Quarterly Status Update (QSU) #1 FY 2012
October – December 2011

L. Wingate, P. Jewell, et. al.
February 13, 2012
Revised: April 2012

Atacama Large Millimeter/submillimeter Array
Expanded Very Large Array
Robert C. Byrd Green Bank Telescope
Very Long Baseline Array

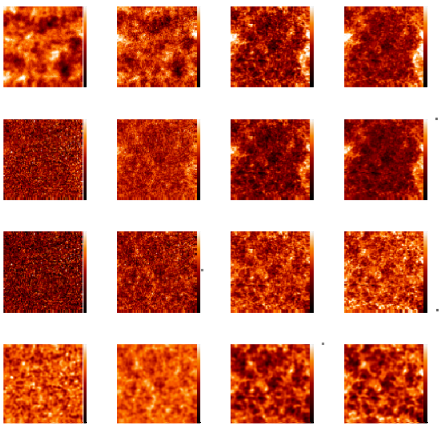
Agenda

- Science Results
- Observatory Science Operations
- Observatory Telescope Operations
- Observatory Development & Programs
- Broader Impact
- Observatory Administrative Services
- Director's Office

Science Results
- *GBT*

GBT and Planck measure the Cosmic Infrared Background

- Cosmic infrared background anisotropies trace large-scale structures and probe the clustering properties of galaxies, which link to those of their hosting dark matter halos.
- HI data is necessary to separate CIB and Galactic cirrus fluctuations.
- CIB anisotropy maps reveal structures produced by the cumulative emission of high-redshift, dusty, star-forming galaxies. The data rule out the linear scale- and redshift-independent bias models.



The Planck Collaboration 2011, A&A, 536, A18

Figure: A 26 square degree field observed with Planck. Left to right are maps at 217, 353, 545 and 857 GHz. The first row shows the raw maps. The second row shows the data after correction for point sources and the CMB. The third row is after correction for foreground cirrus using GBT HI observations. The last row is the third row convolved to 10' to highlight the CIB anisotropies.Some residual point sources are also visible.

NRAO

C. Carilli w/ input from Lockman

Title: Planck early results. XVIII. The power spectrum of cosmic infrared background anisotropies

Publication: A&A, Volume 536, A18

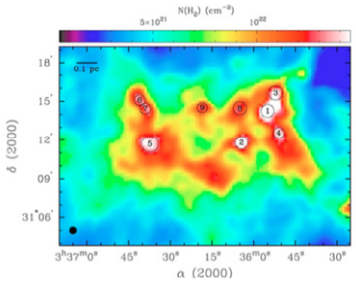
Authors: Ade, P. A. R.; Aghanim, N.; Arnaud, M.; Ashdown, M.; Aumont, J.; Baccigalupi, C.; Balbi, A.; Banday, A. J.; et al.

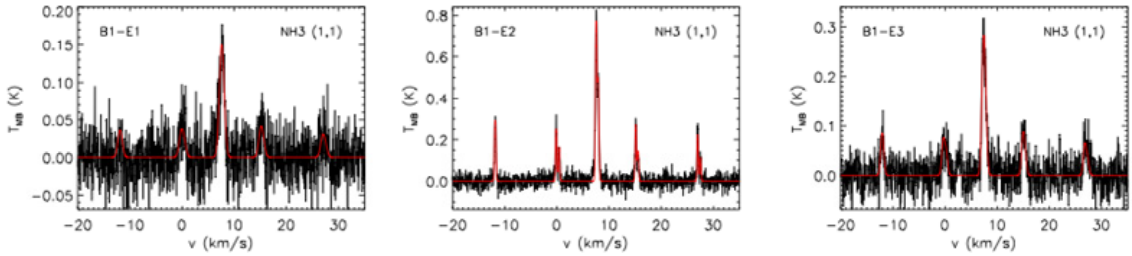
Web: http://adsabs.harvard.edu/abs/2011A%26A...536A..18P

Science Results
- *GBT*

GBT and Herschel probe molecular cloud core formation

- Formation of molecular cloud cores, where stars form, remains a mystery.
- A combination of Herschel FIR measurements and GBT line measurements allow the authors to identify regions in the Perseus molecular cloud that appear to be self-gravitating, and likely to form cloud cores.
- The authors propose that the region may be forming a first generation of dense cores and further study could provide important constraints on the initial conditions of prestellar core formation.





Figures: molecular cloud cores forming in Perseus. Colors indicate column density, while the GBT spectra show the ammonia emission from which cloud physical conditions are derived.

C. Carilli w/ input from Lockman

Title: Herschel Observations of a Potential Core Forming Clump: Perseus B1-E

Publication: eprint arXiv:1111.7021

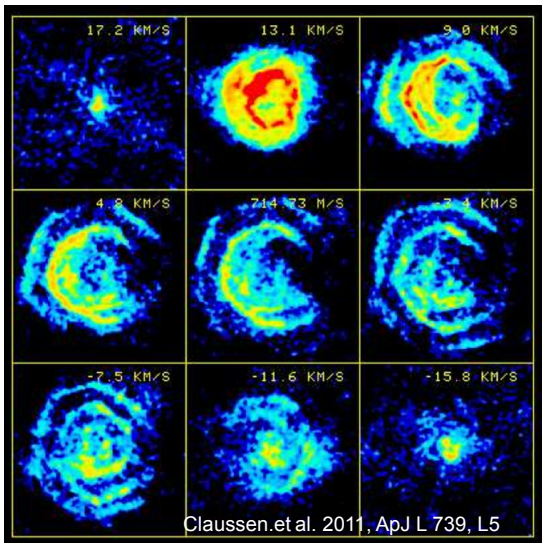
Authors: Sadavoy, S. I.; Di Francesco, J.; Andre, Ph.; Pezzuto, S.; Bernard, J.-P.; Bontemps, S.; Bressert, E.; Chitsazzadeh, S.; Fallscheer, C.; Hennemann, M.; Hill, T.; Martin, P.; Motte, F.; Nguyen Luong, Q.; Peretto, N.; Reid, M.; Schneider, N.; Testi, L.; White, G. J.; Wilson, C.

Web: http://adsabs.harvard.edu/abs/2011arXiv1111.7021S

Science Results
- *EVLA*

EVLA 18 to 40 GHz imaging line survey of AGB stars

- AGB outflows are key to ISM molecule and dust enrichment (Mass loss rate ~ 10^{-4} M_o/yr).
- Pilot study w. new 36 GHz band: HC_3N reveals multiple shells tracing episodic circumstellar envelope evolution, on road to Pne.
- Shell radii ~ 800 to 4000 AU, v_{exp} ~ 13 km/s => age date outbursts over last 1200 yrs.



C. Carilli w/ input from Frail

Title: A Pilot Imaging Line Survey of RW LMi and IK Tau Using the Expanded Very Large Array

Publication: ApJ L, 739, L5 (2011)

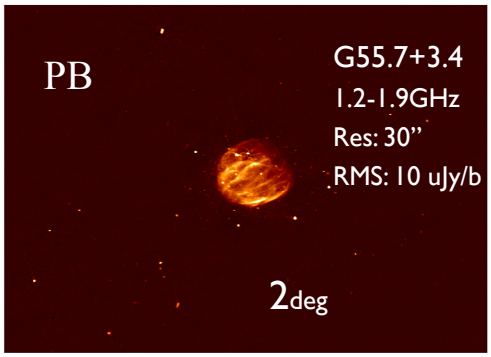
Authors: Claussen, M. J.; Sjouwerman, L. O.; Rupen, M. P.; Olofsson, H.; Schöier, F. L.; Bergman, P.; Knapp, G. R.

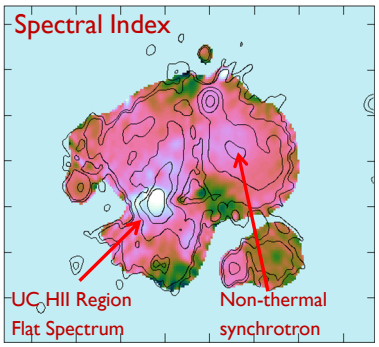
Web: http://iopscience.iop.org/2041-8205/739/1/L5

Science Results
- *EVLA*

EVLA demonstrates wide-band, wide-field imaging: Galactic Plane pilot survey

- EVLA Wide-field, wide-band, high dynamic range imaging provides simultaneous total intensity and spectral index.
- Techniques have been demonstrated to image structures as large as the 1.4GHz primary beam, such as the supernova remnant G55.7+3.4.





Bhatanagar, et al.2011, ApJ 739, L20

C. Carilli w/ input from Frail

Title: Expanded Very Large Array Observations of Galactic Supernova Remnants: Wide-field Continuum and Spectral-index Imaging

Publication: ApJ L, 739, L20 (2011)

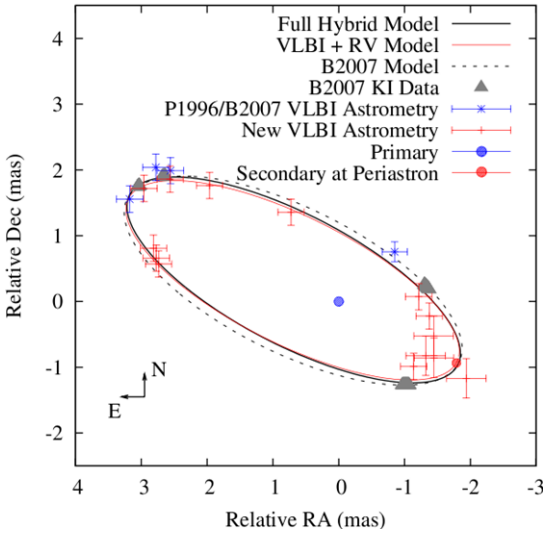
Authors: Bhatnagar, S.; Rau, U.; Green, D. A.; Rupen, M. P.

Web: http://iopscience.iop.org/2041-8205/739/1/L20

Science Results
- *VLBA*

VLBA: Mass, distance, and radio structure of V773 Tau A

- Multi-epoch VLBA astrometric observations trace out 51-day orbit and determine distance (133+-2 pc).
- Mass measurements of the binary members determined: 1.55 and 1.29 Msun.
- Magnetospheric activity inferred from increased brightness of both stars at periastron.
- Fit residuals show acceleration consistent with a 26-yr hierarchical orbit around 2.4 Msun star V773 B.



Torres et al., 2011, ApJ, accepted; arXiv:1112.0114:

C. Carilli w/input from Frail/Brisken

Title: VLBA determination of the distance to nearby star-forming regions V. Dynamical mass, distance and radio structure of V773 Tau A

Publication: Accepted in ApJ: arXiv:1112.0114

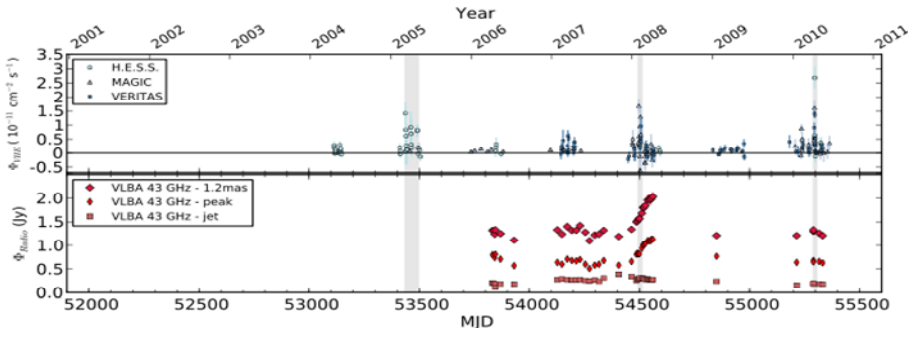
Authors: Torres, R. M.; Loinard, L.; Mioduszewski, A. J.; Boden, A. F.; Franco-Hernandez, R.; Vlemmings, W. H. T.; Rodriguez, L. R.

Web: http://adsabs.harvard.edu/abs/2011arXiv1112.0114T

Science Results
- *VLBA*

VLBA: M87 Very High Energy flare seen in multi-wavelength monitoring

- Flares in 2008 and 2010 caught during VHE observing campaigns (HESS, Veritas, and MAGIC), and during VLBA monitoring campaigns.
- Changes in the jet at VLBI scales were seen in 2008 but not 2010.
- A third flare in 2005 was associated with X-ray flux changes in jet feature HST-1.
- No unique set of features describes the three flares reported.



NRAO

C. Carilli w/input from Frail/Brisken

Title: The 2010 very high energy gamma-ray flare & 10 years of multi-wavelength observations of M 87

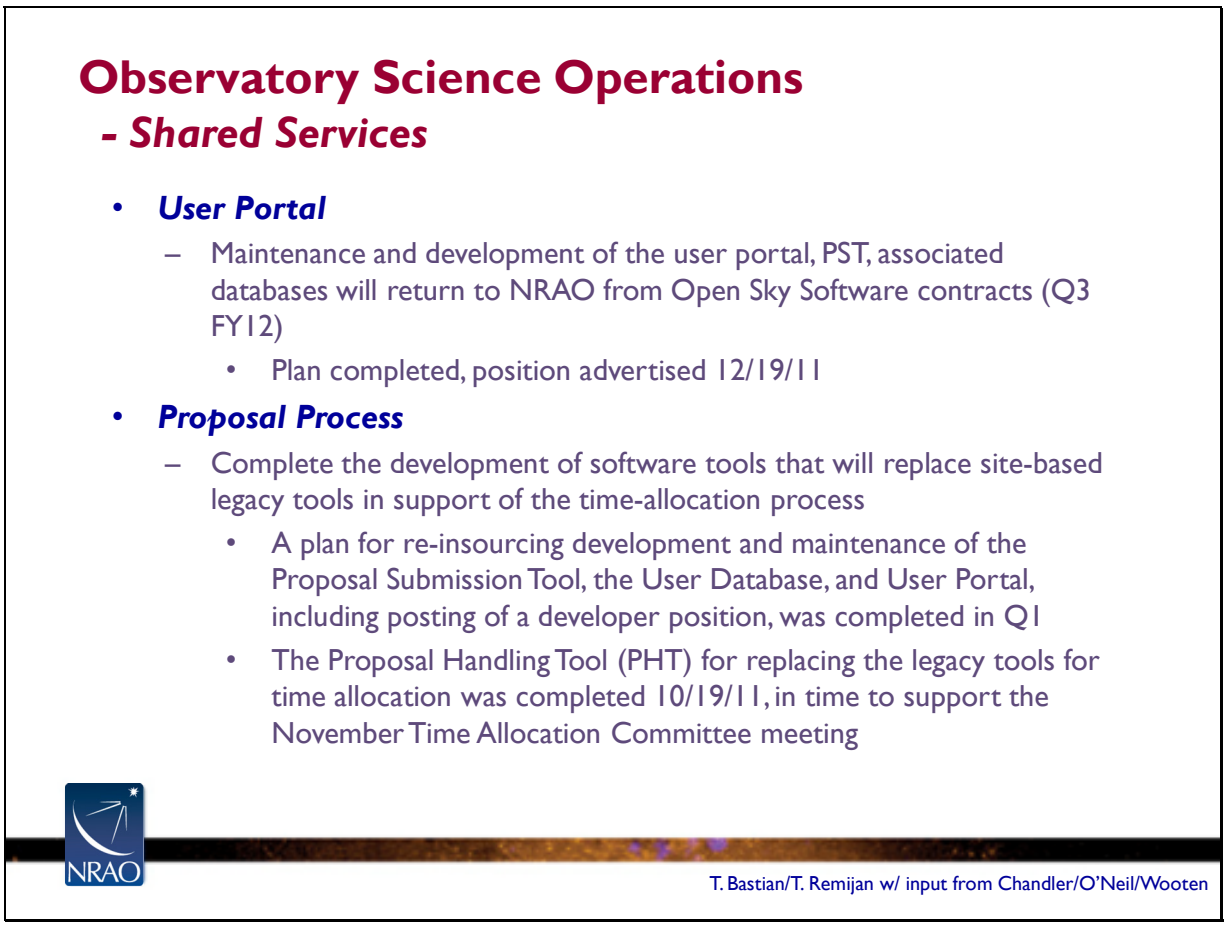
Publication: Accepted in ApJ: arXiv:1111.5341

Authors: The H. E. S. S. Collaboration: A. Abramowski; Acero, F.; Aharonian, F.; Akhperjanian, A. G.; Anton, G.; Balzer, A.; Barnacka, A.; Barres de Almeida, U.; Becherini, Y.; et al.

Web: http://adsabs.harvard.edu/abs/2011arXiv1111.5341T

Agenda

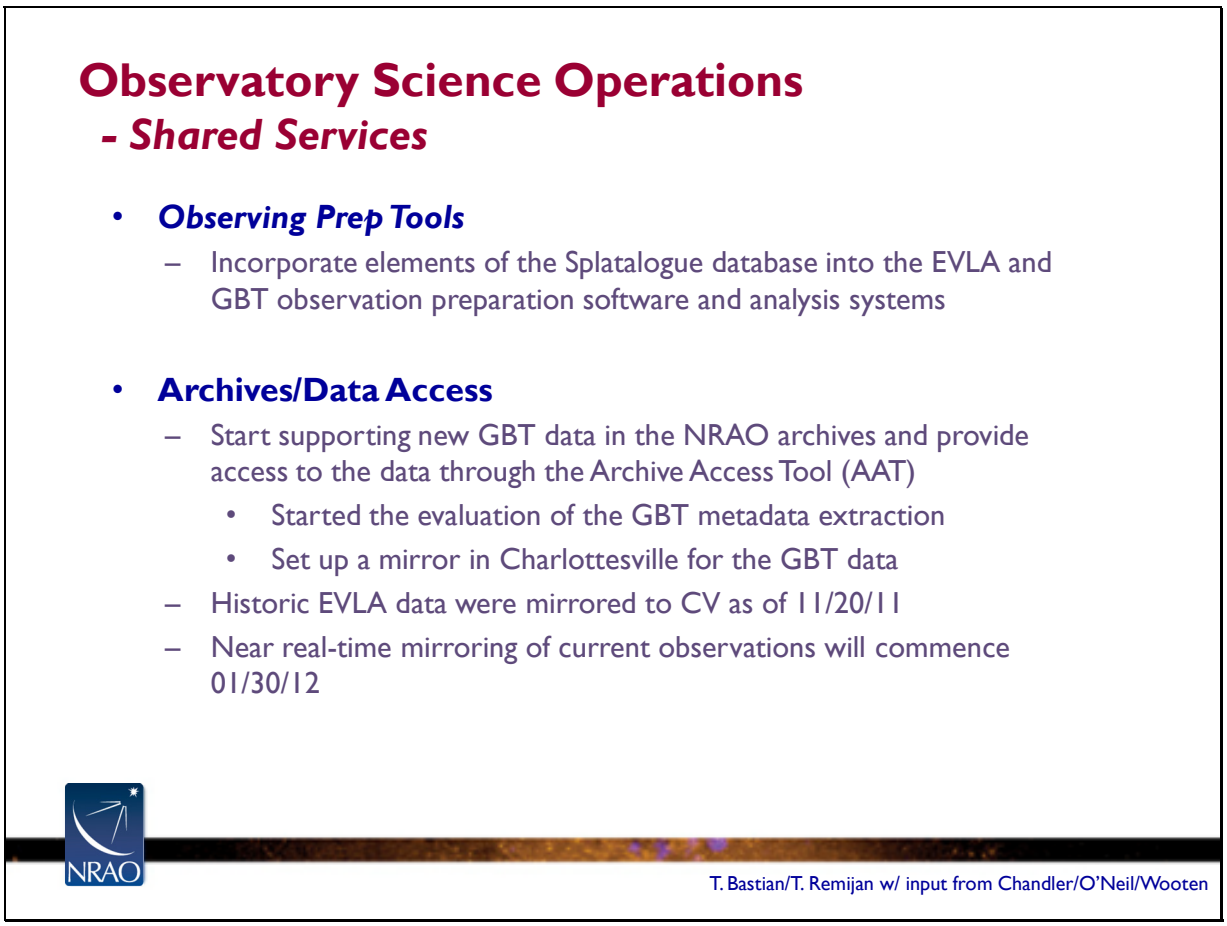
- Science Results
- Observatory Science Operations (OSO)
  - Shared Services
  - Facility-based Activities
  - Training the Next Generation
  - Metrics
- Observatory Telescope Operations
- Observatory Development & Programs
- Broader Impact
- Observatory Administrative Services
- Director's Office



The full maintenance and development of the user portal and PST is not scheduled until Q3 FY12. However, **in Q1 FY12, the job description and advertisement was released for a software engineer** based in Socorro to lead this effort. A short list and interviews will begin starting in Q2 FY12.

Support for the **Proposal Submission Tool, User Portal, and related databases** is currently provided by Open Sky Software. The contract with Open Sky will end in Q3, and the support will be re-insourced to NRAO to improve efficiency and reduce costs. In order for this transition to occur smoothly a plan for the transfer of the development has been completed, and a software engineering position was advertised on 12/19/11. The planning includes prioritization of the PST support along with all other work within the EVLA Science Support Systems group in the event that it takes longer than desired to fill the new position.

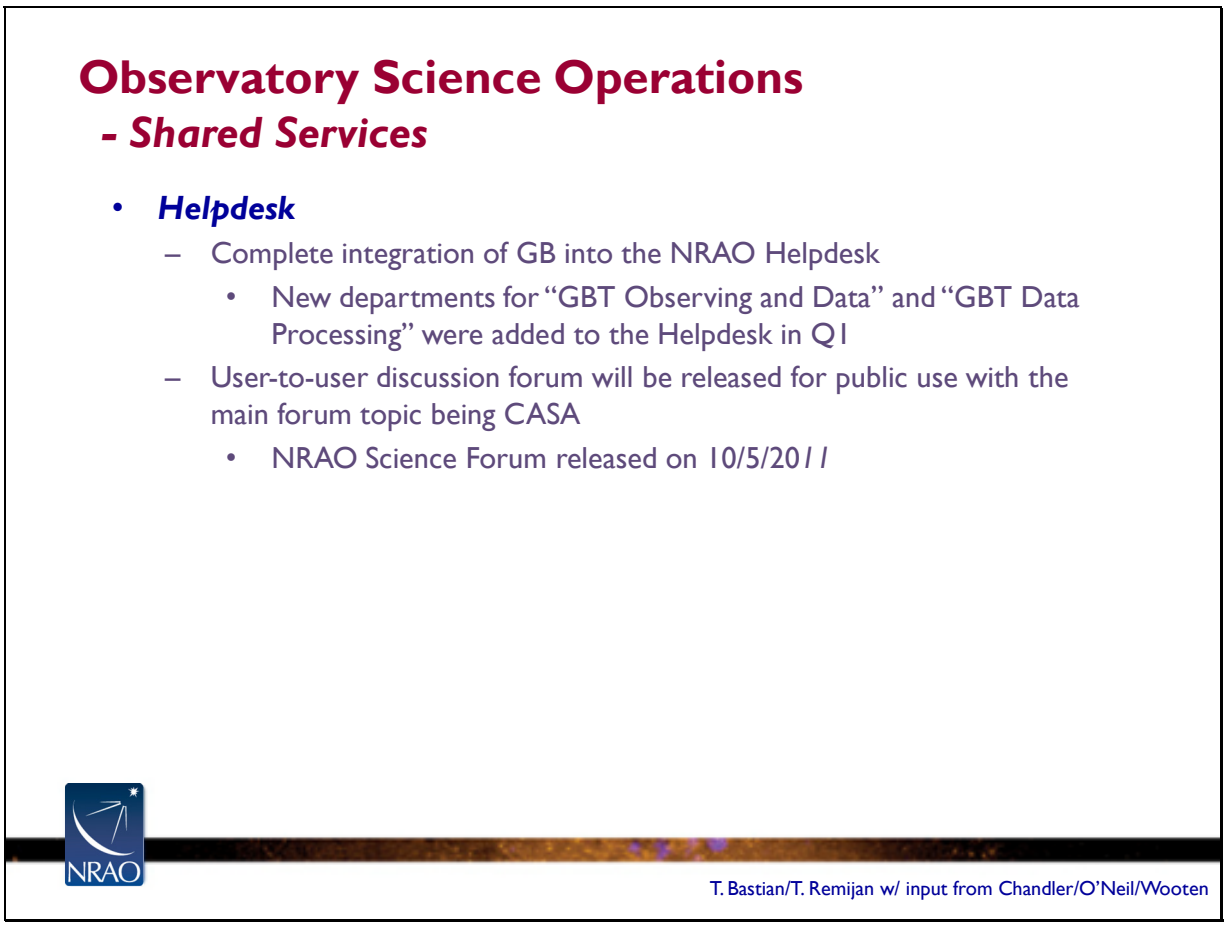
A new **Proposal Handling Tool** (PHT) was developed to support the November Time Allocation Committee (TAC) meeting, which can process EVLA and VLBA proposals. The GBT continued to use legacy tools at that meeting. A plan has been developed to define the requirements and implementation path for incorporating the GBT for the next TAC meeting in Q3.



A meeting was held Nov 21-22, 2011 between NRAO scientists and programmers to discuss further development of the Splatalogue front page and **interfacing the Splatalogue database into the obs prep and data analysis packages** to allow displays of existing spectral line data and to make simulated spectra based on user defined inputs and the spectroscopic parameters contained in Splatalogue. Enhancements were made to the existing "SplataSlap" web service to increase its utility across additional software packages.

Work started in Q1 FY12 towards accessing the GBT data through the NRAO archive access tool. During Q1, a **metadata assessment was carried out for the GBT archive**, identifying key parameters missing from current headers as well as methods of obtaining them from legacy, early science, and test data collections. A **copy of all the GBT data are now mirrored in Charlottesville via a rsync which happens nightly**. A mapping of the GBT data to the current EVLA/VLBA Archive Access Tool database tables was completed. Python code has been written to extract all relevant GBT metadata which is then processed for ingestion into the AAT. The methods and recommendations as determined by the project in consultation with GB staff and GB data management review has been summarized in a requirements document on track to be completed during the first month of Q2.

Historic EVLA data were mirrored to Charlottesville during Q1. The real-time mirror currently resides in the DSOC, and as the mirror NGAS archive nodes are filled up, they are shipped to Charlottesville. The next 4 nodes will be **shipped in January 2012, marking the beginning of near real-time mirroring of current EVLA observations.**



In advance of the NRAO proposal deadline in Q2 FY12, **two new departments were added to the NRAO helpdesk integrating GB operations**. These departments are "GBT Observing and Data" and "GBT Data Processing". Users are now able to obtain help for all three of its North American instruments through the same helpdesk.

OSO also released the NRAO Science Forums on Oct 5, 2011 for the entire scientific community. The NRAO Science Forum provides the observatory's users with an interactive, online environment for general discussions on science, project planning, observing strategies, data reduction, data analysis and archive access. Access to the forums is available at science.nrao.edu/forums. To date the forum has seen very little activity, so we are looking into advertising it more widely. We believe the user forum has the potential to be an important aspect of user support.

