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DOE/SC-ARM-12-008

ARM Climate Research Facility Quarterly Value-Added Product Report

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June 2012

ARM CLIMATE RESEARCH FACILITY

DISCLAIMER

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Third Quarter:
January 01–March 31, 2012

C Sivaraman

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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 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.

Contents

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 Raman Lidar Profiles—Temperature (RLPROFTEMP)

Translator: Connor Flynn, Pacific Northwest National Laboratory

Developer: Chitra Sivaraman, Pacific Northwest National Laboratory

Engineering Change Order-00911was approved to initiate and coordinate the development of an RLPROFTEMP VAP to determine temperature profiles from Raman lidar (RL) data.

1.2 Cloud Condensation Nuclei Average (CCNAVG)

Translator: Connor Flynn, Pacific Northwest National Laboratory

Developer: Yan Shi, Pacific Northwest National Laboratory

Engineering Change Order-00898 was approved to initiate and coordinate the development of an AOSCCNAVG VAP to consolidate the relevant CCN parameters into a single file and average the data over the 5-minute integration time of each percent super saturation (%ss) value.

1.3 Python ARM Radar Toolkit (PYART)

Translator: Scott Collis, Argonne National Laboratory

Developer: Scott Collis, Argonne National Laboratory

Engineering Change Order-00920 was approved to initiate and coordinate the development of a toolkit usable by the ARM community for working with all the radar data formats produced by the scanning ARM precipitation radars (SAPRs).

1.4 Corrected Moments in Antenna Coordinates (CMAC)

Translator: Scott Collis, Argonne National Laboratory

Developer: Scott Collis, Argonne National Laboratory

Engineering Work Order-13977 was approved to initiate and coordinate the development of corrected moments in antenna coordinates (CMAC) in evaluation at the Southern Great Plains (SGP).

1.5 Convective Vertical Velocity VAP (CONVV)

Translator: Scott Collis, Argonne National Laboratory

Developer: Kirk North, McGill University

Engineering Work Order-13978 was approved to initiate and coordinate the development of a CONVV VAP to assist in implementing a convective Vertical Velocity VAP for the Midlatitude Continental Convective Clouds Experiment (MC3E).

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 ARM Cloud Retrieval Ensemble Dataset (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.

Significant progress has been made with a MICROBASE cloud retrieval data set, and an initial data set was presented at the Atmospheric System Research (ASR) Science Team Meeting.

Next milestone: Review feedback provided by users and complete development of an ensemble MICROBASE cloud retrieval data set. The date of this milestone has been pushed back.

2.2 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

There are no ECOs for this VAP.

2.3 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.

2.4 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 AEROSOLBE VAP has been released to Data Management Facility (DMF) for routine processing, and data have started to flow to the archive.

2.5 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.

2.6 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 China deployment (HFE) and Steamboat Springs deployment (SBS) have been processed and released to the archive.

2.7 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 the Tropical Western Pacific (TWP) site is 30% complete.

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

2.8 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.

2.9 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.

2.10 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.

2.11 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.

2.12 Cloud Concentration Nuclei Profile (CCNPROF)

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.

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

2.13 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.

Released the enhanced version of CMBE at SGP to evaluation.

Next Milestone: Develop CMBE for the China deployment and migrate product as ARMBE.

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

Translator: Mike Jensen, Brookhaven National Laboratory

Developer: Karen Johnson, Brookhaven National Laboratory

Status: In Development

Tier: Evaluation

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.

Integration with the Integrated Software Development Environment (ISDE) has been completed to transform the inputs. Significant progress has been made to correct the mode.

Next milestone: The deadline for creating best-estimate KAZR moments has been pushed back to June 01, 2012.

2.16 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.

2.17 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.

2.18 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.

All historical data have been fixed to meet Data Object Design (DOD) standards, and the data are now available at the ARM Data Archive.

Next milestone: Review feedback provided by the users on version 2 of the VAP. The release of version 2 for routine processing at the DMF has been pushed back due to other priorities.

2.19 MFRSR Column Intensive Properties (MFRSRCIP)

Translator: Connor Flynn, Pacific Northwest National Laboratory

Developer: Annette Koontz, Pacific Northwest National Laboratory

Status: In 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.

The VAP has been integrated with ISDE.

Next milestone: Optimize the FORTRAN code and provide an evaluation data set by June 1, 2012.

2.20 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 data for SGP extended facilities E6, E7, E8, E9, E10, E11, E12, and E15.

Next milestone: The deadline for complete processing and analyzing of historical data has been pushed back to June 1, 2012.

2.21 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.

All historical data for the averaged product have been migrated to the Data Archive.

2.22 MICRO-ARSCL (MICROARSCL)

Translator: Mike Jensen, Brookhaven National Laboratory

Developer: Ed Luke, Brookhaven National Laboratory

Status: In 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 National Laboratory. This milestone has been pushed back to June 1, 2012.

