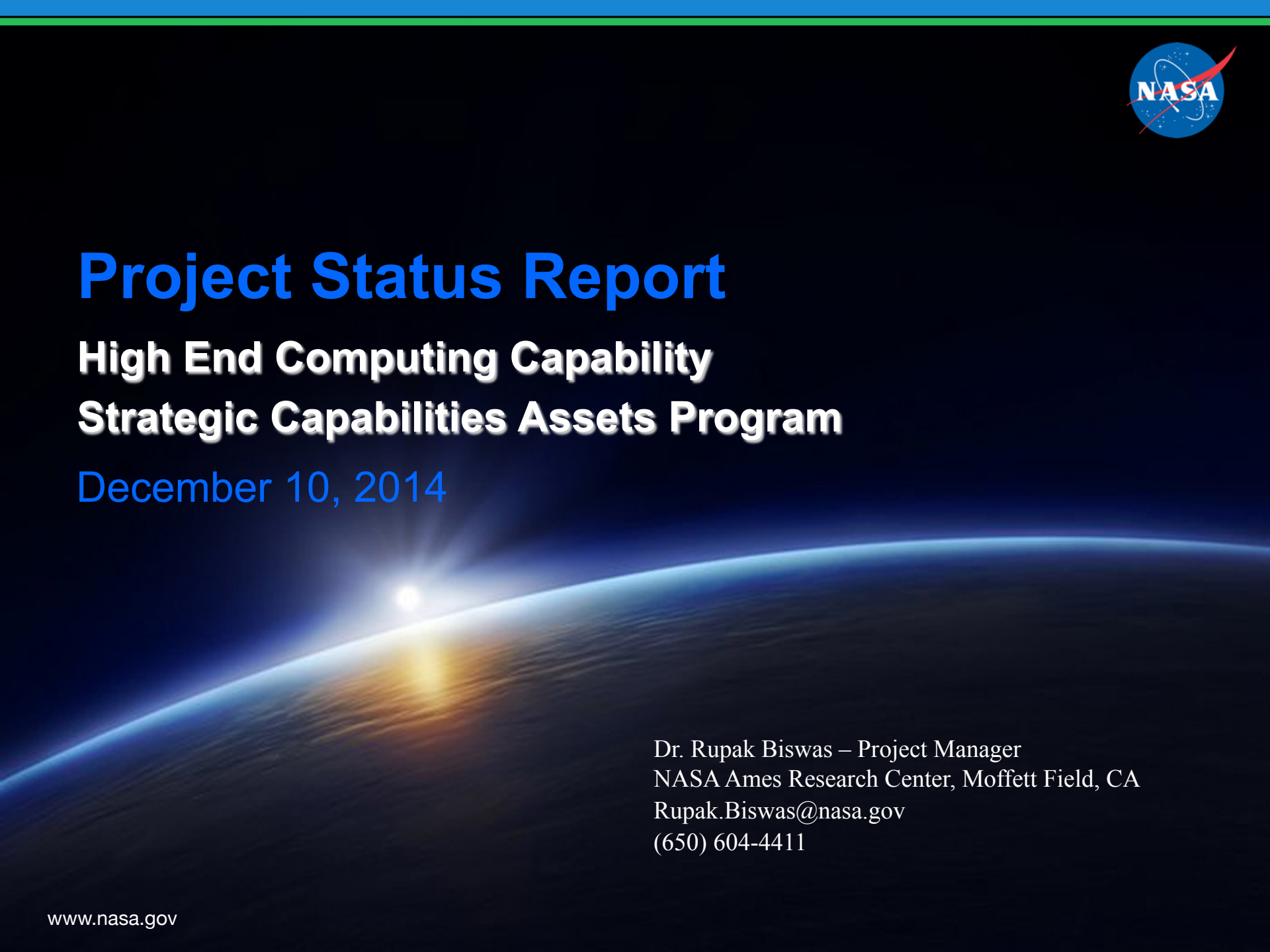

Project Status Report

High End Computing Capability
Strategic Capabilities Assets Program

December 10, 2014

Dr. Rupak Biswas – Project Manager
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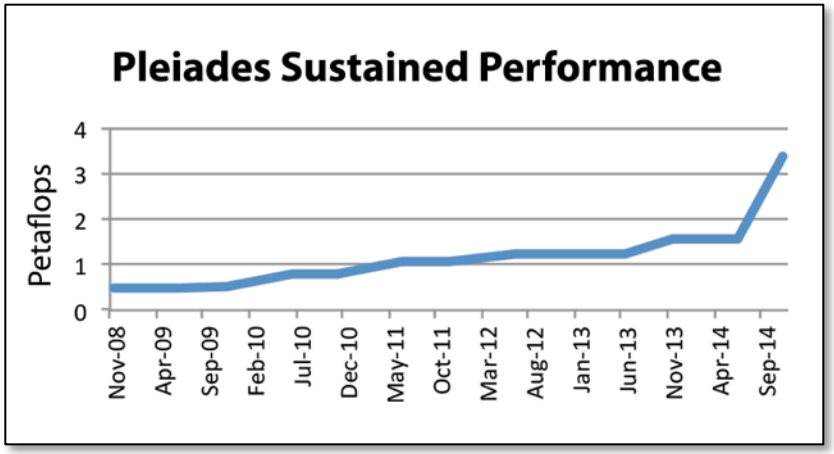
Pleiades Achieves 3.38 Petaflops, Ranks 7th in U.S. and 11th Worldwide on TOP500 List

- On the November 2014 TOP500 list of the world's most power supercomputers, Pleiades ranked 7th in the U.S. and 11th worldwide, with an impressive efficiency of 84.6%. The new list was released on November 17 at the SC14 conference in New Orleans (see slide 11).
- The HECC Systems team worked with SGI engineers to complete system-wide testing on Pleiades, including a LINPACK benchmark run, prior to the release of new Intel Haswell processors for general production on October 27.
- During the LINPACK run, Pleiades delivered a sustained performance of 3.38 petaflops using 73% of its compute nodes, representing 89% of the theoretical peak of the overall system. The benchmark was run on 1,024 Haswell nodes, 5,365 Ivy Bridge nodes, and 1,792 Sandy Bridge nodes.
- In addition to measuring performance, the LINPACK run helped the Systems team detect hardware issues on Pleiades. During this time, the team also deployed additional tools to identify early-stage hardware problems (see slide 5).

Mission Impact: Enhancing NASA's most powerful supercomputer and running subsequent diagnostic tests enables HECC to validate the entire system, improving stability for all jobs.



Pleiades' increased LINPACK benchmark performance since 2008, when the original system was installed at the NASA Advanced Supercomputing (NAS) facility. The initial configuration achieved a sustained performance of 0.487 petaflops and 80% efficiency in benchmark testing. With the latest upgrade, Pleiades achieved 84.6% efficiency on the LINPACK benchmark.

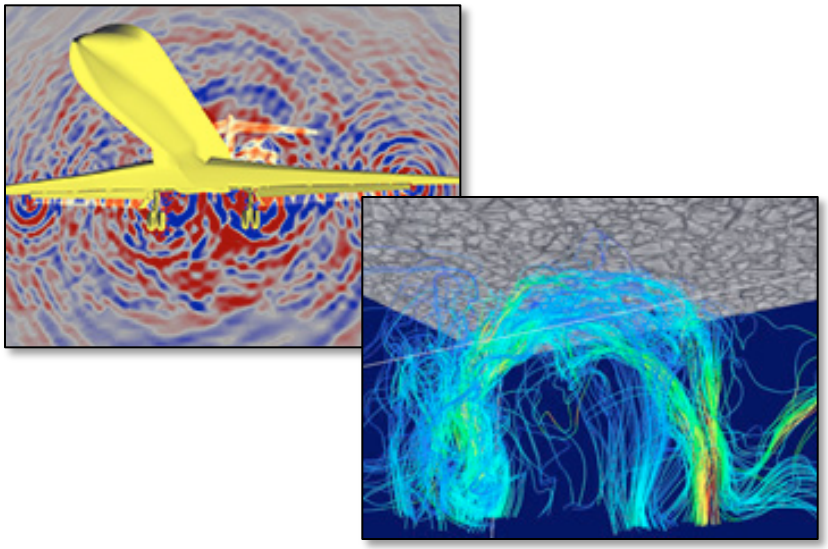
POCs: Bob Ciotti, bob.ciotti@nasa.gov, (650) 604-4408, NASA Advanced Supercomputing Division; Davin Chan, davin.chan@nasa.gov, (650) 604-3613, NASA Advanced Supercomputing Division, Computer Science Corp.

New Allocation Period Begins for Two NASA Mission Directorates

- November 1 marked the beginning of a new allocation period for the Aeronautics Research Mission Directorate (ARMD) and the Science Mission Directorate (SMD).
- These two organizations awarded new allocations on Pleiades and Endeavour for over 270 computing projects that support their science and engineering activities.
- The combined awards, distributed equally between ARMD and SMD, totaled 107 million Standard Billing Units (SBUs)* — 43% more than the Mission Directorates' awards for November 2013.
- The increase in awards was enabled by continued expansion of HECC resources.
- The new allocation period allows ARMD and SMD to assess demands for computing time, rebalance allocations in order to meet directorate needs, and align with ARMD's new organizational structure.

** 1 SBU equals 1 hour of a Pleiades Westmere 12-core node.*

Mission Impact: NASA programs and projects periodically review the distribution of supercomputer time to assess demand and to assure consistency with mission-specific goals and objectives.



Representative images of the ARMD and SMD projects supported by HECC resources. Top: Simulated radiated sound field produced by a full-scale Gulfstream aircraft during landing, with flaps and main landing gear deployed. *Ehab Fares, Exa Corporation; Patrick Moran, NASA/Ames.* Bottom: Visualization of magnetic field lines as a large loop (25 megameters wide) approaches the Sun's surface. *Robert Stein, Michigan State University; Patrick Moran, NASA/Ames.*

POC: Catherine Schulbach, catherine.h.schulbach@nasa.gov, (650) 604-3180, NASA Advanced Supercomputing Division

HECC Engineers Develop New Tools for Early Detection of Hardware Issues

- HECC engineers developed new tools that improve the reliability and stability of Pleiades by detecting (and in some cases, automatically isolating) faulty hardware components before they can impact HECC users' jobs.
  - An automated tool identifies nodes with "recovered memory" errors so they can be evaluated by the hardware vendor, SGI. Such errors may indicate a memory component is failing.
  - The PBSPro batch scheduler now runs a short STREAM benchmark prior to the execution of each user job to identify underperforming components that would adversely impact the job. This change was implemented before a recent system-wide scaling test, helping to identify and isolate faulty hardware to ensure an effective test.
- To avoid negative impacts on user jobs, under-performing components are taken offline for further examination by system.
- Combining these new tools with previously developed tools that analyze InfiniBand issues provides HECC engineers with a rich set of utilities to help ensure optimal functionality of HECC resources.

Mission Impact: Developing and implementing tools and processes to quickly identify faulty components helps HECC engineers resolve many problems before they impact users.

NASA's Pleiades supercomputer contains 56 miles of InfiniBand cables, 11,360 compute nodes, and 22,784 processor chips. With such a high number of components, it is critical for HECC system engineers to develop an arsenal of fast and automated tools to detect and isolate hardware issues.

POCs: Bob Ciotti, bob.ciotti@nasa.gov, (650) 604-4408, NASA Advanced Supercomputing Division; Davin Chan, davin.chan@nasa.gov, (650) 604-3613, NASA Advanced Supercomputing Division, Computer Science Corp.

Facilities Team Manages Rapid Recovery of HECC Resources After Power Outage

- During a planned dedicated time on October 23, a power outage occurred at the NAS facility, affecting the main computer room floor and the communications room. The outage impacted all of the facility's computational, storage, and networking resources.
- The Facilities team led the effort to rapidly restore power, coordinating with several groups, including: HECC Systems, Networks, Security, Engineering Servers and Services, and Control Room, as well as the NASA Ames fire department.
  - The incident occurred while HECC engineers were preparing for system-wide tests, including the LINPACK benchmark run. Quickly restoring power enabled the teams to complete the LINPACK run and bring HECC resources back online as scheduled, following the dedicated time.
  - The Facilities team worked closely with each group to ensure services were brought up in the proper sequence, which is crucial to restoring operations.
- Efficient communication between groups, in addition to the teams' combined years of engineering experience in high-end computing, enabled them to quickly restore resources, with no additional downtime for users.

Mission Impact: By managing the rapid restoration of power after an unexpected outage, the HECC Facilities team returned computational resources to operation with minimal impact to users, and enabled completion of LINPACK benchmark tests on NASA's flagship Pleiades supercomputer.

The Pleiades supercomputer, which was affected by a recent power outage at the NASA Advanced Supercomputing facility. Experienced HECC engineers from multiple groups ensured quick restoration of services.

POCs: Mark Tangney, mark.l.tangney@nasa.gov, (650) 604-4415, John Parks, john.w.parks@nasa.gov, (650) 604-4225, NASA Advanced Supercomputing Division

HECC Team Completes First Annual Maintenance Activities on RUPS Units

- The HECC Facilities team coordinated with Hitec engineers to complete the first annual maintenance on the NAS facility's three Rotary Uninterruptible Power Supply (RUPS) units on October 27–29.
- The RUPS units provide 6 megawatts of backup power capacity to the facility, enabling continued operation of supercomputing resources without interruption in the event of a power outage.
- Maintenance activities included replacing the system's generator oil and filters, greasing the inner and outer Induction Coupler (IC) bearings, and checking the following components:
  - All of the generator's functioning systems (for proper operation and cleanliness);
  - Radiator fans and fuel systems;
  - Battery voltage, current, and starting panel;
  - Frequency regulator current and loads;
  - IC vibration, connections, and bearing temperatures;
  - Programmable logic controller (PLC) and quality management (QMS) software and all displays;
  - All alarms, protections, and electrical panel.
- This maintenance activity, crucial to keeping the RUPS systems operational, was completed with no downtime and no impact to HECC users.

Mission Impact: Periodic maintenance safeguards the backup power capability to NASA's primary supercomputing facility, providing a more stable computing environment by helping ensure that HECC resources will remain operational in the event of an electrical outage.

Three rotary uninterruptable power supply (RUPS) units supporting HECC assets are located at the NASA Advanced Supercomputing (NAS) facility. Each unit provides 2 megawatts (MW) of backup power, for a total of 6 MW, enabling HECC computing resources and the entire NAS facility to remain operational in the event of an electrical outage.

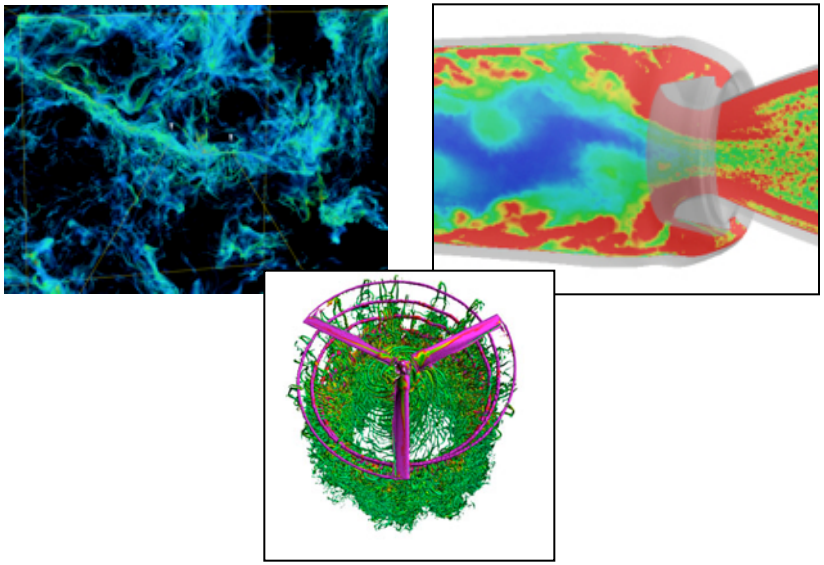
POCs: Mark Tangney, mark.l.tangney@nasa.gov, (650) 604-4415, John Parks, john.w.parks@nasa.gov, (650) 604-4225, NASA Advanced Supercomputing Division

November Usage on Pleiades Exceeds 13.3 Million SBUs and Sets New Monthly Record

- November showed record-high usage of the Pleiades supercomputer, with 13.31 million Standard Billing Units (SBUs*) used by NASA's science and engineering organizations, exceeding the previous record of 12.15 million SBUs (set in September 2014) by over 9.5%.
- This increase was enabled by the addition of 1080 Haswell nodes in October 2014 and by efficient operations that delivered over 80% system utilization (75% utilization is target).
- 340 projects from ARMD, HEOMD, SMD, NESC, and NAS used time on Pleiades during November.
- The top 10 projects used from just under 300,000 to over 1.1 million SBUs and accounted for over 38% of total usage.
- The HECC Project continues to plan and evaluate ways to address the future requirements of NASA's users.

