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THE RAP SHEET

A Quarterly Newsletter of the
National Research Council Research Associateship Programs

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Director's Message

Recruiting well-qualified applicants to the NRC Research Associateship Programs is a constant challenge to our staff, as well as to our program Advisers. We know that historically about half of all applicants first hear about our programs from their prospective Advisers. The other half of applicants hear about the programs through a combination of NRC outreach activities including exhibits and job placement at scientific meetings, print advertising, direct mailing, and e-mailing, etc. This is not a surprising statistic, as we have over 4000 participating Advisers, and this large cadre of scientists and engineers casts a large net in the pool of potential postdocs and visiting scientists.

At the present time, we are receiving almost three applications for each award made. This trend reflects the current job market, but also the efforts of all parties in effective recruiting. Still there are things we can do to further enhance our outreach efforts.

First, I would like to suggest that Advisers strive to keep their Research Opportunities up to date. Annual updates are requested through the agency's Laboratory Program Representative. However, the NRC can update your opportunity(s) on the web at any time. Just send an e-mail to rap@nas.edu. Also be sure to update your contact information.

Second, I hope that Advisers will help in promoting the broad range of research opportunities available in the federal government. Only about 10% of Ph.D.s doing postdocs go to government labs; about 85% do postdocs at universities. Part of the problem is that students simply don't know about the breadth and quality of research activities in the federal government. Please help us in the

general advocacy of the federal research enterprise when speaking with students. It is understood that not all of our Associateship Program Advisers will be able to support a postdoc or visiting scientist each year. However, we hope that all interested applicants can find an opportunity or opportunities somewhere in the programs. If you are an Adviser who finds yourself in this situation – interested applicants, but no funding – please encourage the student(s) to look at other opportunities in the NRC programs, or at other avenues for doing a postdoc or working in the federal government.

We have done a lot of thinking about better ways to match prospective applicants with interested Advisers. In our current system, the NRC promotes all Associateship Programs opportunities on an equal basis, even though some might not have available funding in a given year. In an effort to direct prospective applicants to funded opportunities, the NRC is planning two initiatives. First, we plan to create a list of prospective applicants from professional meetings that can be accessed electronically by Advisers seeking postdocs. Often, NRC staff meet students at professional meetings who are extremely interested in doing research in a federal laboratory, but have not made any contacts. By posting a brief description of the background and expertise of these students, we hope that Advisers actively seeking postdocs will be able to make a connection. Second, we plan to develop a list of "hot" opportunities. This list will include opportunities, submitted by Advisers, which have a high probability of being funded in a particular review cycle. In addition to our general promotion of all research opportunities, NRC staff will be able to highlight these specific opportunities at professional meetings.

I will welcome any thoughts you have on these initiatives or other ways that the NRC Research Associateship Programs might improve our efforts to reach qualified applicants.

H. Ray Gamble - Director, Associateship Programs

Associateship Program Updates

A web-based application system (WebRap) was put in place in January 2003. The system can be accessed from our home page (http://www.nationalacademies.org/rap). Currently, about 50 percent of the applications are being submitted electronically. Advisers are asked to encourage prospective applicants to use the electronic application system, as this will keep down overall program costs.

For calendar year 2002, 906 applications were received and 391 new awards were made. During the year, almost 800 Associates were on tenure, for all or part of the year, representing the largest number of program participants since 1998.

In 2002, the NRC added a fourth annual review with a deadline of November 1. This deadline is now used for the Air Force Research Laboratory and The Environmental Protection Agency Summer Faculty programs, as well as many applicants in the Space Sciences. The addition of this fourth review did not impact the number of applications received during the other review cycles.

As mentioned in the article below, an updated Research Associate Directory is now available on the NRC website. Of 4,590 former Associates for whom we have active e-mail addresses, 2,026 are current federal employees (43.5 percent). This is further evidence of the value of the NRC Associateship Programs to the federal R&D workforce.

The deadline dates for 2003 applications and lab center review (LCR) forms are as follows:

Application deadline:	**LCR forms due:**	**Review completed:**

Spring Review	May 1	May 19	mid-June
Summer Review	August 1	August 19	mid-September
Fall Review	November 1	November 18	early January 2004
Winter Review	February 1, 2004	February 28, 2004	mid-March 2004

Directory of NRC Associates

The National Research Council Resident Research Associateship Programs were established in 1954. In the almost 50 years since the first award was made, over 10,000 Associates have been selected to conduct research in federal government laboratories. Postdoctoral Associates have gone on to diverse careers in science and engineering. Many former Associates are employed in a federal research laboratory or center, and many of these former Associates now serve as Advisers in the programs. Our senior Associates have often formed long-standing collaborations as a result of their Associateship, thereby furthering their research and the programs of the sponsoring laboratories.

