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DOE/SC-ARM-12-002

ARM Climate Research Facility Quarterly Value-Added Product Report

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February 2012

ARM CLIMATE RESEARCH FACILITY

DISCLAIMER

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First Quarter: October 01-December 31, 2011

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Abstract

The purpose of this report is to provide a concise status update for value-added products (VAP) implemented by the Atmospheric Radiation Measurement (ARM) Climate Research Facility. The report is divided into the following sections: (1) new VAPs for which development has begun, (2) progress on existing VAPs, (3) future VAPs that have been recently approved, (4) other work that leads to a VAP, and (5) top requested VAPs from the archive. New information is highlighted in **blue text**. New information about processed data by the developer is highlighted in **red text**. The upcoming milestones and dates are highlighted in **green**.

Acknowledgements

This report is developed largely from the information submitted by the developers and task leads to the Extraview reporting system (http://ewo.arm.gov). Special thanks to our VAP development team for providing timely and complete updates to the Engineering Change Orders and Engineering Work Orders, Dana Dupont and Rolanda Jundt, who make sure that this information is posted accurately on the ARM website, Stefanie Shamblin of Oakridge National Laboratory for providing the metrics report on VAPs, and Coryann Newsom for preparing the graphics related to the metrics.

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1.0 New VAPs

This section describes new activities that have begun in the last quarter after being approved by the ARM Infrastructure and Science Team.

1.1 Mapped Moments to Cartesian Grid (MMCG)

Translator: Scott Collis, Argonne National Laboratory

Developer: Scott Collis, Argonne National Laboratory

Engineering Change Order-00887 was approved to develop a VAP to map the radar moments to Cartesian grid.

The data that were released to evaluation for the Midlatitude Continental Convective Clouds Experiment (MC3E) covers all precipitating events derived from the C-band scanning ARM precipitation radar (C-SAPR).

Next milestone: Release data for Manus by March 1, 2012.

1.2 Ka-band Zenith-Pointing Radar Active Remote Sensing of Clouds (KAZR-ARSCL)

Translator: Mike Jensen, Brookhaven National Laboratory

Developer: Karen Johnson, Brookhaven National Laboratory

Engineering Change Order-00899 was approved to initiate and coordinate the development of an ARSCL-like VAP to enhance the scientific value of data collected by the Ka-band ARM zenith radar (KAZR), the follow-on to the now-retired MMCR.

An implementation plan has been completed, and work has begun using the Integrated Software Development Environment (ISDE).

Next milestone: Create best-estimate KAZR moments by March 1, 2012.

1.3 Planetary Boundary Layer (PBL)

Translator: Sally McFarlane, Pacific Northwest National Laboratory

Developer: Chitra Sivaraman, Pacific Northwest National Laboratory

Engineering Change Order-00893 has been approved to initiate and coordinate the development of a VAP to implement methods for PBL height detection using radiosondes, ceilometer, and micropulse lidar measurements.

An implementation plan has been completed, and work has begun using IDL due to the nature of how radiosondes are launched.

Next milestone: Implement Heffter, Liu and Liang, and Bulk Richardson methods and stage data in the evaluation area by March 1, 2012.

2.0 Existing VAPs

This section describes the status of each VAP and the ongoing activities that were approved to improve the performance of or maintain existing VAPs. The information is abstracted primarily from the monthly updates provided by the development team to the ECOs.

2.1 Atmospherically Emitted Radiance Interferometer Noise Filter (AERINF)

Translator: Sally McFarlane, Pacific Northwest National Laboratory

Developer: Tim Shippert, Pacific Northwest National Laboratory

Status: Operational

Tier: Production

Engineering Change Order-00449 has been approved to run AERINF at the ARM Mobile Facility (AMF) sites and adapt to the new Recovery Act-funded AERIs.

The AERINF VAP has been released to the Data Management Facility (DMF) for routine processing.