Observatory Science Operations
- *Shared Services*

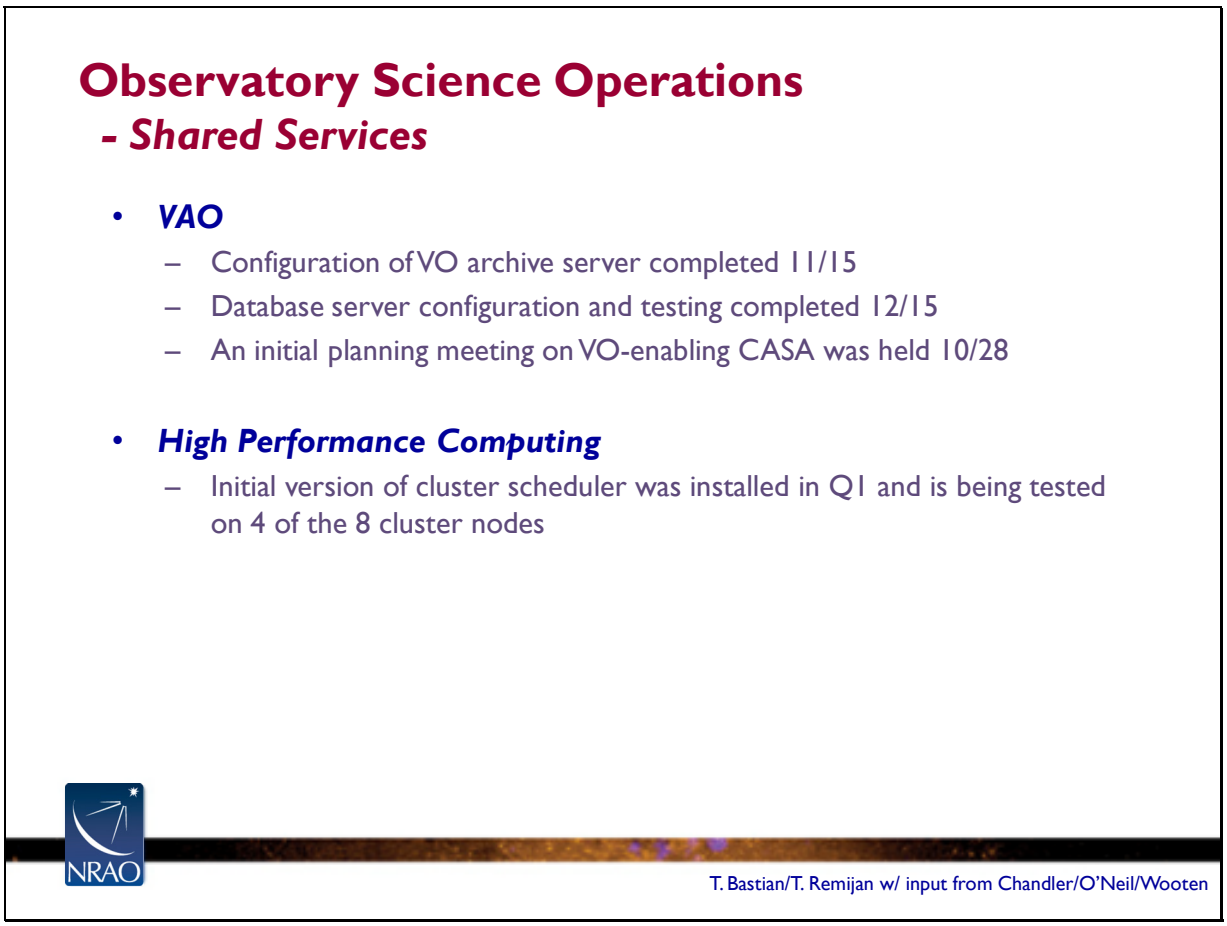
- ***Science Community Communications***
  - Represent at AAS, IAU, and AAAS meetings [Q2, Q3, Q4]
    - Prepared NRAO presence & support materials for AAS Jan 2012 meeting
    - ALMA Special Session proposal for AAS Jun 2012 meeting accepted
  - Represent at the International Conference for High Performance Computing, Networking, Storage and Analysis
    - NRAO participated in SC11 in Seattle WA, November 14-17th, 2011
- ***Science Web***
  - Improved Plone Content Management System implementation
  - Created new content to support NRAO AAS meeting events
    - Town Hall, ALMA Special Session, NRAO Splinter Session
  - Created Surveys pages/content

T. Bastian/T. Remijan w/ input from Chandler/O'Neil/Wooten

AAS meeting: 8-12 Jan 2012 in Austin, TX with ~2900 attendees. NRAO special events included our re-designed exhibit, an NRAO Town Hall, ALMA Special Session, and NRAO Splinter Session (Proposing to Use the NRAO Telescopes). New support materials included on-line content, 2012 NRAO Research Facilities brochures, 2GB flash drives with pre-loaded content, and the 2012 NRAO Calendar. **AAS meeting: 10-14 Jun 2012 in Anchorage, AK.** ALMA Special Session will discuss Cycle 0 Early Science results and the Cycle 1 proposal opportunities. Speakers will include NAASC scientists and members of the community.

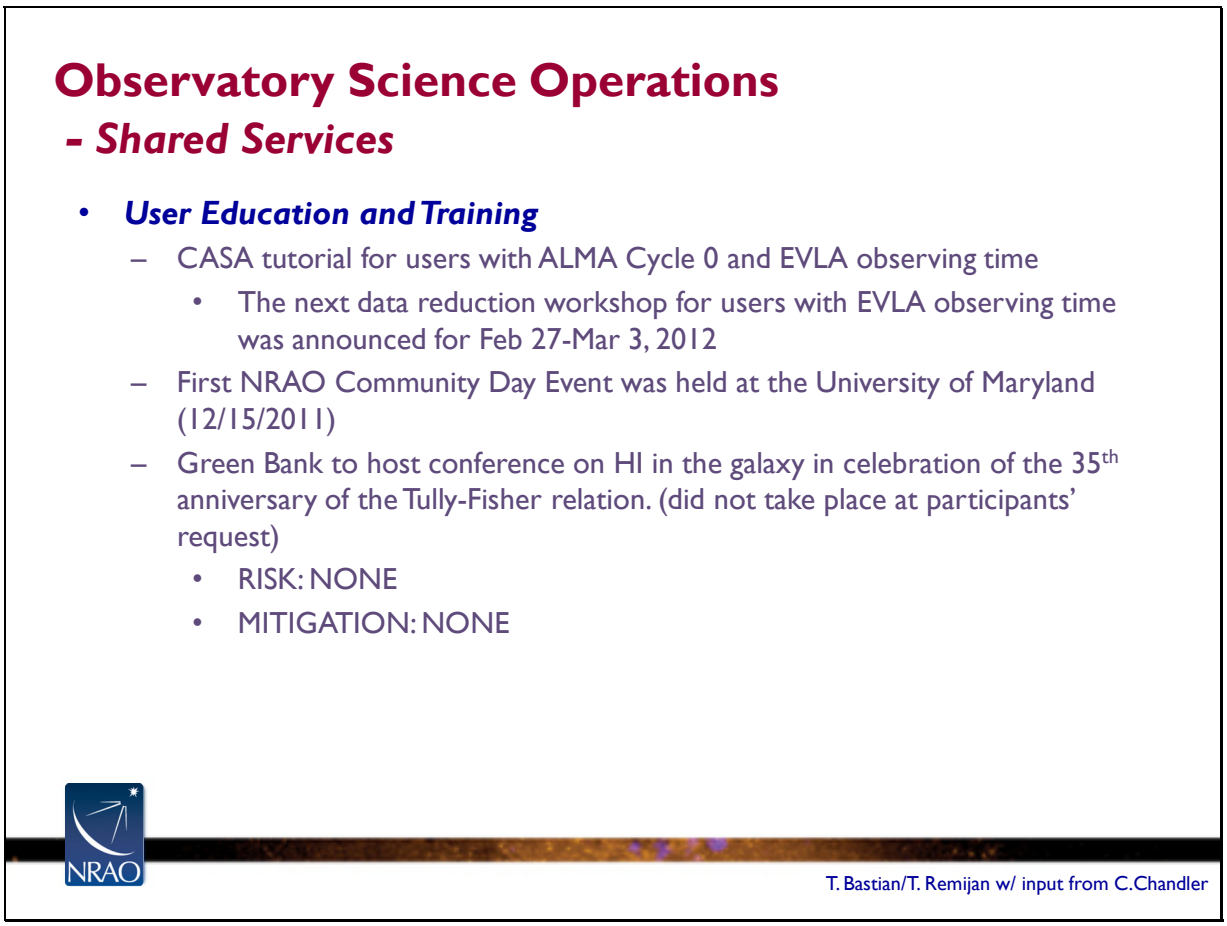
International Conference for High Performance Computing, Networking, Storage, and Analysis (SC11): 14-17 Nov 2011 in Seattle, WA, with ~ 11,000 attendees. Collaboration with Computing & Information Systems (CIS). Re-designed NRAO exhibit to feature the appropriate focus (high performance computing) and available smaller (10 x 10 ft) space. A key collaboration was initiated with Pittsburgh Supercomputing Center to facilitate the 10Gigabit Network link from Green Bank planned for this spring, and the sponsorship and support of the "Chemistry of the Universe" proposal to NSF under the interdisciplinary CRATIV initiative. We also met with HPC vendors for storage, network and systems, as well as the NSF/XSEDE program coordinator to secure storage for the to the on-going 350MHz celestial cap Pulsar search archive hosted at NCSA.

Improvements continued to the NRAO science web including the overall recasting of the site into the **Plone content management system**. In addition, new content was created to support **NRAO meeting events and to collect information via online surveys**.



Special servers needed to support the **VAO "ObsTAP-powered data discovery" initiative were installed** and configured during Q1, and **testing of the database server configuration was completed**. Testing of automated archive database mirroring continues, after which we will turn on automated mirroring of the DSOC facility archive (thus providing VO with its own copy of the archive DBMS). The effort to **VO-enable CASA, part of the VAO Desktop Integration science initiative, is in the planning stages**.

The **initial version of the cluster scheduler is in place and being tested** on 4 of the 8 cluster nodes. It supports the assignment of a single node or nodes to a user for interactive use for a specified time period, and script submission. As we obtain experience with how users interact with the cluster through the scheduler this will be expanded to include public workstations, and will be updated to handle more complex scheduling to ensure time-critical reductions are suitably prioritized.



The reaction to the first EVLA data reduction workshop held from September 14-16, 2011 was overwhelmingly positive. The focus of the workshop was to go through detailed hands-on tutorials involving several types of EVLA data highlighting a number of challenging cases. In addition, one ALMA tutorial was available. Several talks were offered concentrating on areas of active study and development such as wideband wide field imaging and automatic RFI detection and excision. There were 39 participants, of which 30 came from outside NRAO. As such, EVLA staff at the ASC announced **the second of these workshops for Feb 27-Mar 3, 2012 at the ASC in Socorro**.

NRAO planned two community day events with **the first hosted by the University of Maryland on December 15, 2011**. The second will be hosted by UC Berkeley on January 13, 2012 (Q2). The goal of the NRAO wide events is to showcase the NRAO instruments and provide information on how to propose and observe with ALMA, EVLA, VLBA, and GBT. These single day events consist of an overview of the capabilities of each of our instruments, and give a presentation on considerations for a successful NRAO proposal. In the afternoon, there was an opportunity for hands-on experience with the various observation preparation tools and with the post-processing system CASA. Feedback, collected at the end of the day, was overwhelmingly positive, and will serve us as useful input for the next community day planned for January 13, 2012, at UC Berkeley.

The Green Bank workshop in celebration of the 35th anniversary of the Tully-Fisher relation did not take place in Q1 FY12 at participants' request and will be rescheduled at a later date. There was no risk involved of not having this event in Q1 FY12.

Observatory Science Operations

- *Facility-based Specific Milestones - Array Science Center (ASC)*

- ***Pipelines***
  - Pipeline data products to be made generally available through the AAT
    - Prototype EVLA CASA pipeline modified to handle EVLA D-configuration data
    - Primary work was completed on the VLBA Pipeline. VLBA pipeline data products were deposited into the NRAO archive

- ***Post Processing software***
  - CASA 4th public release (version 3.3.0) was distributed on 11/15/2011

T. Bastian/T. Remijan w/ input from C. Chandler

The **prototype pipeline was tested on EVLA D-configuration and B-configuration data with 2 GHz bandwidth in November 2011**. The pipeline worked well for the B-configuration data, but demonstrated the particular challenge of automating the flagging of RFI in the D-configuration. The development and testing of flagging heuristics will be a particular focus in the next quarter, as will the ongoing alignment of the EVLA and ALMA pipeline infrastructure. Work started in Q4 FY10 on providing a VLBA pipeline to the user community which would produce pipelined VLBA data products for insertion into the NRAO archive. The data sets produced by the Mojave project were used to test the prototype pipeline through the end of FY11. This is a large project consisting of roughly 120 observing runs producing approximately 3000 images. The Mojave project images are available publicly which made the comparison to the pipeline products very easy. In Q1 **FY12, primary work was completed on the VLBA pipeline and data products have been returned to the NRAO archive.** Internal testing of the pipeline is taking place in Q2 FY12 with other VLBA datasets.

The release of CASA version 3.3.0 took place on November 15, 2011. To date it has been downloaded ~1500 times, similar to version 3.2.0. Version 3.3.0 contains some parallelized tasks, but full parallelization of the CASA is still undergoing testing.

Observatory Science Operations
- Facility-based Specific Milestones - ASC

- ***Algorithm Development***
  - A software framework for combined wide-band wide-field post-processing was developed during Q1 and is now in use for R&D
  - Combined MS-MFS and A-Projection algorithm testing in progress.

- ***Face-to-face visitor support***
  - During Q1 the DSOC supported 20 scientific visitors, 7 of which were participants in the RSRO program; we also hosted a visit of a group of 14 from the UVa Astronomy Department.

T. Bastian/T. Remijan w/ input from C. Chandler

The **combined wide-band A-Projection algorithm** (to account for the frequency dependence of the antenna primary beam) and the MS-MFS algorithm (to account for the spectral index variations of the sky emission) was implemented in the new software framework during Q1. However, **numerical testing revealed problems (numerical instabilities, slow convergence), and we are now investigating other promising methods**. An intermediate solution that will be applicable to up to the half-power point of the primary beam is also being developed.

NRAO-NM hosted a number of visitors during Q1, ranging from an undergraduate astronomy class from the University of Virginia, scientists visiting to reduce their EVLA and VLBA data using NRAO facilities, and participants in the Resident Shared Risk Observing program.

Observatory Science Operations
- Facility-based Specific Milestones GB

- ***Pipelines***
  - Jim Braatz named Project Scientist for GBT pipelines
  - Tests continued on existing KFPA pipeline

- ***Post Processing software***
  - Work progressed on GBTIDL and SDFITS in preparation for VEGAS

T. Bastian/T. Remijan w/ input from K. O'Neil

For the post processing software, work continued on **enhancing both SDFITS and GBTIDL in anticipation for the new VEGAS spectrometer** that was delivered 12/12/2011. For the pipeline efforts, **Jim Braatz was named project scientist**. This last quarter was largely spent **assessing the performance of the KFPA pipeline and charting a course forward**. KFPA has been reasserted as a pipeline priority, although we are actively pursuing other use cases with input from scientists inside and outside of NRAO.

Observatory Science Operations
- Facility-based Specific Milestones NAASC

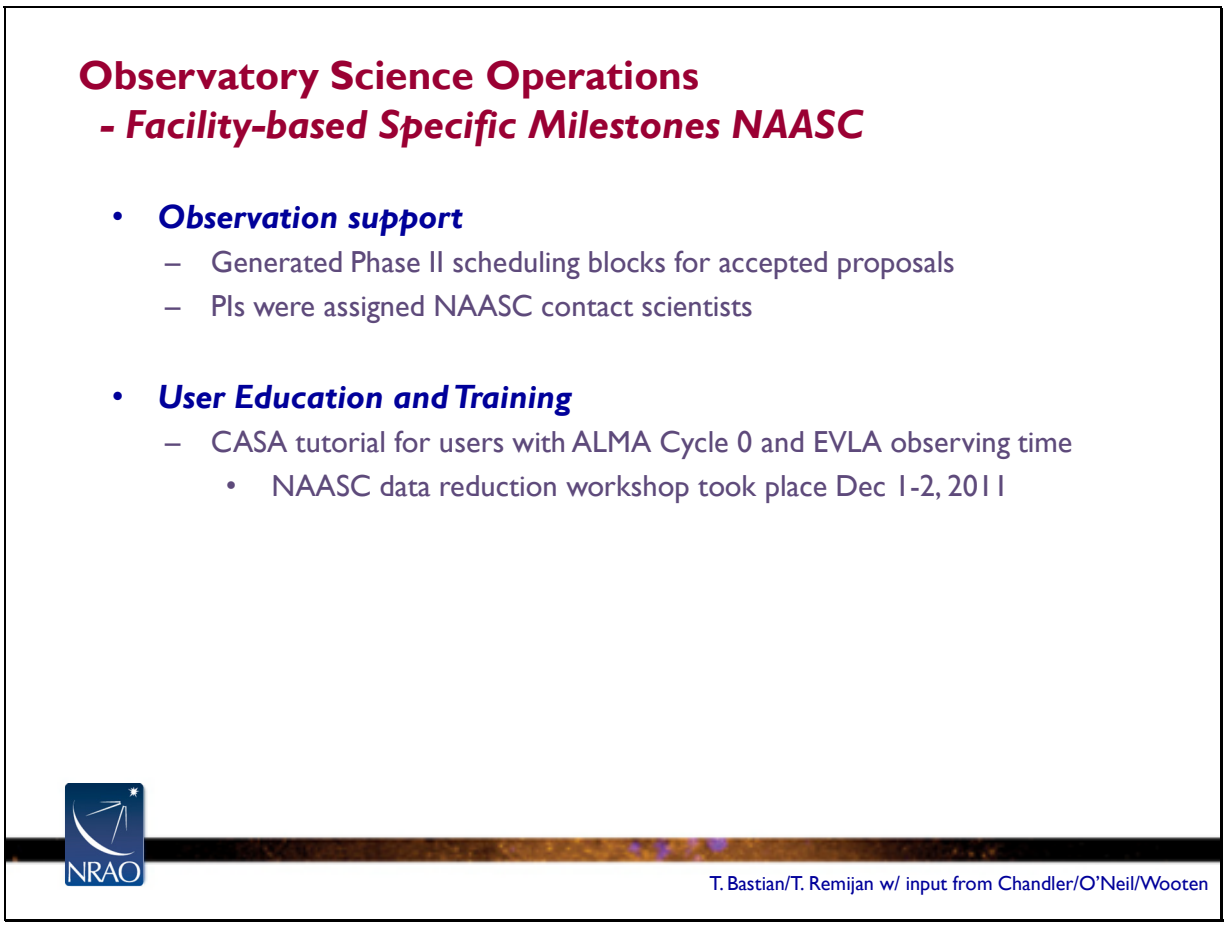
- ***Archive/Data Access***
  - Successfully completed the testing of bulk archive data mirroring and metadata replication

- ***High Performance Computing***
  - First Early Science data products have been mirrored to the NAASC
  - Increased capacity to 24 systems (288 cores, 567 GBs of RAM)
  - A 100 GB Lustre file system was implemented with a node scheduling system

T. Bastian/T. Remijan w/ input from A. Wooten

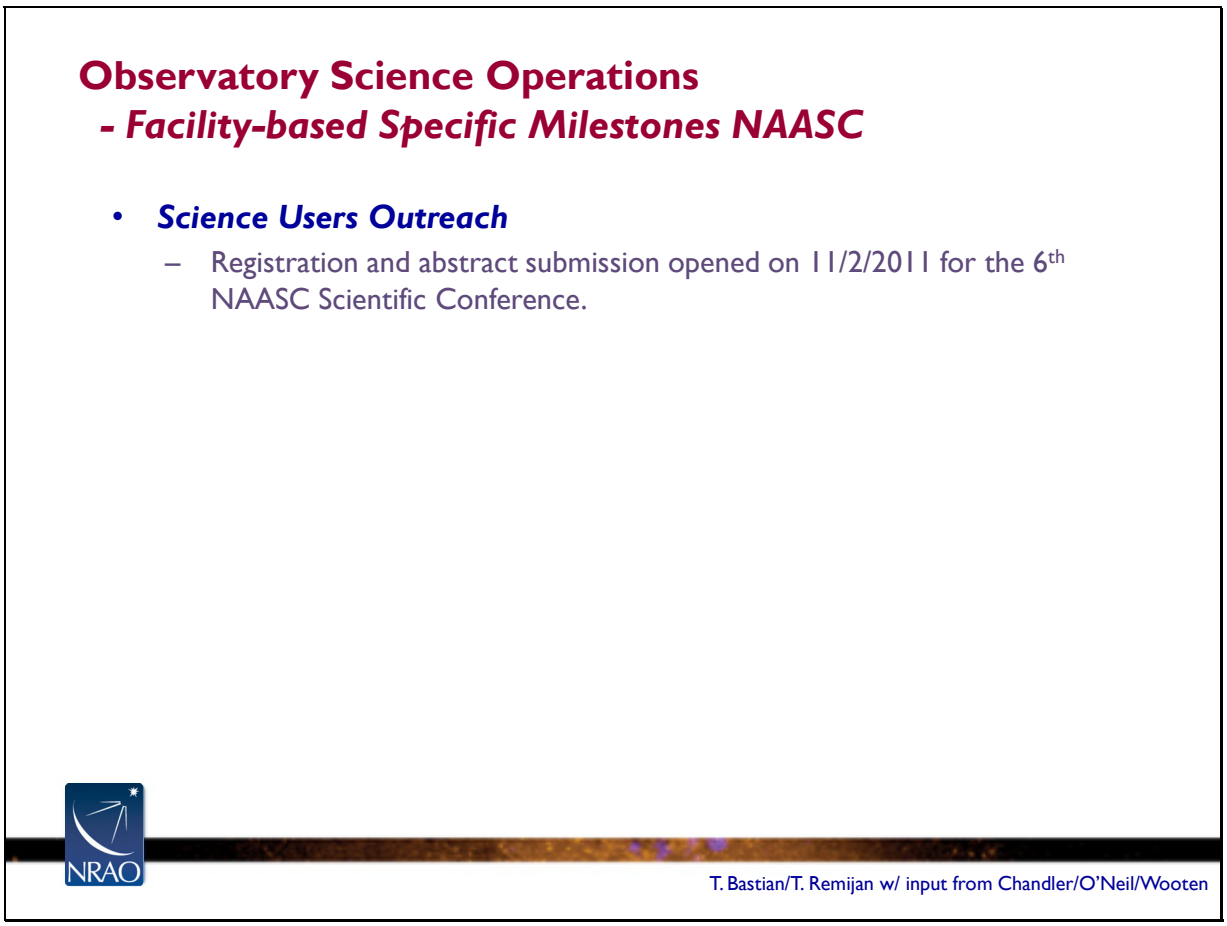
The first packages of ALMA Early Science data were delivered to Principal Investigators (PIs) in the ALMA partner regions in early December. Observations from five blocks of Early Science observing time were also complete and the first batch 1 **Early Science data product** for an approved ALMA project were delivered to the NAASC and distributed by a secure site to the PI. Overall, the NAASC successfully completed the testing of **bulk archive data mirroring** and the metadata replication from Santiago to the NAASC; designed and implemented a secure on-line distribution mechanism for PI data access using ALMA credentials; installed archive query and extraction tool for Data Analyst use and PI support and successfully evaluated 100Mega bit/second test network to Chile.

The NAASC HPC systems was increased to **24 systems** with a total of 288 cores and 567GigaBytes of RAM. In addition, a **100GigaByte Lustre** parallel file system for shared compute cluster and desktop access was implemented along with a node scheduling system and thin client access for the December CASA data processing workshop.

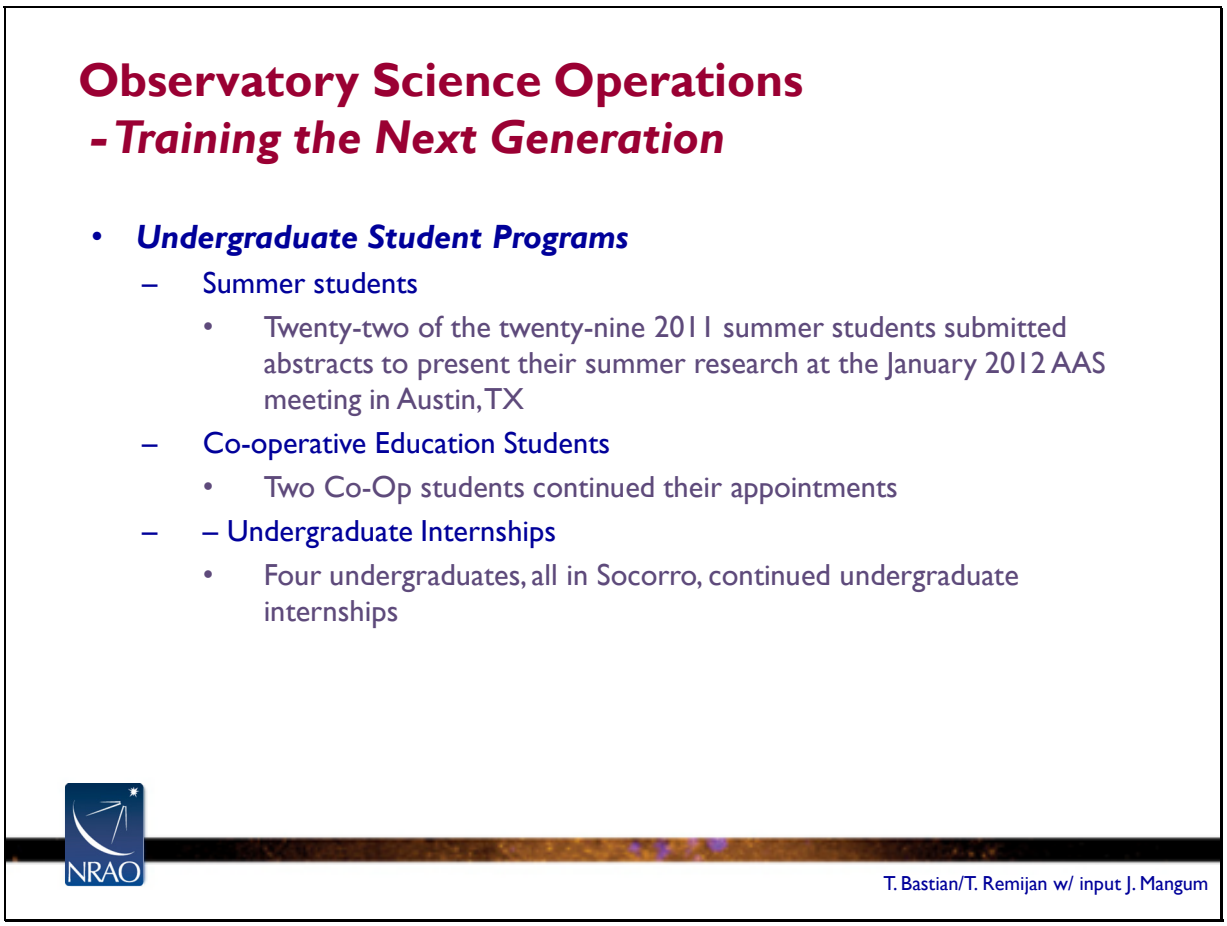


Given the complexity of the observing setup preparation of ALMA early science projects, select NAASC staff took part in extensive training sessions in Chile for the generation of the Phase II scheduling blocks for ALMA projects. These NAASC staff then became part of **the Phase II Group (P2G) which generated 29 scheduling blocks for all the highest priority projects. Each PI on an ALMA approved project was then assigned a contact scientist at the NAASC (19 contact scientists assigned)** who would review the observing setup and procedure with them. Contact made to the PIs from the NAASC staff took place through the ALMA helpdesk. After approval from the PI, the scheduling blocks were submitted to the archive for scheduling.

The NAASC invited investigators from the highest rated North American Community ALMA Cycle 0 programs to a **Data Reduction Workshop in Charlottesville from December 1-2, 2011.** The NAASC User Services Group organized the Workshop, NRAO Computing staff outfitted the Edgemont Road auditorium with terminals and 29 visiting investigators used the new NAASC data reduction cluster to work through training material built around ALMA science verification data. NAASC staff presented background material on ALMA and the CASA software package to the local attendees and several remote participants. Then the local attendees worked hands-on with actual ALMA data sets, learning how to use CASA for calibration, imaging, and self-calibration. During the hands on sessions, NAASC staff provided one on one assistance.