A Directory of former NRC Associates was published in book form in 1995. Since then, more than 2,000 additional Associateships have been awarded.

The NRC now has a web Directory (nrc58.nas.edu/pgasurvey/data/aodir/gen_page.asp), with updated current information on many of our former Associates. This information can be viewed by Associate name, program, or date of award, or by state or country of the Associate's current employment. The Directory is fully searchable.

Although the NRC has gone to considerable effort to locate and update information on former Associates, we realize that there may be oversights and possibly inaccurate information. If you are aware of incorrect information regarding a former Associate listed here, or if you have comments or suggestions regarding the Directory, please contact us at rap@nas.edu.

Laboratory Program Representative Meeting

Each year, representatives from the federal agencies sponsoring Research Associateship Programs come to Washington for a meeting to discuss the status of the program. This year, our general meeting was held on Friday May 2, 2003 at the National Academies' Keck Center. Our NASA program meeting was held on Monday, April 28, in the National Academies' Cecil and Ida Green Building. A total of 46 people attended the general meeting, and 19 NASA representatives attended the NASA meeting.

In addition to a general program update, these meetings are intended to address topics of interest raised by the attendees. At this year's meeting we discussed changes in the review schedule, the electronic application system, new initiatives for program promotion, stipends, policy changes, Associate travel and insurance, Associate orientation, visa issues and security. Information on many of these topics can be found elsewhere in this issue of the Newsletter. Specific questions can be directed to your agency's Laboratory Program Representative.

NRC Staff Updates

Dr. Eric Basques joined the Associateship Programs in mid-January 2003 taking on Program Administrator responsibilities for the Air Force Laboratory, including the Air Force Summer Faculty Fellowships, NASA's Goddard Space Flight Center, Jet Propulsion Laboratory, Marshall Space Flight Center, and Kennedy Space Center, and the U.S. Army Aviation and Missile Command.

Dr. Basques' previous work at the National Academies was with the Computer Science and Telecommunications Board and included a project examining the framework for supporting cybersecurity research in the United States and a study assessing prospects for supercomputing technology research and development.

Prior to joining the National Academies, Dr. Basques worked in Global Data Sales and International Carrier Relations for Sprint International focusing primarily on communication technology convergence in Latin American countries. He also worked at the MITRE Corporation, a Federally Funded Research and Development Center (FFRDC), specializing in satellite communications work for NASA Headquarters and the Goddard Space Flight Center, and spent three years in Hawaii advising the (then termed) CINCPAC (Commander-in-Chief Pacific) on advanced, secure, communications technology. Prior to this he worked at the former U.S. Congress Office of Technology Assessment on space launch, energy, technology transfer, and telecommunications issues.

Dr. Basques holds an M.S. degree in Mechanical Engineering from Stanford University, where he did research on magnetohydrodynamic energy conversion and a Ph.D. in Mechanical Engineering from the University of Maryland, College Park, where he did research on stochastic processes in thermodynamic systems. He lives in Northern Virginia with his wife and three sons.

Dr. Dick Harshman, Associate Director of the Associateships Office, retired on September 6, 2002 after 14 years at the National Research Council.

Since 1994, Dick served as a Program Administrator, for roughly 30% of the Associates on tenure. His other responsibilities included panel selection, sponsor liaison, and oversight for the fiscal support for a variety of NRC Associateship Programs – these included the Naval Research Laboratory, NASA's Jet Propulsion Laboratory, Kennedy Space Center and Marshall Space Flight Center, the Albany Research Center, the Federal Energy Technology Center, the U.S. Geological Survey, the National Institute of Occupational Safety and Health, and the Naval Postgraduate School. From 1988 to 1994, Dick served as Administrative Director, providing fiscal and administrative support for the Associateship Program.