2.2 AERI Profiles of Water Vapor and Temperature (AERIPROF)

Translator: Sally McFarlane, Pacific Northwest National Laboratory

Developer: Tim Shippert, Pacific Northwest National Laboratory

Status: Operational

Tier: Production

There are no ECOs for this VAP.

2.3 Aerosol Best Estimate (AEROSOLBE)

Translator: Connor Flynn, Pacific Northwest National Laboratory

Developer: Annette Koontz, Pacific Northwest National Laboratory

Status: Operational

Tier: Evaluation

Engineering Change Order-00360 was approved to update the VAP to add logic to capture red and blue wavelength quantities, to update the quality check fields, and to use the latest Aerosol Intensive Properties (AIP) data. The VAP was estimated to be released by June 1, 2011.

The ABE VAP has been released to the DMF for routine processing, but data have not started to flow to the Data Archive.

Next milestone: Start data flow by March 1, 2012.

2.4 Aerosol Intensive Properties (AIP)

Translator: Connor Flynn, Pacific Northwest National Laboratory

Developer: Annette Koontz, Pacific Northwest National Laboratory

Status: Operational

Tier: Production

There are no ECOs for this VAP.

2.5 Aerosol Optical Depth Derived From Either MFRSR or NIMFR (AOD)

Translator: Connor Flynn, Pacific Northwest National Laboratory

Developer: Connor Flynn, Pacific Northwest National Laboratory

Status: Operational

Tier: Production

Engineering Change Order-00089 was approved to run the AOD VAP at the AMF sites.

The data from the Ganges Valley, India, deployment (PGH) have been released to the Archive. The AOD VAP has been released to the DMF for routine processing for the PGH and Gan Island (GAN) deployments.

Next milestone: Provide Io values and process data from the Steamboat Springs (SBS) deployment by February 1, 2012, and for the China (HFE) deployment by March 1, 2012.

2.6 Active Remote Sensing of Clouds (ARSCL)

Translator: Mike Jensen, Brookhaven National Laboratory

Developer: Karen Jones, Pacific Northwest National Laboratory

Status: Operational

Tier: Production

Engineering Change Order-00086 has been approved to catch up on processing of ARSCL data and development of new ARSCL for upgraded KAZR system.

Processing of data at Tropical Western Pacific (TWP) for June and July 2010 at C1 and October 2008 at C2 is complete.

Next milestone: Complete historical processing of data by May 2012.

2.7 Best-Estimate Fluxes from EBBR Measurements and Bulk Aerodynamics Calculations (BAEBBR)

Translator: Shaocheng Xie, Lawrence Livermore National Laboratory

Developer: Krista Gaustad, Pacific Northwest National Laboratory

Status: Operational

Tier: Production

There are no open ECOs for this VAP.

2.8 Broadband Heating Rate Profile (BBHRP)

Translator: Sally McFarlane, Pacific Northwest National Laboratory

Developer: Tim Shippert, Pacific Northwest National Laboratory

Status: Development

Tier: Evaluation

Engineering Change Order-00219 has been approved to make updates to the BBHRP/Radiatively Important Parameters Best Estimate (RIPBE) interface, run the alpha version, analyze data, prepare a technical report, and deliver data to the evaluation area.

Processed four years of data (2002–2006) with the latest RIPBE data to the evaluation area.

Next milestone: Create 30-minute average files.

2.9 Best-Estimate Surface Radiative Flux (BEFLUX)

Translator: Sally McFarlane, Pacific Northwest National Laboratory

Developer: Yan Shi, Pacific Northwest National Laboratory

Status: Operational

Tier: Production

There are no open ECOs for this VAP.

2.10 Cloud Classification (CLDCLASS)

Translator: Sally McFarlane, Pacific Northwest National Laboratory

Developer: Chaomei Lo, Pacific Northwest National Laboratory

Status: No Development

Tier: Evaluation

There are no open ECOs for this VAP.

2.11 Cloud Concentration Nuclei (CCN)

Translator: Sally McFarlane, Pacific Northwest National Laboratory

Developer: Chitra Sivaraman, Pacific Northwest National Laboratory

Status: Operational

Tier: Evaluation

Engineering Change Order-00813 (ECO) has been approved to begin implementation of the Ghan CCN Retrieval algorithm, develop a version of the code, provide one month of data for review, and add quality checks.