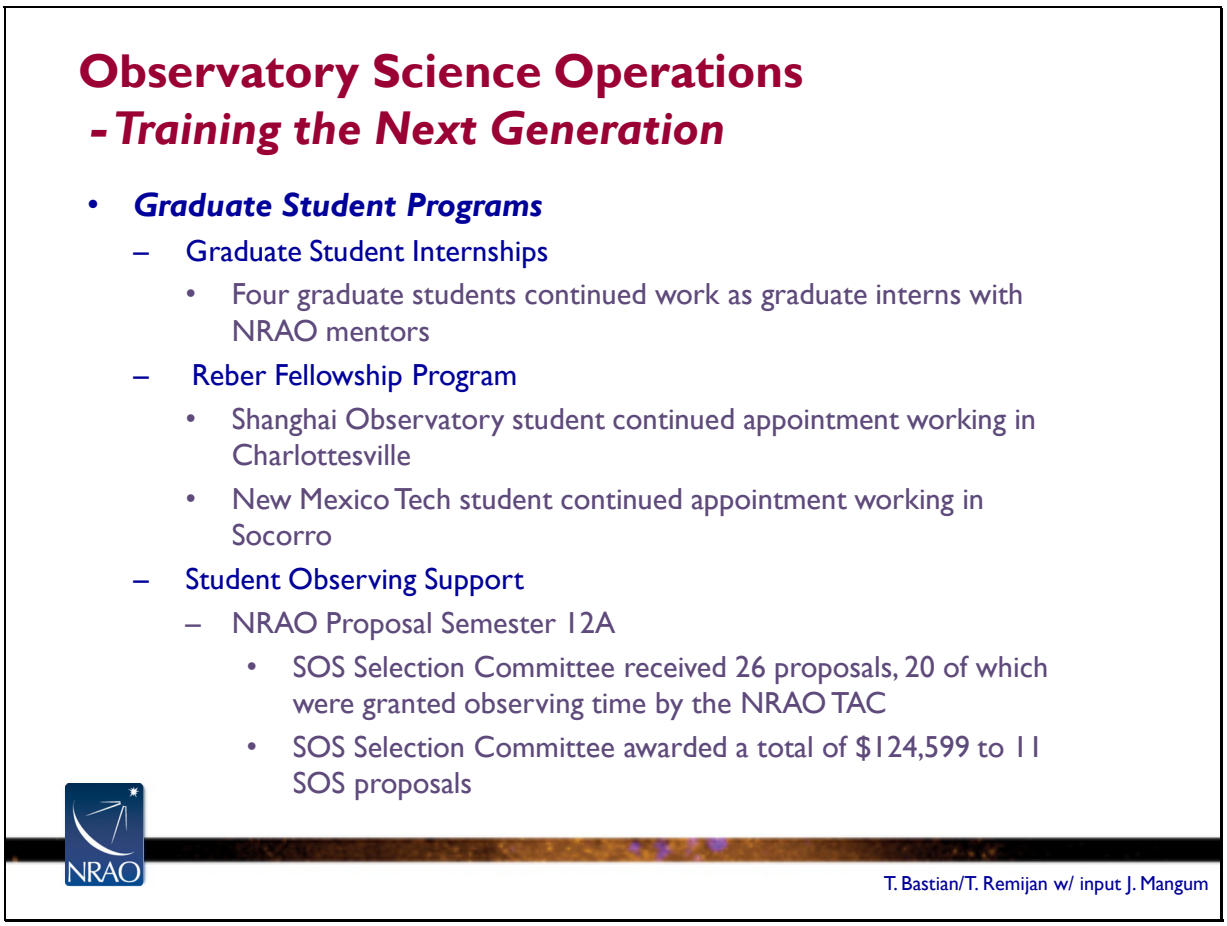
In preparation for the 6th NAASC meeting to be held in Charlottesville VA from March 3-6, 2012 entitled "Outflows, Winds & Jets: from Young Stars to Super-massive Black Holes", **registration and abstract submission was opened on 11/2/2011.** By the end of Q1 FY12, over 65 abstracts were submitted from the community and over 80 attendees have fully registered for the meeting. This workshop is an exciting opportunity to bring together active researchers interested in outflow-bearing systems spanning a wide range of mass and size scales for a refreshing view of the spectacular phenomena and will highlight the new capabilities of all new and upgraded NRAO facilities.



Summer Student Program: Twenty nine undergraduate and graduate students completed appointments as 2011 **summer students**. For more information on the program go to http://science.nrao.edu/opportunities/summerstudents.shtml.

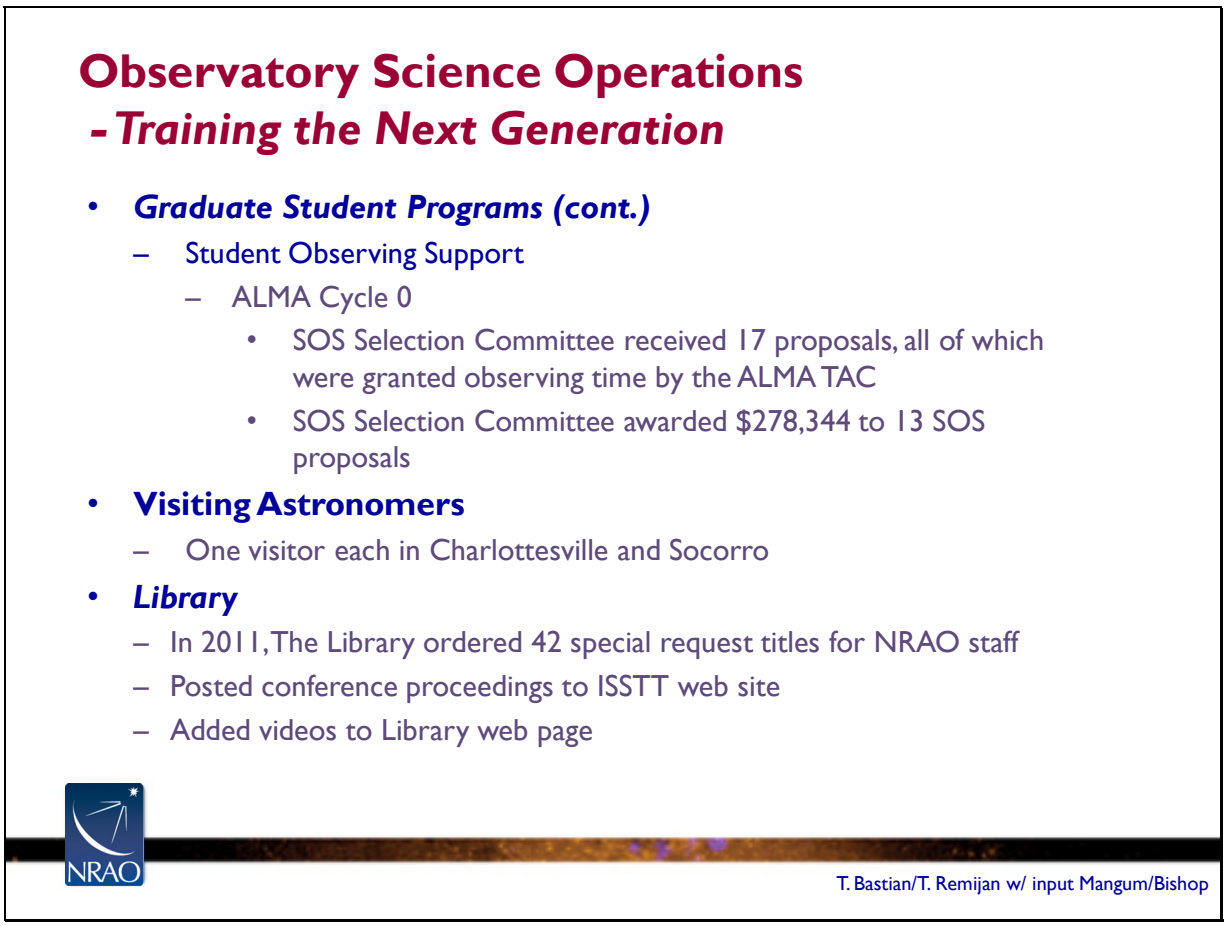
Co-Op: One **Co-Op student** continued their appointments: Utkarsh Sinha (SO)

Undergraduate Interns: Five undergraduates (SO: 4) continued undergraduate internships working in the Electronics Division in Socorro: Natalie Kane, Deepak Rai, Orlando Lopez, and Loren Good (all SO).



Graduate Interns: Four graduate students began or continued work as **graduate interns** with NRAO mentors. *Paul Ries (UVA)* is working with Todd Hunter on studying the long-wavelength characteristics of TNOs; Srikanth Bussa *(University of Akron)* is working with John Ford on research in digital signal process for the Green Bank telescopes; *Dana Ficut-Vicas (University of Hertfordshire)* continued her project working with Michael Rupen on the Little Things project; *Wendy Williams (Leiden Observatory)* worked with Huib Intema in Charlottesville on the reduction of 153 MHz GMRT data of the NOAO Bootes field.

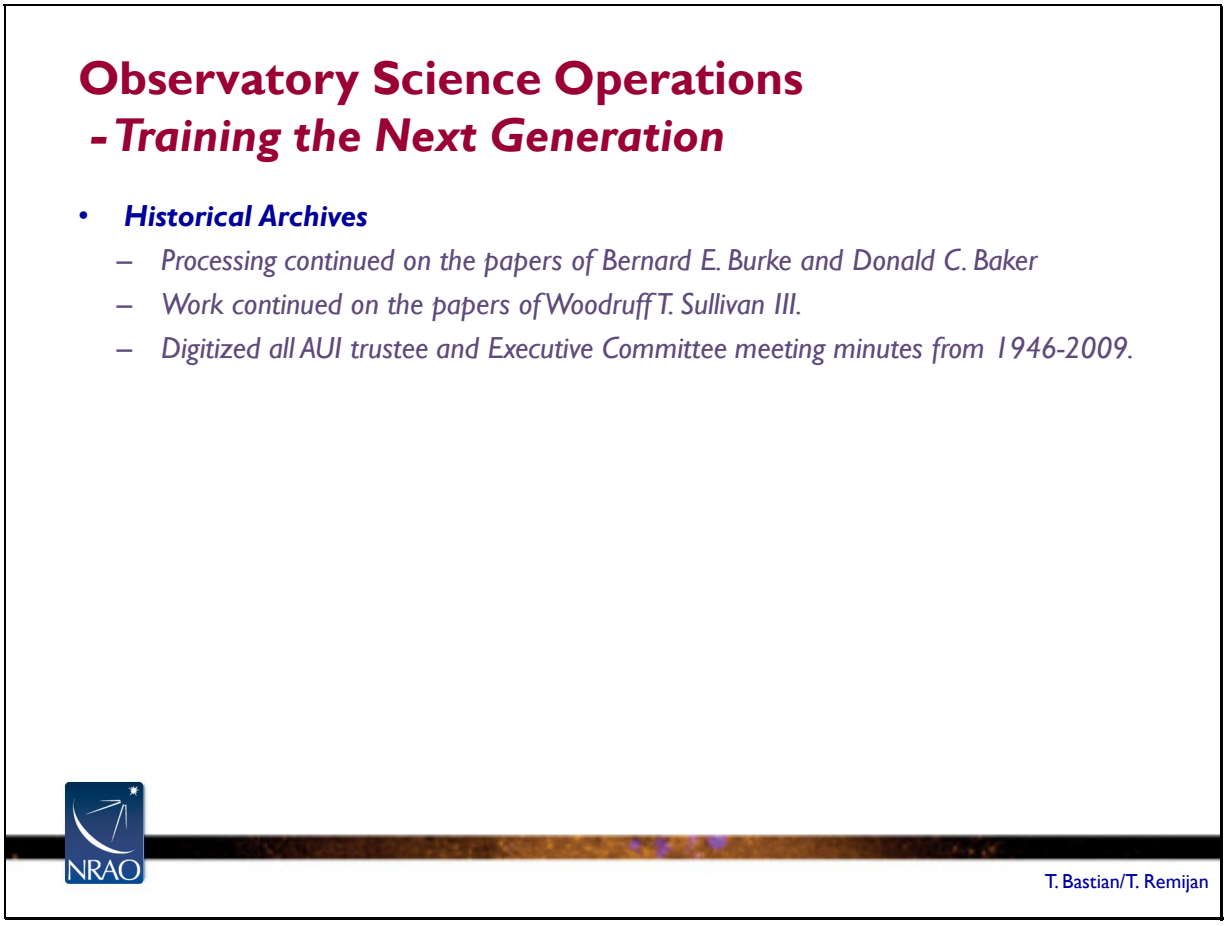
Pre-Docs: Two graduate students participated in the Reber Doctoral Fellowship (formerly the Pre-Doctoral) program. *Feng Gao (Shanghai Observatory)* continued his PhD research working w/ Jim Braatz in Charlottesville on reducing and analyzing VLBI observations of water maser emission from galactic nuclei as part of the Megamaser Cosmology Project; and *Josh Marvil* continued his appointment as a Reber Fellow this quarter working with Fraser Owen.



SOS Awards: The SOS committee recommended funding a total of **$124,599 to 11 of the 26 proposals submitted (only 20 of which were allocated observing time and considered for SOS funding)** this period. Information on the SOS Program can be found at *http://science.nrao.edu/opportunities/sos.shtml*.

Visiting Astronomers: There were three visiting astronomers this quarter. Giulia Macario of Instituto di Radioastronomia in Bologna visited NRAO CV for two weeks in September 2011. Andreas Brunthaler from MPIfR began a one-year visit to NRAO SOC which began in June 2011.

Library: In 2011, the **NRAO Library ordered 42 special request titles for NRAO staff**, saving $746.12 (an average of $17.76. per title) on these by purchasing gently used volumes or shopping less expensive vendors. The 22nd International Symposium on Space Terahertz Technology (ISSTT) **conference proceedings were received and posted** to the ISSTT web site (maintained by the NRAO Library) located at http://www.nrao.edu/meetings/isstt/index.shtml. The NRAO Library **continues to add videos to the Library Web page**; at present we have 13 posted (12 of which are Jansky Lectures).



Processing continued on the Papers of Bernard E. Burke and on the Papers of Donald C. Backer. Work continued on the Papers of Woodruff T. Sullivan III, primarily focused on seeking addresses for interviewees or next of kin so as to obtain permissions for researchers to access the oral interviews conducted by Sullivan. Arthur M. Shalloway donated to the Archives a small group of papers related to his work building correlators at NRAO, and processing was completed on those papers. Additional VLBA materials were received from Kenneth I. Kellermann.

A long term AUI project to digitize all AUI Trustee and Executive Committee meeting minutes, 1946-2009, was completed in this quarter. Although the project, begun in summer 2010, was funded by AUI and not done by Archives staff, direct supervision of the project was provided by the Archivist. The digitized documents are solely for AUI use, not for the Archives.

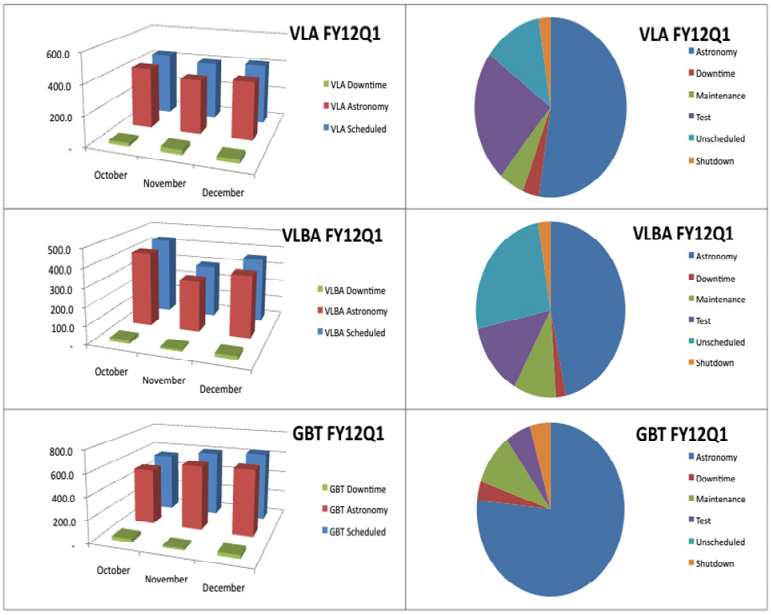
Finding aids for the Archives collection and the Archives online catalog are linked from the NRAO Archives home page, http://www.nrao.edu/archives/

Observatory Science Operations

- Telescope Utilization (Astronomy, Downtime, Maintenance, Test/Calibration, Unscheduled)

Q1 FY12

			October	November	December
	Available Hours		744.0	720.0	744.0
	VLA FY12Q1	Q1	October	November	December
VLA	Scheduled	1,735.6	431.6	394.0	410.0
	Astronomy	*1,158.4*	*410.0*	*363.7*	*384.7*
	Downtime	*77.2*	*21.6*	*30.3*	*25.3*
	Maintenance	118.3	38.3	43.4	36.6
	Test	526.8	204.1	167.1	155.6
	Unscheduled	271.3	70.0	91.5	109.8
	Shutdown	56.0	-	24.0	32.0
	Total Hours	2,208.0	744.0	720.0	744.0
	VLBA FY12Q1	Q1	October	November	December
VLBA	Scheduled	1,079.8	429.3	291.7	358.8
	Astronomy	*1,031.9*	*410.4*	*282.1*	*339.4*
	Downtime	*47.9*	*18.9*	*9.6*	*19.4*
	Maintenance	201.8	57.0	57.0	87.8
	Test	297.4	73.0	141.2	83.2
	Unscheduled	569.0	184.7	206.1	178.2
	Shutdown	60.0	-	24.0	36.0
	Total Hours	2,208.0	744.0	720.0	744.0
	GBT FY12Q1	Q1	October	November	December
GBT	Scheduled	1,771.6	540.5	602.3	628.8
	Astronomy	*1,692.1*	*509.8*	*585.8*	*596.5*
	Downtime	*79.5*	*30.7*	*16.5*	*32.3*
	Maintenance	212.0	93.5	61.5	57.0
	Test	124.4	82.0	20.2	22.2
	Unscheduled	-	-	-	-
	Shutdown	100.0	28.0	36.0	36.0
	Total Hours	2,208.0	744.0	720.0	744.0



NRAO

G. Hunt

Scheduled = planned observing time.

Astronomy = amount of observing hours that concluded

Downtime = amount of hours lost during observing

Maintenance = scheduled period for technicians to service. Observing time is not scheduled during this time. This time is considered 'protected' and is not interrupted for targets of observing opportunity.

Unscheduled = time that went idle (unplanned); for example, for VLBA if no media was available or due to the 10 weather environments and the tiger team visits; for VLA if no dynamic project fit; for all telescopes = holiday.

Downtime = faults that occur during a planned observation; e.g., circuit breaker fault, fraction of array unavailable, etc.

Notes: All month-to-month variations are within the standard distribution

Except: For the VLA, there is a trend to increased astronomical observing following the shutdown in Jan/Feb 2010. There is still a large allocation for test time due to EVLA commissioning.

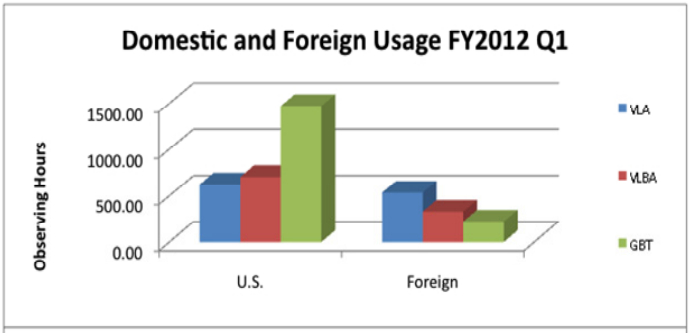
For the VLBA, there is also a large allocation of test time to commission the wideband capabilities.

For the GBT, there is lower observing time in the summer months for maintenance during the period when the conditions are not ideal for high frequency observing. The downtime for June is for painting of the GBT structure. The telescope was shut down overnight between painting sessions. The total loss of observing time will be lower than previously.

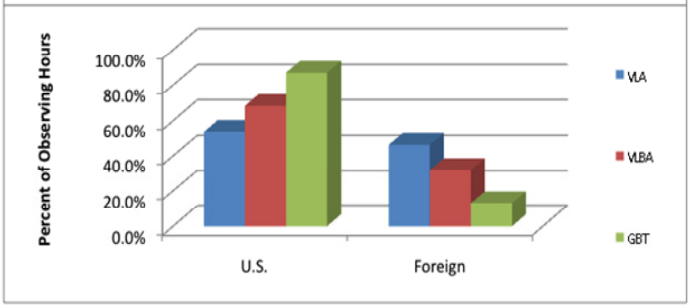
Observatory Science Operations

- *Telescope Usage by Observing Hours Expended in terms of*
- *US/Foreign Observers*

	U.S.	Foreign	Unspecified
VLA	623.23	535.16	0.00
VLBA	703.31	328.55	0.00
GBT	1472.00	220.00	0.00



	U.S.	Foreign	Unspecified
VLA	53.8%	46.2%	0.0%
VLBA	68.2%	31.8%	0.0%
GBT	87.0%	13.0%	0.0%



NRAO

G. Hunt

All metrics are compiled by principal investigator, not project team.

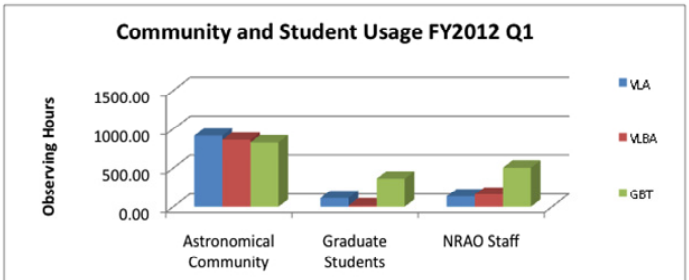
Top graph is in **observing hours**.
Bottom graph is in **% of observing hours.**

There is no systematic variation from previous periods.

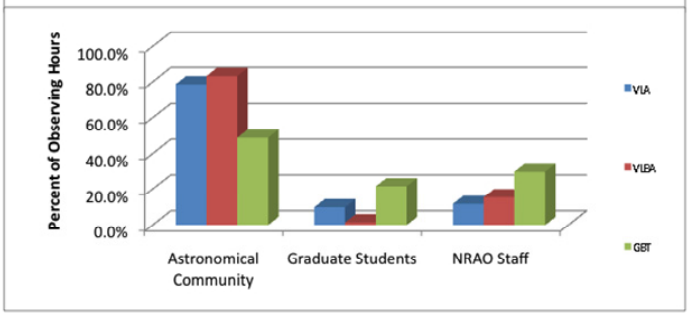
Observatory Science Operations

- Telescope Usage by Observing Hours Expended in terms of - Astronomical Community/Graduate Students/NRAO Staff

	Astronomical Community	Graduate Students	NRAO Staff
VLA	911.48	112.90	134.01
VLBA	858.34	15.30	158.22
GBT	824.25	364.50	503.25



	Astronomical Community	Graduate Students	NRAO Staff
VLA	78.7%	9.7%	11.6%
VLBA	83.2%	1.5%	15.3%
GBT	48.7%	21.5%	29.7%



G. Hunt

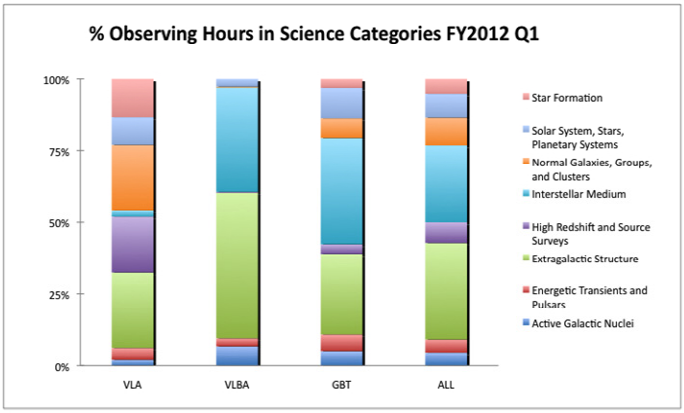
All metrics are compiled by principal investigator, not project team.

Top graph is in **observing hours**.
Bottom graph is in **% of observing hours.**

There is no systematic variation from previous periods.

Observatory Science Operations
- *Telescope Usage by Science Category*

	GBT	VLA	VLBA
Active Galactic Nuclei	5.1%	1.9%	6.7%
Energetic Transients and Pulsars	5.6%	4.3%	2.7%
Extragalactic Structure	28.2%	26.3%	50.8%
High Redshift and Source Surveys	3.3%	19.4%	0.2%
Interstellar Medium	37.3%	2.3%	36.8%
Normal Galaxies, Groups, and Clusters	6.6%	22.7%	0.1%
Solar System, Stars, Planetary Systems	10.8%	9.6%	2.6%
Star Formation	3.0%	13.5%	0.0%
Unspecified	0.0%	0.0%	0.0%



NRAO

G. Hunt

This information is obtained from the observing summaries by referencing the categories which are stored in the Proposal Submission Tool (PST). These categories are assigned in the proposal submission and evaluation process. There are 8 distinct categories, reflected in the chart.

These categories were redefined starting with the Feb 1, 2011 proposal cycle.

Previously, proposers were allowed to choose to apportion their projects between several of the 5 earlier categories. With this report, proposals evaluated on the old system have been re-apportioned to fit into the new categories.

There is no systematic variation from previous periods.

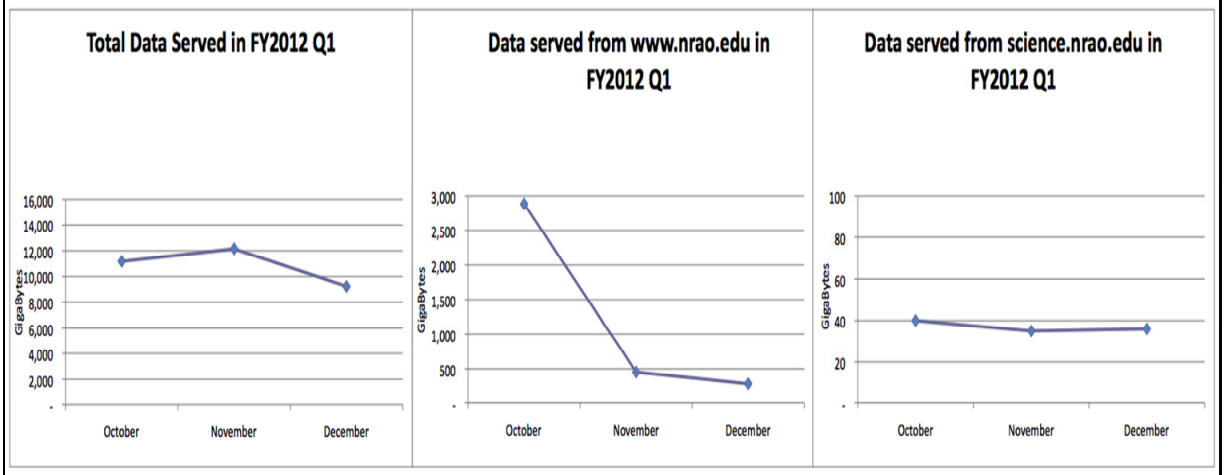
Observatory Science Operations
- *Proposals Submitted during Reporting Period*

None.

Proposals were on a four-month cycle (October 1, February 1, June 1). This changed to a six-month cycle (February 1, August 1) in FY2011, beginning with Feb 1 2011.

There was thus no call for proposals during this reporting period.