*1 SBU equals 1 hour of a Pleiades Westmere 12-core node.

Mission Impact: Increasing Pleiades' system capacity provides Mission Directorates with more resources for the accomplishment of their goals and objectives.



Images from projects that were among the top users in their respective Mission Directorates. Clockwise from top: 1) Density volume rendering of gas filaments formed in an infrared dark cloud simulation. Pak Shing Li, University of California, Berkeley. 2) Coupled fluid-structure interaction simulation of the Space Launch System solid rocket motor with flexible inhibitors. H. Q. Yang, Jeff West, NASA/Marshall. 3) High-fidelity computational fluid dynamics simulation of a V-22 Osprey rotor in hover. Neal Chaderjian, NASA/Ames.

POC: Catherine Schulbach, catherine.h.schulbach@nasa.gov, (650) 604-3180, NASA Advanced Supercomputing Division

ESS Team Completes Deployment of Mac OS X 10.9 to Staff Workstations

- HECC's Engineering Servers and Services (ESS) team completed the deployment of Mac OS X 10.9 (Mavericks) to 200 workstations and laptops used by scientific staff in the NAS facility.
- The ESS team began the rollout in March, after NASA Ames security officials approved the NAS-specific Mavericks image in late February.
- Most of the Macs were upgraded by July, with the final 15 being completed in October, as users made their systems available.
- Development for the Mavericks rollout included:
  - Building the NAS image using Casper;
  - Configuring security and FileVault;
  - Obtaining Ames security approval of the image;
  - Upgrading scientific software;
  - Defining the optimal upgrade process;
  - Completing a full data dump, system imaging, applications installation, encryption, and data restore for each Mac during its upgrade.
- Using knowledge gained from the Mavericks upgrade, the ESS team is already developing a new OS X 10.10 Yosemite build.

Mission Impact: Deployment and approval of the Mac OS X 10.9 (Mavericks) image enables HECC to support the latest Mac workstations and laptops requested by local scientific users and support staff.

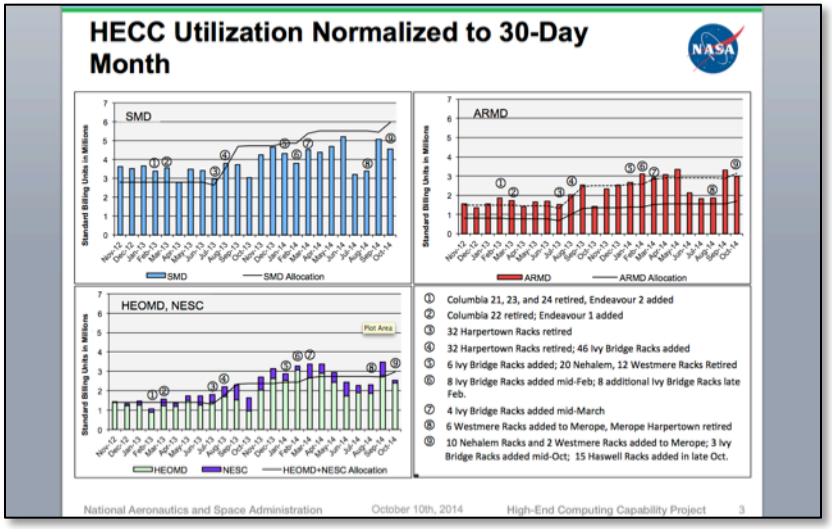
The upgrade to Mac OS X 10.9 (Mavericks) on HECC workstations and laptops has been completed, and the development of the OS X 10.10 Yosemite image is now underway.

POCs: Chad Tran, giang.t.tran@nasa.gov, (650) 604-2780, NASA Supercomputing Division, Computer Sciences Corporation; Edmund Garcia, edmund.a.garcia@nasa.gov, (650) 604-1338, NASA Supercomputing Division, ADNET Systems

Accounting Capability for Haswell Processors Added to HECC Monthly Status Reports

- The Tools team updated the HECC project's monthly status reports to include the new Intel Haswell nodes recently added to Pleiades, and to define the Standard Billing Unit (SBU) conversion rate for the new processor type.
- With recent improvements to the team's reporting programs and processes, incorporating the Haswell information into the reports took only four days, compared with three weeks needed to add Ivy Bridge node information during a previous upgrade.
- Haswell is the 8th processor type and SBU conversion rate added to Pleiades-related reports since the supercomputer's inception in 2008. Work included:
  - Adding the processor type and capacity to the "reports-api" script, which is used by other reporting scripts.
  - Updating the fields and views in the accounting database to include Haswell node and SBU information.
  - Incorporating Haswell information into the scripts that produce PBS utilization snapshots and the programs that parse and upload data to the database.
  - Updating MicroStrategy, including: 3 tables, 30 metrics, and 20 reports to reflect Haswell accounting data; and 25 filters, 8 grids, and numerous scripts used to do the reporting queries.

Mission Impact: Establishing a standard billing unit rate for new processors and accounting for the variety of processor types in status reports enables an accurate summary of the processing capability and utilization rate of HECC supercomputing resources.



The HECC monthly reports use SBU conversion rates for each processor type in the Pleiades, Endeavour, and Merope supercomputers in order to standardize accounting and utilization information.

POCs: Catherine Schulbach, catherine.h.schulbach@nasa.gov, (650) 604-3180, NASA Advanced Supercomputing (NAS) Division

HECC/NAS Staff Lead Agency's 27th Exhibit at Annual Supercomputing Conference

- A team from the HECC Project and the NAS Division coordinated NASA's presence at SC14, the International Conference for High-Performance Computing, Networking, Storage, and Analysis, held November 17–20 in New Orleans.
- Users from 7 NASA centers and several universities presented results of their recent science and engineering projects; 23 projects were enabled by Pleiades and supported by HECC visualization, optimization, and networking experts.
- Remarkable scientific images and movies, many created by HECC visualization experts, were shown on the 10-foot-wide traveling hyperwall to help researchers explain their work to booth visitors. (See related highlight, slide 12.)
- NAS Division Chief Piyush Mehrotra participated in the inaugural "HPC Matters" Plenary, attended by an impressive audience of 1,700.
- Staff also met with students and recent graduates interested in NASA internships and job opportunities, and exchanged knowledge with colleagues and peers from around the world to discuss possible collaborations.

Visit the NASA@SC14 website at: www.nas.nasa.gov/SC14

Mission Impact: Participation in SC14 provided an important opportunity to exchange information with peers and HEC industry leaders from around the world, convey the importance of NASA missions, and meet with candidates for internship/job opportunities.

The 30-ft.x40-ft. NASA booth at the SC14 conference in New Orleans was designed and supported by HECC staff to highlight the critical role of supercomputing in science and engineering projects across the agency. Inset: HECC user Tom Madura (NASA Goddard) points out details in his 3D simulations of the supermassive binary star system Eta Carinae to an SC14 attendee.

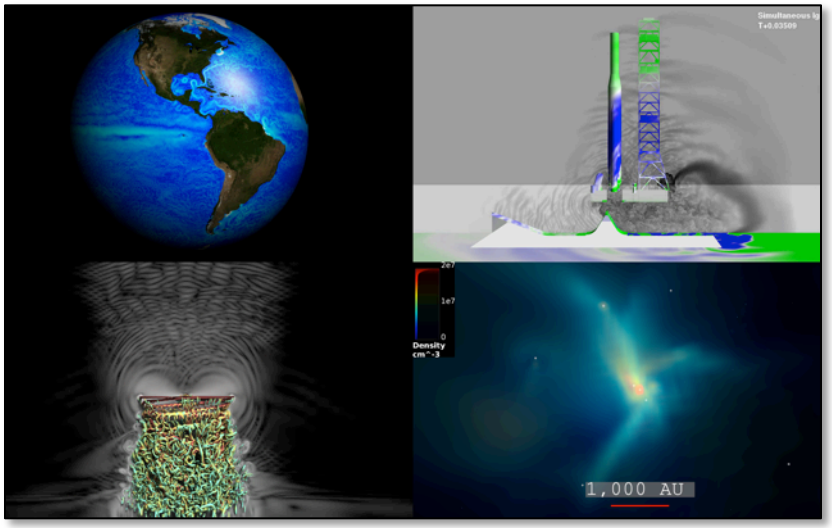
POC: Gina Morello, gina.f.morello@nasa.gov, (650) 604-4462,
NASA Advanced Supercomputing Division

New Visualizations Showcase NASA Science and Engineering at Annual SC14 Conference

- Using datasets from simulations run on the Pleiades supercomputer over the past year, the HECC Visualization team created over three dozen new high-resolution animations to be shown in the NASA booth at SC14. (See slide 11.)
  - More than a dozen of these animations were created at the full 5,800 x 3,280-pixel resolution of the HECC mini-hyperwall, which traveled to the conference.
  - Two animations were shown by NAS Division Chief Piyush Mehrotra during the SC14 "HPC Matters" Plenary.
- New technology developed by the team in order to create the visualizations included:
  - An enhanced field-model library that supports output from simulations produced using the Loci-STREAM code. The library adds a new grid cell type that is a variant of hexahedral cells.
  - An algorithm to wrap very high-resolution images onto a sphere. The images were taken from an Estimating the Circulation and Climate of the Ocean (ECCO) simulation that was run on Pleiades.
- The new technology will enable the team to create visualizations using datasets that result from future scientific studies.

Visit the NASA@SC14 website at: www.nas.nasa.gov/SC14

Mission Impact: High-resolution visualizations created by the HECC team are an effective way to help convey the important science and engineering results, enabled by HECC resources.



Four visualizations created for display at the SC14 conference. Clockwise from top left: Output from the Estimating the Circulation and Climate of the Ocean (ECCO) project's unprecedented 1/48 degree simulation, wrapped on a sphere; computational fluid dynamics (CFD) acoustic study for NASA's next-generation Space Launch System; close-up view of a galaxy from an astrophysics study; and a CFD simulation of rotorcraft acoustics.

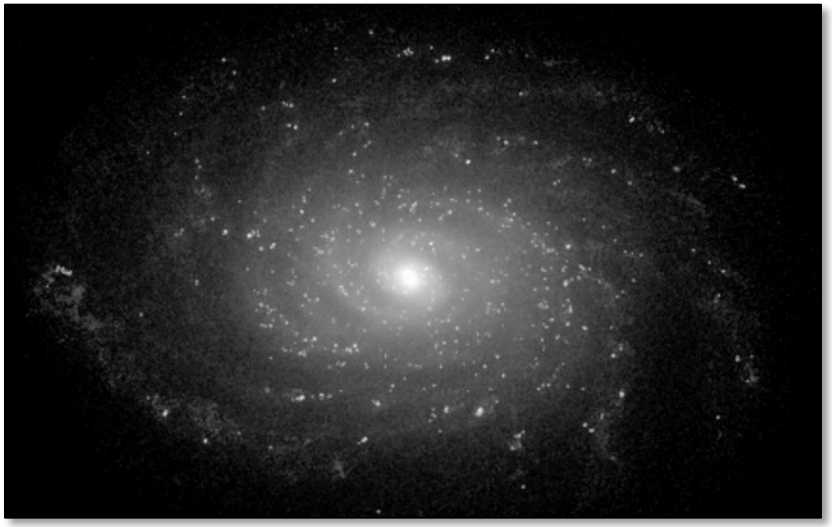
POC: Chris Henze, chris.henze@nasa.gov, (650) 604-3959, NASA Advanced Supercomputing Division

Scientists Produce Unprecedented Galaxy Formation Simulations Using Pleiades

- A science team at the University of Washington and Rutgers University is running a new code, ChaNGA (Charm N-body GrAvity solver), to produce the most realistic galaxy simulations achieved to date.
- The team's high-resolution simulations revealed that when supernovae occur in high-density regions where stars are born, their energy can be transferred to dark matter, pushing it out from the center of galaxies. This process evaded detection for over a decade, despite other attempts to produce realistic galaxy simulations.
- Dozens of simulations, run on Pleiades, have resolved structures down to the scale of star clusters just a few hundred light years in size (< 100 parsecs).
- ChaNGA scales efficiently up to 0.5 million cores. One simulation requires roughly 1 million processor hours on Pleiades.

** HECC provided supercomputing resources and services in support of this work*

Mission Impact: New high-resolution galaxy simulations, enabled by the Pleiades supercomputer, led to discoveries that have revolutionized scientists' view of galaxy formation, and which open new paths of investigation.



This image from a high-resolution simulation of a Milky Way-sized galaxy includes gas, stars, and dark matter, and shows light that traces newly born stars. The simulation was run to the present day (about 13.5 billion years of evolution) using the Pleiades supercomputer.

POCs: Maureen Teyssier, mteyssier@physics.rutgers.edu, (848) 445-8898, Alyson Brooks, abrooks@physics.rutgers.edu, (848) 445-8877, Rutgers University; Fabio Governato, fabio@astro.washington.edu, (206) 543-2604, University of Washington

HECC Facility Hosts Several Visitors and Tours in November 2014

- HECC hosted 5 tour groups in November; guests learned about the agency-wide missions being supported by HECC assets, and viewed the D-Wave Two quantum computer system. Visitors this month included:
  - George Komar, Program Manager, NASA Earth Science Technology Office (ESTO) and Mike Little, Program Manager, ESTO Advanced Information Systems Technology (AIST) Program.
  - Eight selected candidates from the 2014 Astronaut Class, who were on their graduation grand tour of all the NASA centers; Ames was the only West Coast center to host them for a full day of facility tours.
  - NASA TV crew interviewed GeneLAB Project Manager Joe Coughlan at the hyperwall. NAS Deputy Division Chief, Bryan Biegel, hosted the event and provided a tour of the facility.
  - A group of 12 students from the Stanford Student Space Initiative received an overview of the facility, a hyperwall demonstration, and a tour of the quantum computing room.
  - Tamara Gilden, a staffer in Senator Dianne Feinstein's Washington, D.C. office who handles space/science issues, visited the NAS facility as part of her first tour of Ames. Bryan Biegel provided a facility overview, a hyperwall demonstration, and a tour of the quantum computing room.

Tamara Gilden (top in row), a legislative correspondent at the Office of Senator Dianne Feinstein in Washington, D.C., received a overview of the NAS facility and the NASA Ames' Security Operations Center (SOC) from Ken Freeman, SOC project manager.

POC: Gina Morello, gina.f.morello@nasa.gov, (650) 604-4462, NASA Advanced Supercomputing Division

Papers and Presentations

- "**Combining Molecular Dynamics and an Electrodiffusion Model to Calculate Ion Channel Conductance**," M. A. Wilson, T. H. Nguyen, A. Pohorille, The Journal of Chemical Physics, vol. 141, issue 22, November 2014. *
  http://scitation.aip.org/content/aip/journal/jcp/141/22/10.1063/1.4900879
- "**RH 1.5D: A Massively Parallel Code for Multi-Level Radiative Transfer with Partial Frequency Redistribution and Zeeman Polarisation**," T. Pereira, H. Uitenbroek, arXiv: 1411.1079 [astro-ph.SR], November 4, 2014. *
  http://arxiv.org/abs/1411.1079
- "**Coherent Backscattering Effect in Saturnian vs. Uranian Satellites: Observations and Enhanced MSTM Modeling**," K. M. Pitman, et al., presented at The American Astronomical Society's 46th Annual Meeting for the Division of Planetary Sciences, Tucson, AZ, November 9-14, 2014. *
  http://adsabs.harvard.edu/abs/2014DPS....4650209P
- **2014 Supercomputing Conference**, November 16-21, 2014, New Orleans, LA
  - "**Simulations of Telescope Cavity Acoustics for the SOFIA Aircraft**," M. Barad (NASA/Ames) *
    http://www.nas.nasa.gov/SC14/demos/demo9.html
  - "**Understanding the Sun's Weather**," R. Stein (Michigan State University) *
    http://www.nas.nasa.gov/SC14/demos/demo6.html
  - "**Realistic Simulations of the Solar Radiation Spectrum**," I. Kitiashvili (NASA/Ames) *
    http://www.nas.nasa.gov/SC14/demos/demo7.html

** HECC provided supercomputing resources and services in support of this work*

Papers and Presentations (cont.)