The product has completed development and officially released.

Two years of data have been released to the evaluation area. The data have been compared to the RACORO campaign.

Next milestone: Review feedback provided by users in June 2012.

2.12 Climate Modeling Best Estimate (CMBE)

Translator: Shaocheng Xie, Lawrence Livermore National Laboratory

Developer: Renata McCoy, Lawrence Livermore National Laboratory

Status: Operational

Tier: Evaluation

Engineering Change Order-00620 has been approved to make updates to run SGP, North Slope of Alaska (NSA) and TWP sites, publish CMBE to the Earth System Federated Grid (ESFG) and adhere CMBE to ARM data object design (DOD) standards to produce ARMBE.

Addition of clear-sky radiative fluxes is in progress.

Next milestone: Release enhanced version of CMBE at SGP and China. This has been pushed back to March 2012 to meet DOD standards.

2.13 ARM Cloud Retrieval Ensemble Data Set (ACRED)

Translator: Shaocheng Xie, Lawrence Livermore National Laboratory

Developer: Chuanfeng Zhao and Renata McCoy, Lawrence Livermore National Laboratory

Status: Operational

Tier: Evaluation

Engineering Work Order-13590 has been approved to address the uncertainty in cloud retrievals and provide three different retrievals at the five ARM permanent research sites.

Development of an ensemble MICROBASE cloud retrieval data set is in progress.

Next milestone: Review feedback provided by users and complete development of an ensemble MICROBASE cloud retrieval data set by March 2012.

2.14 G-Band Vapor Radiometer Precipitable Water Vapor (GVRPWV)

Translator: Connor Flynn, Pacific Northwest National Laboratory

Developer: Annette Koontz, Pacific Northwest National Laboratory

Status: Operational

Tier: Production

There are no open ECOs for this VAP.

2.15 Langley Regression (LANGLEY)

Translator: Connor Flynn, Pacific Northwest National Laboratory

Developer: Annette Koontz, Pacific Northwest National Laboratory

Status: Operational

Tier: Production

There are no open ECOs for this VAP.

2.16 Microwave Radiometer-Scaled Sonde Profiles (LSSONDE)

Translator: Connor Flynn, Pacific Northwest National Laboratory

Developer: Annette Koontz, Pacific Northwest National Laboratory

Status: Operational

Tier: Production

There are no open ECOs for this VAP.

2.17 Merged Sounding (MERGESONDE)

Translator: Mike Jensen, Brookhaven National Laboratory

Developer: David Troyan, Brookhaven National Laboratory

Status: Operational

Tier: Production

Engineering Change Order-00092 has been approved to add quality check fields, release the first version of the code to the DMF, and provide version 2 of the data to evaluation.

A script has been developed to fix version 1 of the VAP to meet DOD standards.

Next milestone: Review feedback provided by the users on version 2 of the MERGESONDE VAP. Run script to fix the header of version 1 and submit the data to the Archive. Release of version 2 for routine processing at the DMF has been pushed back due to other priorities.

2.18 MFRSR Column Intensive Properties (MFRSRCIP)

Translator: Connor Flynn, Pacific Northwest National Laboratory

Developer: Annette Koontz, Pacific Northwest National Laboratory

Status: Development

Tier: Evaluation

Engineering Change Order-00823 has been approved to develop a VAP to retrieve aerosol column intensive properties from the multifilter rotating shadowband radiometer (MFRSR) including single scattering albedo, asymmetry parameter, and bi-modal log-normal size distributions.

Progress has been made to call the Fortran program from the C wrapper.

Next milestone: Develop code in ISDE and provide evaluation data set by March 1, 2012.

