

ACT Unscripted: Shaping Atmospheric Data Tools with Community Feedback

ARM

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Setting the Stage

Introduction to ACT Capabilities

The Atmospheric data Community Toolkit (ACT) is an open-source Python library designed to support all stages of the scientific data life cycle, from acquisition and quality control to analysis, visualization, and retrievals (Fig. 1). ACT provides a flexible framework for processing diverse atmospheric datasets, including those from other organizations. ACT streamlines data exploration, facilitates reproducible research, and supports interdisciplinary collaboration in atmospheric sciences.

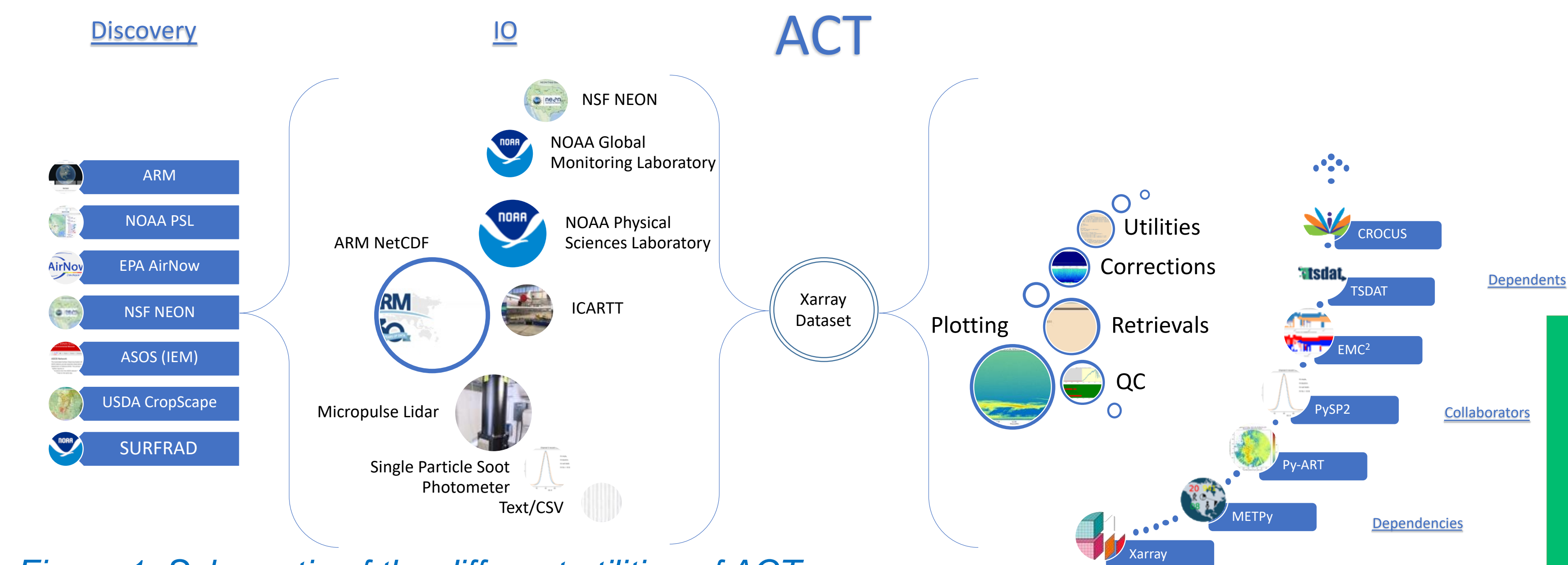


Figure 1. Schematic of the different utilities of ACT

Ensemble Cast

Bridging Data with ACT

ACT can serve as a bridge between science communities from a variety of organizations (Fig. 2). This breaks down barriers to accessing data and enables broader use of these datasets across communities. Examples of how to use these different data sources together are available in documentation linked through ACT's GitHub repository.

