



THE POINT SOURCE

A quarterly newsletter for employees of The National Radio Astronomy Observatory

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Summer 1994

NRAO Users Committee Meeting

The NRAO Users Committee meets annually to provide us with advice on all aspects of the operation of the observatory that affect the users of the facilities. They also help us develop priorities for our actions. The meeting this year was hosted in Socorro and it was attended by more than 20 members of the committee. The committee members serve for four years and are chosen to be representative of the range of scientific research that is conducted on the NRAO telescopes.

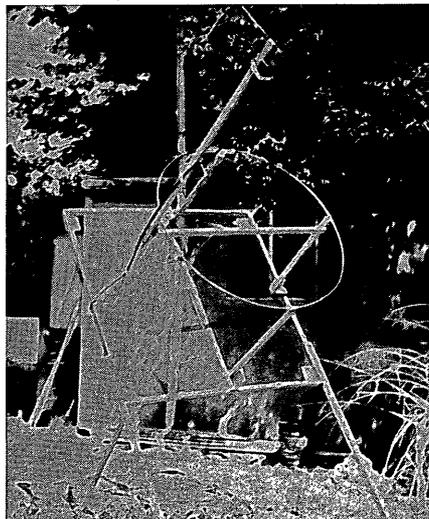
In the committee meeting report compiled by the Chair, Dr. Jean Turner (UCLA), the committee noted with pleasure many new instrumentation developments that are now available to users. These include the VLA 7 mm system and the on-the-fly mapping technique at the 12 Meter Telescope. The committee provided specific advice and encouragement for the following:

- Scheduling of the two sky surveys on the VLA;
- Further development of the VLA high frequency capabilities;
- Proposal handling and acceleration of correlator operation for the VLBA;
- Mapping analysis software and remote observing at the 12 Meter;
- Spectrometer development and high frequency receivers for the 140 Foot Telescope and the GBT;
- Continued emphasis on the work of

the CDL and on development of the MMA.

Computing was highlighted as being one of the biggest challenges facing the NRAO now. Much of the discussion focussed on the need for continued maintenance and improvement of AIPS, development of single dish mapping software, and encouragement that AIPS++ be available even in a rudimentary form to users as soon as possible.

The meeting arrangements were handled by the staff of the AOC with a thoroughness that is becoming a hallmark of meetings held at the NRAO in New Mexico.



Paul Harden's backyard radio telescope

Backyard observations of the Jupiter impacts

The impacts on Jupiter in July were a natural invitation to perform some backyard radio astronomy for Paul Harden, an Electronics Technical Specialist, at the AOC who has been with NRAO for 18 years. Using his interest in electronics, ham radio, and astronomy, his experience with the NRAO, and the considerable help of other NRAO employees, Paul used his backyard radio telescope to monitor the collisions.

Amateurs were encouraged to monitor for bursts of radio emissions just prior to the impacts. Using short wave receivers, a homemade ring antenna, and other equipment, Paul monitored two frequencies (18.1 and 22.3 MHz) simultaneously, beginning about a month before the first impact to develop a baseline of normal activity and to check the system calibration. NRAO engineering and scientific staff were very helpful during this phase in recommending observing methods to use and verifying system sensitivity. This pre-impact observing period was uneventful. Once the impacts began, it unexpectedly got rather exciting.

Some of the impacts observed produced surprising increases in the received noise levels and closely followed the history of the visible flares. The initial increase in energy may be the fragments as they skimmed Jupiter's radiation belt prior to impact. The actual time of the explosions coincide with another increase in emissions and appears to be about 2 million Janskys.

The moment of impact is particularly interesting. As a fragment enters the atmosphere, one would expect the emissions to cease since low frequencies should

(see Scientific News on page 2)

Scientific news...

Backyard Science (cont. from page 1)

not escape Jupiter (just as these frequencies do not leave the earth). This was observed on some impacts, but not all. This could suggest that some fragments exploded before reaching the atmosphere. If this proves to be the case, then some of the comet fragments, basically chunks of ice, were not as dense or heavy as first believed. The dramatic plumes observed visually would then be mostly steam from the exploding ice.

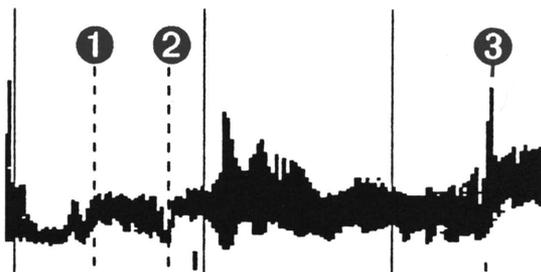
While Paul is anxiously awaiting results from the professional observations, he is receiving plots from other amateurs through the Society of Amateur Radio Astronomers (SARA), which show the same characteristics. Comparing Paul's observations with others is very important, because with only a single antenna, one can not say for certain if the signals were from Jupiter or local interference. (This is not a

problem for the large NRAO antennas since they can pinpoint the source of radio energy within a small fraction of a degree.) Paul's antenna "saw" energy from many degrees across the sky, not just Jupiter. In a sense, the amateurs formed an after-the-fact VLBA of their own, stretching from Virginia to Alberta, Canada, recording most of the impacts. If verified to be impact related, the amateur observations could help determine precise times of the impacts and perhaps where in the Jovian atmosphere the fragments exploded.