Dick graduated from the University of Colorado in 1965 with a BA in Political Science. He served in the US Marine Corps from 1965 to 1969, reaching the rank of Captain, and was awarded the Silver Star and Purple Heart for his services in Vietnam. Dick went on to obtain an MBA from the University of Colorado and a Ph.D. in Mineral Economics from the Colorado School of Mines. He was Contracts and Grants Administrator at the Colorado School of Mines, and became Director of Contracts and Grants for the University of Maine in 1978. Dick was an Associate Professor in the Graduate Center for Management Development at Frostburg State University in western Maryland from 1984 to 1988 before joining the NRC.

Since retirement, Dick and his wife Molly, have been leading a nomadic life in their RV, exploring the country's parks and wildlife refuges. Their plans include birdwatching, fishing, and visiting their children. Their son Nathan is an Instructor in the Physics Department at Rice University; their daughter Stephanie is a software analyst in the Washington area.

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Travel Tips

NRC Associates are encouraged to participate in professional travel to attend scientific meetings and conferences. Here are some tips from our travel department to make your trip more enjoyable:

- Only expenses incurred the day before and the day after the professional meeting, may be claimed for reimbursement.
- A rental car requires prior approval. (Include on your Travel Authorization)
- Membership dues are not a reimbursable expense.
- Expenses that exceed the government per diem are not reimbursable. Per diem rates can be found at www.policyworks.gov.
- A valid receipt includes the following: Associate's name, provider of and date(s) of service, total expense, form of payment, and zero balance or other notation indicating that payment in full was made.
- Submit the TER and original receipts.
- Provide an English translation for receipts issued in a foreign language.

If you have questions, please contact the Travel Unit at 202-334-2710.

Stipend Direct Deposit

If you have not elected to use the Electronic Fund Transfer, consider this:

1. *The deposit is generally made on the last day of the month. Funds are almost immediately available.*
2. *You will avoid Mail Delays and Lost Checks.*

As evidence of direct deposit, you will receive a deposit advice form. This form will show the monthly deductions for insurance, taxes (if withheld), and any other deductions such as repayment of a stipend advance.

If you are not currently participating in the EFT system and would like to do so, or if you would like further information, please contact your program coordinator.

Research Opportunity Booklets

Here are a few things that LPRs and Advisers should keep in mind when making revisions to research opportunities.

opportunities will not be accepted directly from the Advisers. Instead, all revisions should be coordinated through the Laboratory Program Representatives, integrated into the .RTF files, and then forwarded to Marla Allentuck. (mallentu@nas.edu).

The Roster of Research Advisers was sent to Laboratory Program Representatives by Clark May. Updated rosters should be returned directly to him. If you have any questions regarding Advisers or the approval process, you may contact him directly at 202-334-3560 or cmay@nas.edu.

For all new research opportunities, please remember to list (1) the category into which the opportunity most appropriately falls and (2) a maximum of 10 keywords that best describe the research, as requested on the third page of the Adviser Nomination Form.

In addition to revising research opportunities, please remember to check the introductory material to ensure that names, addresses, phone numbers, E-mail addresses, stipends, and citizenship requirements are correct. If you plan a stipend increase, please include the effective date and also officially notify your Program Administrator or Connie Dawson (cdawson@nas.edu) of the change. A stipend Increase form is also located on our website.

A new Adviser, new opportunity, or revised opportunity can be submitted at any time throughout the year. These additions or changes will be posted on the website and included in the next years booklet manuscript.

We appreciate your cooperation. With your help, we can make this the smoothest booklet revision cycle yet.

Visa Update

Spring and summer 2003 have brought several significant developments in immigration regulations that affect all NRC Research Associates holding "F" and "J" visa status in the United States.

INS Now Part of DHS

As part of the Homeland Security Act, the INS (Immigration and Naturalization Service) was moved into the DHS (Department of Homeland Security) effective March 1, 2003. Immigration activities are now divided into three sections:

- **BCIS** (Bureau of Citizenship and Immigration Services) -- changes of status; employment; Regional and District Service Centers; etc.

- **BCBP** (Bureau of Customs and Border Protection) -- immigration inspectors at airports, seaports, and land ports of entry; customs; border management.

- **BICE** (Bureau of Immigration and Customs Enforcement) -- customs and immigration investigation and enforcement; SEVIS; Coast Guard; etc.

Associates may have occasion to interact with each of these bureaus during their stay in the U.S.