Observatory Science Operations
- Data Served during Reporting Period

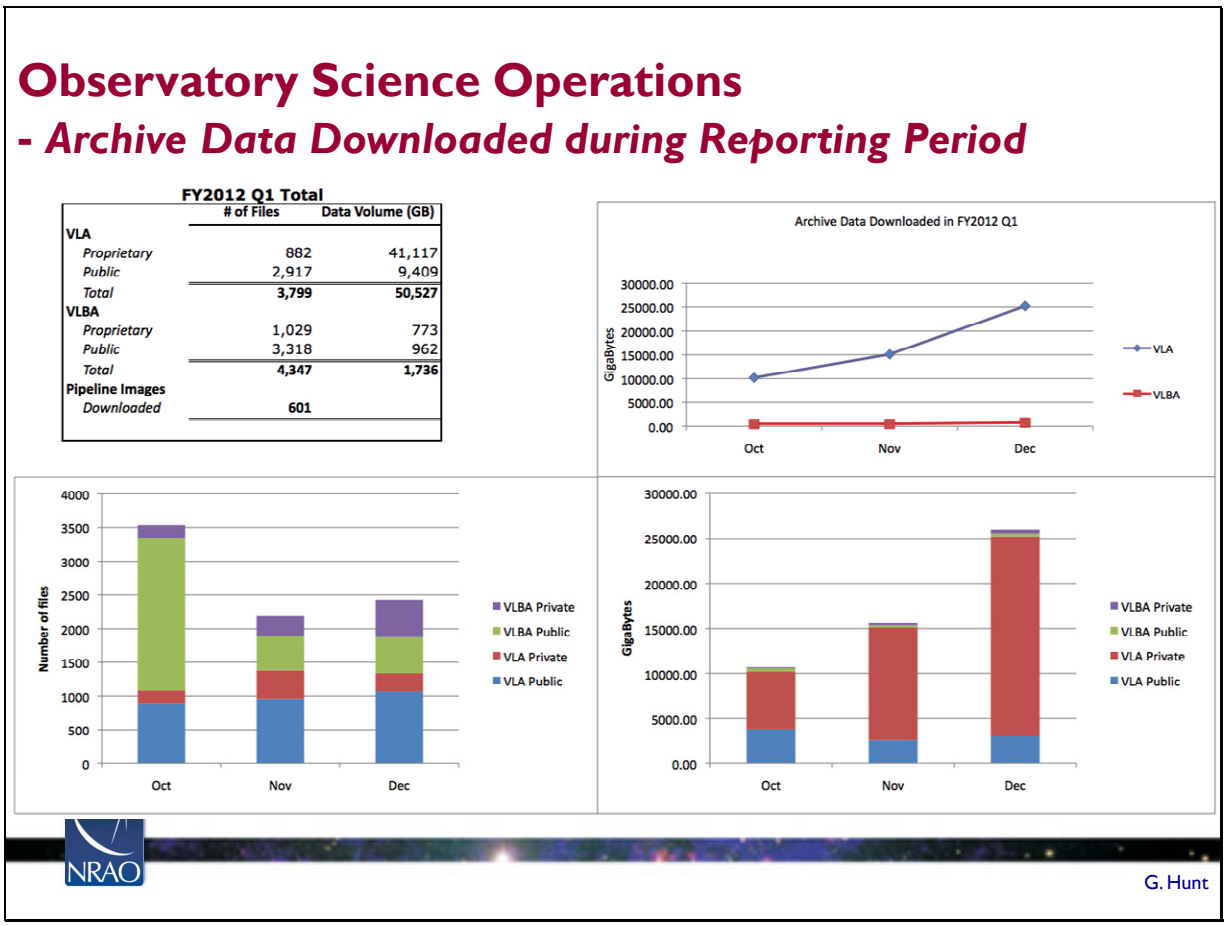


G. Hunt

Total data served from all web servers. 2&3. Specific plots for the main web site and for the science web site

The main web site provides NRAO's presence on the web. The science website is primarily in support of the observers.

The variations are within the usual distribution.



Data being observed with the EVLA using the WIDAR correlator continues to dominate the amount of data being accumulated in, and served to observers from, the data archive in Socorro.

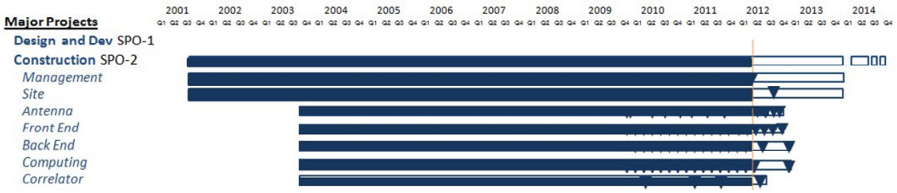
These small monthly variations are within the standard distribution and do not indicate trends.

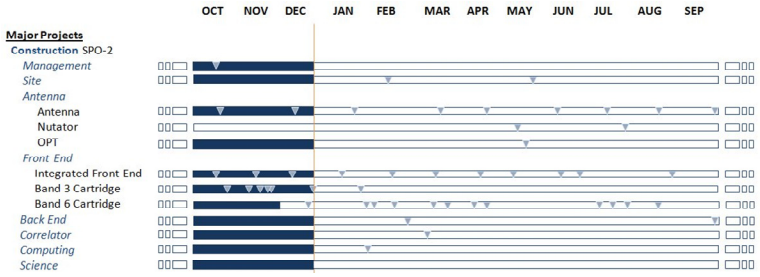
Agenda

- Science Results
- Observatory Science Operations
- Observatory Telescope Operations
  - ALMA Construction
  - EVLA Construction
  - EVLA/VLBA Operations
  - Green Bank Operations
- Observatory Development & Programs
- Broader Impact
- Observatory Administrative Services
- Director's Office

Observatory Telescope Operations
- *ALMA Construction Project Schedule View*

ALMA Major ALMA Construction Milestones



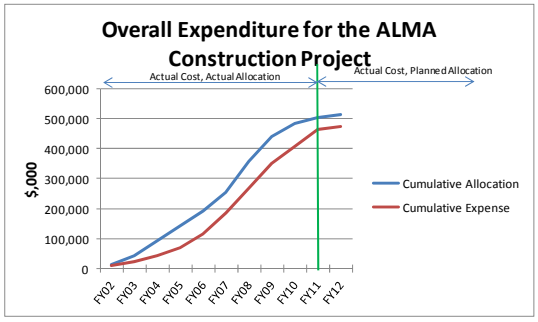


M. McKinnon/M. Pilleux

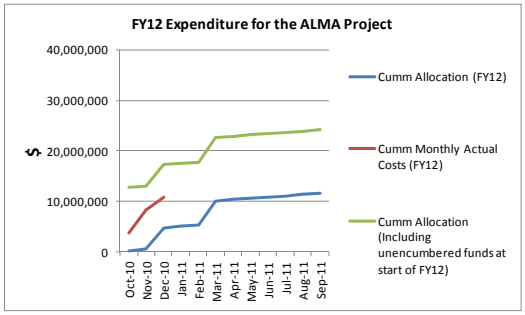
The first graph illustrates the full lifecycle. The second graph is this fiscal year view. The vertical line represents where we are today.

Observatory Telescope Operations

- ALMA Construction Financial Performance Graphs – overall & Q4 FY2011



Overall Spending for the ALMA Construction Project



FY12 Spending for the ALMA Construction Project

M. McKinnon/M. Pilleux

Both graphs show the **NSF budget allocation**. In the case of the overall plan, the cumulative allocation is the allocation actually provided by NSF up to the end of FY2011, plus the planned allocations in FY2012.

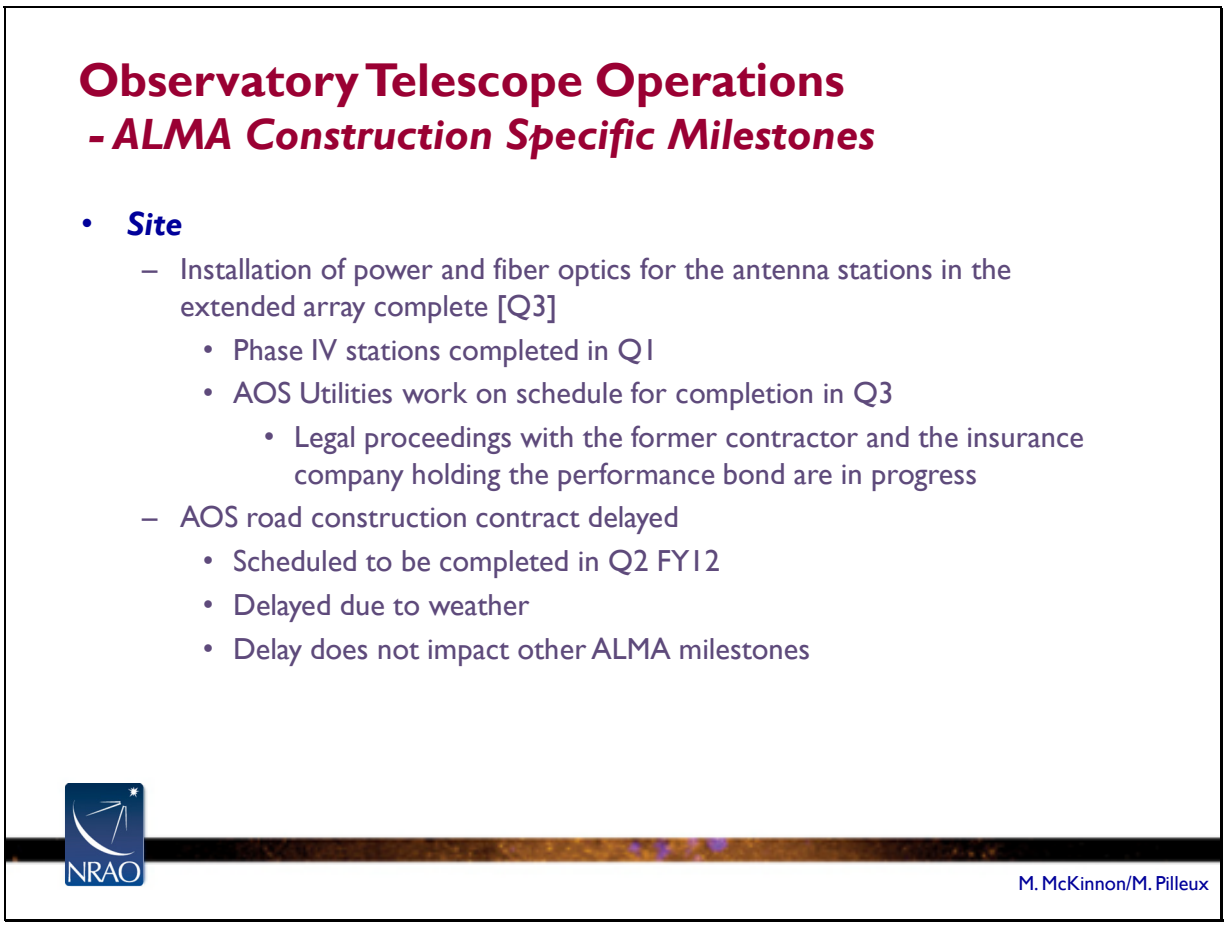
Observatory Telescope Operations
- *ALMA Construction Specific Milestones*

- ***Management***
  - Conduct Annual External Review
    - AAER held 17-20 October 2011
    - Positive feedback received

M. McKinnon/M. Pilleux

Management: The **ALMA Annual External Review (AAER)** was conducted in Santiago 17-20 October 2011. The report indicates "…*The Panel was impressed by the great progress they noted compared to the AAER-2010 visit. Early Science observations with 16 12m antennas started on 30 September 2011, meeting the target set in November 2010. This major achievement demonstrates the success of the entire chain of antenna, frontend, and receiver cartridge deliveries from many places in North America, Europe and East Asia as well as Assembly Integration and Verification (AIV) and Commissioning and Science Verification (CSV) at the JAO and science preparations at the ALMA Regional Centers (ARCs). ALMA staff at the JAO and the three Executives is to be congratulated. Their very collaborative effort has demonstrated in a very convincing manner that "ALMA works!""*

The AAER Panel recommended that ALMA must produce an updated schedule and the corresponding budget to completion, including the necessary margins and prioritization, and also develop a robust integration plan for array and facility operations and maintenance, including scenarios for the transition from construction to operations.



Site: The **AOS Utilities contract** was delayed due to the termination of the former contractor on June 30, 2010. The new contract work restarted January 3, 2011. Acceptance of the complete Central Cluster (CSV Phase IV) was completed in December 2011. The next milestone is the 5 km Array, scheduled for Q1 FY2012, which will be completed in Q2 FY2012. Bad weather at the AOS further delayed the completion of the AOS Utilities work, but the delay should not affect the overall completion of the project. The Utilities Contract work is 59% complete. Legal proceedings with the former contractor and the insurance company holding the performance bond are in progress, and first results are expected to be known during Q2 FY2012.

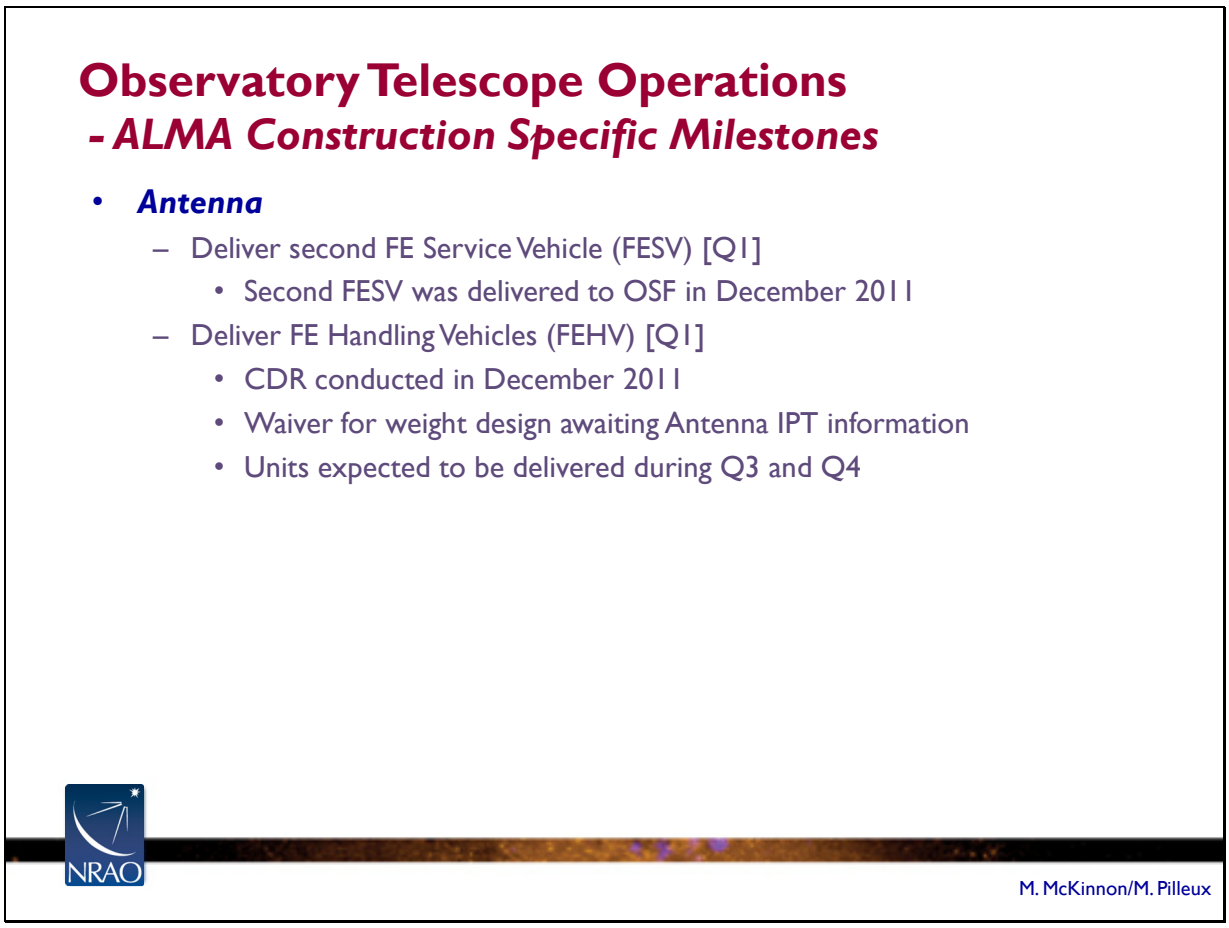
AOS road construction work is 97% complete. This contract restarted in October 2011 after the winter break. To date, all roads are already cut or filled to subgrade level and the remaining work is to achieve the final level in the subgrade and install the crushed gravel in the loading area of the antenna stations. Since this follows the progress in the AOS Utilities Contract, it is delayed due to that work. This contract is scheduled to be completed in Q2 FY2012. Inclement weather has also delayed the road completion, but this did not affect the start of Early Science in September 2011.

Observatory Telescope Operations
- *ALMA Construction Specific Milestones*

- ***Antenna***
  - Vertex antenna acceptance [Q1, Q2, Q3, Q4]
    - Vertex antenna #17 fully-accepted and delivered to the JAO (October)
    - Vertex antenna #18 fully-accepted and delivered to the JAO (December)
    - Vertex antenna #19 will be ready for acceptance in mid/late-January
  - Complete delivery of 6 OPTs [Q2]
    - Independent review of OPT isolated root cause of elevation thermal drift to large thermal input/difference; installation of new CCD camera appears to confirm this conclusion
    - To be delivered in late-Q2 FY2012 or early-Q3 FY2012
  - Deliver nutator unit #1 through #5 [Q1, Q2, Q3]
    - Optimization of control software continues to frustrate progress
    - FAT of first nutator unit now expected in late-Q2 FY2012
    - Delivery of additional 4 units through late-Q3 or early-Q4 FY2012

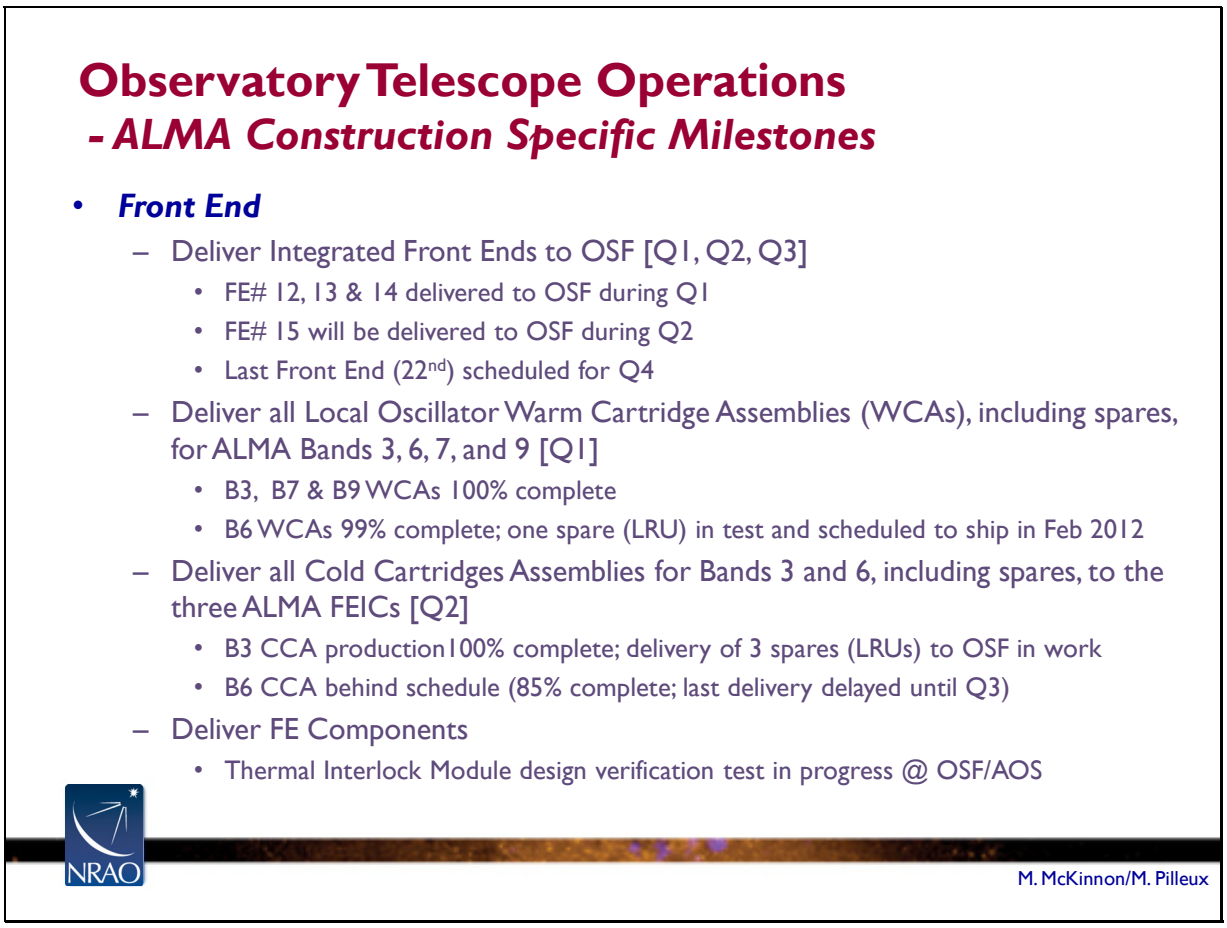
M. McKinnon/M. Pilleux

Antenna: During Q1 FY2012 the **17th and 18th Vertex antennas were fully accepted** by the JAO. Pointing acceptance testing began in December on the **19th Vertex antenna**, with the acceptance review set for mid/late-January. Integration, commissioning, and acceptance testing on the **20th Vertex antenna** is also nearing completion with acceptance of the antenna by the JAO expected Q2 FY2012. Vertex and NAAIPT continue to work with AIV to provide a high level of antenna availability. Efforts continue to concentrate on resolving issues related to encoder and tiltmeter faults. Root cause of tiltmeter faults has been identified, and vendor upgrades are underway. The root cause of encoder faults has been isolated by the vendor, but not completely resolved. Encoder tests continue. **Production OPT (POPT)**: Efforts continued on finalizing the review of the POPT Design Iteration #3 proposed by the POPT contractor. Efforts by the independent review consultant in Tucson identified thermal gradients within the POPT body as the likely cause of elevation thermal drift; a review of the preliminary report from the consultant was conducted by NAAIPT/JAO in Q1 FY2012. **POPT Unit #2** was used on Vertex Antennas #18 and #19 to study reduction of the heat introduced by the CCD camera; first by increasing the CCD cooling temperature used for observing and then by installing a new CCD camera that is specified to require less CCD cooling. These tests indicated a much improved POPT performance with elevation thermal drift almost completely eliminated from observing runs. **Risk:** Delayed delivery of the POPT potentially risks prompt delivery of EU and NA antennas. **Mitigation:** Production of new POPT units incorporating results from Antennas #18 and #19 testing is underway with delivery of first 2 POPT units expected by late Q2 FY2012. **Nutator**: Optimizing the performance of the servo control system has continued to limit progress and complete production and testing of the first Nutator unit. NRAO control engineer in **Green Bank** continues to work in tandem with Taiwan vendor engineers to resolve design issues which now concern the system amplifier and its ability to provide adequate drive/control of the system. Factory Acceptance Testing (FAT) was delayed until late Q2 FY2012. With a successful FAT, **delivery of Nutator Unit #2** to Chile would be in mid-Q3 FY2012 for on-site engineering and interface tests (PAS).



Antenna: PAS of the second (of two) **Front End Service Vehicles (FESV)** was passed at the OSF in December 2011.

CDR of the **Front End Handling Vehicle (FEHV)** was performed in December 2011. The design exceeds the specified maximum weight for the antenna platform (450 kg specified, design requires 680 kg). JAO has requested further information from Antenna IPTs regarding maximum weight allowed on the antenna platform to confirm that FEHV can proceed as designed. This information is expected during Q2. If waiver is accepted, delivery of FEHV units (4) will proceed during Q3 and Q4. Currently, the delay poses no risks as other methods exist to move FEs.



Front End: Front End Assemblies: last delivery (#22) delayed until Q4 (August 2012) due to increased test cycle time (primarily associated with removal and replacement of various non-conforming cold cartridges). Delay has been communicated and acknowledged by the JAO; no impact to overall project schedule. Additional manpower planned for the NA FEIC; cost absorbed without call on management reserve. **Local Oscillator Warm Cartridge Assemblies:** last delivery (B6 #73) delayed until Q2 (February 2012) due to increased repair and re-qualification effort (primarily associated with B3 WCAs). Delay has been communicated and acknowledged by the JAO; this last delivery is alloted to the EU FEIC and will not impede their delivery schedule as it is already behind schedule. The delay has no impact to FE manpower plan because the same staff are continuing production of NAOJ Bands 4, 8 & 10 and they will finish the final B6 WCA. **Note:** 12 Band 3 WCAs have been returned to NRAO because of locking failures. A Corrective Maintenance plan is in work to repair and requalify. The repair schedule will be planned in collaboration with the JAO. **Cold Cartridge Assemblies: Band 3** LRU deliveries scheduled for January 2012 (logistics problem associated with delayed return of shipping containers); no schedule or cost impact. **Band 6** mixer/preamp yield rate has improved and the Band 6 team has recovered schedule to the original Forecast Schedule. Final delivery (#73) scheduled for June. Last seven (7) deliveries are alloted to the EU FEIC and will not impede their delivery schedule. Additional manpower planned for the NA FEIC; cost will be absorbed without a call on management reserve. **FE Components:** All B3, B6, B7 & B9 components are 100% complete. Additional B4, B8 & B10 components requested by NAOJ to accelerate their deliveries. All additional costs will be paid by NAOJ; no schedule impact. **Thermal Interlock Module** (TIM) was a late emerging project requirement. CDMR tentatively planned for late March 2012; production will run through Q4. Additional cost already incorporated in the FE IPT cost-to-complete estimate.

Observatory Telescope Operations
- *ALMA Construction Specific Milestones*

- ***Back End***
  - Decommissioning and delivery to OSF of an Antenna Article Test Stand [Q2]
    - The Antenna Article test stand is available for shipment as planned
  - Deliver all documentation required by the Configuration Item Documentation Lists (CIDL) [Q4]
    - On schedule

- ***Correlator***
  - Reassembly at the AOS of the Correlator fourth quadrant complete [Q2]
    - The correlator passed PAI and is ready for disassembly and shipping to Chile

M. McKinnon/M. Pilleux

Back End: Production is essentially complete with the focus directed towards delivering the last spare items and subassemblies while also managing the transition into Off-site Operations support. The Antenna Article Test Stand, one of two in Socorro, is already available for shipment to the Operations Support Facility in Chile in FY12 Q2. Closeout of documentation handoff requirements are also being managed and on schedule for FY12 Q4 milestone.

Correlator: The required testing for PAI took place in FY12 Q1 and permission to ship was received. The Correlator is scheduled to be shipped to the AOS in early 2012. Subsequently, it will be reassembled and tested. Finally, all four quadrants at the AOS will be combined into one unit. We are currently considering a request from CSV to postpone the shipment by a few months to better accommodate the Early Science program. The fourth quadrant will be in near-continuous use in Charlottesville for software and firmware development and testing until the start of disassembly.

Observatory Telescope Operations
- *ALMA Construction Specific Milestones*

- ***Computing***
  - ALMA software release R9.0/R 9.1 [Q1, Q3]
    - R9 was under test in internal Computing test in Q1, it is expected to be deployed for CSV use in January 2012
      - Deployment will be via patches
- ***Science IPT***
  - Continues work in ALMA CSV

M. McKinnon/M. Pilleux

Computing: Release R8.1 is in routine use by CSV. It is currently expected that Early Science observations will switch from R8.0.3 to R8.1 to take advantage of several facilities it offers (e.g., improve tuning algorithm). This transition is waiting for resolution of some phase offset issues in the correlator software and is expected in FYQ2. **Release R9.0** is under test and is expected to be used by CSV starting in Q2. R9 will be deployed in a series of incremental patches rather than in a "big bang" style. This should lessen the transition overhead. Current schedule shows R9.1 being complete in Q4.