2.19 Cloud Optical Depth from MFRSR (MFRSRCLDOD)

Translator: Sally McFarlane, Pacific Northwest National Laboratory

Developer: Yan Shi, Pacific Northwest National Laboratory

Status: Operational

Tier: Production

Engineering Change Order-00287 has been approved to update the VAP to run with MWRRET as input, run and evaluate data at Azores, and release the product.

Processed SGP data for extended facilities E13, E1, E2 and E13.

Next milestone: Complete processing of historical data has been pushed back to March 1, 2012.

2.20 Continuous Baseline Microphysical Retrieval (MICROBASE)

Translator: Mike Jensen, Brookhaven National Laboratory

Developer: Maureen Dunn, Brookhaven National Laboratory

Status: Operational

Tier: Production

Engineering Change Order-00804 has been approved to update the VAP with quality checks and release to production.

Historical processing at all sites has been completed, and the data have been archived.

2.21 MICRO-ARSCL (MICROARSCL)

Translator: Mike Jensen, Brookhaven National Laboratory

Developer: Ed Luke, Brookhaven National Laboratory

Status: Development

Tier: Evaluation

Engineering Change Order-00847 has been approved to solve the spectral imaging problem and porting MICROARSCL to the ARM computer cluster at Oak Ridge National Laboratory.

No progress has been made for this VAP.

Next milestone: Reprocess historical data at Oak Ridge Laboratory. This milestone has been pushed back to March 1, 2012.

2.22 Micropulse Lidar Cloud Optical Depth (MPLCOD)

Translator: Sally McFarlane, Pacific Northwest National Laboratory

Developer: Chaomei Lo, Pacific Northwest National Laboratory

Status: No Development

Tier: Evaluation

There are no open ECOs for this VAP.

2.23 Micropulse Lidar Polarized Average (MPLAVG)

Translator: Connor Flynn, Pacific Northwest National Laboratory

Developer: Annette Koontz, Pacific Northwest National Laboratory

Status: Operational

Tier: Production

There are no open ECOs for this VAP.

2.24 MPL Cloud Mask (MPLCMASK)

Translator: Sally McFarlane, Pacific Northwest National Laboratory

Developer: Chitra Sivaraman, Pacific Northwest National Laboratory

Status: Operational

Tier: Production

Engineering Change Order-00778 is approved to process historical data.

All historical data have been completed, and the data have been archived.

2.25 Microwave Radiometer Retrievals (MWRRET)

Translator: Sally McFarlane, Pacific Northwest National Laboratory

Developer: Krista Gaustad, Pacific Northwest National Laboratory

Status: Operational

Tier: Production

Engineering Change Order-00526 has been approved to transition the product from evaluation to production, release the product, and process historical data.

The task to use WACR-ARSCL at the AMF sites has been completed. Data are now flowing from the DMF to the Archive.

Next milestone: Process historical AMF data. Process .c2-level data at all permanent sites.

2.26 Organic Aerosol Component Analysis

Translator: Jerome Fast, Pacific Northwest National Laboratory

Developer: Tim Shippert, Pacific Northwest National Laboratory

Status: Development

Tier: Evaluation

Engineering Change Order-00838 has been approved to develop a VAP to estimate organic aerosol components from Aerosol Mass Spectrometers (AMS) and Aerosol Chemical and Speciation Monitors (ACSM) to be deployed at ARM's sites and as part of the Mobile Aerosol Observing System (MAOS).

Progress has been made to converge and remove noise in the data for the initial inputs from the ingest.

Next milestone: Port the code with ingested ACSM data and produce evaluation data before the 2012 Science Team Meeting.

2.27 Data Quality Assessment for ARM Radiation Data (QCRAD)

Translator: Sally McFarlane, Pacific Northwest National Laboratory

Developer: Yan Shi, Pacific Northwest National Laboratory

Status: Operational

Tier: Production

Engineering Change Order-00247 has been approved to run the VAP with Azores data, fix quality check problems, and analyze data.

Completed processing of QCRAD at SGP C1 and E15–27 and BEFLUX at SGP C1, E1–13, and Point Reyes (PYE) M1.

Next milestone: Complete reprocessing of historical data.