- **2014 Supercomputing Conference** (cont.)
  - "**Extending Airframe Noise Simulations from Scale Models to Full-Scale Aircraft**," M. Khorrami (NASA/LaRC) *
    http://www.nas.nasa.gov/SC14/demos/demo16.html
  - "**High-Fidelity Analysis and Design for Complex Aerospace Configurations**," E. Nielsen (NASA/LaRC) *
    http://www.nas.nasa.gov/SC14/demos/demo17.html
  - "**Modeling Materials: Design for Planetary Entry, Electric Aircraft, and Beyond**," A. Thompson (NASA/Ames) *
    http://www.nas.nasa.gov/SC14/demos/demo26.html
  - "**Supporting Climate Research with the NASA Earth Exchange**," P. Votava (NASA/Ames) *
    http://www.nas.nasa.gov/SC14/demos/demo1.html
  - "**A Virtual Telescope on the World's Oceans and Sea Ice**," C. Hill (Massachusetts Institute of Technology) *
    http://www.nas.nasa.gov/SC14/demos/demo2.html
  - "**Modeling Carbon Balance in Arctic Ecosystems**," J. Henderson (Atmospheric and Environmental Research) *
    http://www.nas.nasa.gov/SC14/demos/demo5.html
  - "**Efficient Computational Modeling of Launch Environments**," E. Sozer (NASA/Ames) *
    http://www.nas.nasa.gov/SC14/demos/demo12.html

** HECC provided supercomputing resources and services in support of this work*

Papers and Presentations (cont.)

- **2014 Supercomputing Conference** (cont.)
  - "**Optimizing the Design of Complex Rocket Components with Fluid Analysis**," N. Ramachandran (NASA/MSFC) *
    http://www.nas.nasa.gov/SC14/demos/demo18.html
  - "**Computational Simulations of the Space Launch System Scale Model Acoustic Test**," T. Nielsen (NASA/MSFC) *
    http://www.nas.nasa.gov/SC14/demos/demo19.html
  - "**Designing Liquid Rocket Engine Injectors for Performance, Stability, and Cost**," D. Westra (NASA/MSFC) *
    http://www.nas.nasa.gov/SC14/demos/demo20.html
  - "**NASA's Exploration in Quantum Computing**," D. Venturelli (NASA/Ames) *
    http://www.nas.nasa.gov/SC14/demos/demo8.html
  - "**Optimizing User Applications for NASA's HECC Environment**," D. Kokron (NASA/Ames) *
    http://www.nas.nasa.gov/SC14/demos/demo21.html
  - "**High-End Computing at NAS: Furthering NASA Science and Engineering Goals**," P. Mehrotra (NASA/Ames) *
    http://www.nas.nasa.gov/SC14/demos/demo22.html
  - "**Space Weather Simulation: Preparing for Solar Storms**," M. Tatineni (San Diego Supercomputer Center), A. Majumdar (University of California, San Diego/ScriberQuest, Inc.) *
    http://www.nas.nasa.gov/SC14/demos/demo3.html
  - "**Computational Airframe Noise Prediction**," C. Kiris (NASA/Ames) *
    http://www.nas.nasa.gov/SC14/demos/demo11.html

** HECC provided supercomputing resources and services in support of this work*

Papers and Presentations (cont.)

- **2014 Supercomputing Conference** (cont.)
  - "**Transiting the Exoplanet Search: From Kepler to TESS**," S. McCauliff (NASA/Ames) * *http://www.nas.nasa.gov/SC14/demos/demo23.html*
  - "**ChaNGA Unleashed: Unprecedented Simulations of Galaxy Formation**," M. Teyssier (Rutgers University) * *http://www.nas.nasa.gov/SC14/demos/demo27.html*
  - "**Simulating the Interior Rotation and Dynamics of Stars and Giant Planets**," J. Vriesema (University of Arizona) * *http://www.nas.nasa.gov/SC14/demos/demo28.html*
  - "**When Winds Collide: The Supermassive Binary Eta Carinae**," T. Madura (NASA/GSFC) * *http://www.nas.nasa.gov/SC14/demos/demo39.html*
  - "**Tracing Ultra-High-Energy Cosmic Rays Through the Galactic Magnetic Field**," M. Sutherland (Ohio State University) * *http://www.nas.nasa.gov/SC14/demos/demo4.html*
  - "**Validating Rotorcraft Simulations with Improved Wind Tunnel Measurements**," N. Chaderjian (NASA/Ames) * *http://www.nas.nasa.gov/SC14/demos/demo10.html*

** HECC provided supercomputing resources and services in support of this work*

News and Events

- **New SC14 #HPCMatters Video Campaign: Climate Modeling**, *SC14 media product,* November 12, 2014—In the first of 5 videos produced to show how HPC is helping solve the hardest problems in the world, HECC user and climate scientist Dimitris Menemenlis (NASA/JPL) talks about how supercomputers and visualizations are helping scientists understand climate change and plan for the future. Filmed at the NAS facility and featuring the HECC-developed hyperwall.
- **NASA Highlights Mission Advances at Supercomputing Conference**, *NASA press release,* November 13, 2014—From our home planet to the far reaches of space, NASA will highlight science and engineering mission advances enabled by agency supercomputers at SC14, the international supercomputing conference, Nov. 16-21, 2014 in New Orleans. *http://www.nasa.gov/ames/nasa-highlights-mission-advances-at-supercomputing-conference/*
- **NASA to Highlight Mission Advances Enabled by Supercomputers at SC14**, *HPCwire*, November 14, 2014—NASA presents over 30 of the amazing science achievements performed on agency supercomputers at this international conference. (From NASA press release and picked up by other media sources.) *http://www.hpcwire.com/off-the-wire/nasa-highlight-mission-advances-enabled-supercomputers-sc14/*

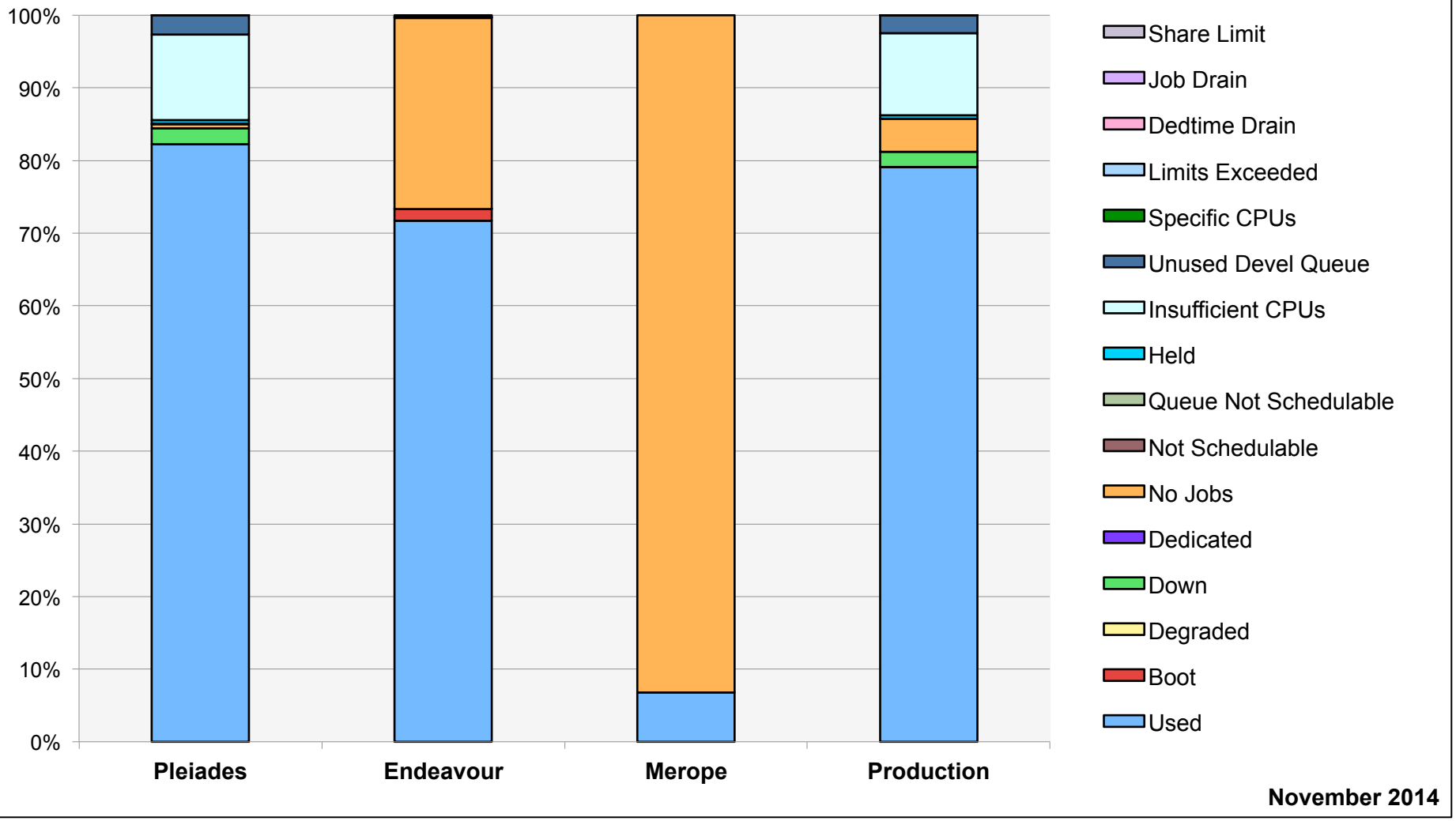
News and Events (cont.)

- **SGI Enhances NASA's Research Capabilities with Upgraded Supercomputers and Pleiades Ranks #11 on TOP500**, *SGI press release*, November 17, 2014—Following a recent upgrade to the Pleiades supercomputer at the NASA Advanced Supercomputing facility, the system ranked as #7 in the U.S. and #11 in the world. (Picked up by *CNNMoney, Space Ref, Scientific Computing, MarketWatch,* and other media sources.
  http://www.sgi.com/company_info/newsroom/press_releases/2014/november/nasa_ames.html
- **On the Ground at SC14: Opening Plenary Session and Exhibition Opening Gala**, *Intel Blog,* November 17, 2014—Intel's Emily Backus covers the beginning of the Supercomputing Conference in New Orleans, including the Inaugural HPC Matters Plenary by NAS's Piyush Mehrotra and SGI's Eng Lim Goh.
  https://communities.intel.com/community/itpeernetwork/datastack/blog/2014/11/18/on-the-ground-at-sc14-opening-plenary-session-and-exhibition-opening-gala
- **NASA Researchers Receive HPC Innovation Excellence Award***, NAS Division news article,* November 18**,** 2014—A team of NASA researchers was honored with an HPC Innovation Excellence Award for their work to produce high-fidelity simulations that are being used to help reduce aircraft noise.
  http://www.nas.nasa.gov/publications/news/2014/11-18-14.html
- **Designing New Rocket Engines for NASA's Space Launch System**, *NASA Ames Featured Image*, November 18, 2014—NASA Ames features an image from Douglas Westra's (MSFC) SC14 demo on the heavy-lift launch vehicle's rocket engines.
  http://www.nasa.gov/ames/designing-new-rocket-engines-for-nasa-s-space-launch-system/

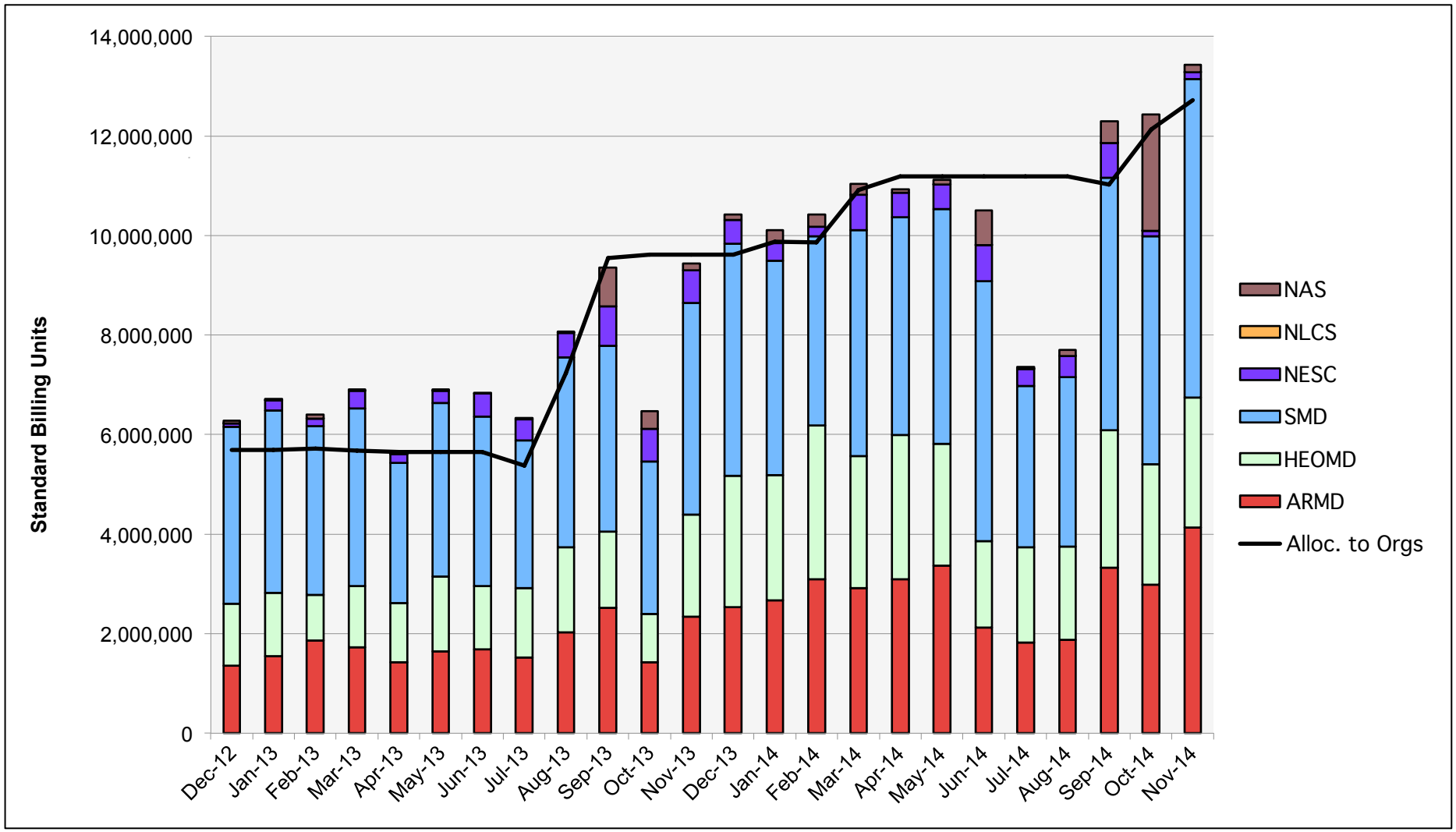
News and Events (cont.)

