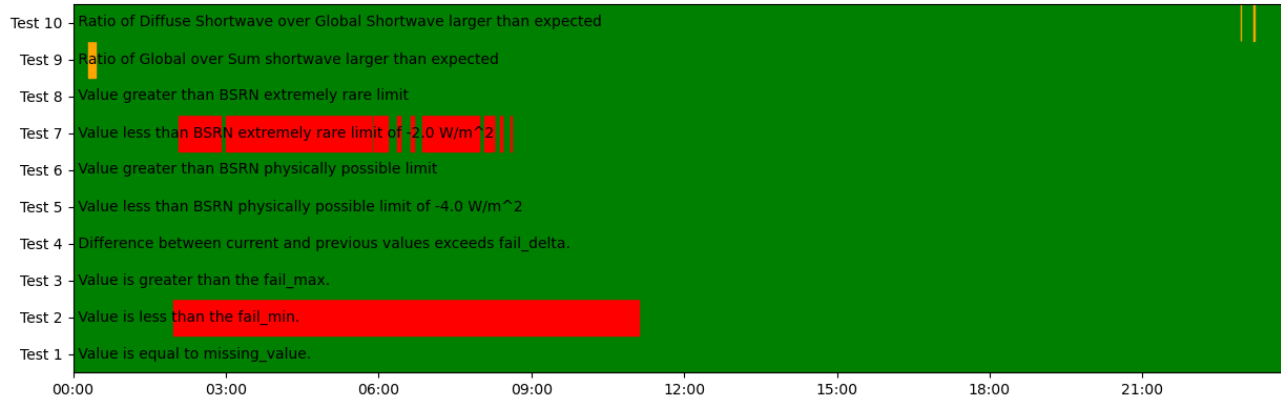
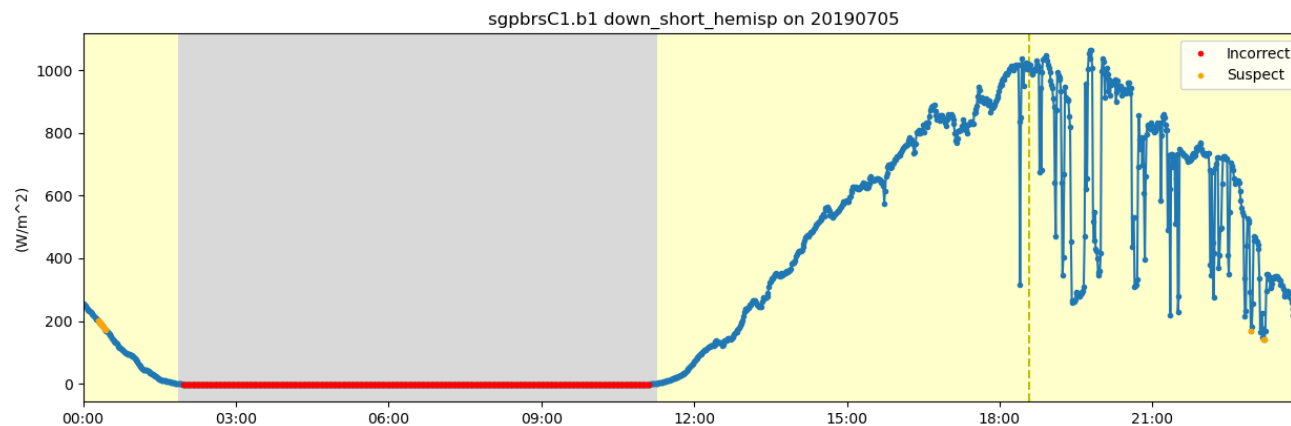


Lifted Index: 28.43
 SBCAPE: 1.07
 SBCIN: 0
 MUCAPE: 0
 MUCIN: 0
 LCL Temp: -8.08
 LCL Pres: 926.53



Quality Control

- ▶ Variety of tests and filtering that can be applied to data in the Dataset
 - Following CF-standards with bit-packed QC and can be flexible to incorporate other QC methods