2.28 Raman Lidar Profiles—Aerosol Scattering Ratio (RLPROFASR)

Translator: Connor Flynn, Pacific Northwest National Laboratory

Developer: Chitra Sivaraman, Pacific Northwest National Laboratory

Status: Operational

Tier: Production

There are no open ECOs for this VAP.

2.29 Raman Lidar Profiles—Best Estimate (RLPROFBE)

Translator: Connor Flynn, Pacific Northwest National Laboratory

Developer: Chitra Sivaraman, Pacific Northwest National Laboratory

Status: Operational

Tier: Production

There are no open ECOs for this VAP.

2.30 Raman Lidar Profiles—Depolarization Ratio (RLPROFDEP)

Translator: Connor Flynn, Pacific Northwest National Laboratory

Developer: Chitra Sivaraman, Pacific Northwest National Laboratory

Status: Operational

Tier: Production

There are no open ECOs for this VAP.

2.31 Raman Lidar Profiles—Extinction (RLPROFEXT)

Translator: Connor Flynn, Pacific Northwest National Laboratory

Developer: Chitra Sivaraman, Pacific Northwest National Laboratory

Status: Operational

Tier: Production

There are no open ECOs for this VAP.

2.32 Raman Lidar Profiles—MERGE (RLPROFMERGE)

Translator: Connor Flynn, Pacific Northwest National Laboratory

Developer: Chitra Sivaraman, Pacific Northwest National Laboratory

Status: Operational

Tier: Production

There are no open ECOs for this VAP.

2.33 Raman Lidar Profiles—Mixing Ratio (RLPROFMR)

Translator: Connor Flynn, Pacific Northwest National Laboratory

Developer: Chitra Sivaraman, Pacific Northwest National Laboratory

Status: Operational

Tier: Production

There are no open ECOs for this VAP.

2.34 Radiatively Important Parameters Best Estimate (RIPBE)

Translator: Sally McFarlane, Pacific Northwest National Laboratory

Developer: Tim Shippert, Pacific Northwest National Laboratory

Status: Operational

Tier: Evaluation

The ECO-00767 has been approved to fix bugs and enhance the product based on feedback from beta users.

The birth of a datastream (BODS) process has been completed, and the product has been released.

Data from 2002 to 2007 have been processed and released to the Archive.

Next milestone: Complete processing of data with the released version of the VAP.

2.35 SGP Area Surface Cloud and SW Radiation Grid (SFCCLDGRID)

Translator: Sally McFarlane, Pacific Northwest National Laboratory

Developer: Krista Gaustad, Pacific Northwest National Laboratory

Status: Operational

Tier: Production

There are no open ECOs for this VAP.

2.36 Surface Spectral Albedo (SURFSPECALB)

Translator: Sally McFarlane, Pacific Northwest National Laboratory

Developer: Krista Gaustad, Pacific Northwest National Laboratory

Status: Operational

Tier: Production

There are no open ECOs for this VAP.

2.37 SONDE Adjust (SONDEADJUST)

Translator: Mike Jensen, Brookhaven National Laboratory

Developer: David Troyan, Brookhaven National Laboratory

Status: Development

Tier: Evaluation

Engineering Change Order-00824 has been approved to correct the documented biases in radiosonde humidity measurements.

The BODS and technical report have been completed.

Next milestone: Migrate data to the Archive and release the VAP for routine processing.

2.38 Shortwave Flux Analysis (SWFLUXANAL)

Translator: Sally McFarlane, Pacific Northwest National Laboratory

Developer: Krista Gaustad, Pacific Northwest National Laboratory

Status: Operational

Tier: Production

There are no open ECOs for this VAP.

2.39 Tower Water-Vapor Mixing Ratio (TWRMR)

Translator: Sally McFarlane, Pacific Northwest National Laboratory

Developer: Krista Gaustad, Pacific Northwest National Laboratory

Status: Operational

Tier: Production

There are no open ECOs for this VAP.