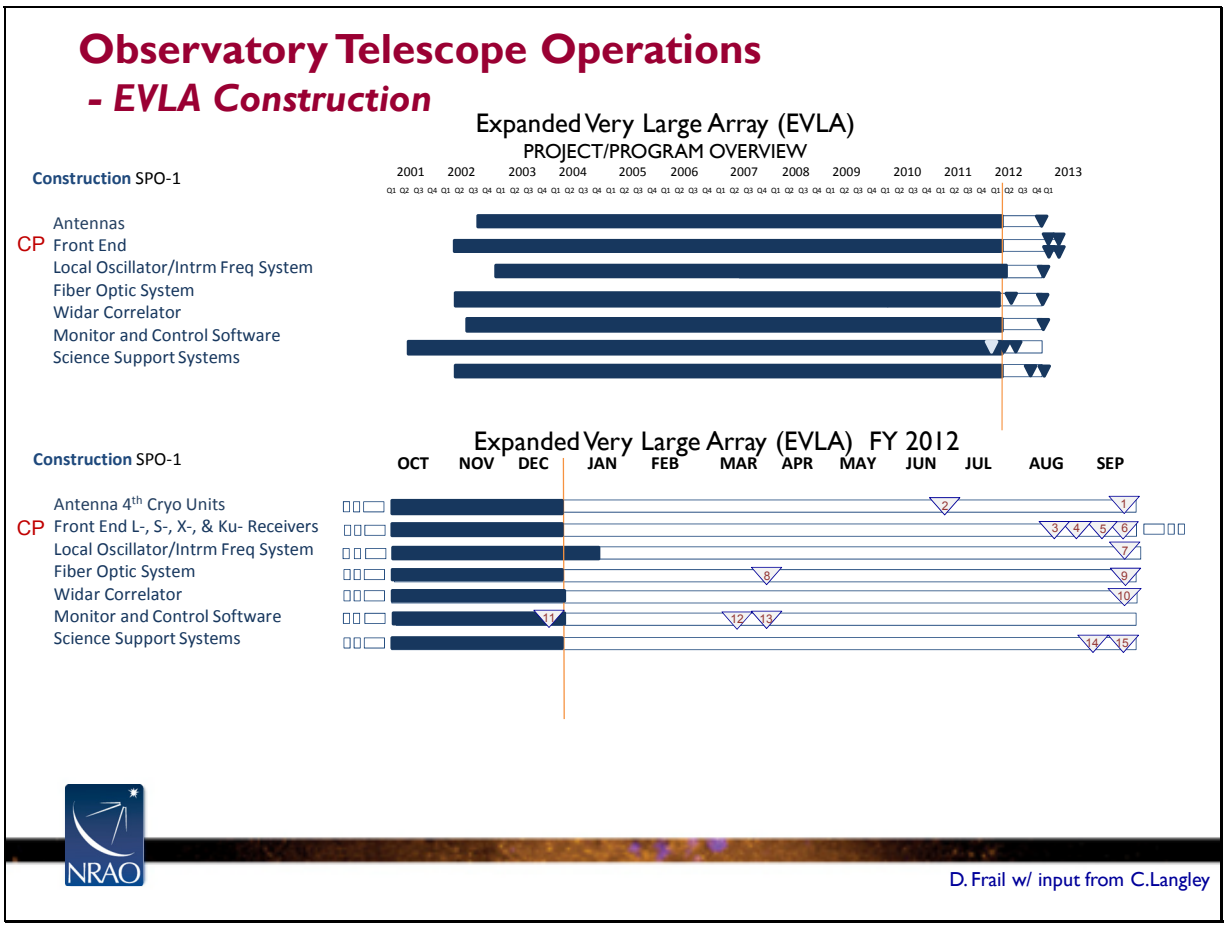
Science: Science IPT members work with the NA antenna contractor to test newly assembled antennas before delivery to ALMA. They also help to debut antenna problems uncovered by ALMA.

Observatory Telescope Operations
- *ALMA Construction Significant Events-Japan Partnership*

- NAOJ delivery of Band 4 & 8 CCAs delayed due to pending requests for waiver.
  - NA FEs #12, 13, 14 & 15 shipped without B4 CCAs
  - NA FEs #12, 13, 14 & 15 shipped without B8 CCAs
- Four additional Band 4 WCAs completed this quarter
  - Total delivered: 50 (69% complete)
- Three additional Band 8 WCAs delivered this quarter
  - Total delivered: 50 (69% complete)
- Additional components ordered to support accelerated delivery schedule

M. McKinnon/M. Pilleux

Front End Assemblies: Overall, Japan's delivery of Bands 4, 8, and 10 is coming later in the project than the delivery of the baseline Bands 3, 6, 7, and 9 due to Japan's late entry in the project. An integration plan for Band 4, 8, and 10 CCAs is under development. Some work will occur at the NA FEIC and EA FEIC; the balance of this work will occur at the OSF. **Warm Cartridge Assemblies:** NA FEs #12, 13, 14 and 15 included Band 4 WCAs; NA FEs #12, 13, 14 and 15 included Band 8 WCAs.



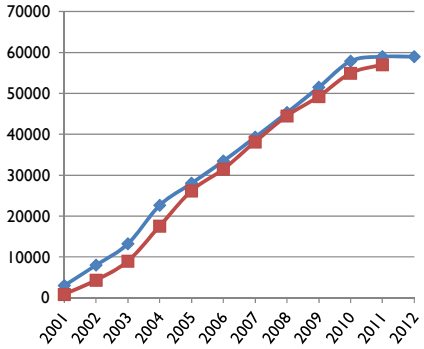
The top graph illustrates the full lifecycle of the EVLA construction project. The bottom graph reports status on POP goals for the current fiscal year. The vertical line represents where we are today. The CP represents the critical path. Now that 3-bit samplers are in full production, FE receiver production has returned to the critical path, which was previously held by the FO system.

With the exception of FE receiver production/implementation, all major subsystems are scheduled for completion by the end of FY2012. The array is scheduled to be fully outfitted with FE receivers by the end of CY2012.

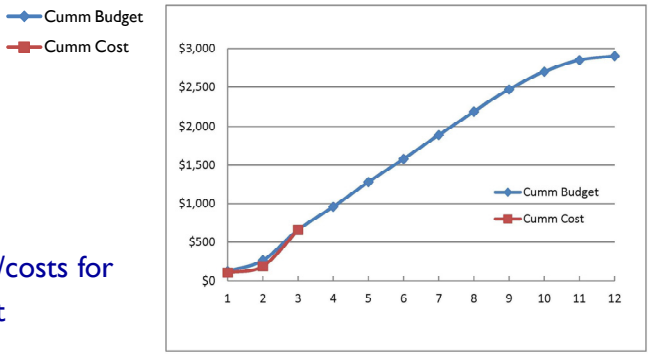
Details are provided in additional slides.

Observatory Telescope Operations

- *EVLA Construction Financial Performance Graphs – overall & FY2012 Q1*



Overall Spending for the EVLA Project

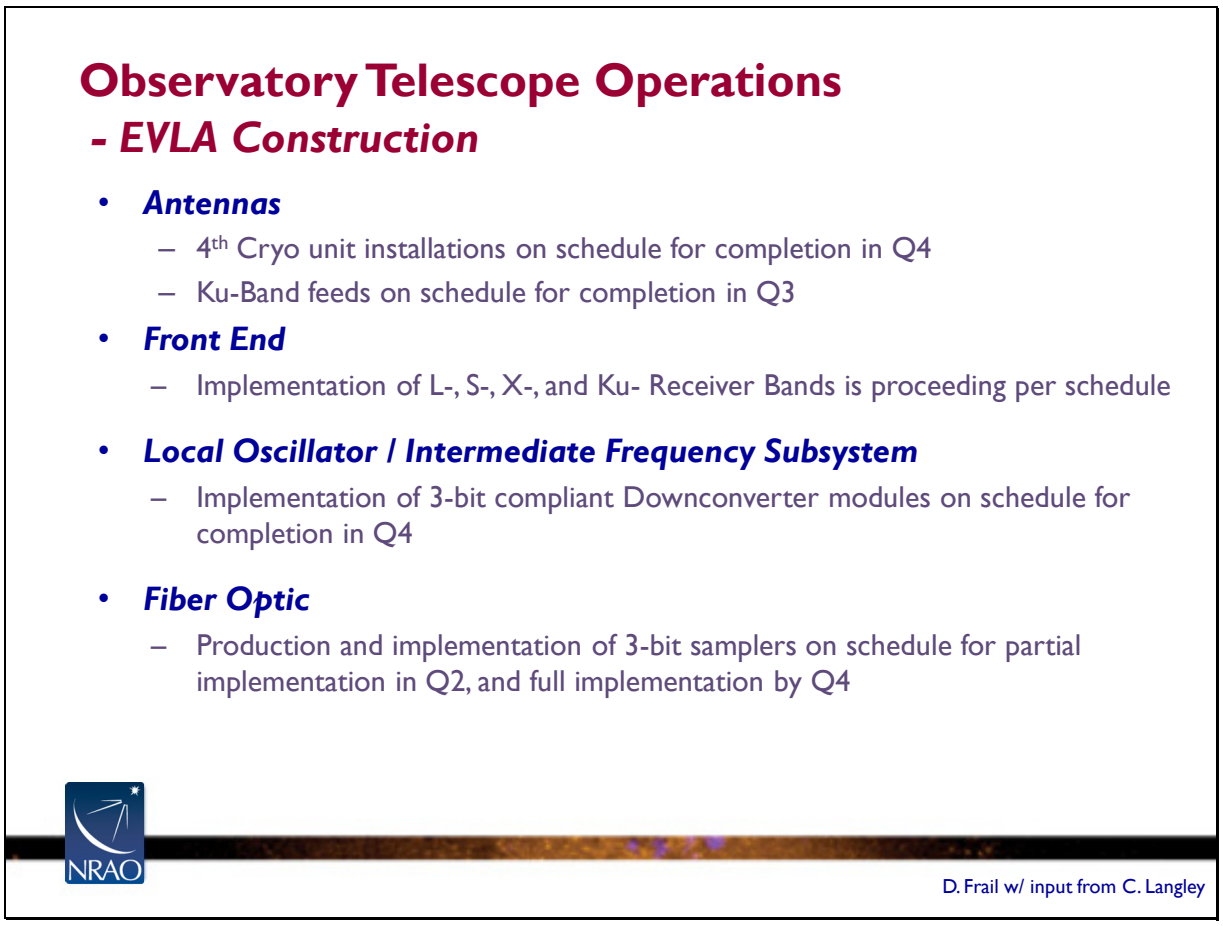


FY12 Budget/costs for EVLA Project

NRAO

D. Frail w/ input from C. Langley

Remaining project contingency is $867K. Recent items drawn from the contingency and added to the budget are an extra cost for the previously approved RF switch. Project contingency versus cost-to-complete stands at 23.6%.



Note: the numbers in [#] correspond to the milestone numbers from the overall construction status.

Antennas: 15 of the 4th cryo units have been installed. 18 Ku-Band feeds have been installed.

Front End: Wideband receivers installed include 18 L-Band, 18 S-Band, 14 X-Band, and 17 Ku-Band receivers. These replace the older version narrow band receivers as they become available.

Fiber Optic: 7 antennas are half-populated with 3-bit samplers. First of two shipments for the remaining sampler assembles has arrived from the vendor, with the balance due in early 2012.

Observatory Telescope Operations
- *EVLA Construction*

- ***Correlator***
  - On schedule for formal acceptance of WIDAR in Q4
- ***Monitor and Control***
  - 3-bit testing is supported in executor and correlator software.
  - Phased EVLA support in executor and correlator software on schedule for Q2 completion
  - Sub-array support in executor, telcal, mcaf, and correlator software on schedule for Q2 completion
- ***Science Support System***
  - Test version of Observation Preparation Tool on schedule to be available in Q4
  - Pipeline processed OSRO data on schedule to be delivered to users in Q4
- ***Management***
  - Successful EVLA Path to Completion Review held in December, 2011

D. Frail w/ input from C. Langley

Correlator: the formal acceptance of WIDAR is on schedule for completion in Q4. Hardware testing is currently near completion, and software testing/on-the-sky tests are in progress.

Monitor & Control: 3-bit support in the executor and correlator software was completed on schedule in Q1; support of phased EVLA and sub-array modes are on schedule for Q2.

Science Support System: no major milestones for Q1.

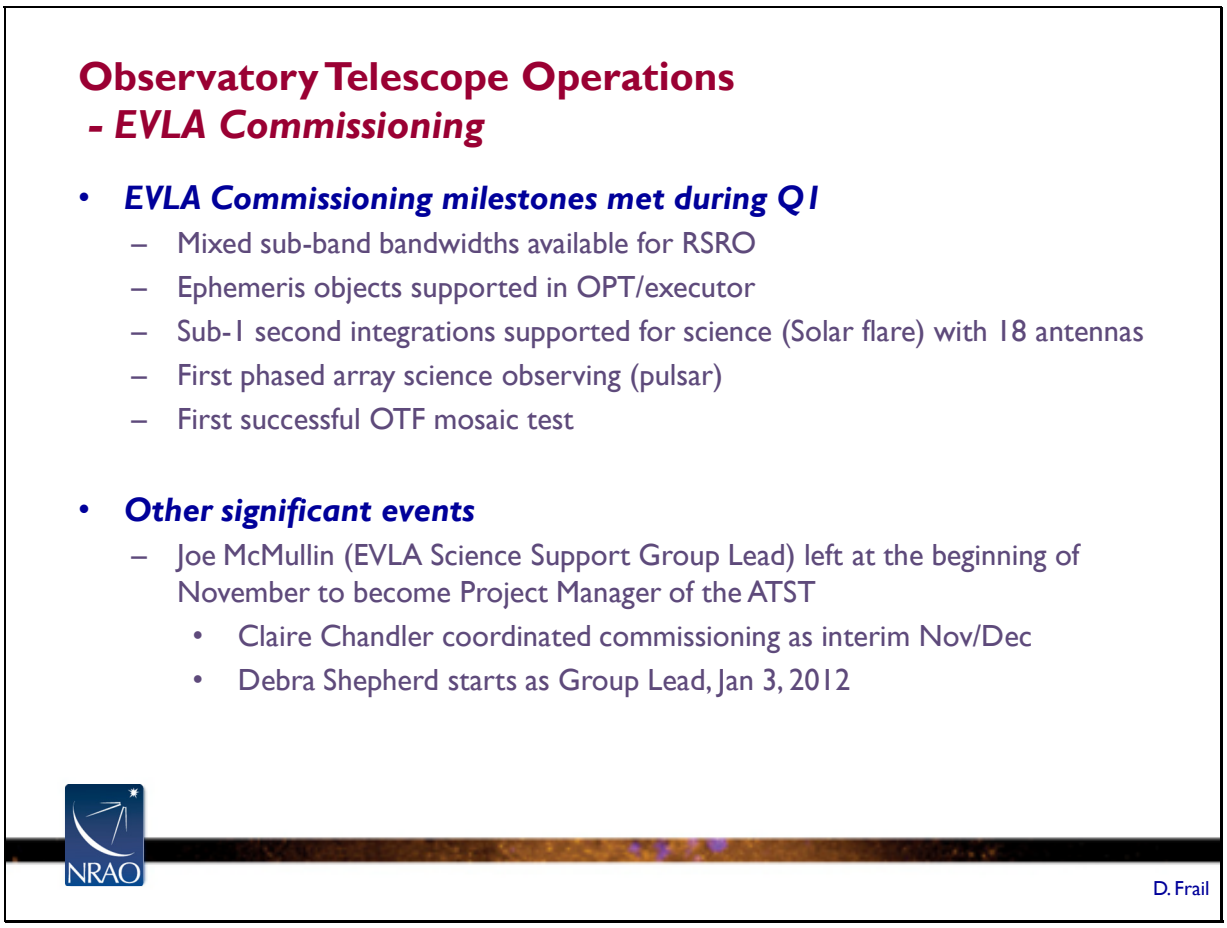
Management: the exit interview from the NSF's EVLA Path to Completion Review expressed general satisfaction with the EVLA construction project, and gave valuable advice regarding upcoming operational challenges. NRAO awaits the formal report from the review panel.

Observatory Telescope Operations
- *EVLA Construction*

- ***EVLA Low-Band Receivers Milestones***
  - Original goal of 4 receivers installed during Q1 was not met due to cabling problems

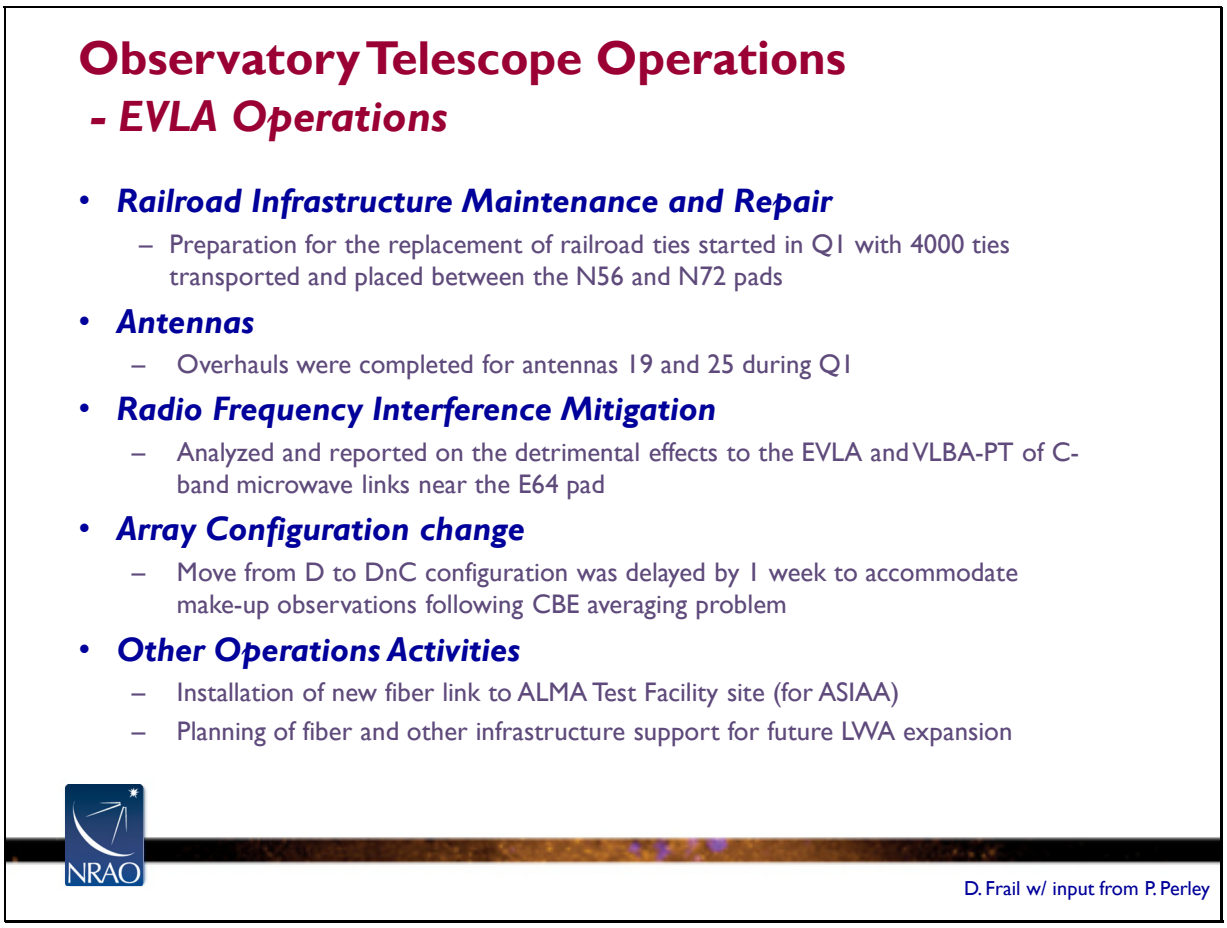
D. Frail w/ input from C. Langley

Unanticipated problems associated with the cabling of the new EVLA low-band receivers delayed the installation of the first four units during Q1. It is not currently expected that this will impact the completion date of the project, and the goal of first astronomical observations during Q4 is expected to be met. This capability will not be offered for the February 1 proposal deadline, but users will have access to the new system through the Resident Shared Risk Observing program.



A number of important commissioning milestones were met during Q1, including the first successful On-The-Fly mosaicing test.

The EVLA commissioning effort lost its lead in November, when Joe McMullin left to become Project Manager of the ATST. Claire Chandler stood in as interim, in addition to her position as Head of the Array Science Center, during the search for a replacement. Debra Shepherd accepted the position as Group Lead for EVLA Science Support in the ASC, and starts the first week of Q2.



Approximately 4000 railroad ties were transported and placed between the N56 and N72 pads during Q1; plate installation and spiking is still required. The majority of the old ties were collected and bundled; all but 1500 ties remain to be collected. During poor weather conditions, the track crew built cages for concrete timbers.

Newly identified interference from C-band microwave links close to the E64 pad, off the east arm, were analyzed for their potential detrimental effects on observing with the EVLA and VLBA-PT antenna. This information will be used to assist with the production of RFI flagging templates for the EVLA calibration pipeline.

On December 2 a problem with the averaging of data by the correlator backend (CBE) computer was noticed by NRAO staff that affected all data taken with integration times greater than 1 second, starting September 20. Given the large amount of observing time affected we decided to focus on repeating the worst affected priority A programs, in conjunction with a one week extension of the D configuration. The move from D to the DnC hybrid configuration, originally scheduled to start on December 27, 2011, was delayed to the beginning of Q2.

Various other activities at the VLA site were undertaken in order to support the Vertex antenna at the ATF for ASIAA, and the LWA.

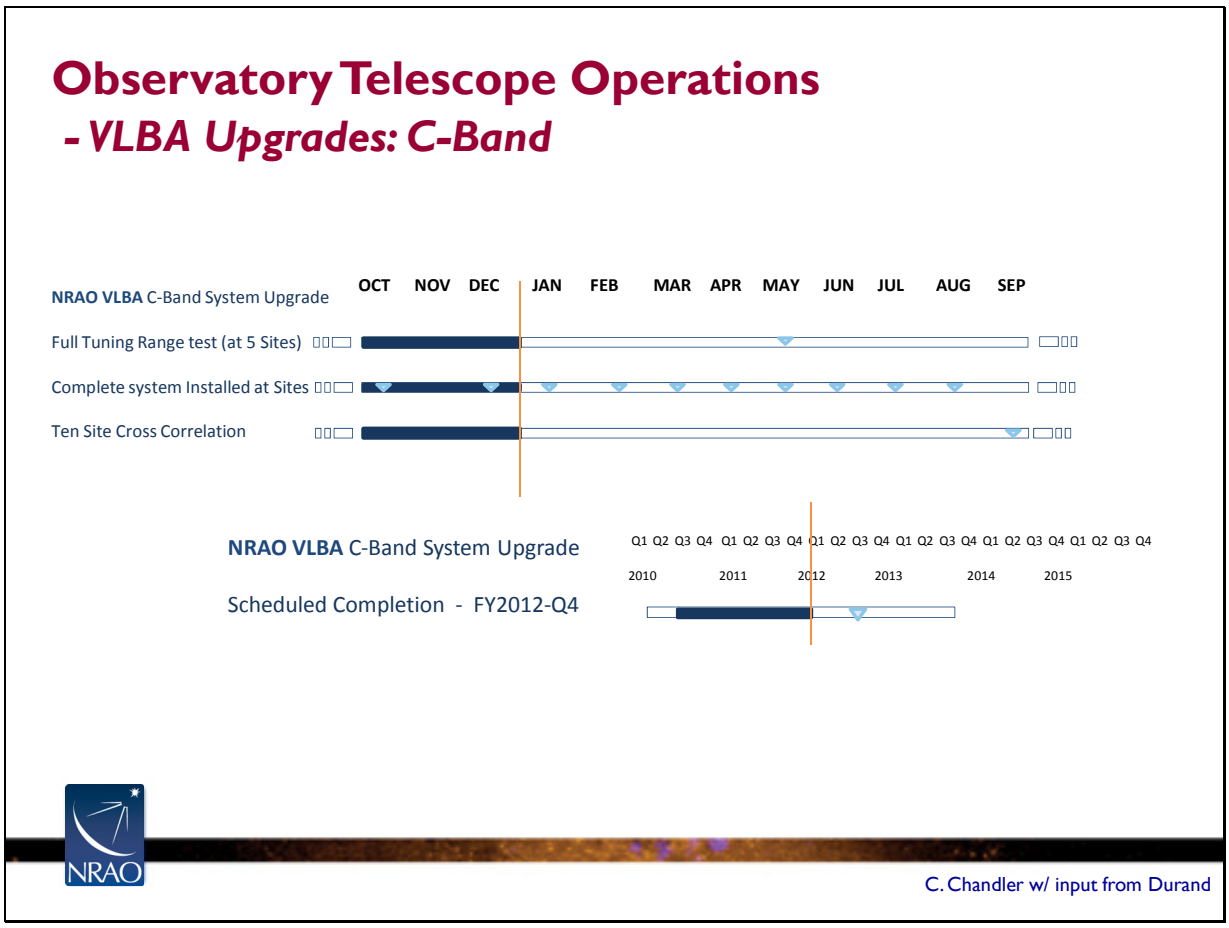
Observatory Telescope Operations
- *VLBA Operations*

- ***Operations***
  - RFI Mitigation
    - Discussions with NOAO at KP to insure that wireless repeater changes and proposed wireless LANs and control systems do not adversely affect VLBA-KP observing
    - Modified, tested, and installed a shielded box to contain RF emissions from the new VLBA-PT telecom LAN switch
  - Daily UT1–UTC observations did not begin during Q1 due to Continuing Resolution
- ***Maintenance Plans and Schedules***
  - Wideband C-band receivers were installed at HN, BR during Q1
- ***Projects (work for others)***
  - Completed VLBA C-band build for Arecibo
  - Contract for C-band receiver system from Shanghai Obs. signed

NRAO

D. Frail w/ input from Perley/Brisken

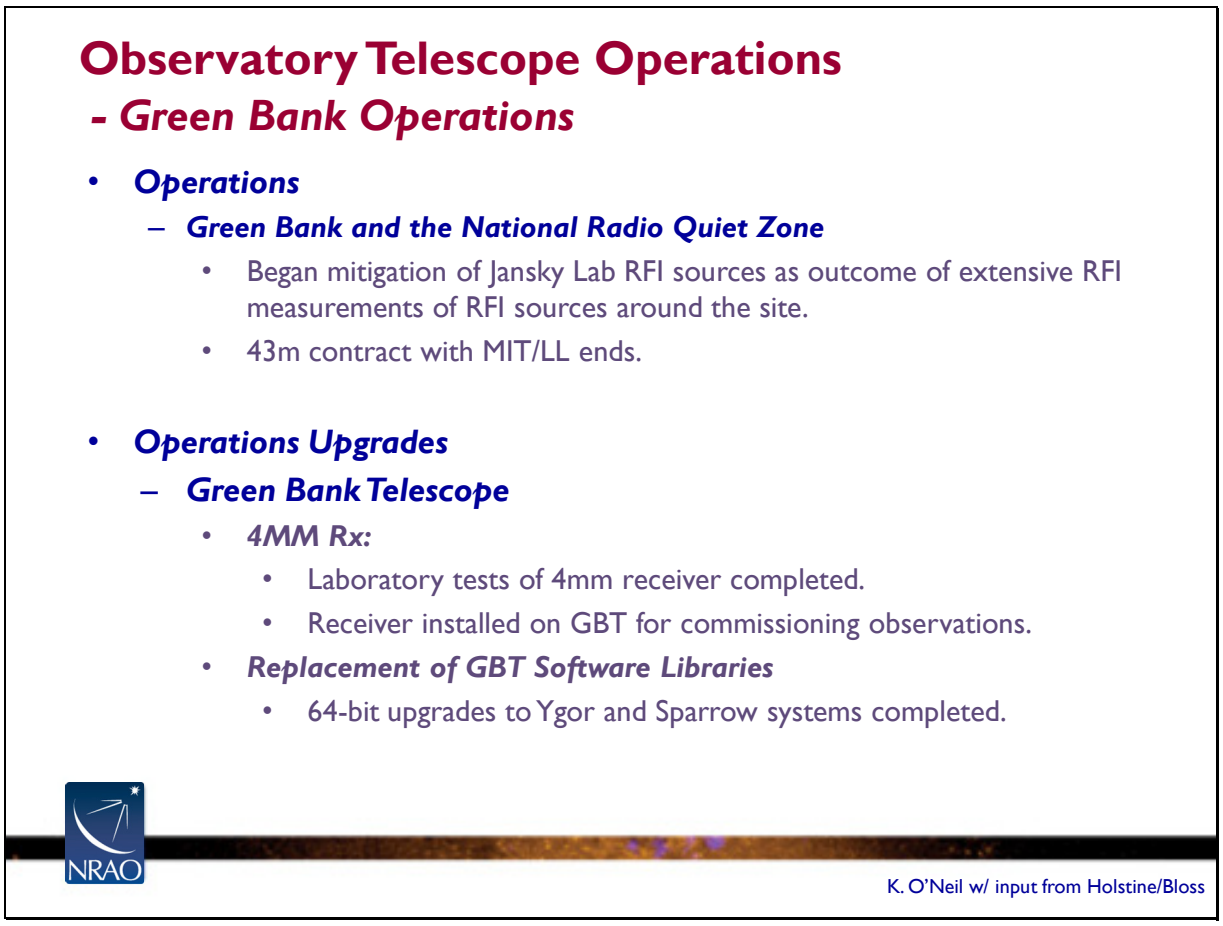
The planned start of daily UT1–UTC observations using PT and MK for the US Naval Observatory did not take place in Q1 because the Navy funding for the observations was blocked by the ongoing Continuing Resolution. However, NRAO used the opportunity to test the observing procedures in preparation for when the observations do begin.