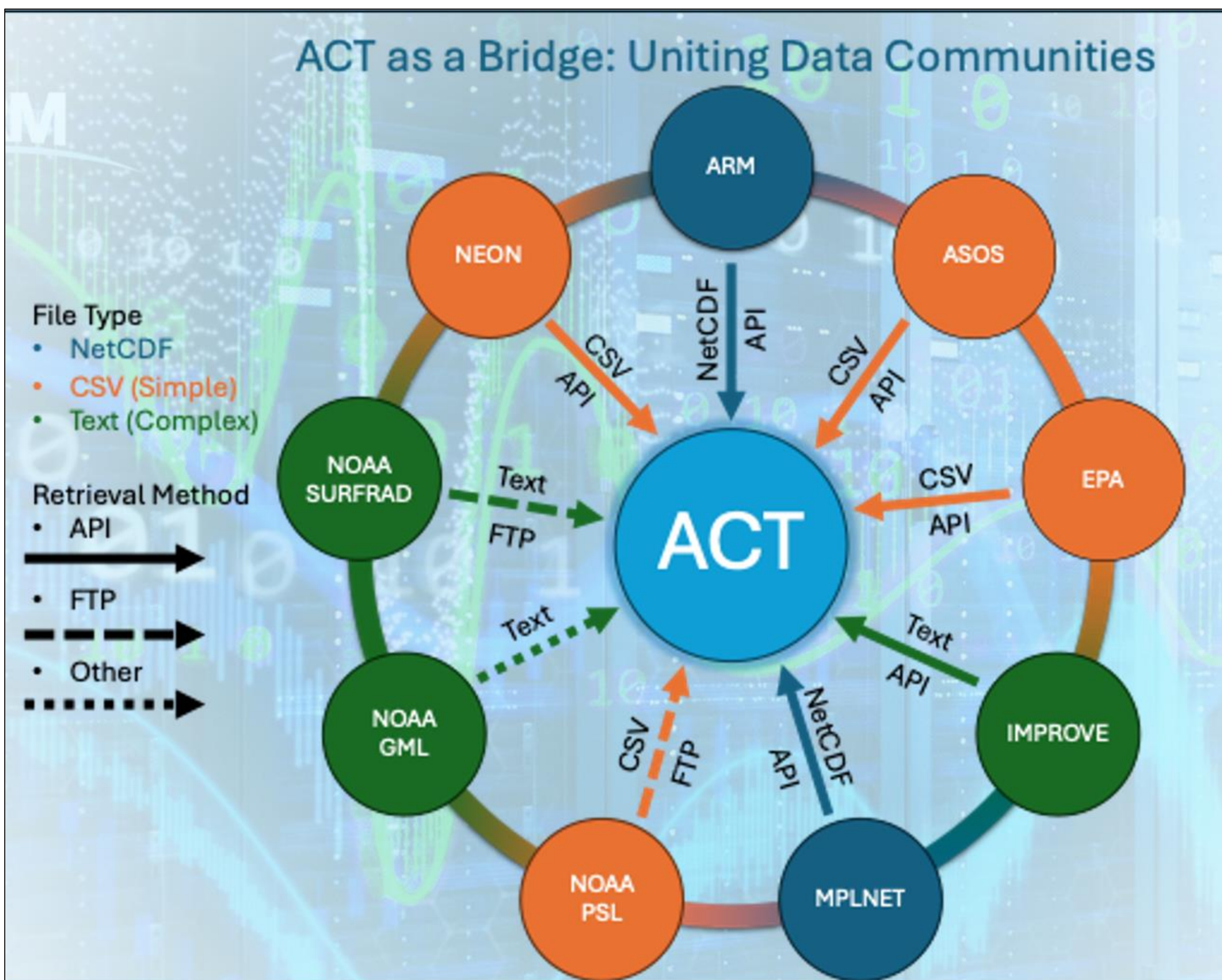


Figure 2. Current data sources that ACT can access and read.

Spotlight on Success

Progress from the Last Roadmap

In 2022, the second ACT roadmap outlined plans to enhance the toolkit's accessibility, usability, and functionality (Fig. 3). The roadmap was developed using feedback from the community while also incorporating needs and priorities from ARM.