2.23 Mapped Moments to Cartesian Grid (MMCG)

Translator: Scott Collis, Argonne National Laboratory

Developer: Scott Collis, Argonne National Laboratory

Status: In Development

Tier: Evaluation

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

The data for Manus were showcased at the ASR Science Team Meeting, and the work to move the data to evaluation has been 90% completed.

Next milestone: Release data for Manus and SGP X-SAPR, and produce attenuation correction for MC3E by September 1, 2012.

2.24 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.

2.25 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.

2.26 MPL Cloud Mask (MPLCMASK)

Translator: Sally McFarlane, Pacific Northwest National Laboratory

Developer: Chitra Sivaraman, Pacific Northwest National Laboratory

Status: Operational

Tier: Production

There are no open ECOs for this VAP.

2.27 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 code has been updated to run with WACR-ARSCL at AMF sites.

All historical AMF data have been processed and are available at the Data Archive.

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

2.28 Organic Aerosol Component Analysis

Translator: Jerome Fast, Pacific Northwest National Laboratory

Developer: Tim Shippert, Pacific Northwest National Laboratory

Status: In 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).

The code has been ported to read the ingested ACSM data, and an initial analysis of six months of the data set was presented at the ASR Science Team Meeting.

Next milestone: Produce evaluation data before the 2012 ASR Working Group Meeting.

2.29 Planetary Boundary Layer (PBL)

Translator: Sally McFarlane, Pacific Northwest National Laboratory

Developer: Chitra Sivaraman, Pacific Northwest National Laboratory

Status: In Development

Tier: Evaluation

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.

An initial evaluation data set has been provided to the PBL interest group after implementing the Heffter, Liu, and Liang and Bulk Richardson method for the MC3E field campaign data.

Next milestone: Provide evaluation data by April 30, 2012.

2.30 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 historical processing of data at all sites except for NSA C1 and C2. These data are in need of calibration information from the period when the instruments were swapped.

Next milestone: Archive the processed data.

2.31 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.

2.32 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.

2.33 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.

2.34 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.

2.35 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.

2.36 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.

2.37 Radiatively Important Parameters Best Estimate (RIPBE)

Translator: Sally McFarlane, Pacific Northwest National Laboratory

Developer: Tim Shippert, Pacific Northwest National Laboratory

Status: Operational

Tier: Evaluation

Engineering Change Order-00767 has been approved to fix bugs and enhance the product based on feedback from beta users.

Next milestone: Produce evaluation data of RIPBE average.

2.38 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.

2.39 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.

2.40 SONDE Adjust (SONDEADJUST)

Translator: Mike Jensen, Brookhaven National Laboratory

Developer: David Troyan, Brookhaven National Laboratory

Status: In Development

Tier: Evaluation

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

No progress has been made on this VAP.

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

2.41 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.

2.42 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.

2.43 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.

Data have been released for the AMF China deployment and the MC3E field campaign.

Next milestone: Comply with DOD standards and migrate the data to the Data Archive. Develop ensemble large-scale forcing data for MC3E and large-scale forcing data for the ARM Madden-Julian Oscillation Experiment (AMIE).

2.44 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: The deadline for submitting data as an evaluation product has been pushed back to June 1, 2012 due to other priorities.

2.45 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 insect clutter problem in the data has been fixed.

Next milestone: Re-run the VAP and move data to the Data 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 have been completed for the Quantitative Precipitation Radar VAP and Aerosol Observing System Correction VAP.

4.0 Other VAP-Related work

4.1 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.

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 Data 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
BAEBBR	39962	77	22
RUC	34986	24	15
RLPROF	29582	131	55
LSSONDE	23515	10	8
ARSCL	18309	36	20

IOP Data Product	Number of Files Requested
SONDEADJUST	20103
MICROBASE	4235
WACRARSCL	2138
CLDCLASS	2136
MPLCOD	1637