PT and HN were outfitted with complete C-band systems during Q1. The first full system test took place successfully, culminating with the first observation of the methanol maser line using the VLBA in Dec 2011.

VLBA C-Band Project Support: GB Machine Shop is fabricating the C-Band Feeds; Delivery is complete [Q1]. VLA Machine shop is fabricating the Dewars, OMTs, Modules [Q2,Q3]. CDL is providing the LNAs [FY2011-Q3 to FY2012-Q2]. Five receivers have been completed.

The project is on schedule for completion in Q4.

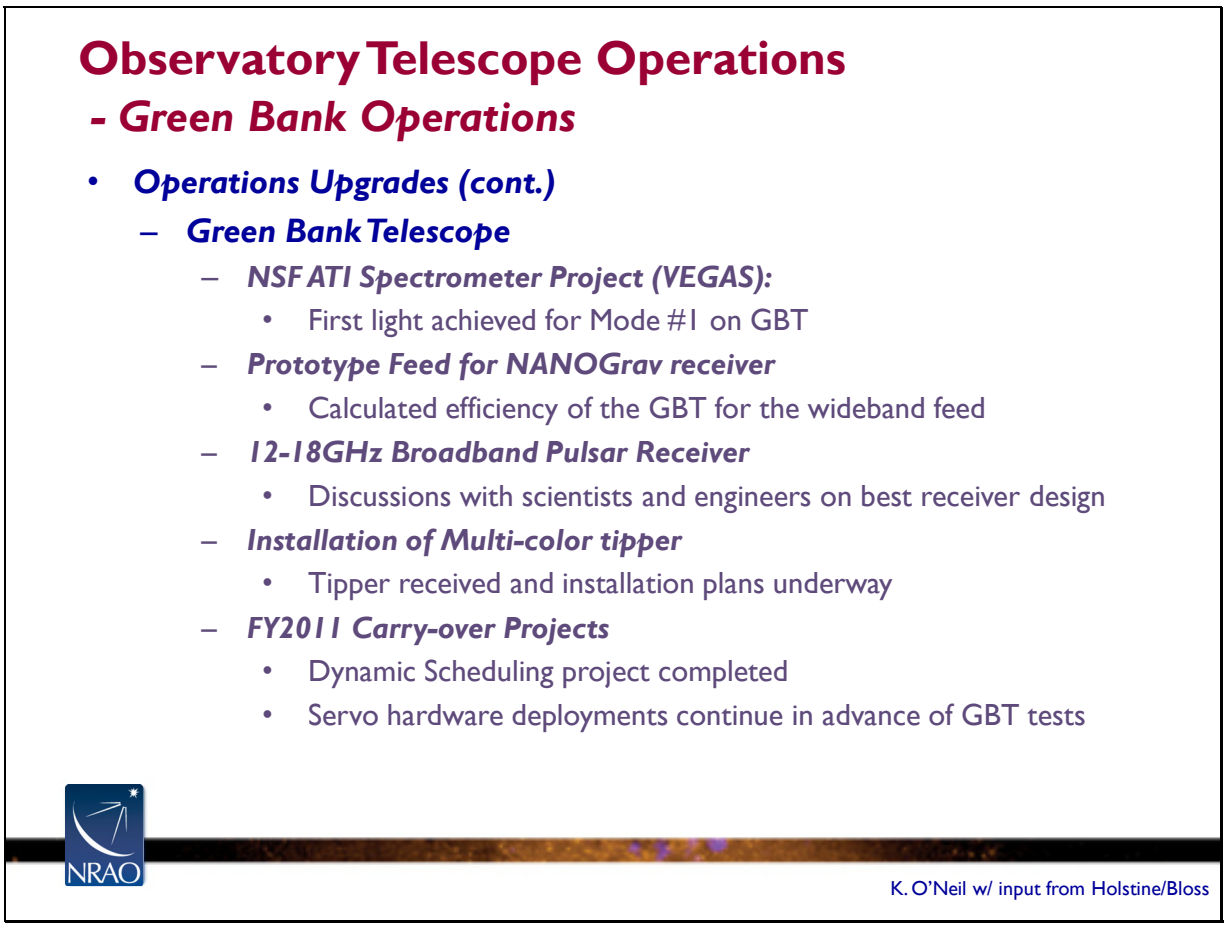


After the Interference Protection Group conducted a series of measurements of **RFI** sources in RFI Zone #2 of the Green Bank site, the IPG established a plan for mitigation for sources in the Jansky Lab. Mitigation of office and networking systems was started in Q1FY2012 and will run throughout the year.

The agreement with **MIT/Lincoln Labs** for use of the 43m Telescope in Green Bank ended in December. The MIT/LL owned equipment (feed, backend, data collection) will be removed by MIT/LL in Q2FY2012.

Laboratory tests of the Receiver balancing, M&C Integration, and optical table/calibration wheel on **4mm receiver** were completed in Q1FY2012. The receiver was installed on the GBT for astronomical commissioning after earlier instability issues for channels 5 and 7 were fixed in the lab. New equalizers enable observations with more than 1 GHz of bandwidth and, once new amplifiers are delivered by CDL, gives better access to the low end of the band (below 74 GHz). The Tsys performance on the GBT are within expectations from lab measurements for 3 out of the 4 channels.

The Ygor and Sparrow systems were upgraded to 64-bit versions and passed all unit tests as part of the **GBT Software Library** replacements. Old implementations of Glish in the M&C administration system have been removed.



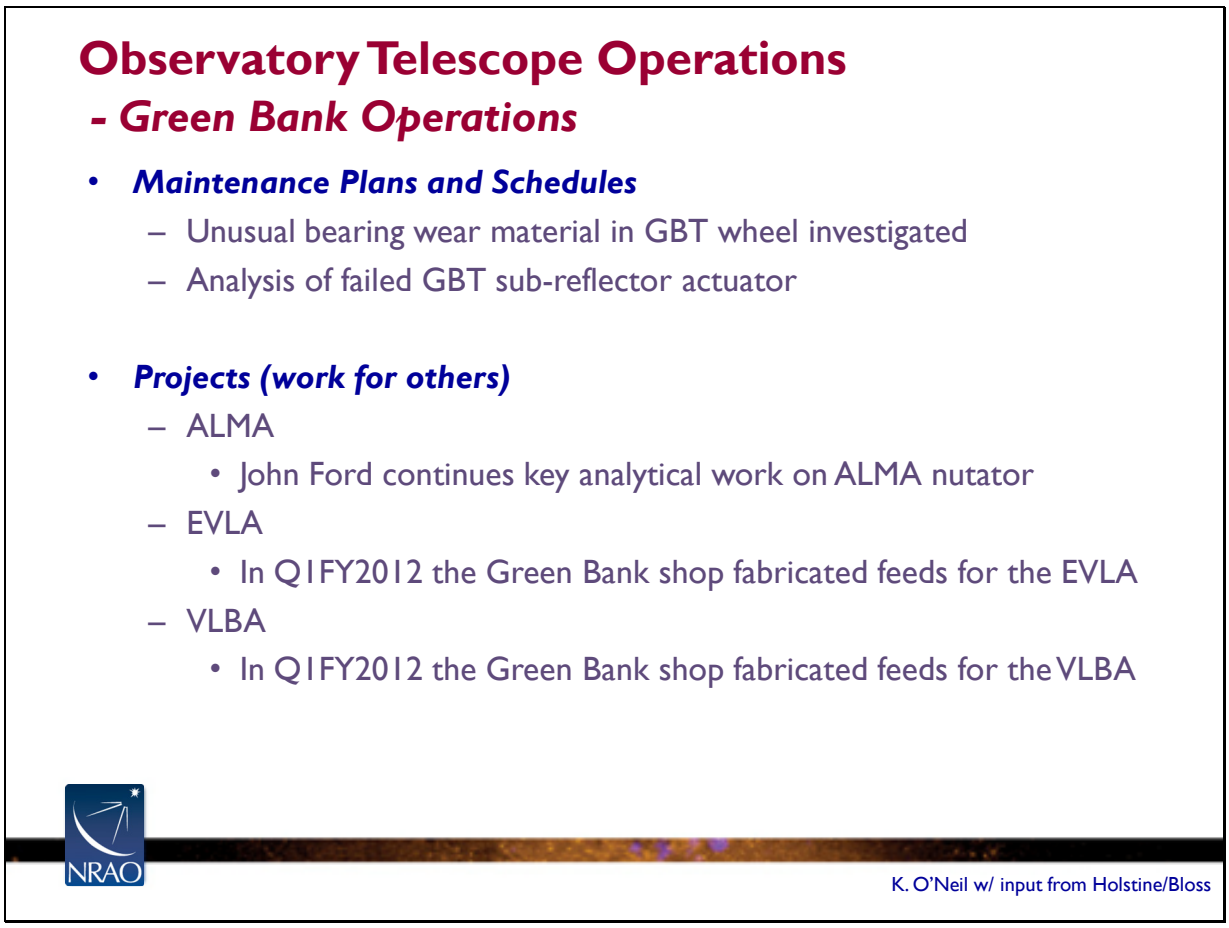
The **VEGAS spectrometer** (CICADA backend) achieved first light in December 2011 during an integration and test session on the GBT by the Berkeley and NRAO groups in the NSF-ATI grant. Images at http://www.gb.nrao.edu/vegas/Results/

The CDL engineers calculated the efficiency of the GBT for the **NANOGrav receiver** wideband feed.

Discussion and design meetings were held throughout Q1FY2012 on the best design to support the science goals of the **12-18 GHZ Broadband Pulsar Receiver**. These discussions have caused a delay and missing of the milestone in of "Feed Design completed" in Q1FY2012. Risk: Overall receiver delivery may be delayed. Mitigation: Special meeting to force closure on design issues in early Q2FY12 will hopefully allow the lag on feed design to be absorbed.

The **Multi-color tipper** arrived in Q1FY2012 and installation locations under are evaluation but it was not installed in Q1FY2012 as planned. Risk: Characterization of tipper data may not be completed by end of year; opacity information for GBT scheduling might be delayed. Mitigation: Research into tipper control and monitoring has begun while tipper is still in lab.

As reported in Q4FY2011, the **final release of the DSS** with all observing efficiency and ease-of-use components was delayed one month due to lost resource. It completed in Q1FY2012 along with the project closeout meeting. Laboratory tests of the **new servo system** are delayed due to underestimation of the complexity of the control kernel. The final commissioning of the replacement servo will be delayed into Q3FY2012.



Bearing wear material was found in an oil sample from the outside bearing on **GBT wheel** 2 on corner 4. The locknut was found loose during the subsequent inspection, and the locking tab worn. The locknut was tightened and the locking tab replaced. Telescope Operations will open this bearing again in the summer and inspect it for recurrence.

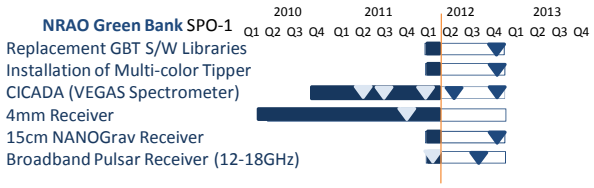
A GBT **sub-reflector actuator** failed in November. A team of NRAO engineers and the manufacturer participated in a subsequent analysis and inspection. They determined that a manufacturer's design oversight resulted in a lack of lubrication to the key moving components; the manufacturer designed a correction, and the actuator will be rebuilt. All of the remaining actuators in service along with the spares will be inspected, modified, and refurbished as time and funding permits.

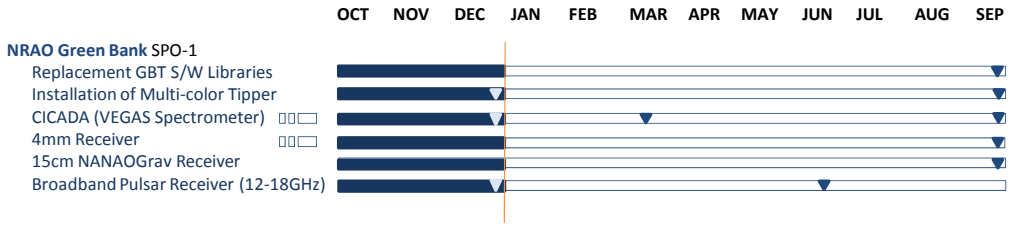
Green Bank Electronics Head John Ford traveled to Taiwan in Q1FY2012 to work the manufacturer of the **ALMA nutator**. He continues to play a significant role in resolving the mechanical and control issues with the completed units.

The Green Bank shop spent ~10% of Q1FY2012 shop hours on the feeds for **EVLA**.

The Green Bank shop spent ~30% of Q1FY2012 shop hours on the C-Band feeds for **VLBA**.

Observatory Telescope Operations
- *Green Bank Telescope Upgrades*





NOTE: These development activities are unrelated, therefore there is no critical path identified.

K. O'Neil w/ input from Bloss

Installation of Multi-color Tipper: Tipper received and installation locations under are evaluation but it was not installed in Q1FY2012 as planned.

Broadband Pulsar Receiver (12-18GHz): Extended design discussions pushed feed design past the Q1FY12 milestone.

Agenda

- Science Results
- Observatory Science Operations
- Observatory Telescope Operations
- Observatory Development & Programs (ODP)
  - Coordinated Development Laboratory
  - CDL Production, Maintenance and Repair
  - New Initiatives Office
- Broader Impact
- Observatory Administrative Services
- Director's Office

Observatory Development & Programs
- *Coordinated Development Laboratory*

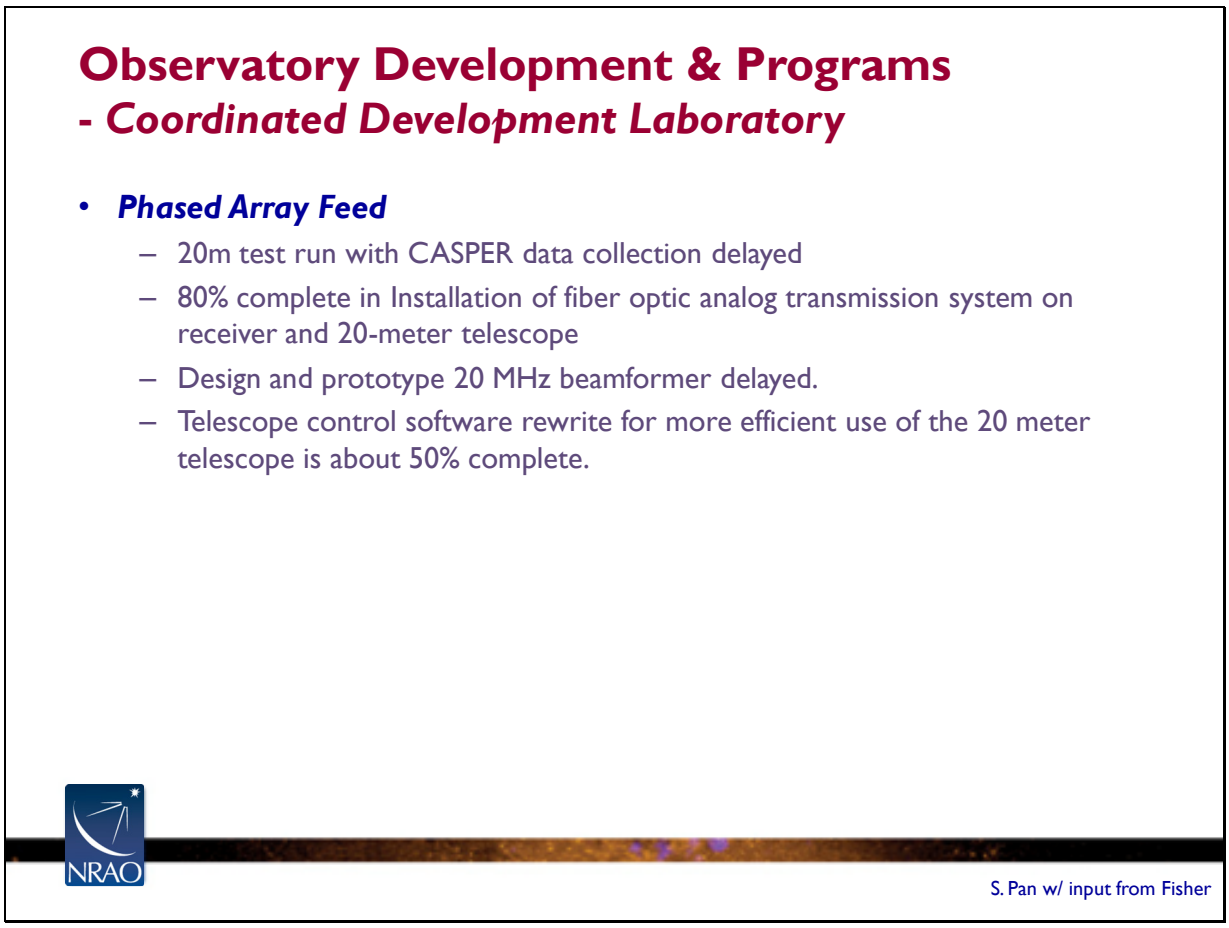
- ***Amplifier Development***
  - Development of ALMA Bands 1 and 2 amplifiers continues
  - Research on heterojunction bipolar transistors (HBTs) and CMOS MOSFET continues.
  - Tested three new designs from 35nm InP HEMT wafer run

S. Pan w/ input from Pospieszalski/Bryerton

Development of **ALMA Bands 1 and 2 amplifiers** using NGST cryo3 devices continues. An optimal design for 33-50 GHz for Band 1 has been developed as an alternative to 31-45 GHz design.

Research into general noise properties of three terminal active devices and in particular on noise properties of **heterojunction bipolar transistors (HBTs) and CMOS MOSFET continues.**

Tested three new designs from 35nm InP **HEMT** wafer run. Two wideband 68-116 GHz designs and one 4mm (67-90 GHz, ALMA Band 2) design. All showed higher noise and lower gain versus 2008 35nm wafer. All designs are being rerun on new wafer.



This quarter has seen a major reassessment of the long-term development strategy in this project, partly due to the loss of grant funding of our partners at BYU. This collaboration continues as a no-cost grant extension to BYU, but we anticipate that NRAO will take over the bulk of this development. A parallel electromagnetic design effort has been established in Charlottesville, and Green Bank personnel are involved in the staged development of a CASPER-based data acquisition system and beamformer. The transfer of expertise from BYU to NRAO is proceeding amicably. In a state-of-the-art development project, changes in strategy based on experience and test results are to be expected.

20m test run with **CASPER** data collection: This has been delayed due to under-estimation of the size of the task of building the CASPER system at BYU and changes in student participants. NRAO has begun a parallel effort to develop a CASPER data acquisition system and beamformer in house.

Install fiber optic analog transmission system on receiver and **20-meter telescope**: 80% complete; scope of work was expanded to include fiber to outdoor test facility.

Design and prototype **20 MHz beamformer**: Delayed; see first item above.

Continue test runs on 20m and GBT: **Telescope control software** rewrite for more efficient use of the 20 meter telescope is about 50% complete. This includes the adoption of telescope control commands and output data structures (FITS) similar to GBT.

Observatory Development & Programs
- *Coordinated Development Laboratory, cont.*

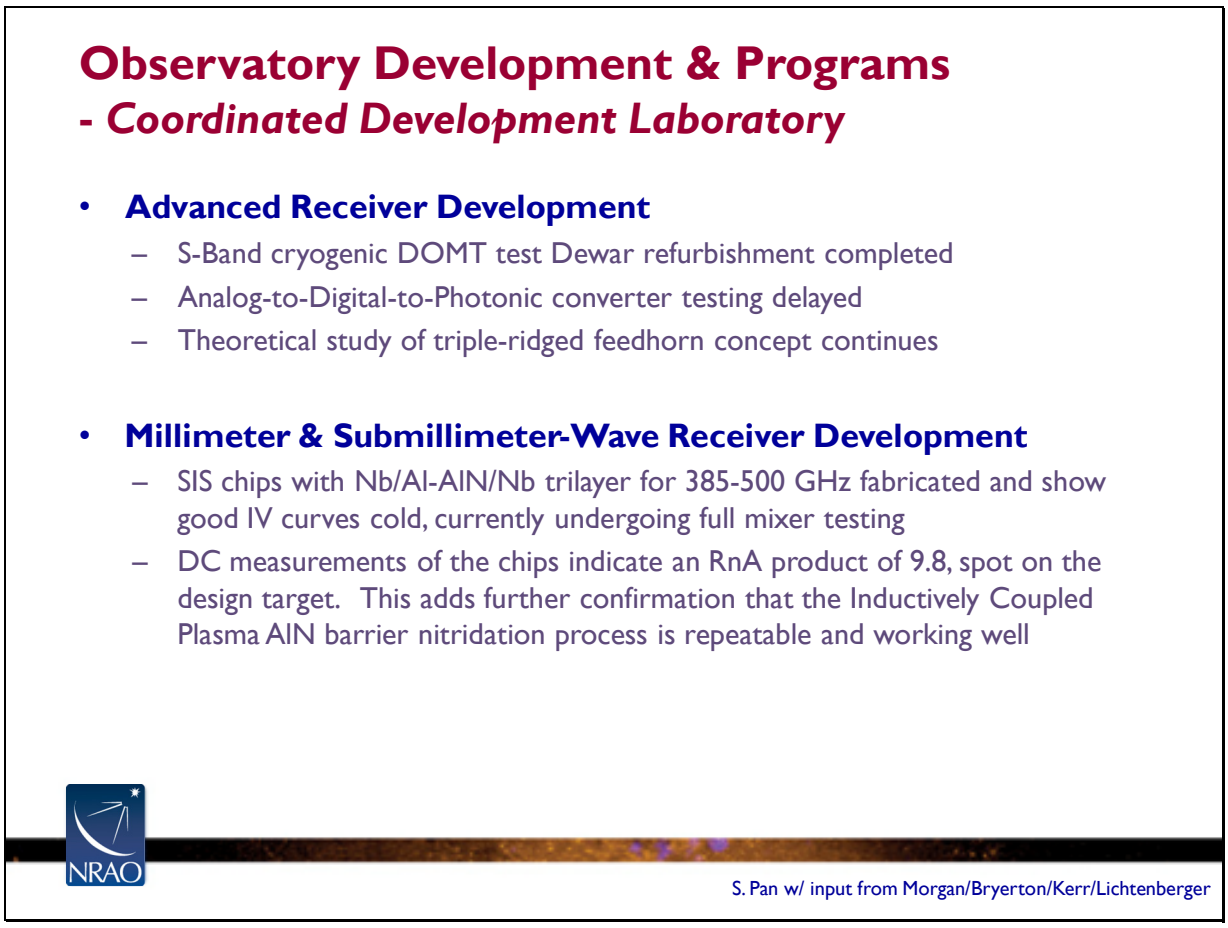
- ***Electromagnetic Development***
  - Computed efficiency and spillover temperature for different array configurations for the 800 MHz GBT array program.
  - Started a study to optimize the 800 MHz Short Back-fire Antenna
  - Computed efficiency and spillover temperature of a wide-band ridged horn for GBT Pulsar Timing Project
  - Assisted in tuning and measuring of EVLA orthomode transducers

S. Pan w/ input from Srikanth

Computed efficiency and spillover temperature for different array configurations for the **800 MHz GBT array program**. Also, started a study to optimize the 800 MHz Short Back-fire Antenna for low spillover.

Computed efficiency and spillover temperature of a wide-band ridged horn for **GBT Pulsar Timing Project**.

Assisted in tuning and measuring of **EVLA orthomode transducers**.



Advanced Receiver Development: Work on refurbishing the test Dewar for the triangular S-band Digital Orthomode Transducer (DOMT) is complete. Initial vacuum and cooling tests with the Dewar empty have been successful. Initial cooldowns of the DOMT itself have not reached the desired temperature due to insufficient infrared filtering of the window, which is now being remedied. RF testing could begin in the near future, although the schedule is substantially hampered by lack of technician support (Tod Boyd having been re-assigned to address production issues with ALMA Band 6).

Testing of the first fully-integrated Analog-to-Digital-to-Photonic converter is also still delayed due, again, to lack of technician support (Francoise Johnson's time has been decreased in favor of the ALMA Band 6 project).

Progress on a digital backend for real-time processing of the data from these innovations is also on hold due to lack of technician support; Matt Luce having taken a new position for the VLBA. We have engaged a fraction of Jason Castro's time to take up where Luce left off and we are hopeful that progress on this critical aspect of the program can begin soon.

Observatory Development & Programs
- *CDL Production, Maintenance and Repair*

- ***HFET Amplifiers Production***
  - Delivered 12 new amplifiers to EVLA and 4 to VLBA
  - Delivered 16 P-band amplifiers to USNO/NRAO P-band receiver project
  - Repaired and retested10 amplifiers for the EVLA ,GBT, and VLBA
  - Upgraded/repaired four 26-36 GHz amplifiers for CARMA

S. Pan w/ input from Pospieszalski

Amplifier Production Milestones: New amplifier production included sixteen 230-470 MHz amplifiers, four 2-4 GHz, four 4-8 GHz, six 12-18 GHz, and two 26-40 GHz. Repair, upgrade, and, retesting of amplifiers included four 1-2 GHz, one 8-12 GHz, three 12-18 GHz, one 26-40 GHz amplifier, one 75-102 GHz and four 26-36 GHz CARMA amplifiers. In total, 46 amplifiers were shipped. The EVLA and VLBA amplifier and production is approximately on schedule.

Observatory Development & Programs
- *Coordinated Development Laboratory*

- ***20m Radio Skynet Spectrometer***
  - Narrow-band mode completed

M. Bloss

The narrow band mode for the **20m/Skynet spectrometer** is competed and tested. Main remaining tasks for Q2 are adding the switching signal control and the wideband spectrometer mode.

Observatory Development & Programs
- *Coordinated Development Laboratory*

- ***The Precision Array to Probe the Epoch of Reionization (PAPER) (collaboration with UC Berkeley) (see NIO)***
  - South African 64-element array
    - Observations continue
  - Green Bank 32-element array
    - Engineering experiments continue
    - Study of ionospheric effects on PAPER data continue
  - Construction of 128-element South African Array has begun
- ***LUNAR***
  - Work continues on the NASA Dark Ages Radio Explorer (DARE) mission proposal
  - Work continues on the DARE Instrumentation Verification Plan
    - Fabrication and testing of front-end electronics is underway
    - Plans for deployment of prototype in Australia are underway

S. Pan w/ input from Bradley

The Precision Array to Probe the Epoch of Reionization (PAPER): Components are being ordered for the expanded South African Array. Data analysis and observations continue with the existing arrays. Construction of additional elements for the 128-element has begun.