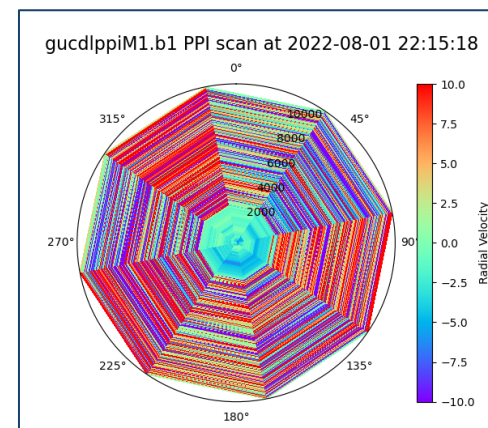


Example on applying
Baseline Surface
Radiation Network
(BSRN) quality control
– Ken Kehoe



Retrievals

- ▶ Advanced calculations that would not constitute an individual repository (keep it relatively simple)
- ▶ Current Examples (subset)
 - Wind profiles from scanning doppler lidar high elevation PPI scans – Newsom et al. 2016
 - Planetary boundary layer from radiosondes – Liu and Liang 2010
 - Sea Surface Temperatures from dual-Infrared Radiometer on a ship
 - Infrared sky temperature from an Atmospheric Emitted Radiance Interferometer (AERI)
 - And more!

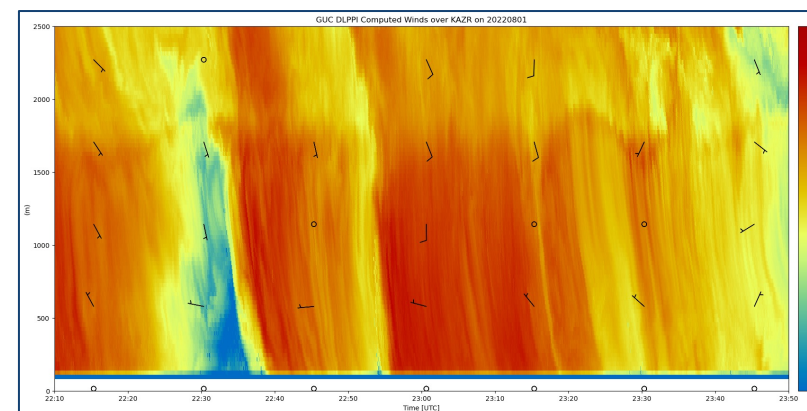


Doppler Lidar PPI
(Courtesy of ARM DQ Office)