Paul says that NRAO scientific staff has been very helpful in evaluating these amateur observations to determine their scientific merit. Applying the equations to Paul's antenna and receivers to calculate sensitivity, antenna temperature, and so forth (as is done with the VLA or any radio

telescope) has truly given Paul an appreciation for how sensitive the NRAO instruments are. For example, the sensitivity of a single VLA antenna is a few thousandths of a Jansky, while Paul's is about 40,000 Janskys. That makes one VLA antenna about 2 million times more sensitive than Paul's antenna! (Of course, he built his for \$40.)

Paul writes: "I appreciate the assistance given me from many of the NRAO staff and certainly understand why they love their computers. Performing the required calculations by hand is very cumbersome and time consuming. Also, keeping a wet-ink chart recorder running for over a month is just short of heroic. Computer data reduction and plotting wins hands down. As for myself and my Jupiter station, I think I am about to retire from the astronomy business. It's too much work!"



Observation of SL-9 Fragment G recorded on a wet-ink chart recorder
10 minutes preceding and 10 minutes after impact

- ① Pre-impact rise in noise level, possibly fragment penetrating Jupiter's radiation belt.
- ② Drop in noise level at impact time, followed by post-impact emissions.
- ③ Post impact emissions faded to pre-impact noise level.

New Employees

Green Bank

Stephen Hinkle, Plant Maintenance
Loretta Sipe, Admin. Services
Robert Taggart, Telescope Services
Patricia Thompson, Admin. Services

Tucson

James Lynn, Operations & Maint.

Socorro

Bryan Butler, Basic Research
Andrea Cox, Student Support
Christopher DePree, Student Support
Athol Kemball, Computing
Kevin Marvel, Student Support
David Moffett, Student Support
Marcelo Rosales, Electronics
Laura Rupp, Admin. Services
Kevin Ryan, Computing
Angelos Vourlidis, Student Support

Departures

Green Bank

Sharon Dakan Christopher Norris
Michael Masterman Todd Pfalzgraf
Steve Puckett Melvina Shinaberry, Retired

Socorro

Bonnie Bruton Gerard Hurst
Richard Martinez David Medcalf
Charles Rucci Lonnie Wisdom

Tucson

Dennis Chase Andrew Dowd
Fred Escalante, Jr.

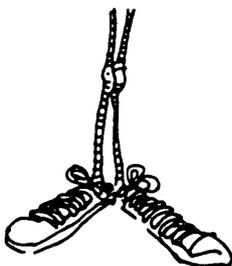
6/1/94 - 8/31/94

Scoping the sites...

Charlottesville

● Charlottesville and Green Bank employees will be "walking" to the VLBA sites soon! Through the Wellness Program, employees will have the opportunity to participate in "Take a Hike!" This program is designed to encourage and assist employees in starting a walking program of their own.

Each participants will receive an individual mileage goal based on his or her physical condition. Each week their individual goal is reached, participants can turn in the number of miles they walked. The total miles walked by each site will be credited toward the "walk" to the VLBA. For the Charlottesville/Green Bank program, a route has been mapped beginning in Staunton (located between the two sites) and leading to each of the eight VLBA sites located on the U.S. mainland. A map showing each site's progress will be maintained at each location. The site that "walks" to the most VLBA sites wins. There also will be prizes for achieving individual goals.



Socorro and Tucson employees will be given the opportunity to participate in the "Take a Hike!" program after the first of the year. We will keep you posted on the number of miles NRAO employees walk through this program in future editions.

Green Bank

● True or False?

- Radio waves and sound waves are the same thing.
- Radio waves and light waves are the same kind of energy.
- Our eyes are not sensitive to radio waves, but our ears are.

These questions were used as part of a survey given to visitors of the Green Bank Visitors' Center this summer. The survey was created to assist in the overhauling of the Green Bank public education program. The current program consists of a presentation and slide show, followed by a bus tour of the telescopes. The NRAO plans to ask the NSF Informal Science program for funding for an interactive exhibit and computer display program which will allow visitors to explore the physics behind radio astronomy and to see research in progress at the GBT and other telescopes.

Of the 325 people who responded to the survey, 300 indicated that they felt scientific research was important. Only 5 people indicated that they felt it was not.

Some of the more interesting questions asked of the tour guides this summer were:

- Do you listen to the foliage?
- Can I look through the telescope?
- Do employees wear protective clothing?
- You couldn't tell us if you discovered aliens, now could you?

The formal proposal will be submitted to the NSF prior to February 1, 1995. If you have an idea for an interesting and informative interactive exhibit, contact Sue Ann Heatherly by phone at (304) 456-2209 or by email at sheather@nrao.edu.