LUNAR: The Lunar University Node for Astrophysics Research (LUNAR) is a grant from the NASA Lunar Science Institute to develop instrumentation for lunar-based research. Our current activity is centered around the Explorer-class DARE mission proposal with specific attention given to the antenna and front-end design concepts. Engineering prototype is currently under construction with plans to begin deployment in Australia next quarter.

Observatory Development & Programs
- *New Initiatives*

- ***DVA-1***
  - DVA-1 Managing Board agreed to close-out program aimed at optimizing progress on DVA-1 using only unspent NSF and new DRAO/SPDO funds
- ***NANOGrav***
  - A white paper on NANOGrav status and consortium plans was discussed at the November 17/18 NANOGrav workshop
- ***PAPER***
  - The $4.5M PAPER proposal to NSF was successful
  - Fiber connection from PAPER site in SA to the Internet complete

R. Dickman

DVA-1: NSF cancelled remaining $2.3M of SKA TDP award to Cornell in October 2011. DVA-1 Managing Board agreed to close-out program aimed at optimizing progress on **DVA-1** using only unspent NSF and new DRAO/SPDO funds.

NANOGrav: A white paper on **NANOGrav** status and consortium plans was discussed at the November 17/18 NANOGrav workshop in Charlottesville. Submission to NSF/AST Portfolio Review prepared Q1 (+ early Q2).

The $4.5M **PAPER** proposal to NSF to expand to 128 elements and begin EOR observations was successful and will be fully funded. Fiber connection from PAPER site in SA to the Internet complete.

Observatory Development & Programs
- *New Initiatives*

- ***Space Very Long Baseline Interferometry: RadioAstron***
  - (Early Q2): The Lebedev Physical Institute has received approval from the Russian Federal Space Agency (RosCosmos) to support NRAO operation of a RadioAstron ground station at Green Bank at a cost of $2M per year for at least 3 years
  - GB ground station would use the 140' antenna; Export control/ITAR issue being investigated
- ***Export Control***
  - Review of export for SHAO C-band receiver completed

R. Dickman

RadioAstron: Fringes with satellite at L, C, and K band were obtained in Q1 FY2012. (Early Q2): The Lebedev Physical Institute has received approval from the Russian Federal Space Agency (RosCosmos) to support NRAO operation of a RadioAstron ground station at Green Bank at a cost of $2M per year for at least 3 years. GB ground station would use the 140' antenna.

Export Control: Review of export for SHAO C-band receiver completed. Progress on developing an export control program for the Observatory continues.

Observatory Development & Programs
- *New Initiatives*

- ***VLBA – Status of External Operations Support* (I)**
  - Shanghai Astronomical Observatory (SHAO)
    - SHAO C-band receiver contract signed
    - SHAO $50k contribution for export control assessment received
    - SHAO's first payment of $50k for VLBA Ops received; final 2012 $50k payment expected
    - Joint C-band receiver export clearance review with Fischer Associates completed
  - Max-Planck Institut fur Radioastronomie (MPIfR)
    - $200k per year support of VLBA approved, will begin in 2012
    - Consists of 2 parts:
      - $100k in new funds from MPG
      - $100k in MPIfR operational funding
  - All details of ASIAA assumption of MK site technicians S&B costs complete in
  - ASIAA now proceeding to assume MK site tech employment by RCUH (January 2012)

R. Dickman

DiFX = VLBA software correlator
MPG = Max-Planck Gesellschaft (= MP Society)
MK = Mauna Kea
RCUH = Research Corporation of the University of Hawai'I

Joint C-band receiver export clearance: advisory opinion being sought from Dept. of State (DOS).

Note: MOA now being finalized with ASIAA; signature is not a prerequisite to assumption of employment costs

Observatory Development & Programs
- *New Initiatives*

- ***VLBA – Status of External Operations Support* (II)**
  - Agreement with CASS/ICRAR for $125k per year for at least 2 years in process by CASS/ICRAR
  - USNO
    - Problem with NSF IAT fees has been avoided this year
    - Transfer of $1M from USNO to NSF begun; in future years, transfer will be direct to AUI to avoid annual $65,000 NSF transfer fees.
    - FY12 DoD budget approved, but USNO final budget is not yet determined – DoD appropriations bill was $20B below President's request
    - Funding transfer process will resume after UNSO funding is finalized
    - May need to realign USNO-NRAO geodesy program year start to capture full $1M per year
    - Basic terms of contract for DiFX software correlator clone in FY12 & FY13 agreed to; contract includes cost of NRAO correlator support

R. Dickman

IAT = Interagency Transfer
DiFX = VLBA software correlator

Agenda

- Science Results
- Observatory Science Operations
- Observatory Telescope Operations
- Observatory Development & Programs (ODP)
  - Coordinated Development Laboratory
  - New Initiatives Office
- Broader Impact
  - Education and Public Outreach
  - Diversity
- Observatory Administrative Services
- Director's Office

Broader Impact
- *Education & Public Outreach*

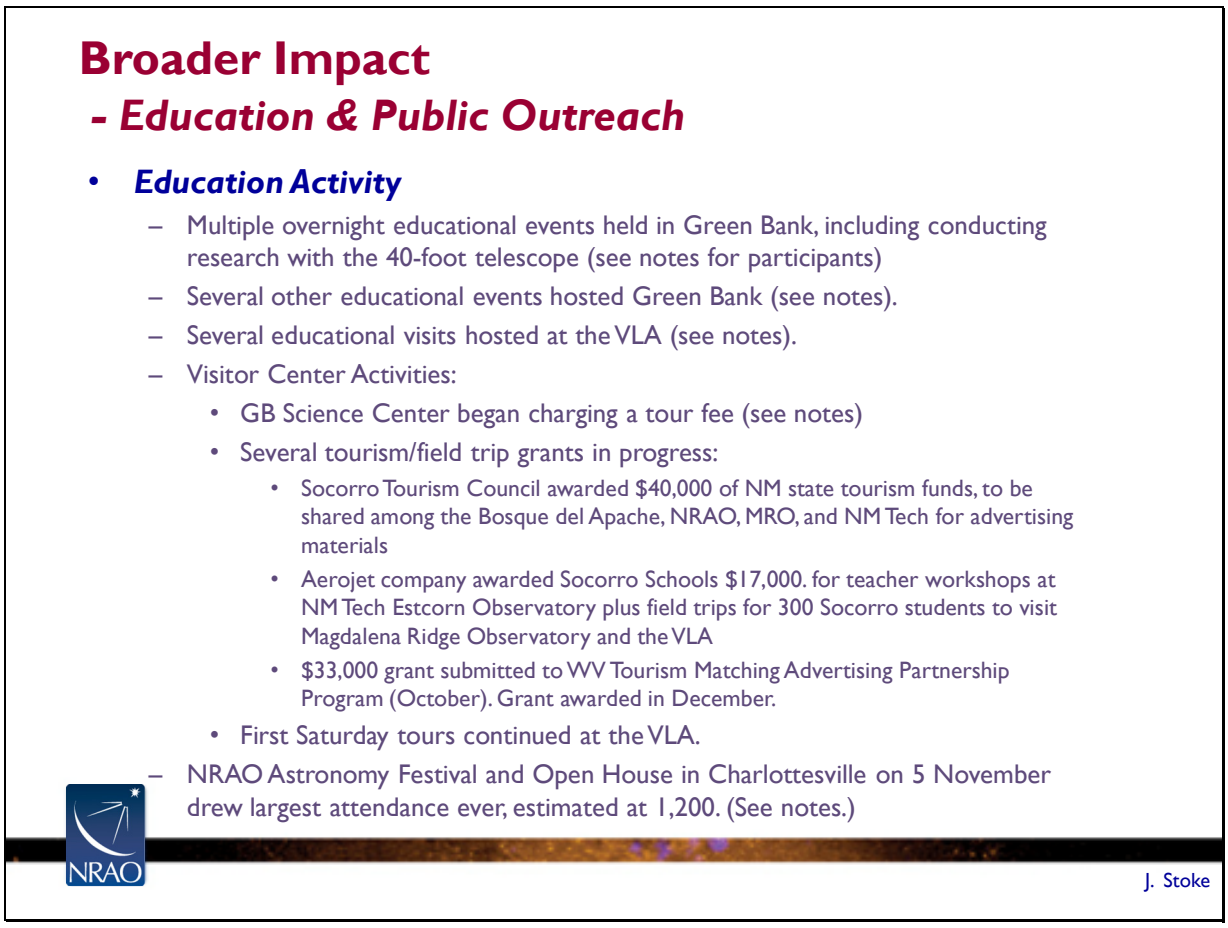
- ***External Press/Media Activity***
  - Six national press releases issued (see notes), including three associated with start of ALMA Early Science, which were accompanied by extensive graphics, including public images of Antennae galaxies from ALMA, VLA, and HST data. In association with the ALMA Early Science campaign, we:
    - Produced short web video "ALMA Opens Its Eyes," which has had nearly 29,000 viewings
    - Fielded media/interview requests from ABC, Christian Science Monitor, NPR, Al Jazeera, CNN, NBC.
    - Detected online coverage in hundreds of sites, including such high-profile locations as Yahoo News, Google News, Drudge Report, Fox News, Discover, etc
    - Represented 34.3% of the 4646GB of data served by NRAO CV web servers on a single day, 3 October
    - Updated our ALMA Explorer online virtual site tour (www.nrao.edu/explorer/alma/) with new content
    - Arranged for display of ALMA video on "jumbotron" screens at Times Square & Las Vegas Strip.
    - Worked with NSF's Office of Legislative and Public Affairs to coordinate and maximize press coverage
  - Accompanied NBC News crew to ALMA for production of a ~11-minute segment for "Rock Center with Brian Williams," expected to air sometime in February.
  - Deployed http://www.namethearray.org site for public to suggest new name for the VLA, drawing extensive public interest.
  - See notes for additional important media activity

J. Stoke

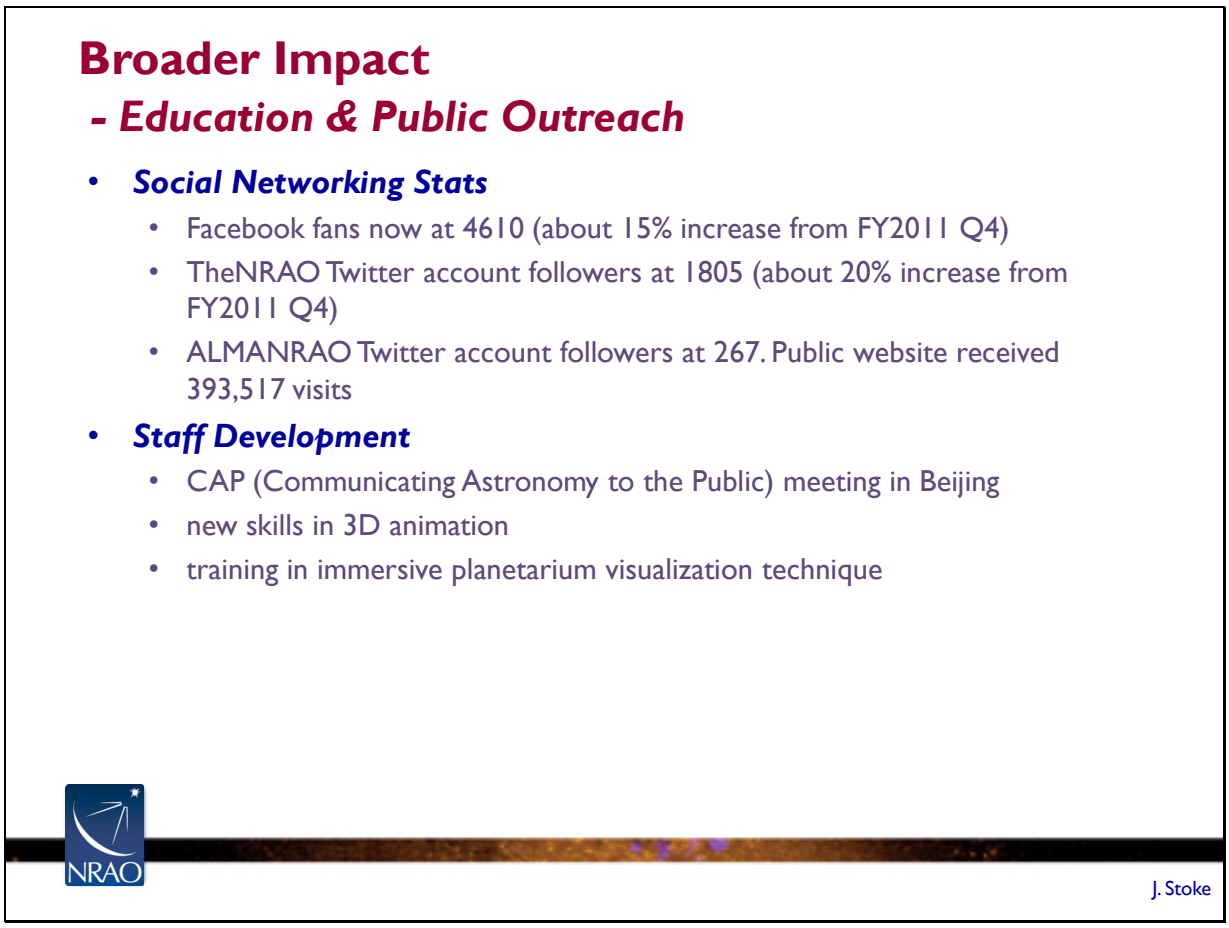
National press releases:
(1) "ALMA Opens Its Eyes" (http://www.nrao.edu/pr/2011/almaearlysci/) ;
(2) "General Dynamics SATCOM Technologies Enables ALMA Early Science" (http://www.nrao.edu/pr/2011/GDearlysci/), issued in collaboration with GDC4 Systems, who took the lead in producing it;
(3) "First Images from ALMA" (http://www.nrao.edu/pr/2011/almafirstpics/);
(4) "Observatory Seeks New Name for Transformed Scientific Icon" (http://www.nrao.edu/pr/2011/rename/);
(5) "NRAO, AUI Join Chilean Educational Project" (http://www.nrao.edu/pr/2011/chileeducation/);
(6) "VLBA Observations are Key to 'Complete Description' of Black Hole" (http://www.nrao.edu/pr/2011/cygx1/).
ALMA Media Interview details:
(1) Dr. Adam Leroy, Dr. Kartik Sheth, and Dr. Brad Whitmore live panel interview at NSF. The session was recorded and released to the public.
(2) Dr. Alison Peck at NPR studios in Charlottesville with Guy Raz about ALMA Early Science.
(3) Dr. Mark McKinnon with Al Jazeera at the Newsplex in Charlottesville.
(4) Dr. Nuria Marcelino on the CNN en Espanol show called Encuentro, at CNN studios in DC.
(5) Additionally, ALMA scientists on NBC News and Christian Science Monitor.

Additional Media Activity:

(1) Dale Frail gave interview on Planetary Radio podcast.
(2) NRAO Enabled world's first high-elevation live broadcast from 16,500 ft with El Mercurio Online (emol), viewable at http://www.emol.com/especiales/2011/tecnologia/observatorio-alma/videos.asp.
(3) Animations and scene transitions for ALMA PBS documentary completed and delivered to producer.
(4) Assisted in production of a podcast A podcast "ALMA Opens Her Eyes" on 365 Days of Astronomy Podcast from the IAU.
(5) New image use policy posted in image gallery, greatly decreasing the amount of time staff must spend handling image use requests.



GB overnight educational events participants: NSF/NASA Einstein Fellows (Teachers); Renaissance School; New River Academy; WVU Astronomy Club; WVU Honors; Madison Middle School; Ohio University; Tandem Friends School; Villanova University; Robinson High School; Mercer Christian School; Raw Learning Home School Association; Glenville state College; Ferrum College; University of Maryland; George Marshall High School; Broadway High School; George Mason University; Stonewall Jackson High School; Tygarts Valley High School; UVA; Penn State Abington; Nysmith School; Randolph College; Boy Scout Troop 39. **Other Green Bank events:** National Youth Science Day for county 4-H; Virginia Tech-in depth tour, 40 foot telescope use for 60 physics freshmen (career awareness). **VLA Events:** 18 Grad students from CO; 24 Weebelo Boy Scouts from AZ; 22 ABQ Museum Volunteers; 31 boy scouts from AZ; Festival of the Cranes participants - 66 visitors. VLA also hosted a Star Party at Gran Quivira (Pueblo Indian ruins; see http://www.nps.gov/nr/twhp/wwwlps/lessons/66gran/66gran.htm). **GB Tour Fees:** Adults, $6; Seniors, $5; Children 7-12, $3.50; Children 6 and under, free. Pocahontas County residents receive a $1 discount. This is the fee to get on the bus tour; admission to the Science Center itself remains free. **Charlottesville Astronomy Festival** featured many new activities, including live virtual tours of the universe, and involvement of many members of the staff and local students. Hubble Servicing Mission astronaut Dr. John Grunsfeld made a public appearance and gave a well-attended evening lecture.



Social Media/Networking Stats: 52 new Facebook stories on the NRAO Facebook page. 100 tweets from TheNRAO and ALMANRAO Twitter accounts. Facebook fans now at 4610 (about 15% increase from FY2011 Q4). TheNRAO Twitter account followers at 1805 (about 20% increase from FY2011 Q4). ALMANRAO Twitter account followers at 267. Public website received 393,517 visits.

Staff Development: T. Burchell attended CAP (Communicating Astronomy to the Public) meeting in Beijing. Artist B. Saxton continues to acquire new skills in 3D animation. B. Kent and J. Stoke received training in immersive planetarium visualization techniques.

Broader Impact
- *Diversity*

- ***Diversity***
  - Conducted Diversity Training for Green Bank staff
  - Met with faculty at Howard University to
    - discuss Astronomy curriculum for undergraduate students
    - solicit and encourage students to participate in the NRAO REU program for 2012
  - Working with West Virginia University Extension Service to establish science based 4-H projects

Faye Giles

Conducted Diversity Training for Green Bank staff. Member of NAASC Scientific Staff met with faculty at Howard University to discuss Astronomy curriculum for undergraduate students. Working with Howard University faculty to solicit and encourage students to participate in the NRAO REU program for 2012. Working with county and state leaders to establish science based 4-H projects with West Virginia University Extension Service.

Broader Impact
- *Diversity Employment Results*

- ***Diversity New Hires***
  - **GB**
    - 1 White Female
  - **SOC**
    - None
  - **CV**
    - 1 Asian Female
    - 1 Asian Male
    - 1 White Female

J. Firmani w/input from Giles/Franks

GB
- Tracy Samples, Sr. HR Generalist

CV
- Mao – Jansky
- Moullet – Jansky
- Kim – Web Developer

Broader Impact
- *Diversity Promotions*

- ***Diversity Promotions***
  - SOC
    - 1 Hispanic Female
  - GB
    - None
  - CV
    - 1White Female

J. Firmani w/input from Giles

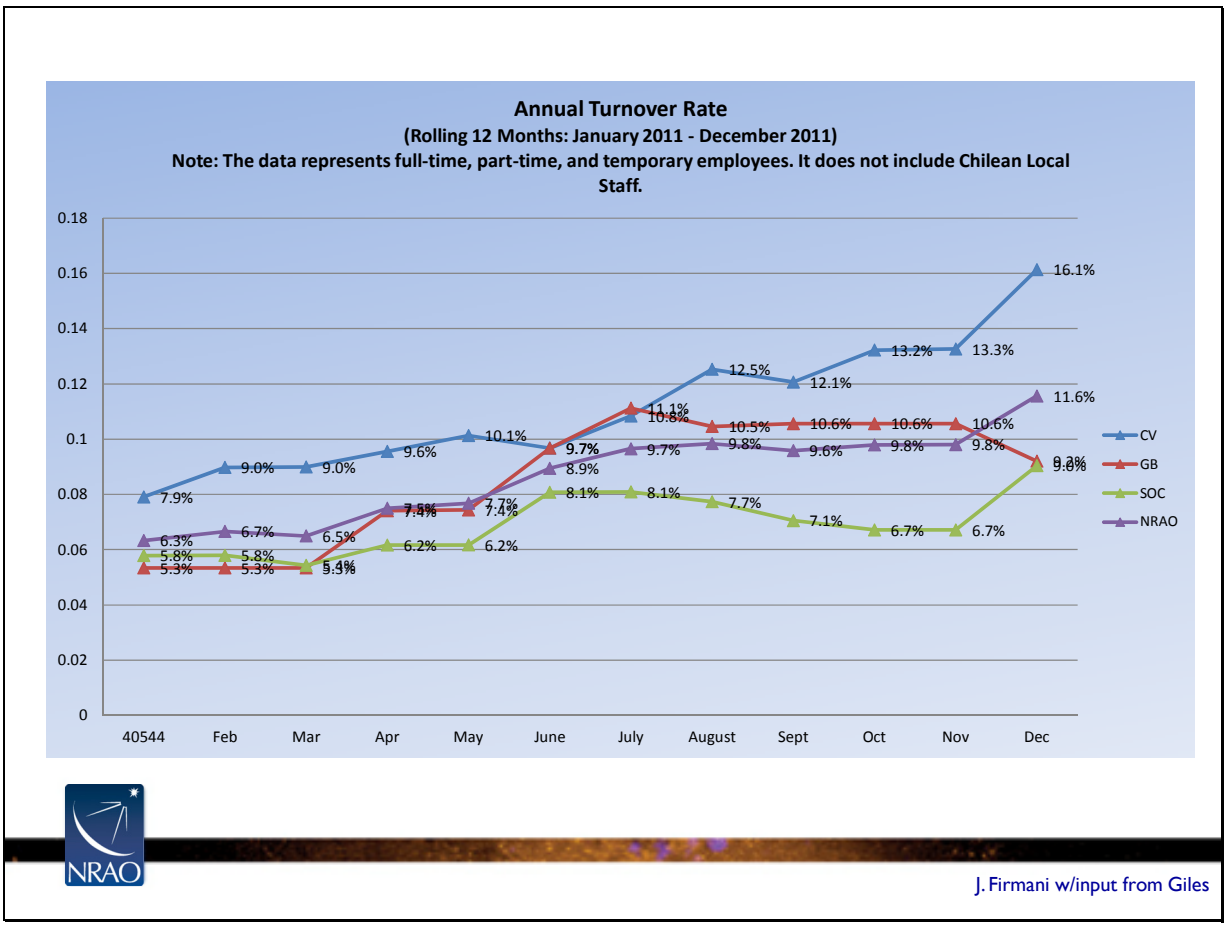
CV – Davina Moore – Contracts & Procurement (Team Lead)

SOC – Connie Gallegos – HR

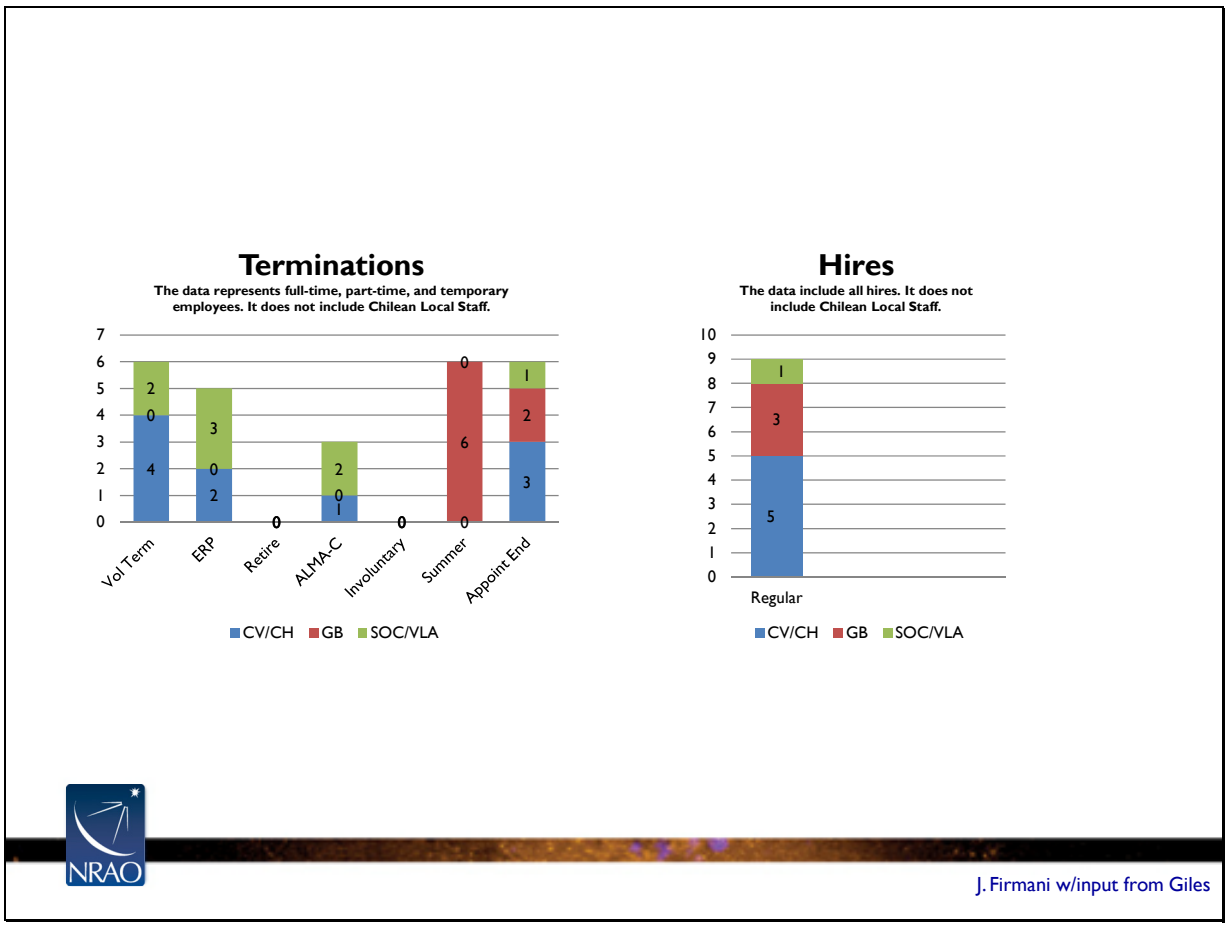
Observatory Support Services
- Human Resources

- ***Employee Relations***
  - Hired full time HR professional to provide on-site HR support for Green Bank staff and managers

J. Firmani w/input from Giles/Franks



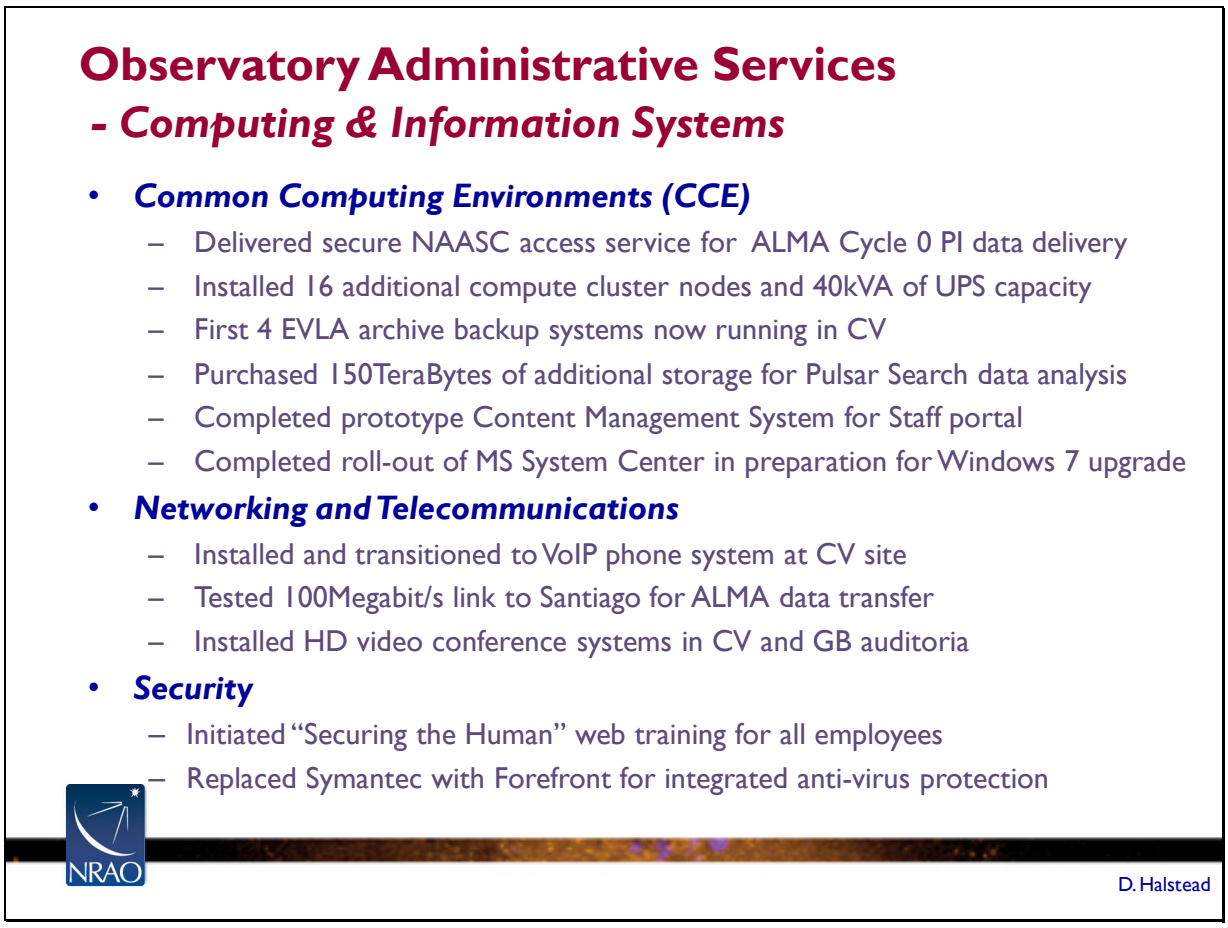
See Next Slide for information.