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

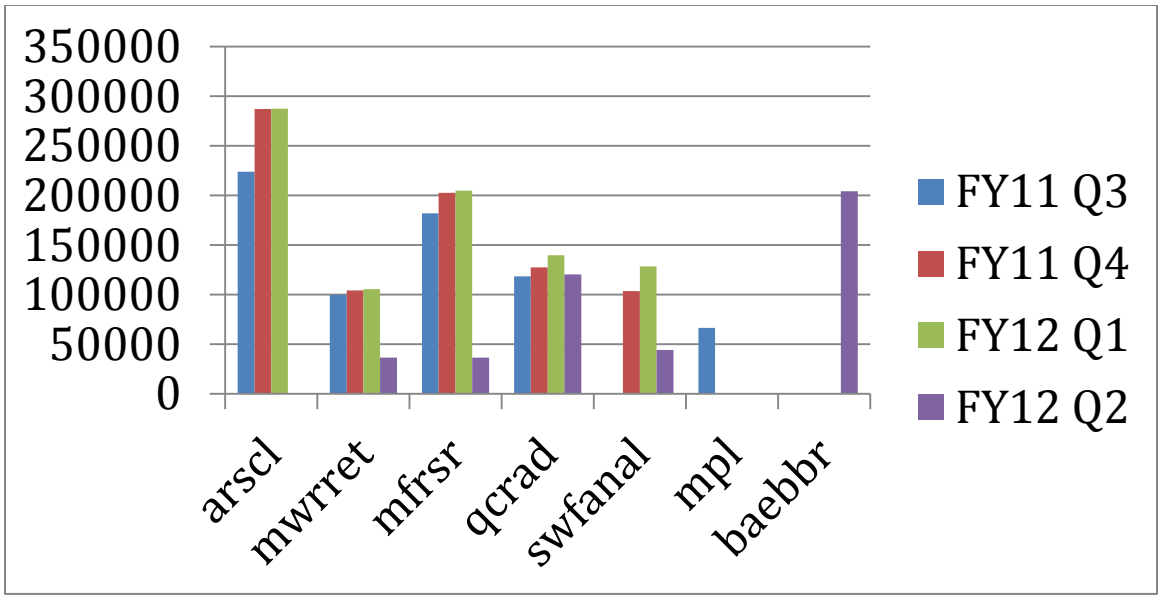

Figure 1. Top five VAPs requested by users from the Data Archive during the last four quarters.

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

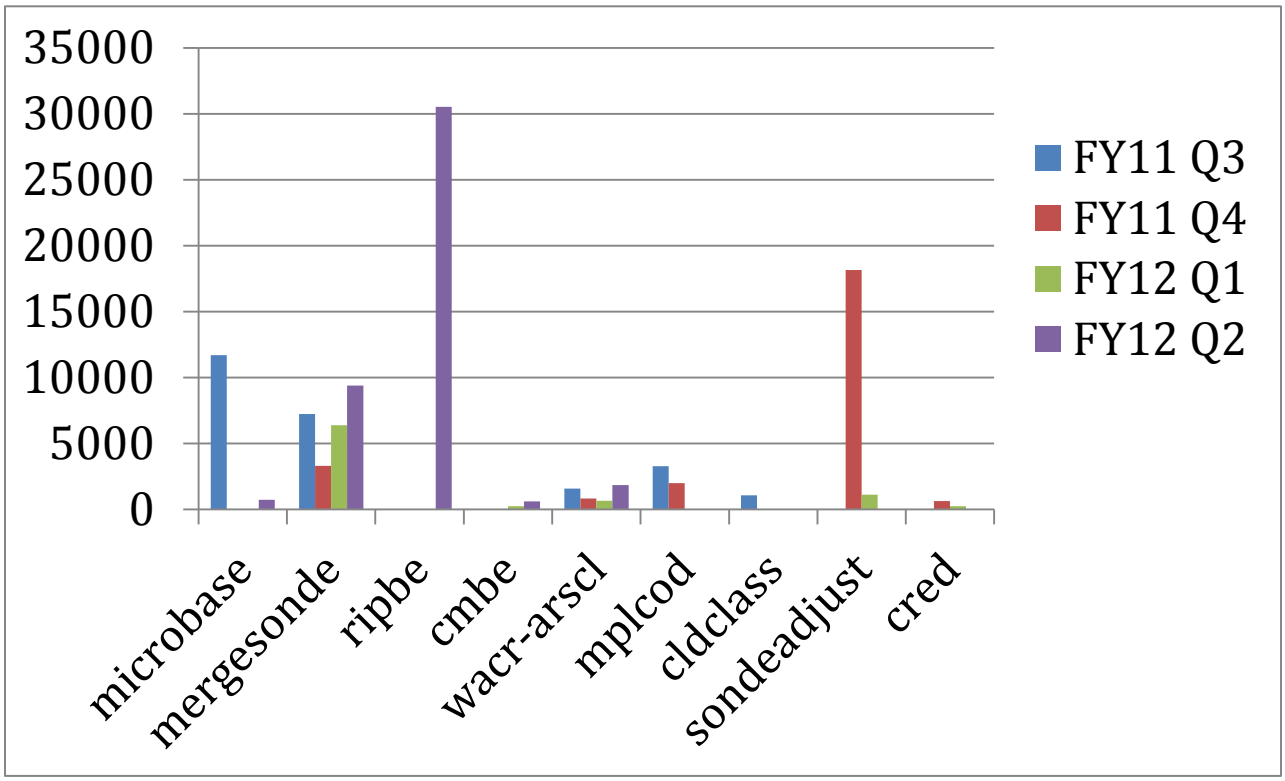

Figure 2. Top five VAPs downloaded from the Data Archive evaluation area during the last four quarters.

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