SEVIS (Student and Exchange Visitor Information System)

In February 2003, the U.S. Immigration and Naturalization Service (now DHS), in partnership with the U.S. Department of State, launched an electronic system that provides immediate data on the location and activities of all non-immigrants in F, J, or M status. Sometimes referred to as the "student tracking system," SEVIS was developed to replace the inefficient paper-based system used previously. Only certain authorized staff of the Departments of Homeland Security, Education, and Department of State; Consular posts; and program sponsors are allowed access to information in SEVIS.

The government requires sponsors to collect and electronically report information through SEVIS on each student or exchange visitor in their program in order to issue the appropriate SEVIS I-20 and DS-2019 forms. In addition to the information that appears on the form itself, SEVIS requires the specific research field or major, U.S. home address, U.S. sponsor (i.e., NRC) address, date and place of visa issuance, and date and place of entry and each action throughout the visitor's program, such as extensions, transfers, and reinstatement. The system allows program sponsors to produce laser-printed forms for each visitor and each member of the family, with a bar code and individual unique SEVIS number. An advantage of the new system is that family members can now travel using their own, individual DS-2019 form, endorsed by the NRC Responsible Officer.

In July, the NRC Associateship Programs issued new SEVIS DS-2019 forms to all continuing Associates and their accompanying family members. Each form was sent with a cover letter explaining the new system, and a copy of the recently revised "Pre-arrival Information." Associates or Laboratory staff may contact Peggy Wilson, the NRC Visa Officer, at any time for assistance (pwilson@nas.edu).

To protect yourself and all future visits to the United States, it is more important than ever before to anticipate travel, renewals, household and laboratory moves, any change in your family, and early resignation. As mentioned in the last edition of The Rap Sheet, Associates are still required to notify the government of a change of address, but now it is done through SEVIS. You must notify the NRC Visa Officer in writing within 10 days following a move so that an update can be made to the SEVIS record electronically. Likewise, if you leave tenure early, you must notify the NRC Visa Officer at least 30 days before your last day of tenure in the laboratory.

Visa Application Process

The State Department now requires almost all visa applicants to appear for an interview with a consular officer as part of their visa application. Only certain applicants are exempt from this requirement. For example, applicants whose visas have not been expired more than 12 months and who are applying in the U.S. consulate in their home region, may not be required to have an interview. Because of this and because summer is a very busy travel season, visa applications are expected to take even longer than usual. We suggest that you visit the embassy consular website to get the most current information http://travel.state.gov/links.html).

Some Good News

The State Department has ordered the embassies and consulates to give all researchers, professors, and students priority in the interview schedule over all other visa applicants to try to avoid serious delays in their arrival in the U.S.

You can get the most current copy of the "Pre-arrival Information" on our web

2003 Professional Meetings

The NRC staff attends more than twenty-five annual meetings of professional scientific societies to disseminate information about the Associateship Programs.

At each of these meetings, the NRC has an exhibit booth where we discuss the program with potential applicants. At many of the meetings, we also participate in the job placement centers, where we make brief presentations to small groups of potential applicants followed by question and answer sessions. Additionally, a link to the NRC Associateship Programs website appears on the websites of many of the professional scientific societies.

The meetings we will attend for the remainder of 2003 are listed below, as well as under "Program Promotion" on our website.

Ecological Society of America (Booth #320)	Aug 3-8	Savannah, GA
American Fisheries Society (Booth #38)	Aug 11-13	Quebec City, Quebec
American Chemical Society (Booth #749)	Sept 8-10	New York, NY
AIAA/Space	Sept 23-25	Long Beach, CA
Society for the Advancement of Chicanos & Native American in Science	Oct 3-4	Albuquerque, NM
Florida Educational Fund/McKnight Fellows Conference	Oct 10-12	Tampa, FL
Human Factors and Ergonomics Society	Oct 14-16	Denver, CO
Annual Biomedical Research Conference for Minority Students	Oct 16-18	San Diego, CA
Hispanic Association of Colleges and Universities	Oct 18-21	Anaheim, CA
Geological Society of America (Booth #724)	Nov 2-5	Seattle, WA
Society for Neuroscience* (Booth #1526)	Nov 9-12	New Orleans, LA
Society for Environmental Toxicology and Chemistry (Booth #50)	Nov 9-12	Austin, TX
Materials Research Society	Dec 1-5	Boston, MA
American Society of Tropical Medicine and Hygiene	Dec 3-7	Philadelphia, PA
American Geophysical Union	Dec 8-12	SFrancisco, CA
American Society for Cell Biology*	Dec 13-17	SFrancisco, CA

* both exhibit booth and job placement

If you have specific recruitment needs and would like flyers that highlight your research opportunities in any of the areas covered by these meetings, please contact Jane Dell'Amore at 202-334-2768 or jdellamo@nas.edu. If you have any suggestions of meetings to add to this list, please contact your NRC Program Administrator.