2.40 Variational Analysis (VARANAL)

Translator: Shaocheng Xie, Lawrence Livermore National Laboratory

Developer: Renata McCoy, Lawrence Livermore National Laboratory

Status: Operational

Tier: Evaluation

Engineering Change Request-0096 (ECR-0096) has been approved to develop continuous large-scale forcing data.

Significant progress has been made to produce the ensemble large-scale forcing for the China deployment.

Next milestone: Release the data for China and for MC3E.

2.41 Vertical Velocity in Stratiform Rain (VVSR)

Translator: Mike Jensen, Brookhaven National Laboratory

Developer: Maureen Dunn, Brookhaven National Laboratory

Status: Development

Tier: Evaluation

Engineering Change Order-00865 was approved to initiate and coordinate the development of the VAP to generate profiles of vertical air motion during large-scale stratiform liquid precipitation. It will include information on the horizontal and vertical sheer of the velocity.

Progress has been made to develop the code in IDL and identify quality check variables and the DOD.

Next milestone: Submit data as an evaluation product by February 15, 2012.

2.42 W-Band ARM Cloud Radar Active Remote Sensing of Clouds (WACRARSCL)

Translator: Mike Jensen, Brookhaven National Laboratory

Developer: David Troyan, Brookhaven National Laboratory

Status: Operational

Tier: Evaluation

Engineering Change Request-00826 has been approved to run WACRARSCL at all AMF deployments and continue development at SGP.

The code is now adapted to produce data that meets DOD standards. A problem was found related to insect clutter, and work is now being done to fix the problem.

Next milestone: Re-run the VAP and move data to the Archive.

3.0 Future VAPs

This section describes new activities that have been approved in the last quarter by the ARM Science and Infrastructure and Science Steering Committee. Work on these activities will begin in the next quarter.

White papers are in progress for Quantitative Precipitation Radar VAP, Raman Lidar Temperature Profile VAP, and AOS Correction VAPs. A white paper also is in progress for Python ARM Radar Toolkit (PY-ART).

4.0 Other VAP-Related Work

4.1 Pre-mapping Corrections to SAPR Data

Translator: Scott Collis, Argonne National Laboratory

Developer: Scott Collis, Argonne National Laboratory

Engineering Work Order-13725 has been initiated to track the process of pre-mapping corrections that need to be performed on the new radar data. This EWO covers work involved in the researching and implementation of standard algorithms on the SAPR data for the purposes of generating evaluation data sets.

The work associated with this ECO has been completed.

4.2 CARES Data Set

Translator: Jerome Fast, Pacific Northwest National Laboratory

Developer: Chen Song and Manish Shrivastava, Pacific Northwest National Laboratory

Engineering Work Order-13683 has been approved to create an evaluation product from CARES data set for the Aerosol Modeling Testbed. For details on this work, please visit https://wiki.arm.gov/bin/view/Engineering/VAPWhitePapers.

Significant progress has been made with CARES data set. New features have been added to the tool kit. Waiting on three principal investigators to update their data before finalizing the testbed.

5.0 VAP Metrics

Table 1 lists the top five VAPs that were requested by users from the Archive during the first quarter.

Table 1. Top five VAPs requested by users from the Archive during the first quarter.

Instrument Class	Number of Files Requested	Number of Unique Requests	Number of Unique Users
ARSCL	287344	493	126
MFRSR	204968	120	76
QCRAD	139791	223	135
SWFANAL	128325	113	80
MWRRET	105405	115	65

IOP Data Product	Number of Files Requested
MERGESONDE	6375
SONDEADJUST	1114
WACRARSCL	658
ACRED	237
CMBE	234

Figure 1 shows the top five VAPs that were requested by users from the Archive during the last four quarters.