Charts provide a breakdown of terminations and hires for the 1st quarter.

Terminations – The rate of voluntary terminations for the quarter was normal. The final six out of 20 ERP volunteers retired during this period along with the third group of ALMA construction roll offs. Of the 3 ALMA-C roll offs, 1 reverted back to retirement, 1 is unemployed and 1 is travelling.

Hires – Of the regular hires, 1 is the Assoc Dir of Admin; 1 is administrative staff, 1 is Sr. HR Generalist, 1 is Web Developer, 1 Janitor, 1 Housekeeper. Antonio Perfetto rehired as Engineering Consultant. Scientific Staff hires: 2 Jansky Fellows.



Common Computing Environments (CCE): Delivery of Cycle 0 through the official ALMA user portal is not supported until Cycle1; interim solution was created by NRAO programmers to allow for PI authenticated access via a web link. Over 500GigaBytes of ALMA PI Observation and Science Verification data were delivered from the NAASC in Q1. NAASC cluster capacity increased by 200% (now 24 cluster nodes) in preparation for early science data processing and NA ALMA workshops. A Second 40kVA battery backup Uninterruptable Power Supply was installed to ensure headroom for planned growth through ALMA full science. Initial 4 EVLA backup archive systems now running in CV Edgemont Road computer room. NRAO Lustre parallel file system increased in capacity from 100 to 150 TeraBytes, with additional 100TeraBytes of disk storage being used to transport Pulsar Search (NanoGrav) data from GB to CV for distribution and analysis. Successfully moved to an observatory-wide Microsoft System Center solution for security patches and software upgrades in preparation for OS upgrade to Windows 7 this year. Further leverage the Plone Content Management System for web information and service hosting to migrate HR and Computing sites as well as the Staff (internal access) Portal.

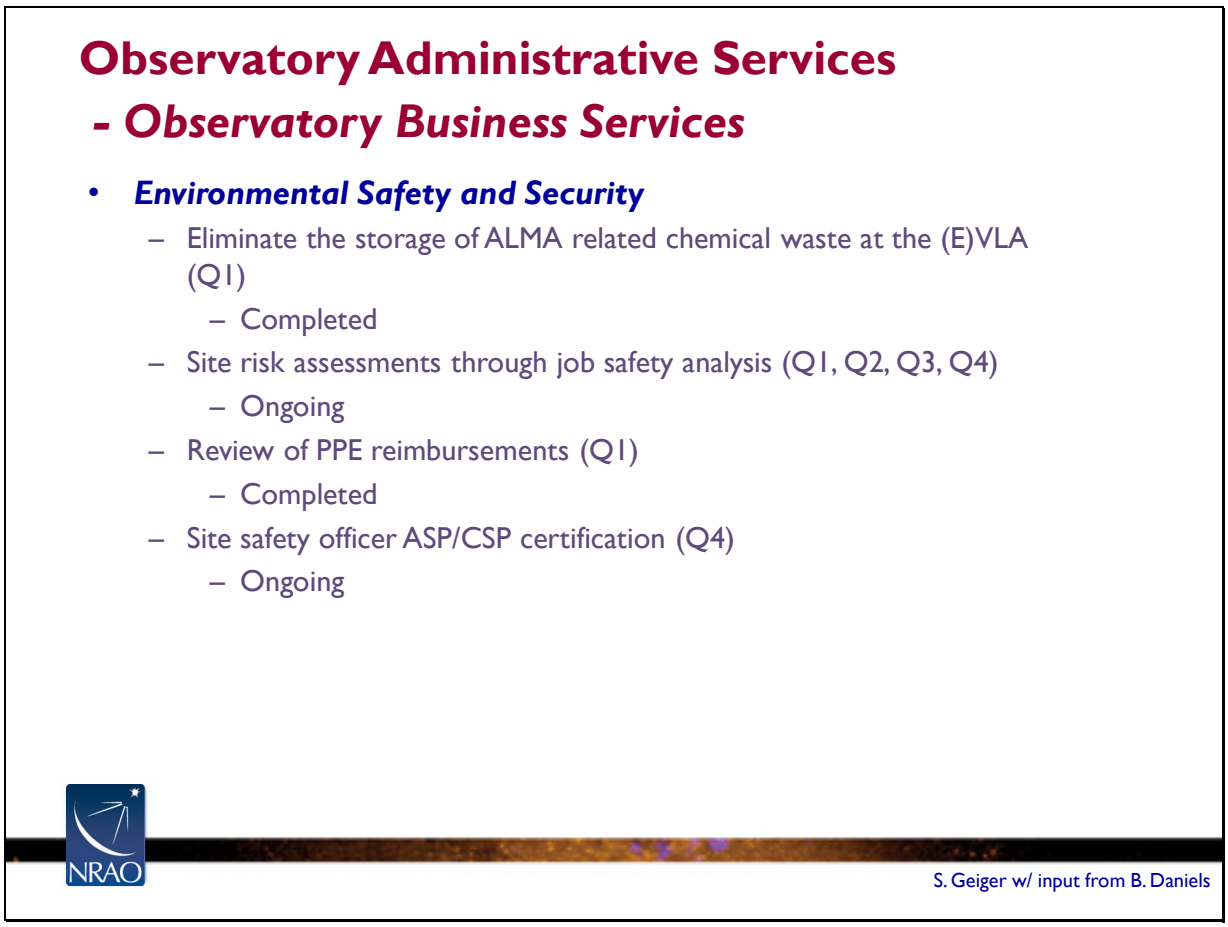
Networking and Telecommunications: CV Cisco phone system was upgraded and transitioned from analog to unified VoIP solution with retirement of legacy Nortel system was completed. Link to SCO in Chile was tested at 100Mbps, but circuit is still capped at 20Mbps by JAO until NOAO/AURA delivers shared circuit in April 2012. The end-of-life Auditorium video systems in both Edgemont Road and Green Bank were replaced with HD units for improved inter-site collaborations and session presentation.

Security: Delivered an all-employee on-line SANS "Securing The Human" Virtual Learning Environment portal . Move to new Anti-virus desktop/laptop protection system, Forefront, for improved system scanning performance, management integration, and reporting capabilities. No production impacting security incidents occurred this quarter.

Observatory Administrative Services
- *Observatory Business Services*

- ***Business Services***
  - Completion of Travel web page
    - In process
  - Automated reports generation and publication
    - List of report needs being generated for consideration
  - Reports Review
    - In process
  - ER surveillance and security enhancement systems
    - Committee formed of Associate Director of Administration, Associate Director for CIS, and Environmental & Safety Manager to review current systems

S. Geiger



The **chemical waste** stored in the ESO container was picked up and removed for disposal by Envirosolve, Inc. Although some **JSA's** have been completed, this will be an ongoing effort. As work is conducted, new JSA's will be developed and old ones will be reviewed and updated. We will begin to note the number of JSA's completed per month. The NRAO **safety footwear program** was reviewed and a change was made to the form to accommodate more expensive shoes to be worn for 2 years vs 1 year. The **eyewear program** has been reviewed but no changes were made to the program under this review period. **Site Safety Officer certifications**; James Sullivan attended the OSHA 501 training course in Albuquerque, NM on Dec. 9, 2010. He received his certificate for authorized general industry training for both the 10 and 30 hour courses. On June 2, 2011, he attended the industrial truck "train the trainer class" provided by FMH/Material Handling Solutions and received a new certification in train-the-trainer for industrial trucks. Lonnie Guin will apply for CCHST (Board Certification as Technician) in 1Q 2012. GB SO to refresh in June – August quarter.

Observatory Administrative Services - *Observatory Business Services*

- ***Fiscal***
  - Coordination and completion of fiscal year 2011 financial close
  - Preparation of OMB A-133 audited financial statements, financial disclosures, and audit schedules per request of external audit firm
  - Provide primary support for the completion of OMB A-133 audit fieldwork
  - Preparation of requested documentation specific to the NSF Business System review Phase 1
  - Full implementation of electronic vendor ACH payments at the Socorro Fiscal Division. Transition to ACH payments at the Green Bank Fiscal Division to be completed by Q3

S. Geiger w/ input from C. Williams

The annual OMB A-133 audit fieldwork was scheduled for 11-28-11 through 12/13/11 with an expected report date of 02/14/12.

To facilitate preparation for the NSF Business System Review, NRAO Management implemented a dedicated website as a depository for all requested documentation. All documentation identified by NSF as Phase 1 was completed and uploaded to the website.

The Fiscal Division completed the phase in of ACH electronic payment processing for vendor payments remitted from one of the three Fiscal Divisions. Based on the successful implementation, the process will be migrated to the second division by Q3 of FY 12.

Observatory Administrative Services
- *Observatory Business Services*

- ***Management Information Services***
  - Complete major Oracle J. D. Edwards ERP software upgrade (Q4)
    - Ongoing
  - Complete review, consolidation, and rewrite of the financial reports (Q4)
    - Evaluation and ongoing

S. Geiger w/ input from C. Beverage

Observatory Administrative Services - *Observatory Business Services*

- ***Contracts and Procurement***
  - Updates Procurement Manual are being done in phases and will be completely updated by the end of January 2012 (FY12Q2)
  - Implement an export compliance program
    - It will be worked in FY12Q3 ahead of schedule.
  - Revise the Procurement website, internal and external pages
    - – Website is being updated in phases. All Updates/Revisions will be complete by the end of FY12Q2
    - Revised Procurement Manual will be posted to the NRAO Webpage in FY12Q2

S. Geiger w/ input from J. Cappiello

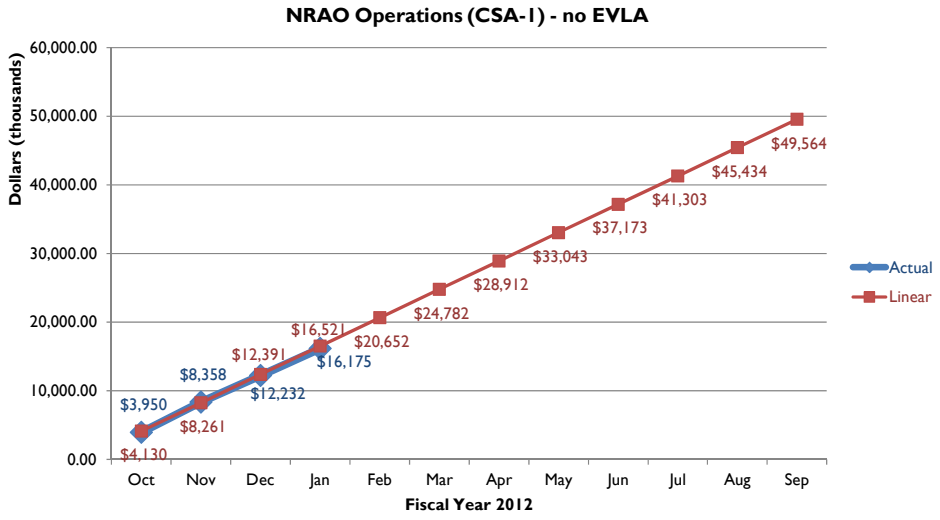
Finalize Procurement Manual: The Procurement Manual Updates/Revisions were started in Oct 2011 time frame and will be completed Jan 2012.

Implement an Export Compliance Program: Export compliance consultant has been requested to prioritize his time with the proposed C-band destined for Shanghai China and the Import Export Compliance Program.

Revise the Procurement Website Internal and External: NRAO Terms & Conditions, Representations, Certifications and Acknowledgements, and other appropriate documents to include the Contracts and Procurement Manual will be updated on the Webpage.

Observatory Administrative Services
- *Observatory Business Services*

- ***Financial Performance***



S. Geiger w/input from A. McReynolds

NRAO Operations (less EVLA) FY 2012 new funding allocation is $42,890.0K. Total available funding including prior year commitments and carryover totals $49,564.1K. Total expenses and commitments for the first quarter of FY 2012 is $16,175K or 30.7% of total available funds. Benefits are ahead of spending projections due to higher than anticipated medical claims. NRAO budgets for 32.5% benefits rate, however, as of January the actual benefits rate was 35.28%.

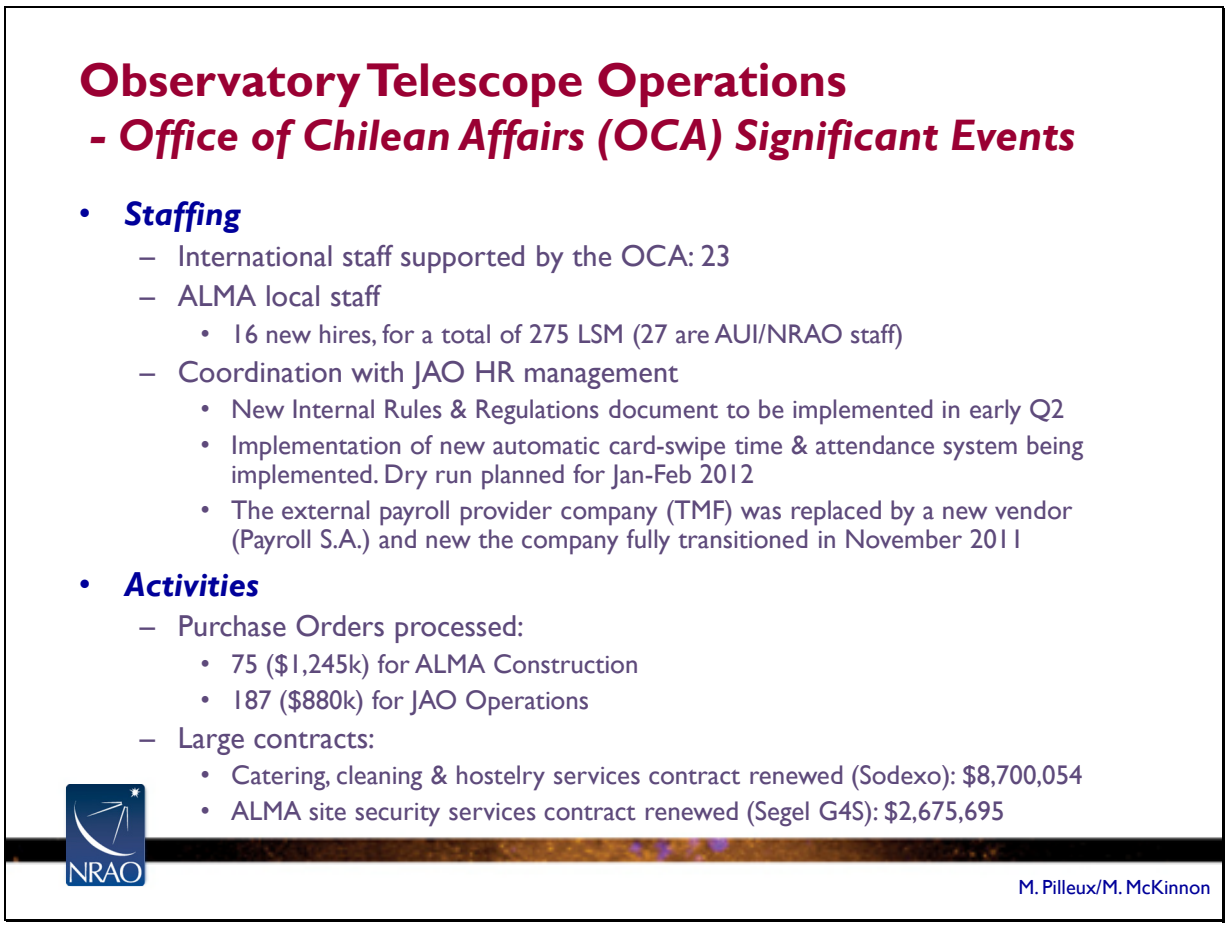
Observatory Work Breakdown Structure - Quarter 1 Actual Expenses

	Total NSF New Funds (PRL) and Carryover	FY12 Qtr 1 Actuals	% Spent	Notes (25% fiscal year elapsed)
Observatory Science Operations (OSO)	13,314,050	1,927,938	14.48%	OSO Spending increases in 3rd in 4th quarters overall due to summer programs and student research projects.
Observer Support, Services, and Tools	4,298,986	1,071,204	24.92%	Open Sky project still largely on a Purchase Order and has not been spent yet as of Q1.
Community Support Programs	1,604,540	92,770	5.78%	Most spending for Community Support occurs in the 3rd and 4th quarters as students come to NRAO for summer projects
North American ALMA Science Center	6,919,647	733,237	10.60%	Spending ramps up in summer as students come to NRAO to work with NAASC Scientists. Also, ALMA Telescopes just began receiving data for analysis and research in the 1st Quarter.
Research Experience Teachers & Undergraduates	490,877	30,728	6.26%	Most REU/RET Spending occurs in 3rd and 4th quarters as students come to NRAO for summer projects
Observatory Telescope Operations (OTO)	52,912,657	7,105,948	13.43%	
Green Bank Operations	9,669,702	2,124,790	21.97%	Green Bank's general expenditure trends are weighted toward Q3 and Q4 with summer programs, dorm maintenance/increased usage, café operations, and telescope painting.
New Mexico Operations - EVLA	12,752,802	2,930,022	22.98%	Budget is split between EVLA and VLBA. Travel portion of budget used sparsely in Q1. Also, there was also more than half of the projected non-employee revenue for the year collected in Q1.
New Mexico Operations - VLBA	5,215,183	1,104,247	21.17%	Budget is split between EVLA and VLBA. Travel portion of budget used sparsely in Q1. Also, there was also more than half of the projected non-employee revenue for the year collected in Q1.
ALMA Technical Support and JAO Chile Operations	25,208,559	937,475	3.72%	NRAO received $3.0M in revenue from NRAO's Japanese partners for invoices billed in FY11. NRAO also received $750K in recovery from ESO and $983K in LSM Recovery. The remaining funds are for prior year commitments for expenses for future years.
Green Bank Solar Radio Burst Spectrometer	66,412	9,414	14.17%	Solar Radio Burst spending does not follow linear trends.
Observatory Construction Projects	73,598,817	12,587,432	17.10%	
ALMA NA Construction	60,867,193	10,436,638	17.15%	While ALMA-Construction is reported on the POP on a per year basis, ALMA-C is tracked as inception to date by the project. ALMA is forward funded by NSF and the variance is the remaining forward funding and contingency for completion of the project.
ALMA Japan Construction	9,228,624	1,751,834	18.98%	While ALMA Japan is reported on the POP on a per year basis, ALMA-J, as part of the overall ALMA Construction project, is tracked as inception to date by the project. ALMA-J is forward funded by NSF and the variance is the remaining forward funding and contingency carried forward for completion of the project.
EVLA Construction	3,503,000	398,960	11.39%	EVLA will be using the $4M remaining in carryover in 2012 (no new funds in 2012). Project completion is expected in FY12.

Observatory Work Breakdown Structure - Quarter 1 Actual Expenses (continued)

	Total NSF New Funds (PRL) and Carryover	FY12 Qtr 1 Actuals	% Spent	Notes (25% fiscal year elapsed)
Observatory Development Programs (ODP)	4,701,194	691,186	14.70%	
New Initiatives	582,919	199,842	34.28%	NIO paid 50% of severance/vacation payout to a departing employee in Q1.
Coordinated Development Lab	2,269,732	491,344	21.65%	Currently the AD position is vacant and staff are still occasionally pulled off CDL projects to work on production projects for ALMA.
ALMA Development	1,848,543	-	0.00%	$500K in development money is being awarded for development studies. Proposals for these funds were just submitted in 2nd quarter of FY12. The remaining money is being held for JAO projects which NRAO was instructed to hold onto until further notice.
Observatory Administrative Services (OAS)	3,864,178	843,522	21.83%	
Administration	683,775	91,562	13.39%	Head of Budgets position was open in Q1. Also, FY11 ERP expenses were accrued at FY11 year end, resulting in a reversing credit in Q1.
Human Resources	823,062	201,454	24.48%	
Computer and Information Services	1,346,596	363,520	27.00%	
ALMA Office of Chile Affairs	1,010,745	186,985	18.50%	General underspend is due to reversing accruals of FY11 expenses reversed in October 2011.
Director's Office (DO)	4,370,997	957,234	21.90%	
Director's Office	1,363,109	257,220	18.87%	Funds out of Director's discretionary research fund have not been spent as of Q1.
Science Staff (OSAA)	1,325,886	253,985	19.16%	Some budgeted Post-Doc positions have not been filled as of Q1.
Education and Public Outreach	1,628,630	435,309	26.73%	
Spectrum Management	53,371	10,720	20.09%	Most travel for Spectrum Management is in Q2 through Q4.
ARRA Stimulus Funds	965,700	190,504	19.73%	ARRA Funds will be expended by Sept 2012. Some projects were underspent, so funds will be used to fund additional supplies/services under these projects per NSF approval. Also, some funds are set aside for possible Davis-Bacon compliance payments.
Interagency Agreements Assoc. with Base Operations	-			
Subtotal Interagency Agreements Assoc. with Base Operations	-			
AUI IDC/Mgmt Fee	3,466,000	866,664	25.00%	
NRAO Operations Carryover	3,995,000			Carryover is distributed throughout the NRAO Operations Divisions.
Observatory Grand Totals (carryover plus new NSF AST funding)	161,188,593	25,170,427		

NOTE: Cost Pool Recovery has been distributed through the functional areas and the FY12 budget reduced to reflect the impact of the cost pool as appropriate.



Office of Chilean Affairs (OCA): The number of **international staff** is at 23 FTE. OCA has increased the total number of **Local Staff Members** contracts in the quarter, bringing the total number of employees for which OCA provides ALMA with legal, payroll and travel support to 275 local staff on 31 December 2011 (27 are under AUI/NRAO direct supervision). A second revision to the **Internal Rules & Regulations document** was approved by the HRAG and will be implemented in early Q2. An automatic time & attendance system was implementated on schedule in Q1 FY2012. The **external payroll provider** company (TMF) was replaced by a new vendor (Payroll S.A.) in order to implement a more effective software platform that includes an HR database, as well as improve the level of service. Full operation with the vendor started with the processing of the November payroll (successful).

OCA has provided the legal and institutional support for contracts and procurements for ALMA as follows: a total of 75 purchase orders were issued for ALMA Construction (1,245 k$) and 187 for ALMA Operations (880 k$). The activities for ALMA Construction involve those described in the Site IPT section, namely AOS Roads Construction Contract, AOS Utilities – Electrical and FO cables installation contract, Fiber Optic Cable supply and Contractors' Camp expansion (JAO activity). The termination of the AOS Utilities – Electrical and FO cables installation contract with Echeverría & Kelly Ltda. continued to involve additional litigation in September. Also, the **Sodexo contract** (catering, cleaning & hostelry services) for $8,700,054 was renewed until 31 December 2014, with annual renewal options December 31st of each year. The **Segel-G4S contract** (security services) for $2,675,695 was renewed until 31 December 2014, with annual renewal options on December 31st of each year. Reports were issued to CONAMA (environmental authority) related to flora/fauna and archaeological follow-ups.

Agenda

- Science Results
- Observatory Science Operations
- Observatory Telescope Operations
- Observatory Development & Programs
- Observatory Administrative Services
- Director's Office
  - Office of Science and Academic Affairs (OSAA)
  - Spectrum Management

Director's Office

- *Office of Science & Academic Affairs (OSAA)*

- ***General Activities***
  - Documentation for OSAA, and NRAO science highlights and direction, to NSF NRAO program review, with presentation
  - NRAO long-range vision document being written with Fisher, Myers, Frail
  - Met with South African head of NRC, and SKA project Director to discuss PAPER and related US-ZA collaborations
  - Identify emerging science areas for Director's Review of NRAO observing proposals
  - Input on external grants administrative process to DO/Fiscal
- ***Recruiting***
  - Visiting scientist position (1yr) offered to Ravi Subrahmanyan (RRI)
  - Joint appointment for Astronomer TZ Chang arrange with ASIAA, to start Jan 2012
- ***General Postdoc programs***
  - Postdoc positions have been filled for EVLA, VLBA, GBT
  - Jansky selection committee met and made recommendations to the Director (5 offers are recommended for 4 positions. Over 100 applications were received)
  - Sheth is now Jansky mentor/contact in Charlottesville, with Goss acting as program head and mentor/contact in Socorro

C. Carilli

Director's Office

- *Office of Science & Academic Affairs (OSAA)*

- ***Scientific Staff***
  - Scientific Performance Evaluation
    - Finished science evaluation due to late-submission of PEPs
  - Academic promotions
    - Brogan accepted by AUI board for Tenure
    - SPRC-A made recommendations for promotion for 5 scientist-track staff to the Director
    - STPC organized and scheduled for review in Jan
- ***Budget***
  - Research guidance budgets finalized, and memos circulated to scistaff
  - DSAA input to budget summit with contingency planning

C. Carilli

Director's Office

- *Office of Science & Academic Affairs (OSAA)*

- ***NAASC Postdoc Activities***
  - Contributed to ALMA Cycle 1 software testing
  - Contributed to ALMA Data Workshop in Charlottesville
  - Contributed to Splatalogue database
  - Contributed to ALMA calibrator database
  - Lead weekly lunch talk series and journal club discussion group
  - Attended conferences, wrote papers, conducted observations
- ***NAASC Postdoc Mentoring and Training***
  - Interferometry Discussion Group
  - Python programming training
  - Participated in ALMA Single Dish workshop hosted by EA ARC
  - Journal club
  - Various science topic specific group meetings

C. Carilli

Director's Office
- *Spectrum Management*

- ***General Spectrum Management***
  - Tests of 79 GHz car radar emissions were conducted at the ARO Kitt Peak 12m telescope in conjunction with ARO, Haystack Observatory, Bosch and Continental, NRAO Electronics Division Tech. Note 219, http://www.gb.nrao.edu/electronics/edtn/edtn219.pdf
  - Prepared IUCAF background documents for WRC12 in Geneva, January 23 -February 17, 2012

H. Liszt

The car radar tests were conceived at a session hosted by NSF at the NAS in May 2012.

Harvey Liszt is the IUCAF rep at the World Radio Conference in Geneva.