Aircraft or UAS Related Functionality	ARM deploys uncrewed aerial systems and has a new challenge research jet in development. ACT has implemented some features beneficial to interacting with aerial data, more is needed.
Retrievals	ACT has some retrievals available, but it would be beneficial to keep expanding the functions available.
Windows Compatibility	Known issues with windows compatibility have been addressed.
ARM Data Surveyor	ARM has a command line tool that can be used for plot generation. This is currently available in the ACT GitHub page under "Scripts".
Performance Improvements	Significant performance improvements have been implemented, included with how ACT is imported using lazy loading.
Statistics Tracking	Statistics are being tracked for the GitHub repository itself and for the documentation.
I/O Improvements	ACT has significantly added to its I/O capabilities to encompass a variety of new organizations data and existing formats such as ICARTT.
Tutorial and Example Development	ACT has a large engaged of examples as part of the documentation. The developers have also engaged in a variety of tutorial and training events with materials hosted on ARM-Notebooks repo.
Discovery Improvements	A significant amount of new data discovery functions have been added, including getting data from AIRNOW, IMPROVE, NEON, NASA, and NOAA.
Visualizations	Additional plotting capabilities have been added included data roses (see below slideshow)

Figure 3. Priorities from the second ACT roadmap. Green are priorities that have been addressed and completed. Blue are ones that could still use more work or additions.

Acknowledgments

This presentation has been created by UChicago Argonne, LLC, Operator of Argonne National Laboratory ("Argonne"). Argonne, a U.S. Department of Energy Office of Science laboratory, is operated under Contract No. DE-AC02-06CH11357. This research was supported by the ARM User Facility funded by the Office of Biological and Environmental Research in the US Department of Energy Office of Science.

Audience Participation

Shaping ACT's Future

ACT's Future is shaped by you! Scan the QR Code and Take the Survey!



ACT thrives on feedback and contributions from the community. Your input helps prioritize new features, improve existing ones, and guide future development. Beyond feedback, we encourage direct contributions to ACT. **All contributors are included as authors on ACT's Data Object Identifier and citation.**

ACT Citation

Adam Theisen, Ken Kehoe, Zach Sherman, Bobby Jackson, Max Grover, Alyssa J. Sockol, Corey Godine, Jason Hemedinger, Joe O'Brien, Jenni Kyrouac, Maxwell Levin, Israel Silber, & Denny Hackel. (2024). ARM-DOE/ACT: ACT Release Version 2.1.7 (v2.1.7). Zenodo. <https://doi.org/10.5281/zenodo.14531201>

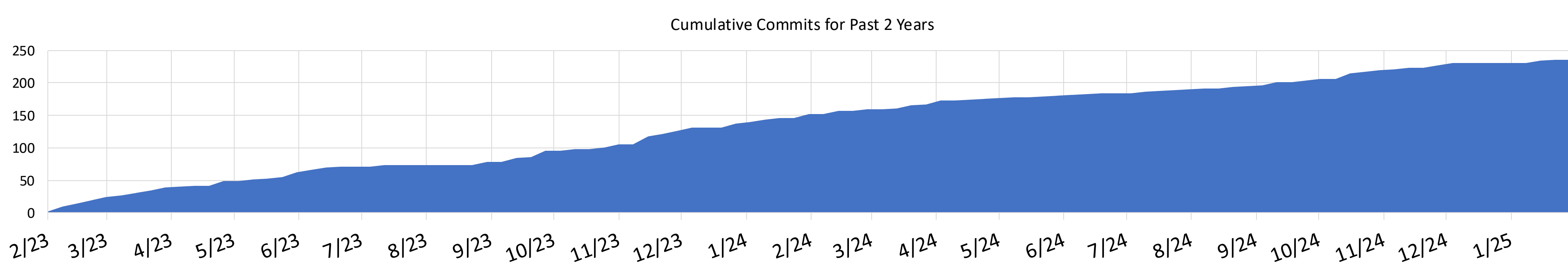


Figure 4. Cumulative commits to ACT over the past 2 years.

ACT GitHub Repository