Socorro

● The NRAO-Socorro spring picnic was held in June at Sedillo Park. Two hundred adults and about as many children attended. The festivities included a lunch of steak, barbequed brisket, chicken, and all the fixings. Door prizes ranged from coolers and frisbees to lawn chairs and fish pillows (won by Bill Brundage).

Activities consisted of a balloon toss for the kids, all of whom won a prize for their efforts. There were also pinatas for the kids, split into a realistic dinosaur for the older children and a certain big, smiling purple dinosaur for the younger kids. Plenty of candy to go around for all! The horseshoe contest was won by the team of Paul Savedra and Jimmy Sanchez. The egg toss was won on a fabulous long throw by the team of Phil and Jill Diamond (we won't mention the spare egg in Phil's back pocket which was used to "crown" the organizer after the event!). The first sack race was a runaway victory for Tim Hankins and his son, while the second contest was won in a photo finish by a diving Carolyn Smith/Doug Claycomb. In a stunning development, the tug-of-war was won by the guys, ending the women's winning streak!

● Future PRA events include the fall picnic, scheduled for the Water Canyon campgrounds on October 8th, and the Christmas party, scheduled for December 17th at the Garcia Opera House.

Tucson

● Next year marks the twenty-fifth year anniversary of the first detection of carbon monoxide in the interstellar medium using the NRAO 36 Foot (now the 12 Meter) Telescope. Planning is well underway for a 1995 symposium honoring the event and highlighting ongoing and future mm-wavelength research. The conference, which is to take place 29 May-2 June, is entitled "CO: Twenty-five Years of Millimeter-wave Spectroscopy".

On behalf of NRAO and the Submillimeter Telescope Observatory, Bill Latter and Darrel Emerson submitted a proposal to the International Astronomical Union (IAU) for meeting sponsorship. The IAU has accepted the proposal and granted the meeting symposium status. Granting "symposium status" means not only that IAU recognizes this as a valuable conference, but also that it supports the conference by providing money to be used for the travel expenses of students and others on a limited budget. The event is likely to draw between 150-300 international participants.

● Employees in Tucson and New Mexico received Wellness Training in August - Financial Wellness Training, that is. This training was conducted by Frank Federmann of AUI. Topics included retirement planning, wills, and trusts. Frank particularly stressed the need to keep all your financial and other pertinent information where others can find them.

Personnel news...



Maximum SRA contributions may change for some

It may be necessary to adjust the contribution levels of certain employees who have opted for the maximum permissible retirement contributions this year.

Employees working for non-profit organizations such as NRAO are permitted to tax shelter up to 20% of their taxable salary by making pre-tax contributions to the TIAA-CREF Supplemental Retirement Annuity or to alternative annuity programs, such as the mutual funds offered by Fidelity and Vanguard. The maximum amount which can be contributed in any taxable year is the lesser of 20% of taxable salary or \$9500.

Until now, the 20% amount has been calculated using the employee's base annual salary. We are now advised that the correct salary basis is the employee's "taxable" annual salary. The taxable salary is usually lower because medical and dental insurance premiums paid by the employee are subtracted from the base salary amount before federal and state

income taxes are computed. (FICA contributions are computed on base annual salary.) An employee's taxable salary is further reduced if he or she participates in a health care and/or a dependent care flexible spending account.

If your base annual salary is under \$56,000 and you are making voluntary retirement contributions by salary reduction, your maximum permissible contribution amount will be recalculated by the Personnel Office. Such employees who are at the maximum contribution level may need to adjust their contributions for the remainder of the year in order to be in compliance. All such employees will be contacted by the Personnel Office within the next few weeks. Any adjustments which are necessitated by this change will be relatively minor.

If you have any questions or wish any additional information please contact Billie Rodriguez at (804) 296-0312 or by email, brodrigu@nrao.edu.

New NRAO Employee Handbook to be released

Each employee will receive a copy of the newly revised edition of the **NRAO Employee Handbook**. The **Handbook** is designed to be placed in the front of the blue binder entitled, **Employee Handbook**. This binder already contains your **Insurance and Retirement Program** information. If you do not have a binder, contact your local personnel representative.

There are several changes in policy which affect all employees. Since you are responsible for following the guidelines and policies laid out in the Handbook, make certain that you read over the booklet. If you have any questions about any of the information in the NRAO Employee Handbook, talk to your supervisor or the Personnel Office.

All employees will be asked to sign a statement acknowledging that they have received a copy of the new **Employee Handbook**. When you receive your copy, sign the acknowledgment and return it to your supervisor.

Special thanks to all of the employees who agreed to have their picture included in the **Handbook**.

Notes from the Editor

Suggestion email Box

If you would like to make a suggestion to improve the operation of NRAO or to improve worklife, submit the suggestion to me in the Personnel Office or send email to wmahle@nrao.edu.

Q&A

If you have a question you would like answered or a topic you would like addressed in this publication, please submit it in writing. All questions and topics will be referred to the appropriate person. Their responses will be published in the next issue, as space is available.

You may request that your question or suggestion be submitted confidentially. If you do, only I will know who sent the question. However, I do ask that you include your name with your question/suggestion.

Wendy Mahle, Editor