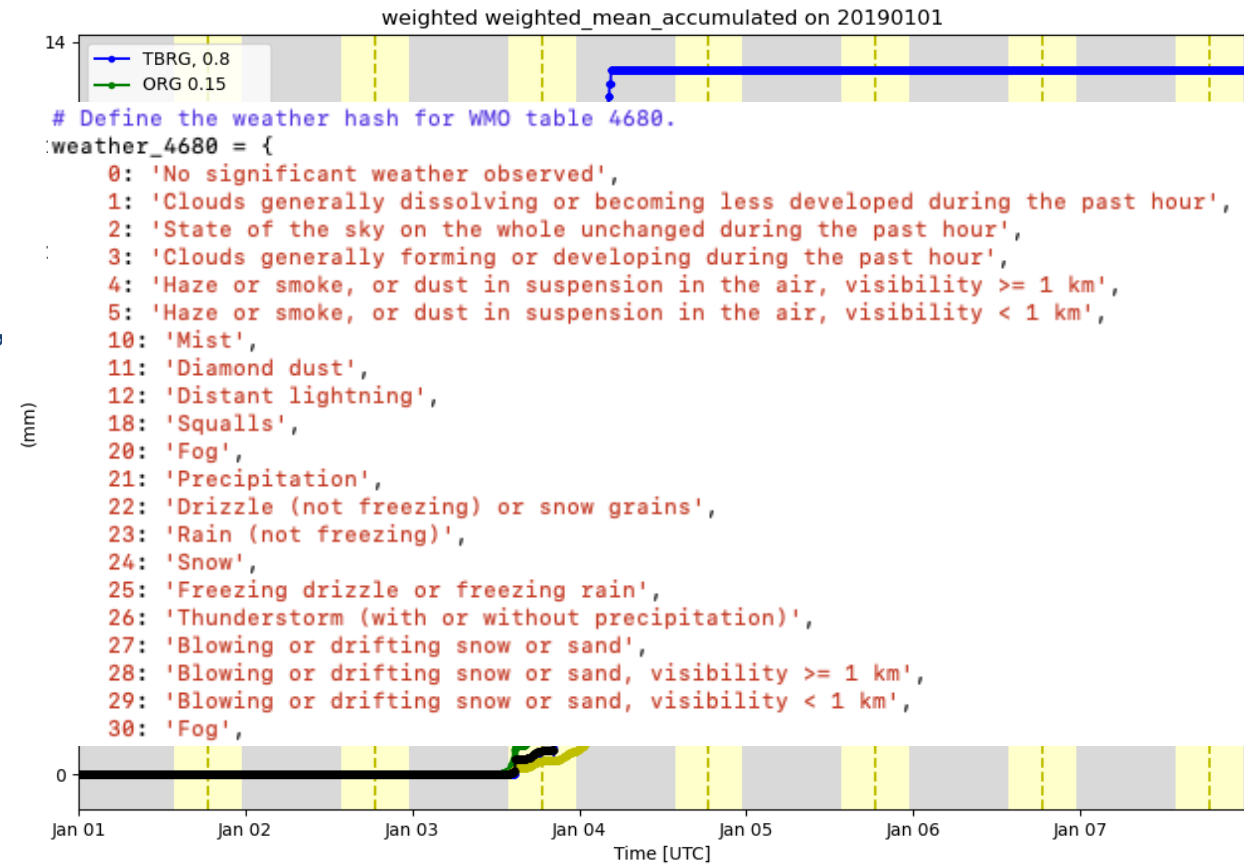


References

Rob K Newsom, Alan W Brewer, James M Wilczak, Daniel E Wolfe, Steven P Oncley and Julie K Lundquist ; Validating Precision Estimates in Horizontal Wind Measurements from a Doppler Lidar, Atmospheric Measurement Techniques Discussions 2016, 10, 1-30



- ▶ General utilities that don't fall into the other categories
 - Precipitation accumulation
 - Weighted averages
 - Decode present weather observations
 - Adding solar variables to denote day, night, dawn, dusk
 - Unit conversion
 - Planck converters
 - Datetime/ARM time converters
 - etc...



Core Practices

- ▶ We want to funnel citations to the papers behind the algorithms
 - Where we have the information, we have a “Reference” section in our documentation that point to the papers or technical reports the code is based on
- ▶ Contributors get added to the Author list on the DOI
 - Citation is auto-generated with each new release
- ▶ Unit test coverage stays above 90%
- ▶ Vulnerability and antivirus scanning

References

Bradley, F. and Farall, C. (2007) A Guide to Making Climate Quality Meteorological and Flux Measurements at Sea. Boulder, CO, NOAA, Earth System Research Laboratory, Physical Sciences Division, 44pp. & appendices. (NOAA Technical Memorandum OAR PSD-311). <http://hdl.handle.net/11329/386>

Adam Theisen, Ken Kehoe, Zach Sherman, Bobby Jackson, Max Grover, Corey Godine, Alyssa J. Sockol, Jason Hemedinger, Joe O'Brien, Jenni Kyrouac, Denny Hackel, & Michael Giansiracusa. (2023). ARM-DOE/ACT: ACT Release v1.5.1 (v1.5.1). Zenodo. <https://doi.org/10.5281/zenodo.8117547>

coverage 90%

Thank you to the current ACT Contributors



kenkehoe

322 commits 17,889 ++ 5,342 --



zssherman

155 commits 124,770 ++ 10,189 --



rcjackson

76 commits 95,949 ++ 1,487 --



mgrover1

47 commits 98,858 ++ 7,234 --



cgodine

22 commits 824 ++ 412 --



ajsockol

18 commits 841 ++ 8,266 --



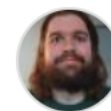
jrobrien91

7 commits 15,586 ++ 60 --



jkyrouac

3 commits 65 ++ 13 --



jrobrien91

2 commits 14,408 ++ 8 --



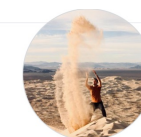
AdamTheisen

656 commits 128,780 ++ 6,643 --



dennyh-ssec

1 commit 62 ++ 0 --



Maxwell Levin
maxwelllevin

Michael Giansiracusa (Oak Ridge National Laboratory)

Welcome to future ACT contributors!

act-atmos

Anaconda.org 1.5.1

codecov 90%

downloads 65k total

DOI 10.5281/zenodo.3855537

Used by 41



Questions

<https://github.com/ARM-DOE/ACT>