Air Force Summer Faculty Program: Collaboration that Supports Research and Teaching

Dr. Nancy Ma

North Carolina State University

AF Summer Faculty Fellow

My name is Nancy Ma and I am currently an Assistant Professor of Mechanical and Aerospace Engineering at North Carolina State University. Since attending graduate school at University of Illinois, Urbana-Champaign, I have been conducting research in numerical modeling of semiconductor crystal growth with magnetic fields. As a graduate student, I attended a conference and was extremely fortunate to meet Dr. David F. Bliss, a physicist in the Sensors Directorate at Hanscom Air Force Base, Massachusetts. At this conference, we first realized that we had common research interests. Dr. Bliss, a top researcher in the crystal growth community, is one of the few scientists in the world to have state-of-the-art experimental facilities for crystal growth in magnetic fields. Since our meeting, Dr. Bliss has expanded his experimental program to include the application of electric fields during crystal growth, a novel area that shows great promise.

Dr. Bliss and I began an informal collaboration where we have studied various aspects of crystal growth but had not yet investigated dopant segregation. A major objective during the growth of any semiconductor crystal is to minimize this segregation. In recent investigations, the numerical effort had matured and we provided the first predictions of dopant segregation in the crystal in the magnetically stabilized liquid-encapsulated Czochralski (MLEC) process. This led Dr. Bliss to suggest that I apply for the NRC/USAF Summer Faculty Fellowship, which I first received in 2002 and have received again in 2003.

The timing of these first predictions and the participation in the Summer Faculty Fellowship Program was perfect. Dr. Bliss and his research group have been working on a new initiative, which involves conducting experimental investigations to produce high-quality doped gallium-antimonide (GaSb) and alloyed gallium-
aluminum-antimonide (GaAlSb) semiconductors by vertical gradient freezing using submerged heater growth (VGF-SHG), which uses a combination of magnetic and electric fields in order to control the transport and the segregation in the crystal. The production of high-quality single crystals of doped GaSb and alloyed GaAlSb crystals addresses Air Force missions in two important areas (i.e., space force surveillance and threat warning, as well as space control/national missile defense). As a result of my 2002 Fellowship, we have provided the first predictions of dopant segregation in a doped GaSb crystal grown by this process. On-going experimental studies go hand-in-hand with these numerical tools for prediction of segregation grown by both the VGF-SHG and MLEC processes. Dr. Bliss and I hope to take this research to the next level and determine the

optimal growth process and conditions that can be used to produce the highest quality semiconductor crystal.

I am extremely grateful for this collaboration because it has provided me with a unique opportunity to work with an outstanding scientist on state-of-the-art experimental research. It has been a wonderful experience to be a part of this important investigation and has renewed my excitement about research. This collaboration has already affected my research program in many tangible ways, including training students through graduate research and relating fundamental concepts in the classroom to cutting edge technology, as well as the publication of several articles. I look forward to further collaboration and hope to make important contributions to this field.

Associateship Programs Office Merges with the NRC Fellowships Office

In December of 2002, Dr. Tom Rozzell, retired as Director of the NRC Fellowships Office. Some may remember that Tom was at one time a Program Administrator in the Associateship Programs and prior to that a scientist at the Naval Research Laboratory. For the past 10 years, Dr. Rozzell administered the Ford Foundation Graduate and Postgraduate Fellowships and a number of other important fellowship programs. Upon Dr. Rozzell's retirement, a decision was made to merge the programs of the Fellowships Office with the programs of the Associateship Office. This merger will combine some of the internal administrative functions of these offices and presumably contribute to keeping costs down. We expect this internal reorganization to be seamless to our sponsors, and we are committed to maintaining the visibility of the programs above any NRC organizational structure. At the same time, we hope to leverage the resources of the other fellowship programs to further enhance our outreach efforts, while maintaining the same high level of service to our applicants and awardees.