- **A Virtual Telescope on the World's Oceans and Sea Ice**, *NASA Ames Featured Image*, November 19, 2014—NASA Ames features an image by HECC visualization lead Chris Henze, from Chris Hill (MIT) and Dimitris Menemenlis' (JPL) SC14 demo on the Estimating the Circulation and Climate of the Ocean (ECCO) project.
  http://www.nasa.gov/ames/a-virtual-telescope-on-the-worlds-oceans-and-sea-ice
- **NASA Honored with Three HPCwire Awards at SC14,** *NAS Division news article,* November 20**,** 2014—A team from the NASA Advanced Supercomputing (NAS) facility accepted three HPCwire Awards at the international SC14 conference in New Orleans.
  http://www.nas.nasa.gov/publications/news/2014/11-20-14.html
- **Hover Simulation of a Rotor in a Wind Tunnel**, *NASA Ames Featured Image*, November 20, 2014—NASA Ames features an image by researcher Neal Chaderjian, from his SC14 demo on NASA's Rotary Wing Project.
  http://www.nasa.gov/ames/hover-simulation-of-a-rotor-in-a-wind-tunnel
- **Supercomputer Simulation of Magnetic Field Loops on the Sun**, *NASA Image of the Day,* November 25, 2014—NASA featured an image by HECC visualization expert Timothy Sandstrom, from user Bob Stein's SC14 demo on work to understand how the Sun's weather affects Earth and the solar system. (Reposted by *Newsroom America*)
  http://www.nasa.gov/multimedia/imagegallery/iotd.html
- *http://www.nasa.gov/ames/magnetic-field-loops-on-the-sun*

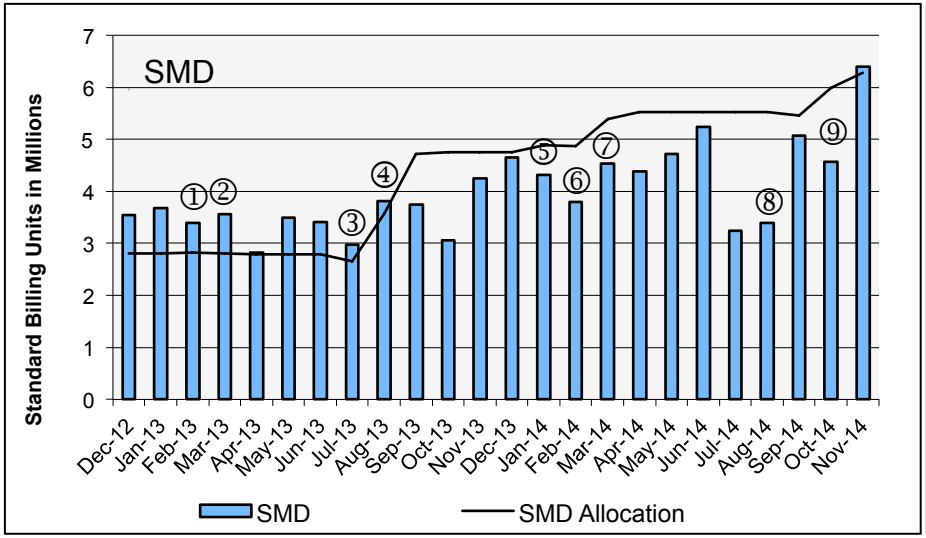
HECC Utilization

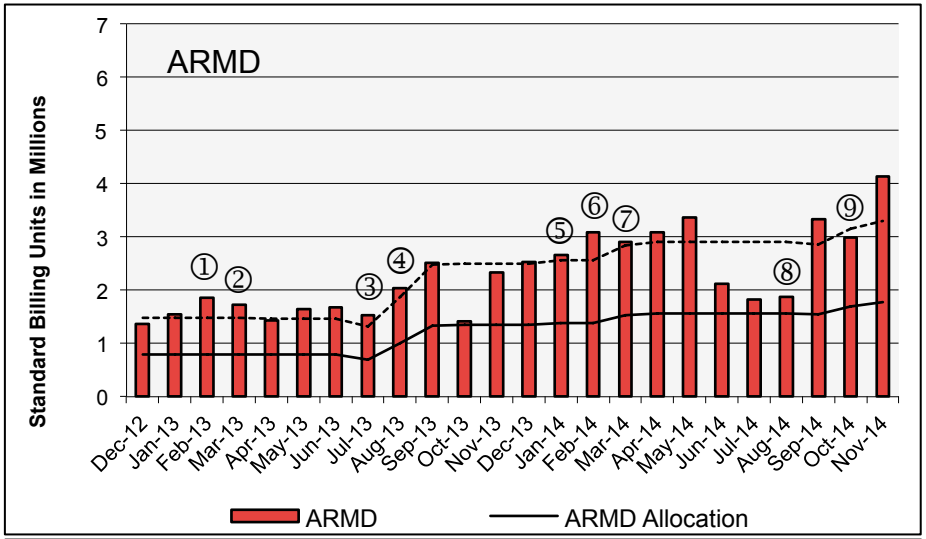


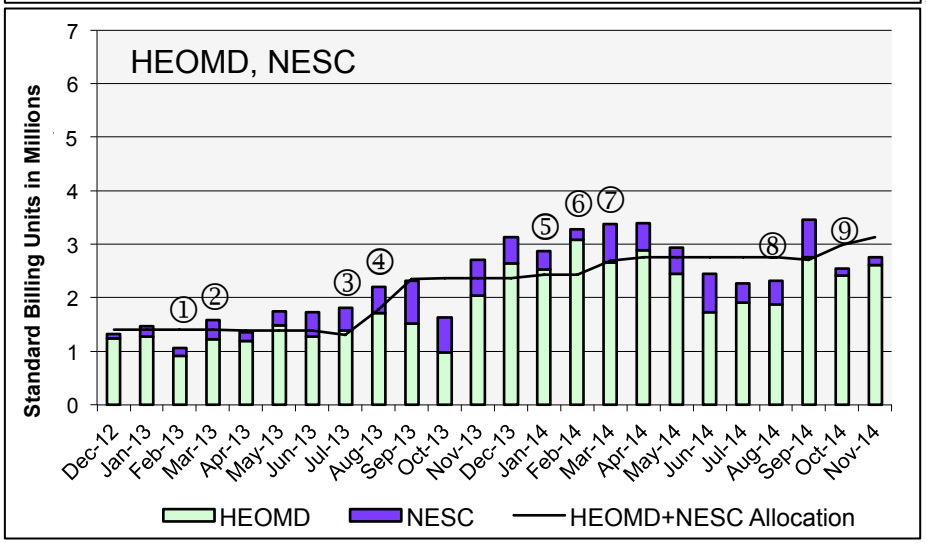
HECC Utilization Normalized to 30-Day Month



HECC Utilization Normalized to 30-Day Month







① Columbia 21, 23, and 24 retired, Endeavour 2 added

② Columbia 22 retired; Endeavour 1 added

③ 32 Harpertown Racks retired

④ 32 Harpertown Racks retired; 46 Ivy Bridge Racks added

⑤ 6 Ivy Bridge Racks added; 20 Nehalem, 12 Westmere Racks Retired

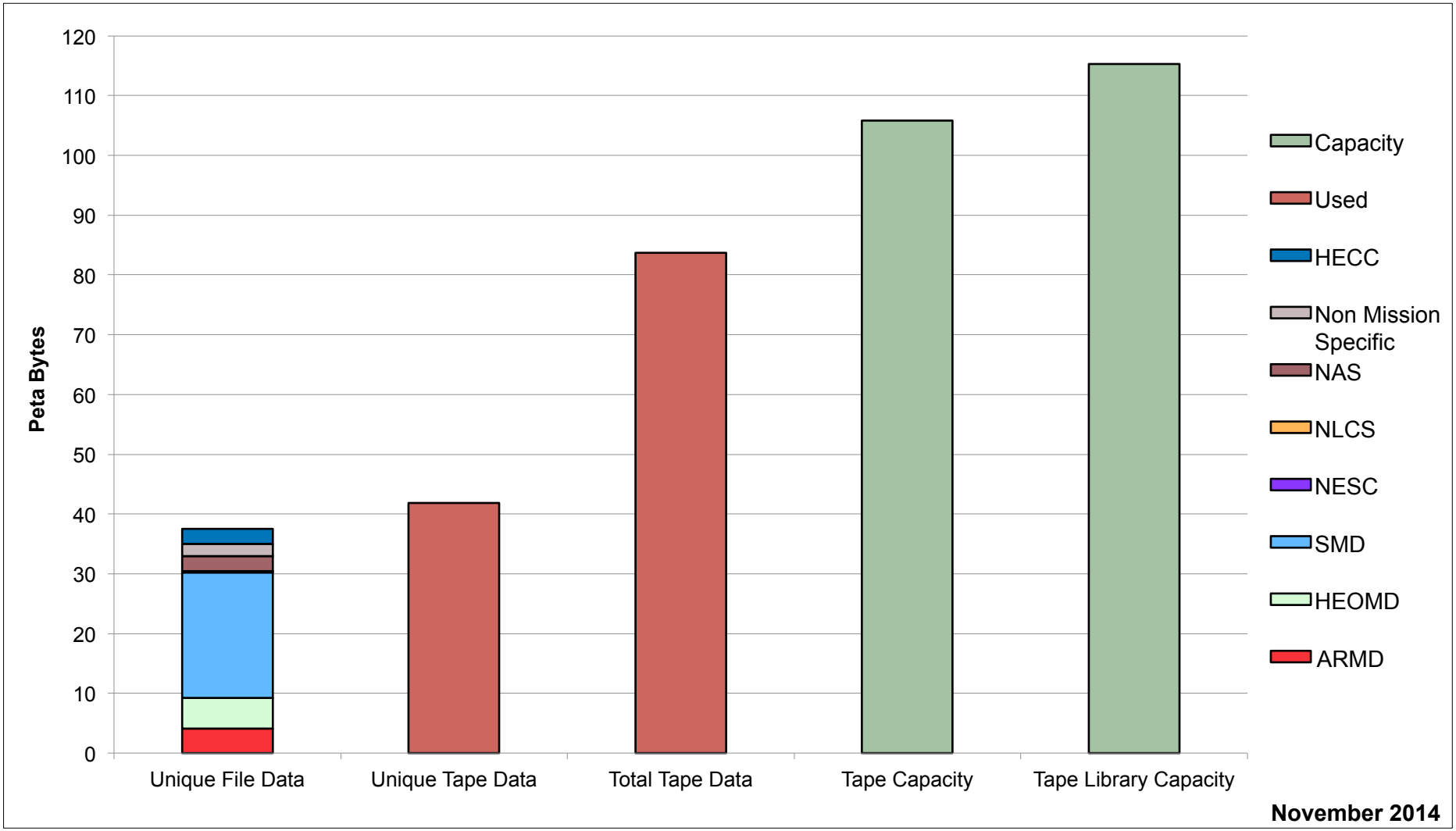
⑥ 8 Ivy Bridge Racks added mid-Feb; 8 additional Ivy Bridge Racks late Feb.

⑦ 4 Ivy Bridge Racks added mid-March

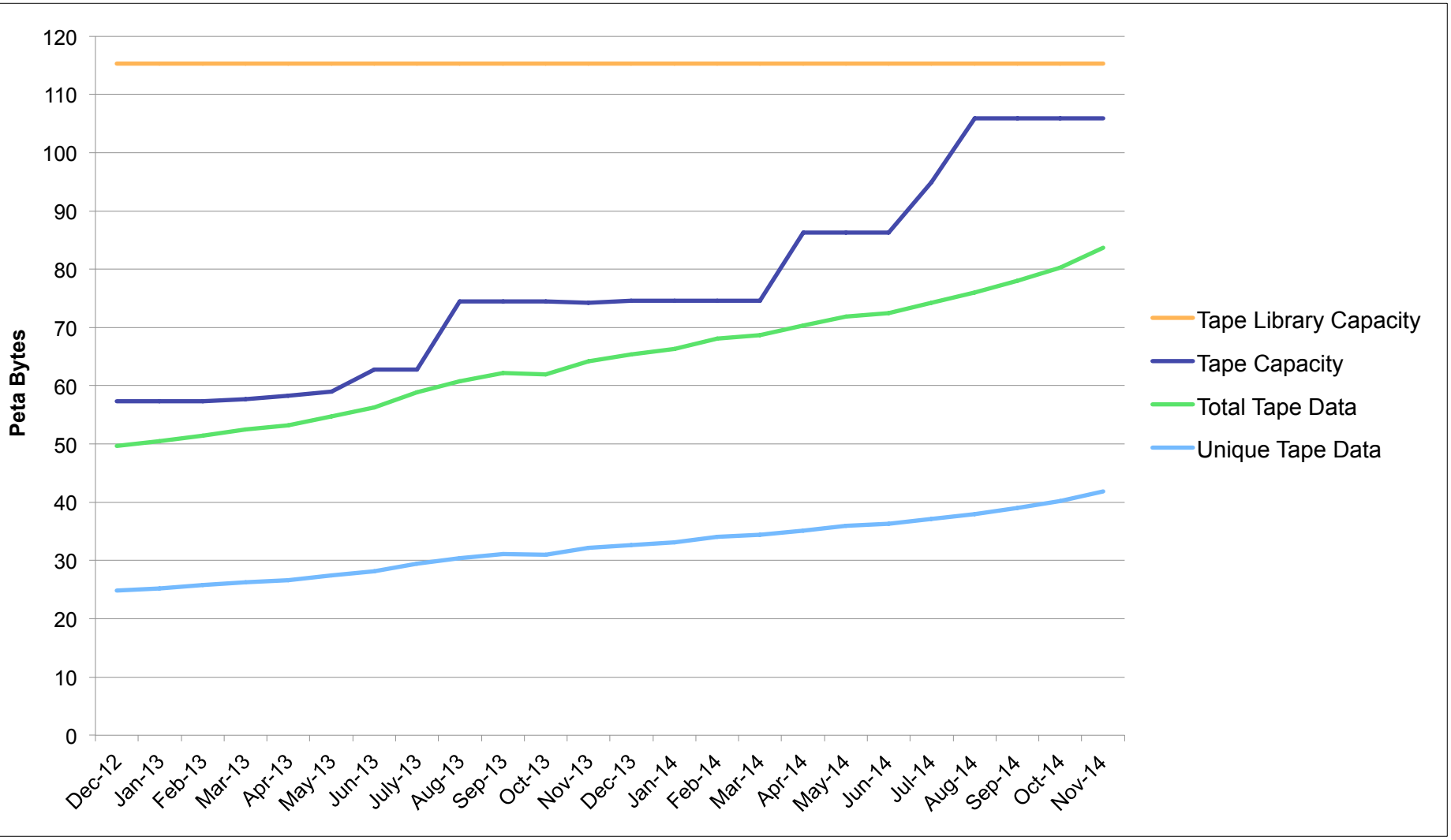
⑧ 6 Westmere Racks added to Merope, Merope Harpertown retired

⑨ 16 Westmere Racks retired; 10 Nehalem Racks and 2 Westmere Racks added to Merope; 3 Ivy Bridge Racks added mid-Oct; 15 Haswell Racks added in late Oct.