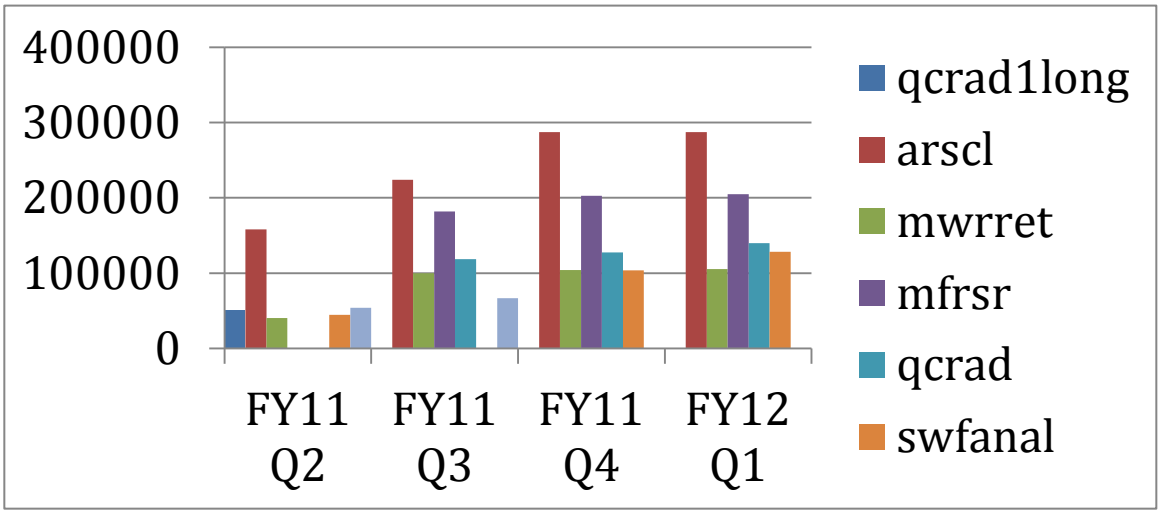

Figure 1. Top five VAPs requested by users from the Archive during the last four quarters.

Figure 2 shows the top five VAPs downloaded from the Archive evaluation area for the last four quarters.

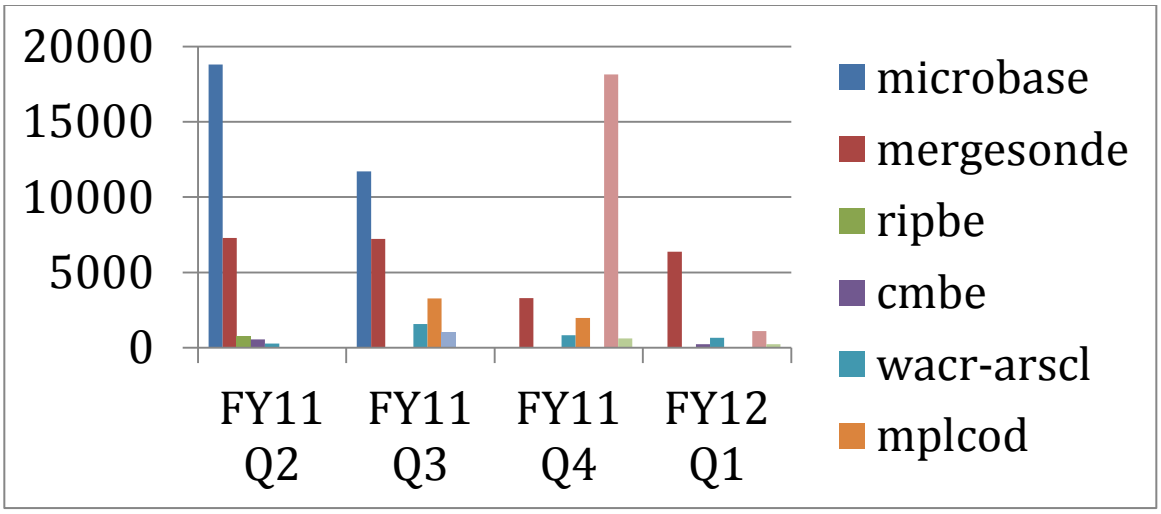

Figure 2. Top five VAPs downloaded from the Archive evaluation area during the last four quarters.

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