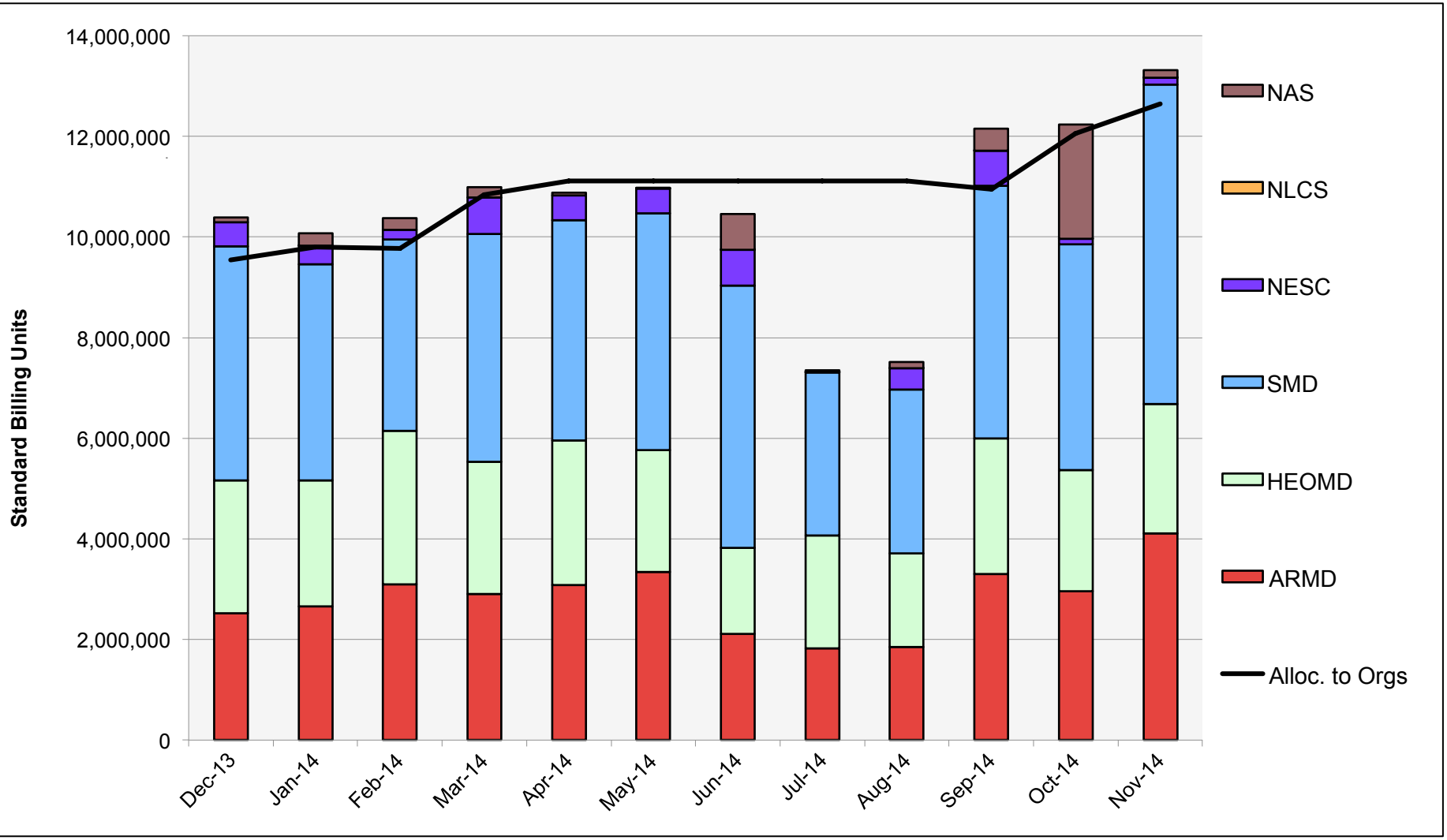
Tape Archive Status



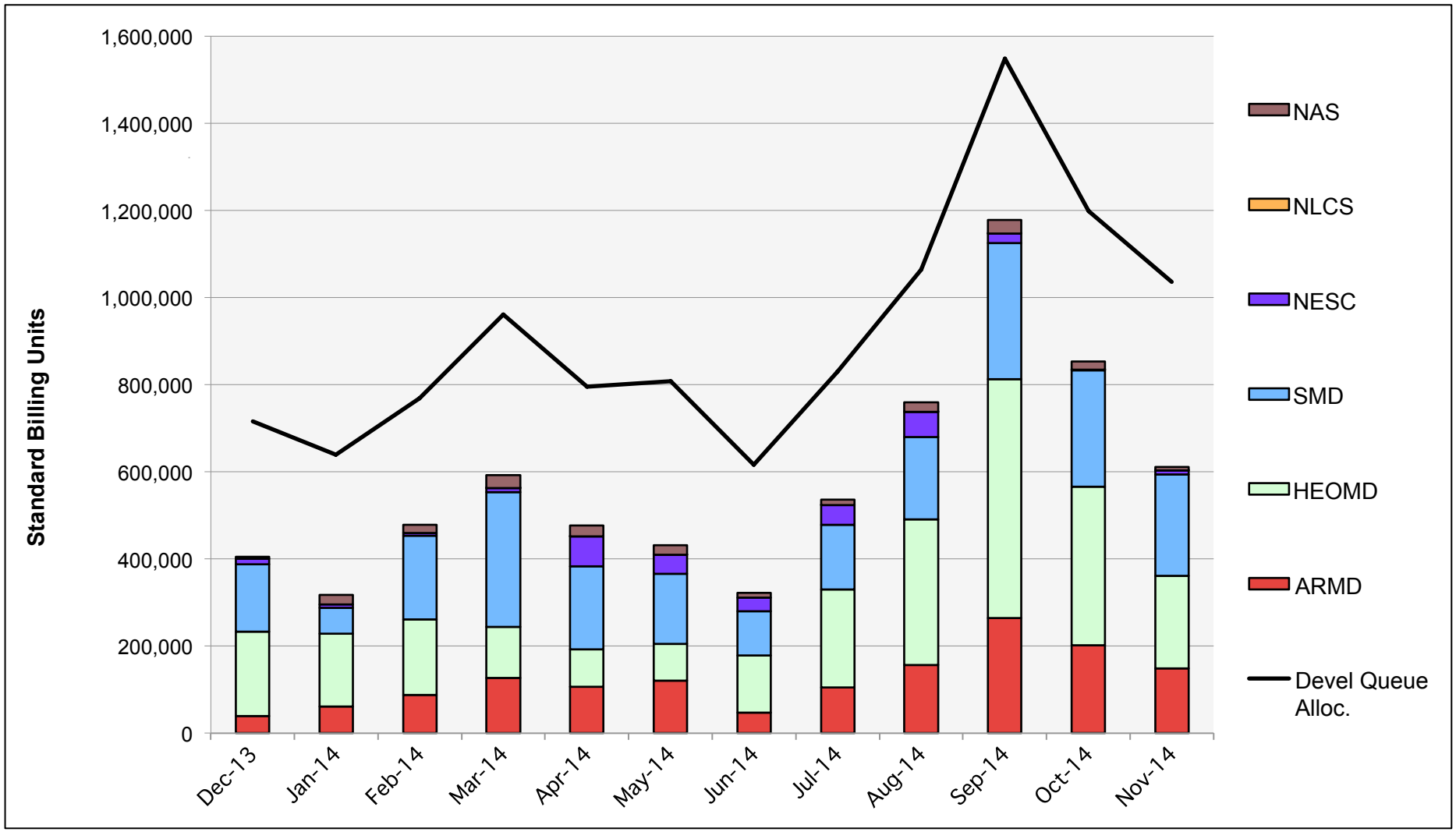
Tape Archive Status



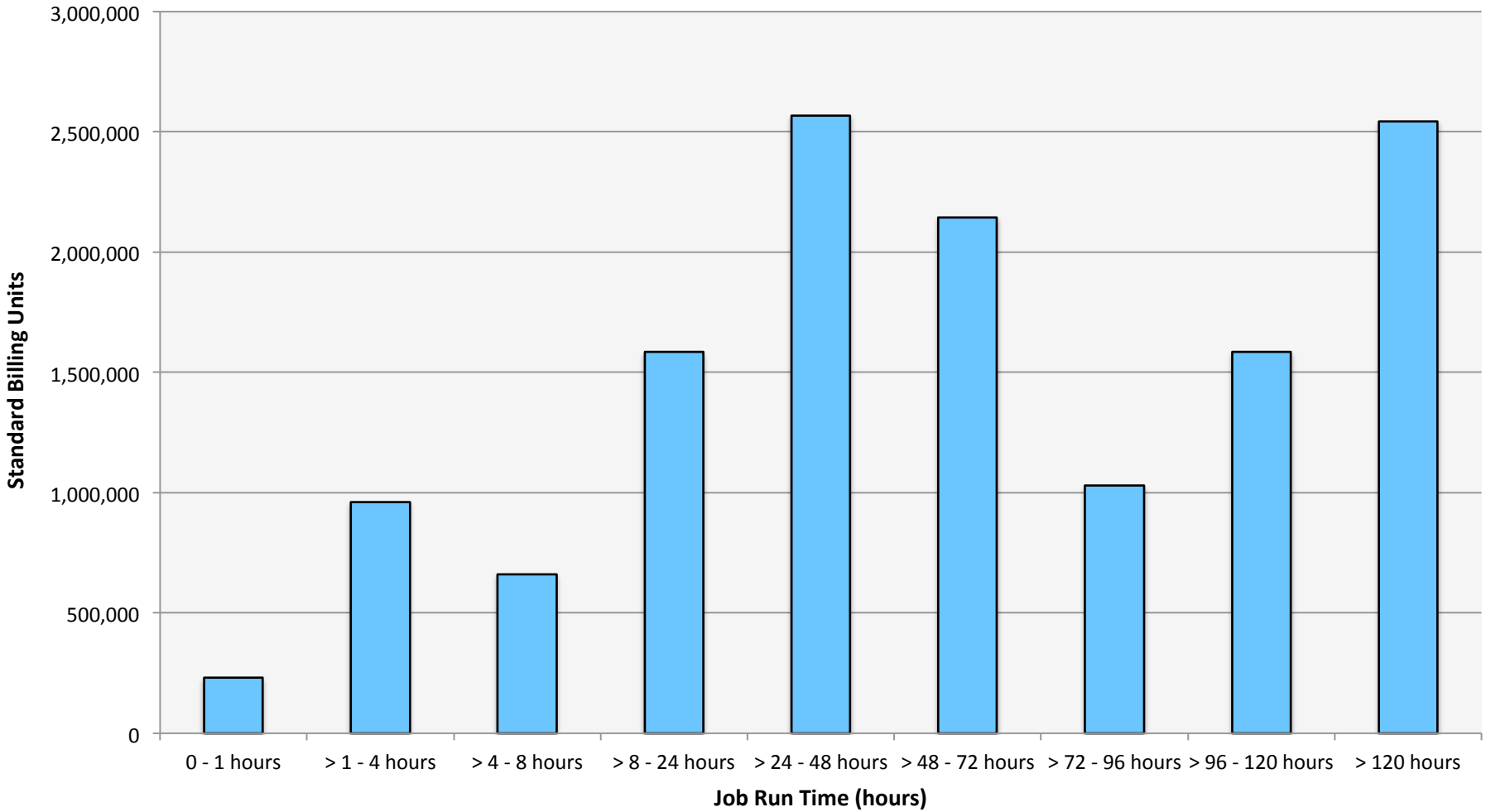
Pleiades:
SBUs Reported, Normalized to 30-Day Month



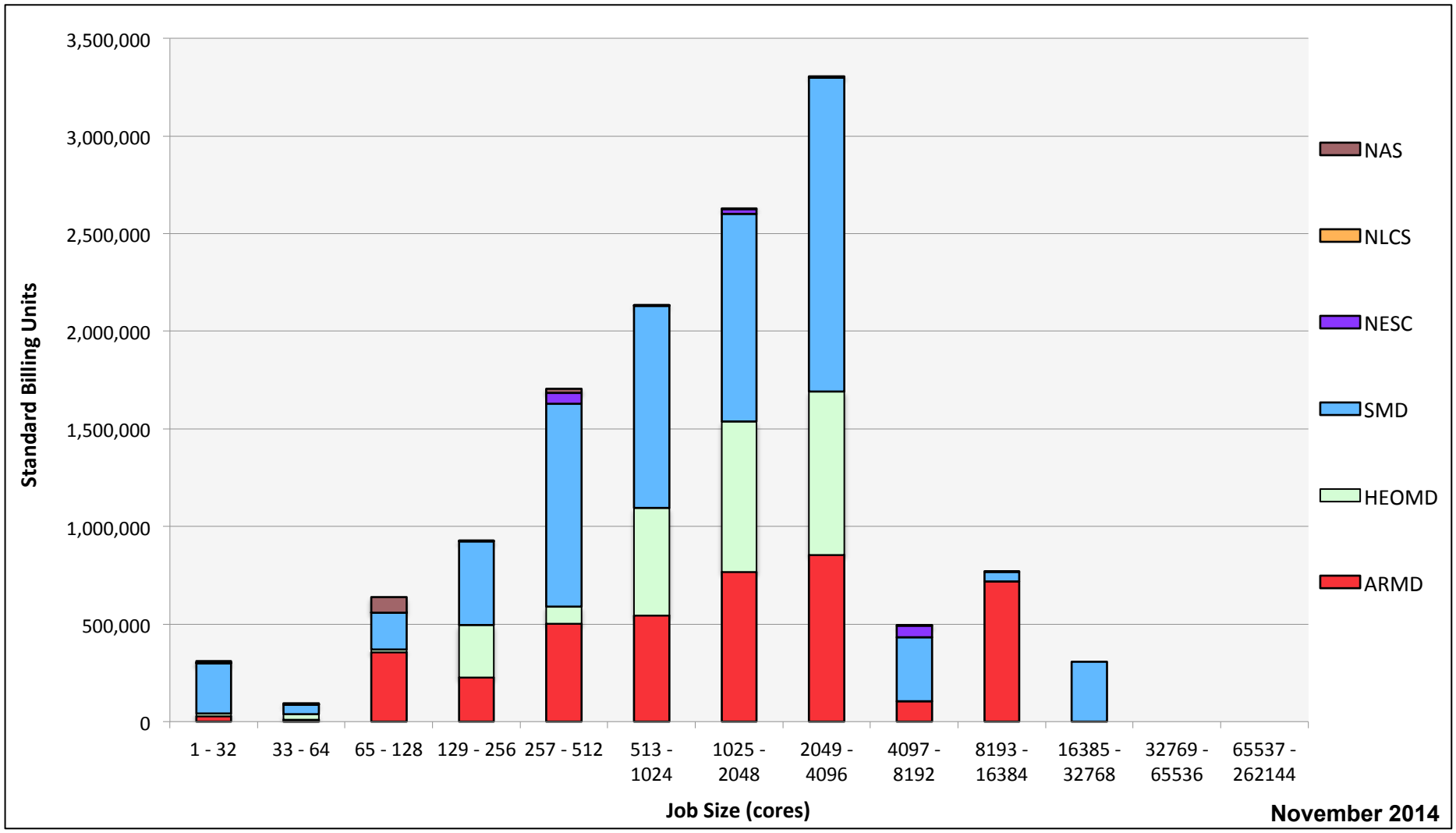
Pleiades:
Devel Queue Utilization



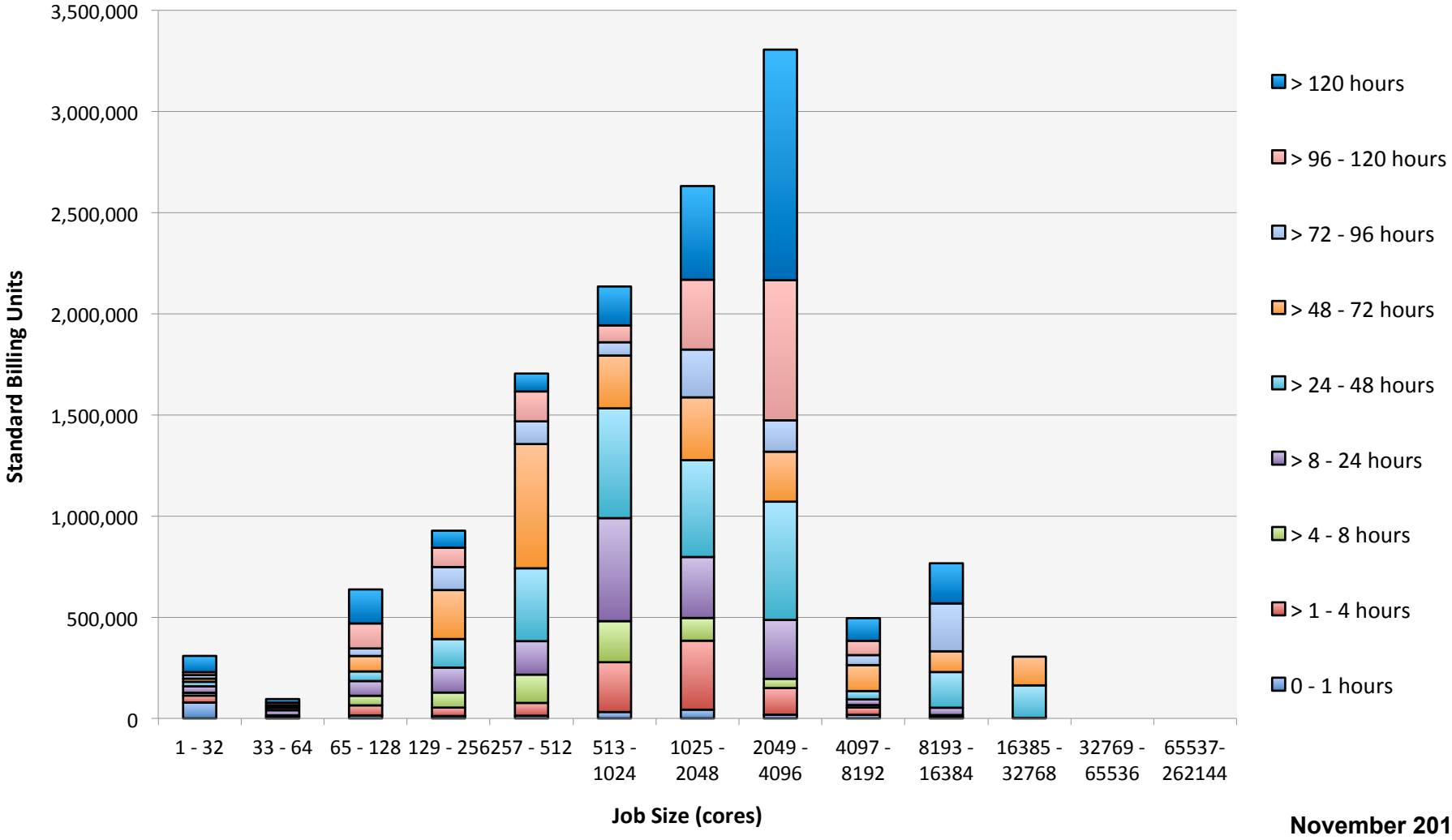
Pleiades:
Monthly Utilization by Job Length



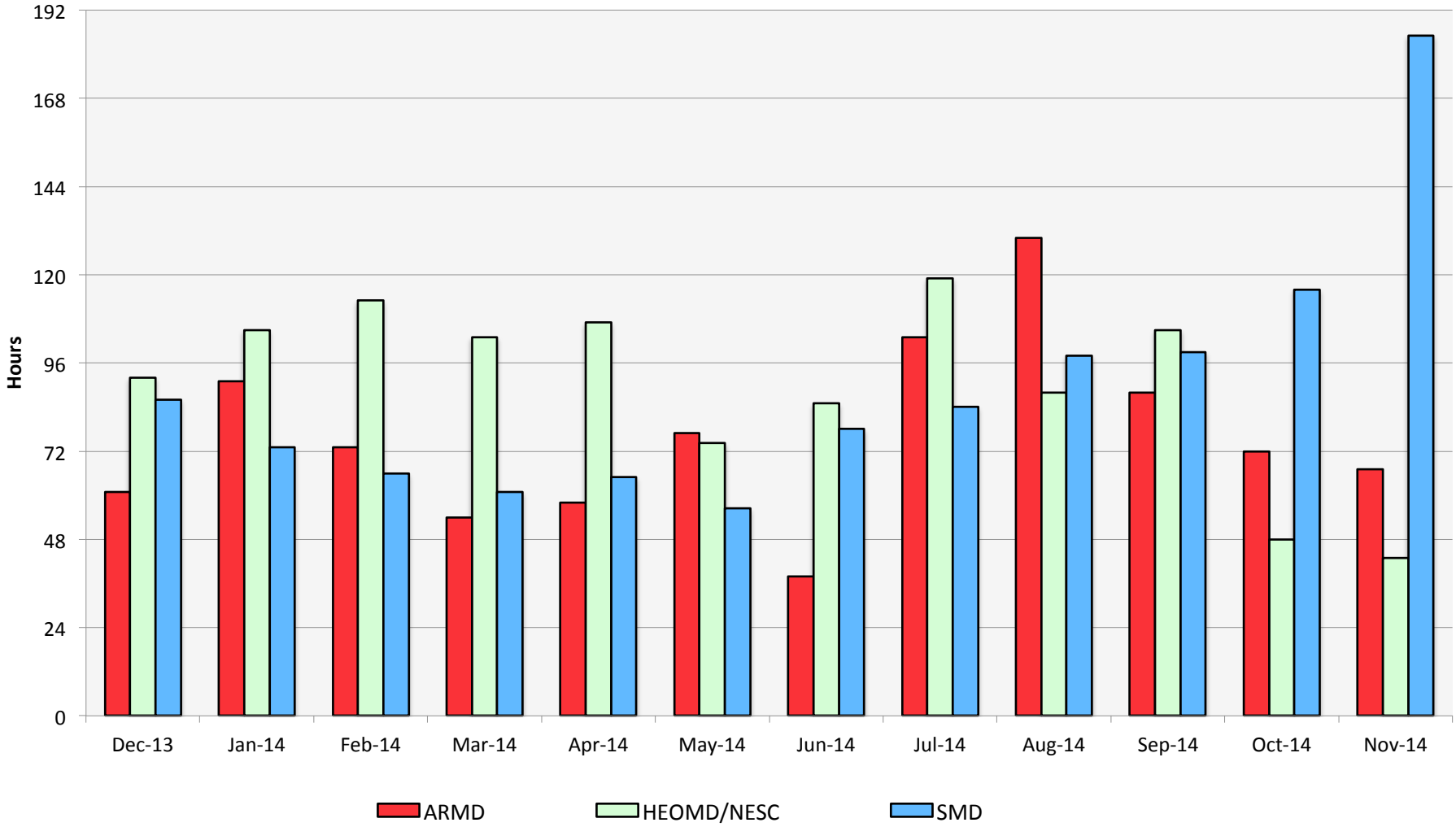
Pleiades:
Monthly Utilization by Size and Mission



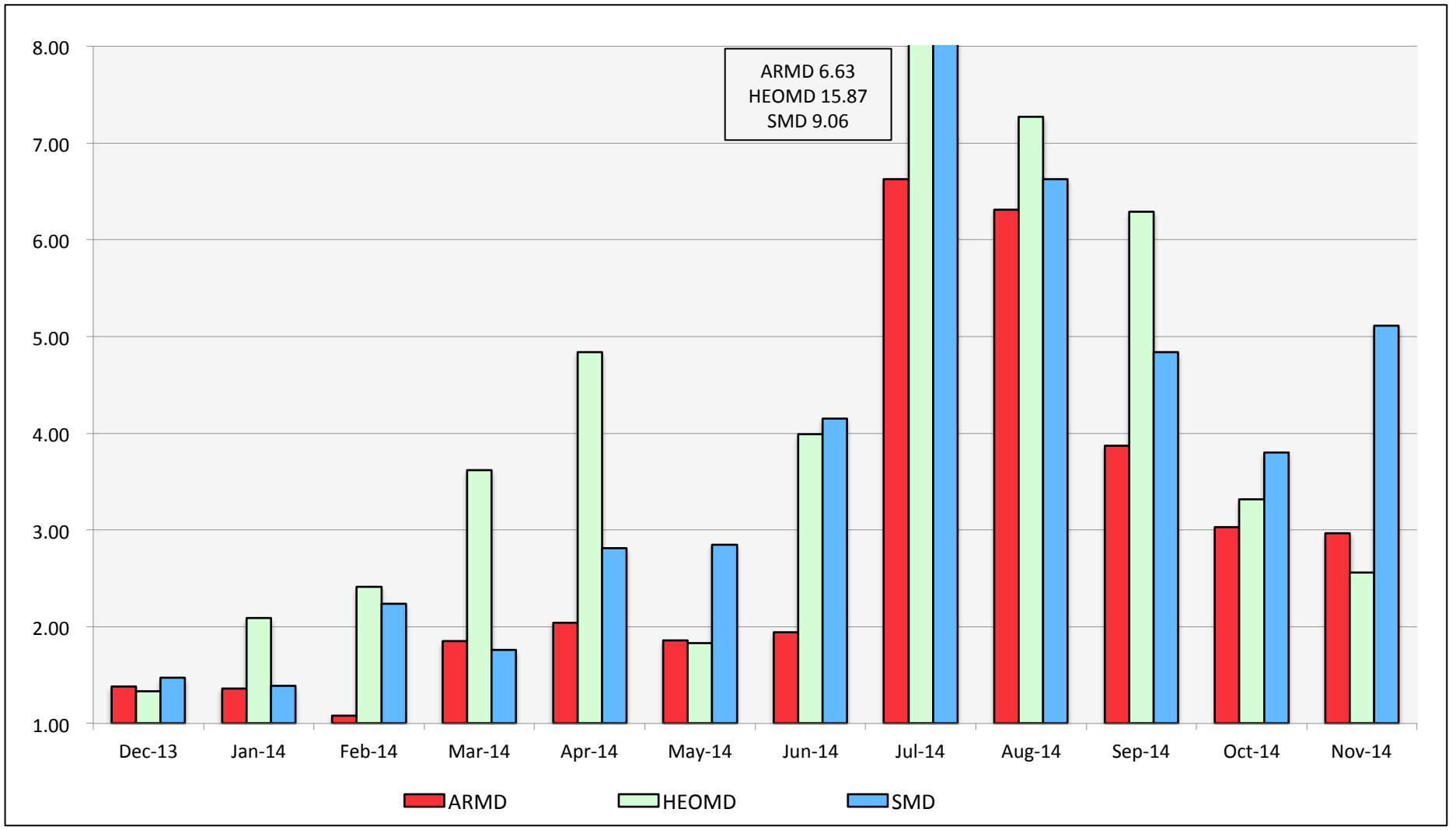
Pleiades:
Monthly Utilization by Size and Length



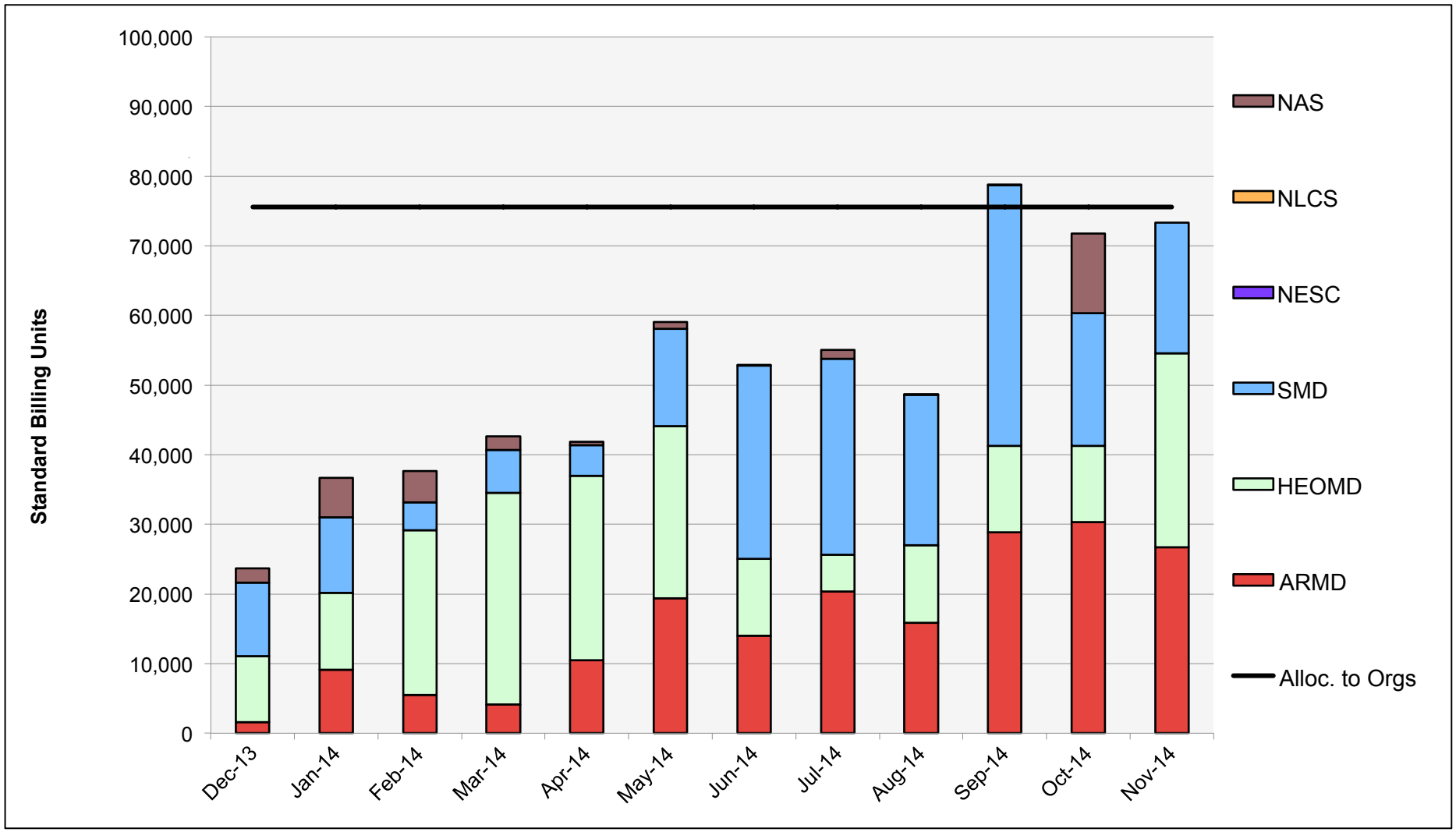
Pleiades:
Average Time to Clear All Jobs



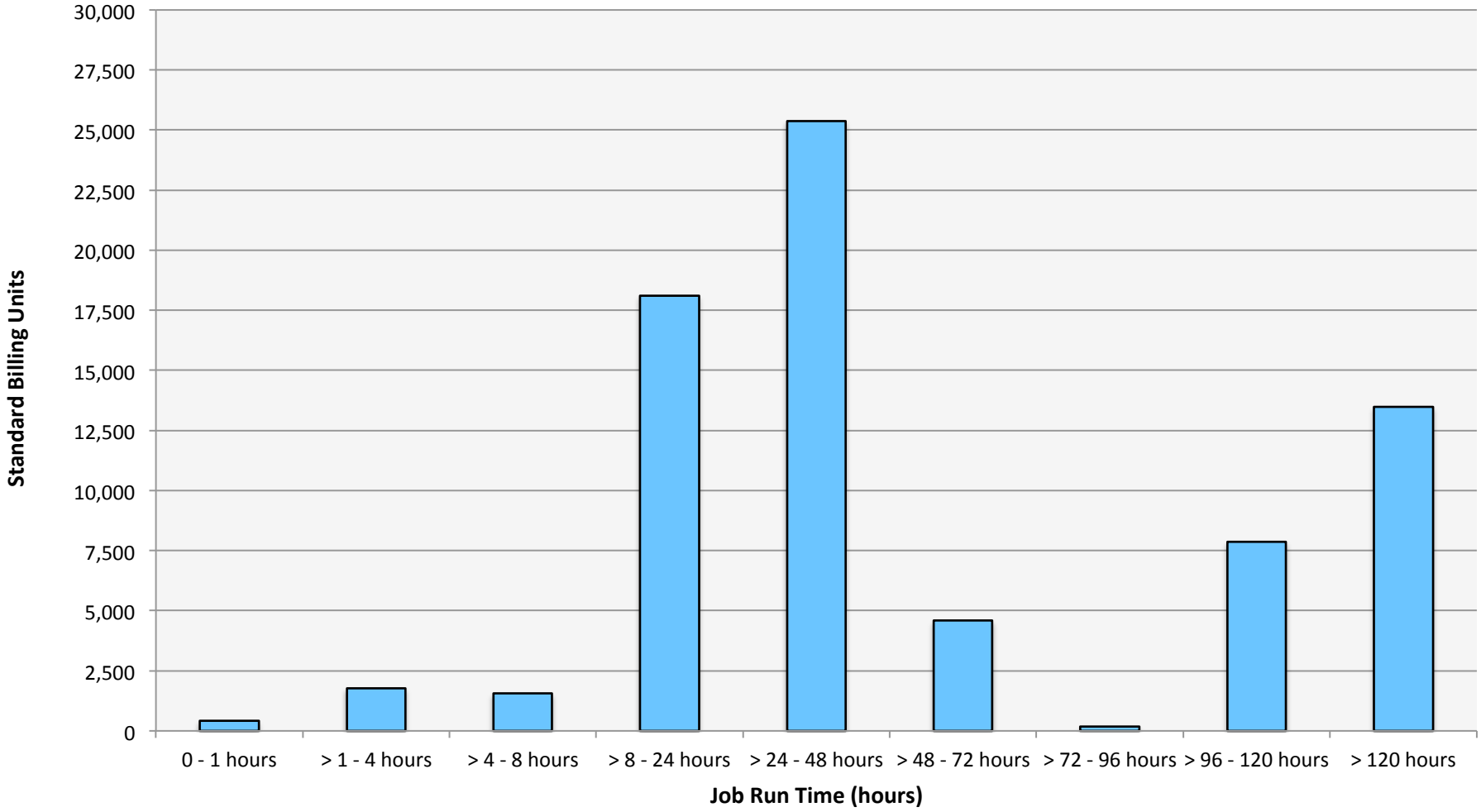
Pleiades:
Average Expansion Factor



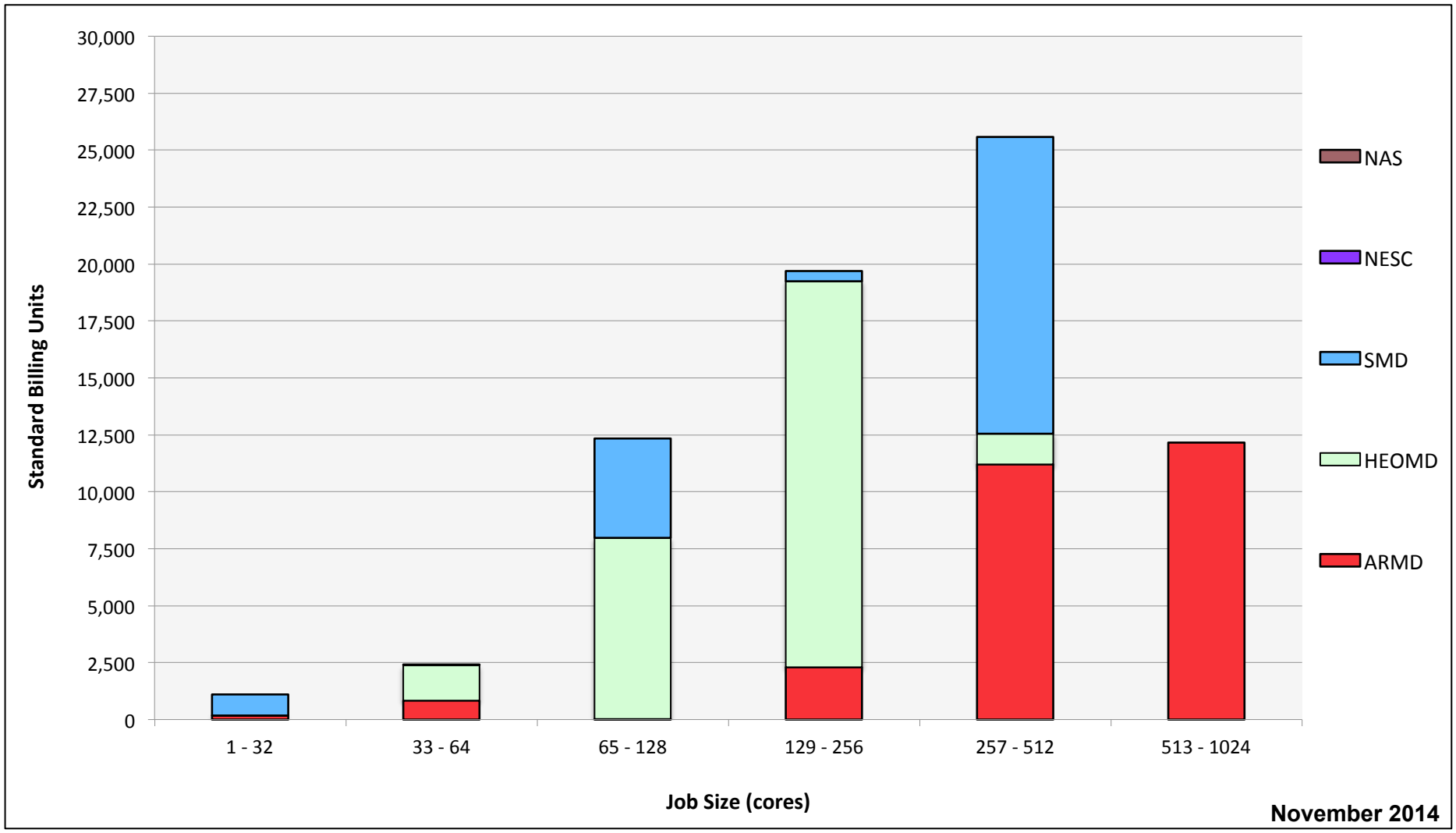
Endeavour:
SBUs Reported, Normalized to 30-Day Month



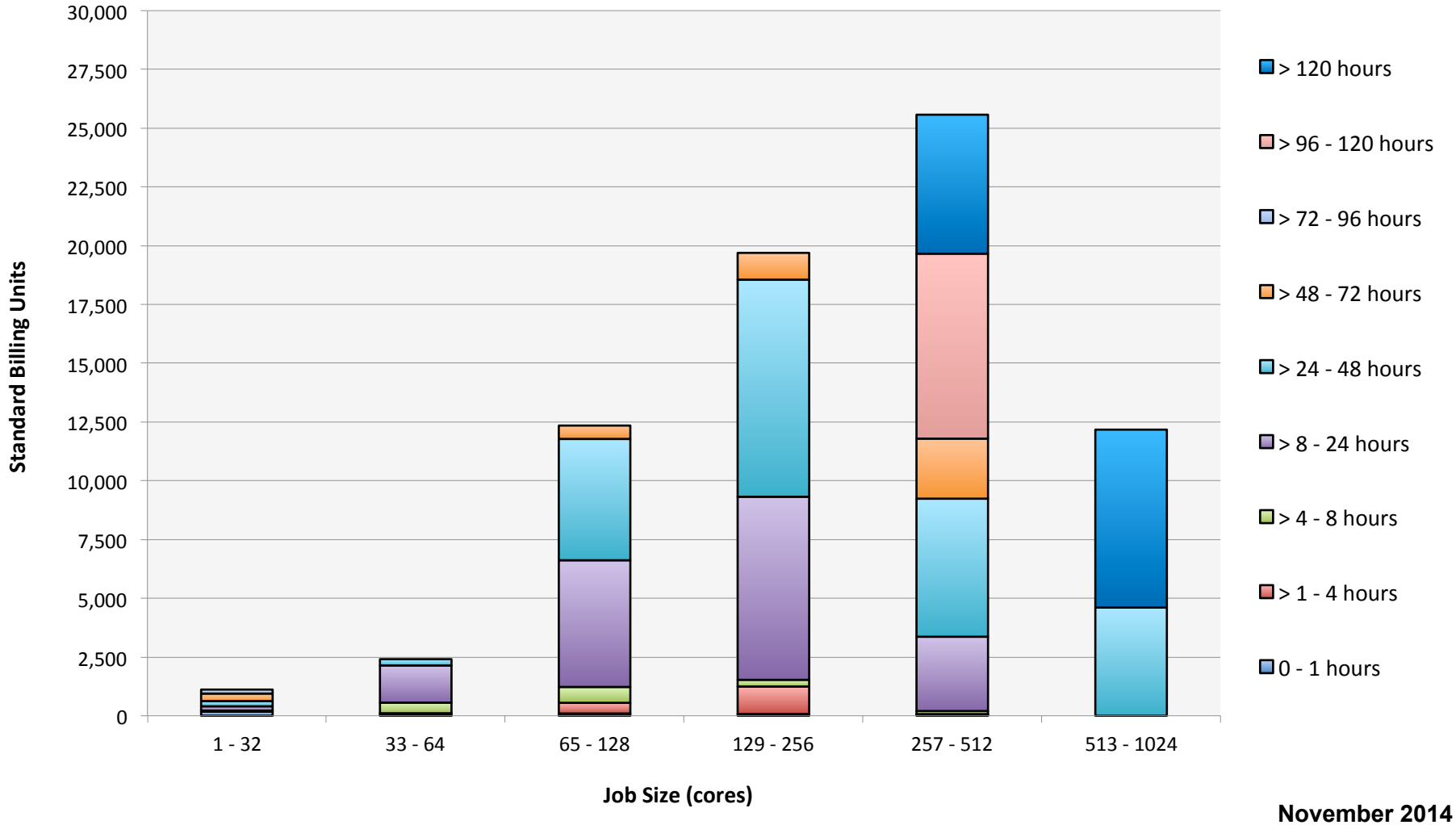
Endeavour:
Monthly Utilization by Job Length



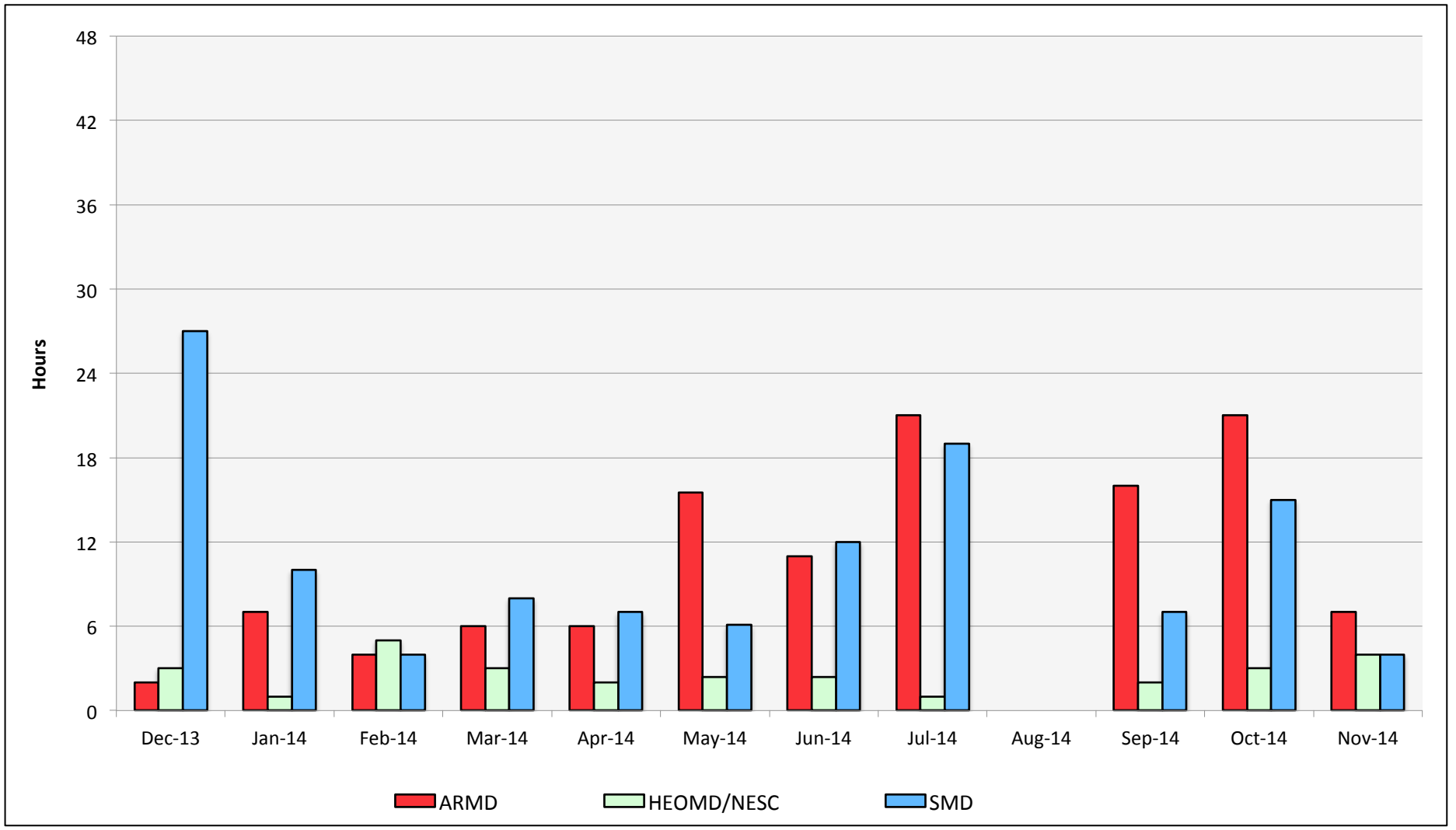
Endeavour:
Monthly Utilization by Size and Mission



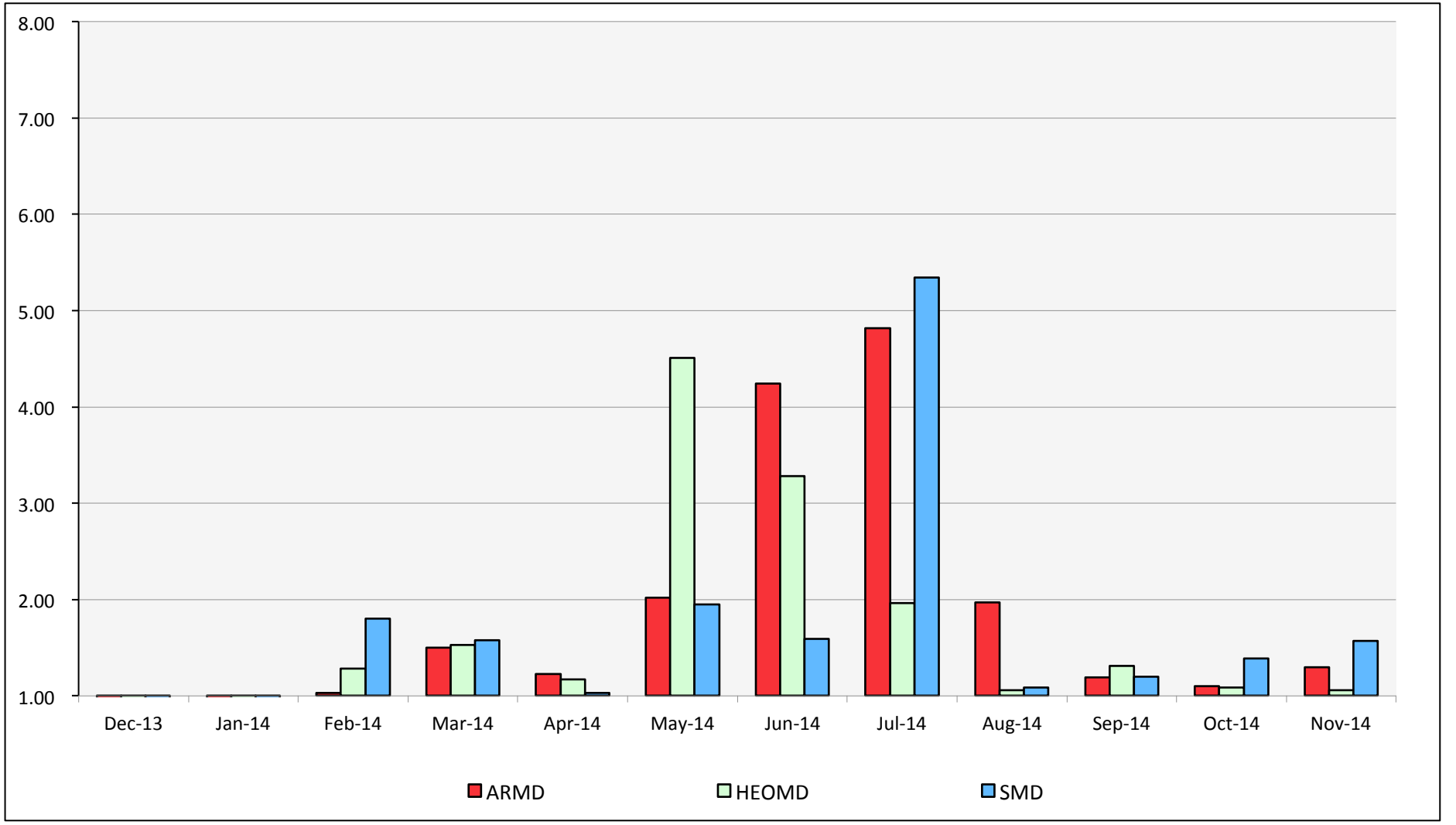
Endeavour:
Monthly Utilization by Size and Length



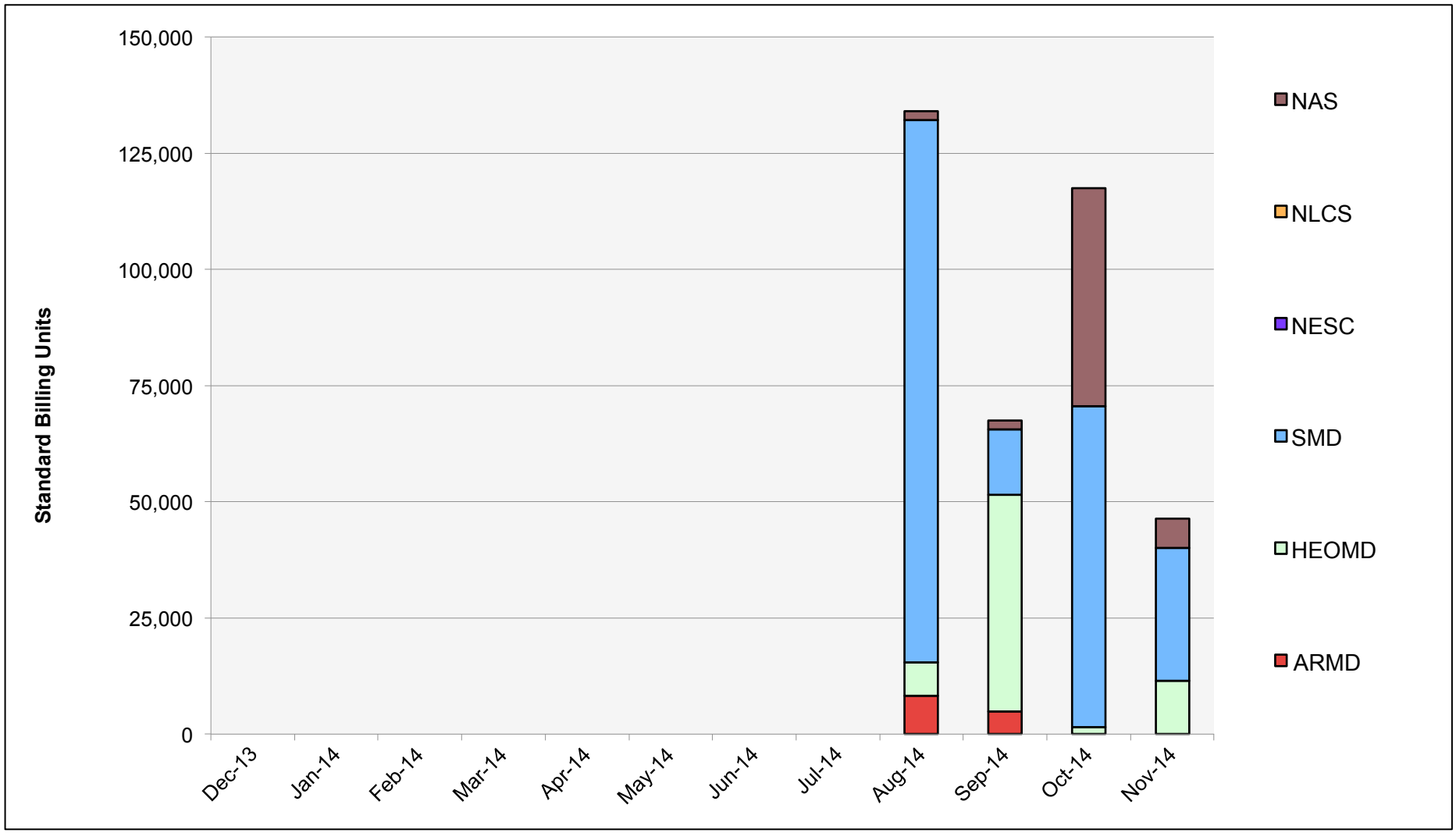
Endeavour:
Average Time to Clear All Jobs



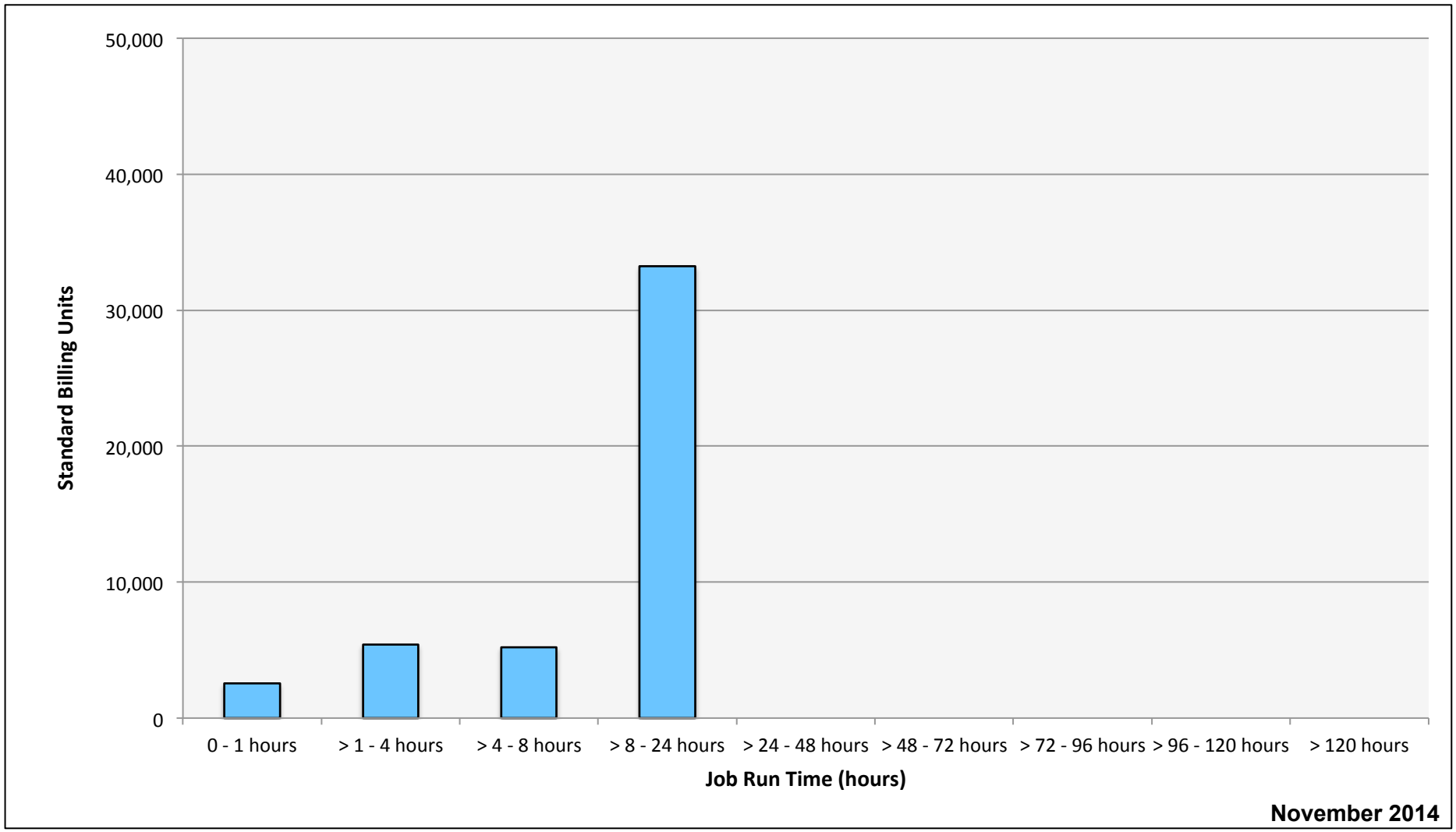
Endeavour:
Average Expansion Factor



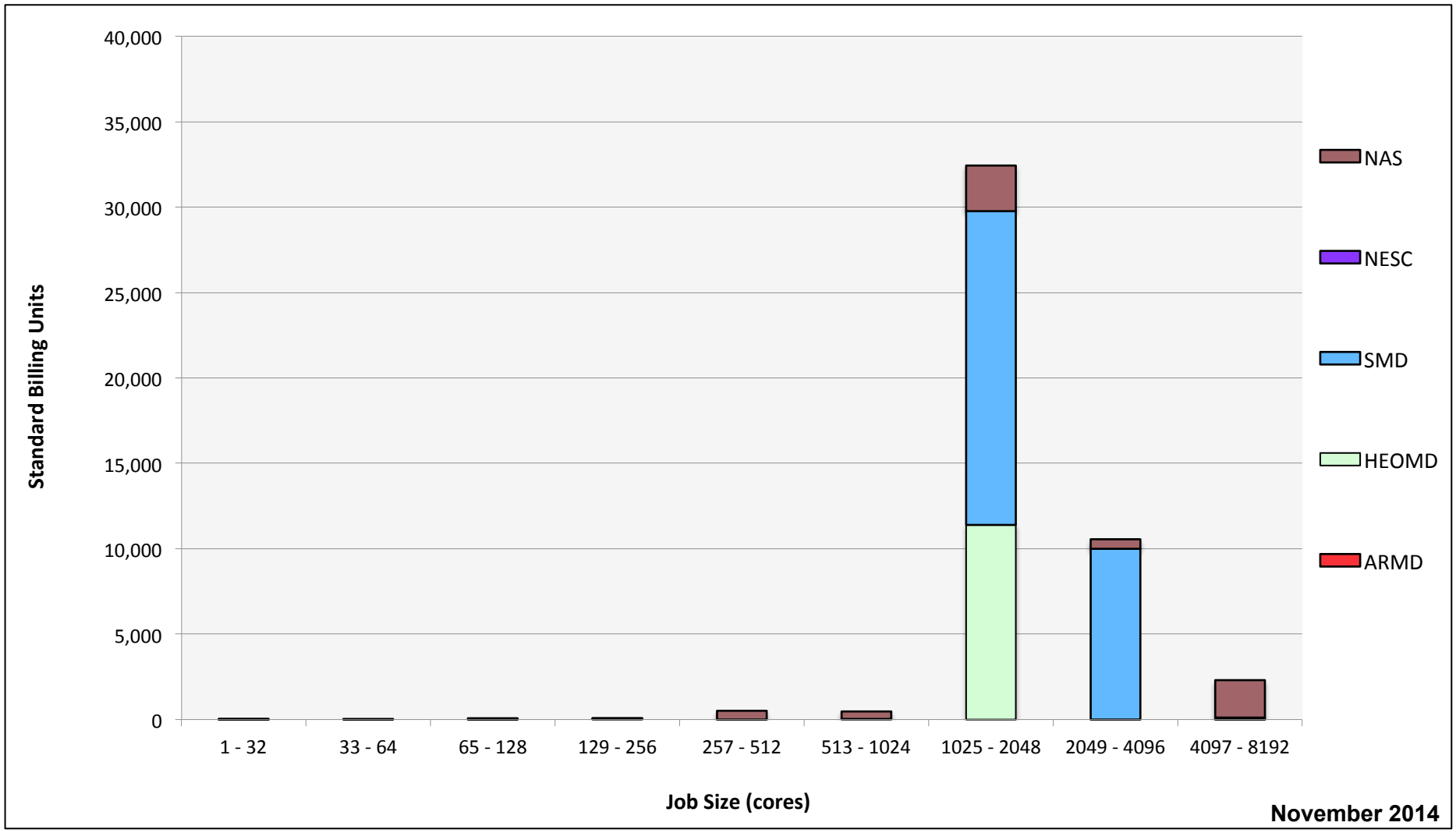
Merope:
SBUs Reported, Normalized to 30-Day Month



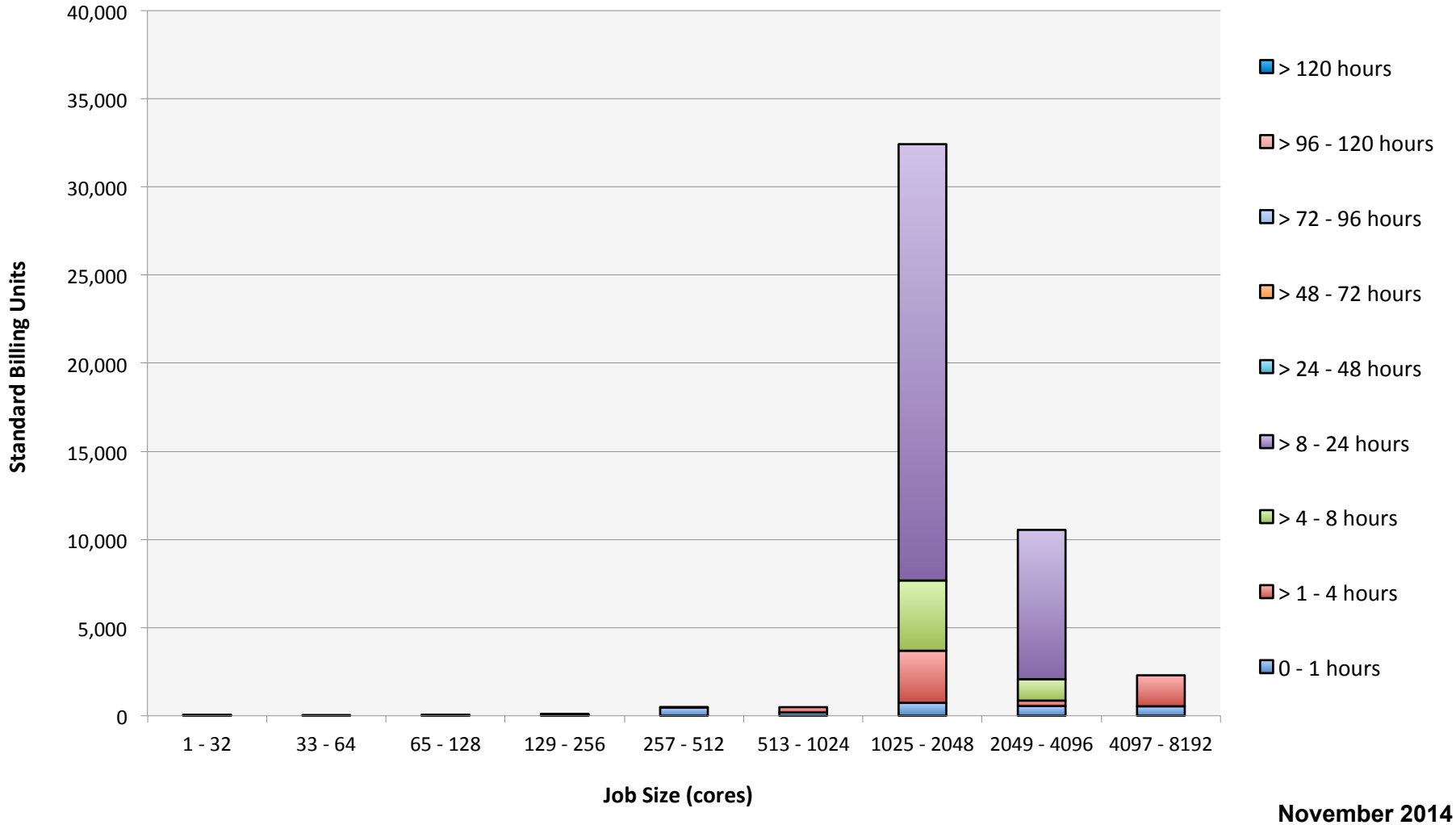
Merope:
Monthly Utilization by Job Length



Merope:
Monthly Utilization by Size and Mission



Merope:
Monthly Utilization by Size and Length



Merope:
Average Expansion Factor