NRC Associateship Program at NASA/Marshall Space Flight Center

By: Dr. G. Allen Gary/Astrophysicist, Solar Physics Group

Under the educational Resident Research Associateship program (RRA), NASA Headquarters funds postdoctoral research scientists through a contract with the National Research Council (NRC). This short article reviews the important influence that the Research Associates have had on solar research at NASA's Marshall Space Flight Center (MSFC).

NRC's Resident Research Associateship (RRA) program has provided the MSFC Solar Physics Group with 29 postdoctoral Research Associates since 1975, which also marks the beginning of an increase in solar physics research. A number of MSFC scientists had been supporting NASA's Skylab Mission, which was in operation from May 1973 until February 1974. This scientific effort included the development of MSFC's S056 X-ray telescope and the United States' first full-vector magnetograph. Numerous MSFC engineers and scientists helped develop and operate the cluster of solar telescopes on the Apollo Telescope Mount (ATM), a principal part of the Skylab orbiting workshop. With the enormous volume of new observations of the solar corona, MSFC dedicated a group of scientists to analyze these data and develop new solar instruments and programs. This new initiative brought the world-renowned solar prominence expert, Dr. Einar Tandberg-Hanssen, from the High Altitude Observatory in Boulder, Colorado, along with the first two NRC Associates in support of solar physics research.

These first two Associates were Dr. Hugh Comfort from the University of Alabama in Huntsville (UAH) and Dr. Ted Fay from Indiana University at Bloomington. Because of the new view of the corona and the complex relation of the observed structures to the magnetic field, there was an interest in detailed modeling of the coronal magnetic field. Dr. Comfort contributed to the modeling of non-force-free magnetic fields in solar active regions, supporting data analysis from the MSFC magnetograph and from Skylab. During this post-Skylab time frame, the magnetic field analysis was furthered by NRC Associates Dr. Y. Nakagawa, Dr. B.C. Low, and Dr. K. Krall. Dr. Nakagawa developed an analysis method for the MHD initial-boundary problem for evolution of non-force-free fields based on the method of near characteristics. Dr. Low worked on the field and plasma configuration of a filament overlying a solar bipolar magnetic region. Working with Dr. S.T. Wu at UAH, Dr. Low also wrote a paper on a class of analytic solutions for the thermally balanced magnetostatic prominence sheet. Dr. Krall studied the sheared photospheric velocity fields inferred from spot motions and compared the velocity shear with transverse magnetic field orientation changes observed with the MSFC magnetograph.

After Skylab, NASA looked beyond the ATM solar success to possible new programs in solar physics (e.g., Photoheliograph, Solar Corona Explorer, and Advanced Solar Telescope) and chose a dedicated orbiting solar observatory, the Solar Maximum Mission (SMM). Dr. Tandberg-Hanssen became the principal investigator for the Ultraviolet Spectrometer and Polarimeter (UVSP) on this mission. SMM was launched February 14, 1980, and re-entered the Earth's atmosphere on December 2, 1989. During this time, the fully operational MSFC vector magnetograph supported the SMM. With data from SMM and MSFC magnetograms, much of the research concentrated on relating the influence of magnetic field in the heating of the corona and on the processes behind the production of solar flares. The NRC Associates of the SMM era were Drs. Doug Rabin, Jason Porter, Chung-Hyuk An, Fukuo Nagai, Marcos Machado, and Juan Fontenla. In 1980, the Huntsville solar group was further stimulated with the arrival of Dr. Ernest Hildner from High Altitude Observatory to head MSFC's Solar Physics Group. In addition, Dr. Gordon Emslie (1981) from the University of Glasgow joined UAH, who in the 1990s would be interested in the imaging solar flares in hard X-rays using Fourier telescopes (which were precursor studies to RHESSI).

Working with MSFC's Dr. Ron Moore and Dr. Mona Haygard, Dr. Rabin studied the thermal conduction from the sides of coronal loops heated by current dissipation with reference to the observed temperature distribution in the transition region. He also investigated submergence of the magnetic field in active regions. Dr. Porter studied UVSP observations and MSFC magnetograms, researching coronal heating with changes in the strength and configuration of the photospheric magnetic field. Drs. An and Nagai's research centered on magnetohydrodynamic and magnetostatic models of filament eruption and flares. Dr. An worked with Dr. Moore and Dr. Steve Suess of MSFC to investigate Alfven wave propagation and trapping as a mechanism of solar heating. Working with MSFC and UAH scientists, Dr. Machado studied the magnetic energy release leading to hard X-rays during the impulsive phase of flares and studied the importance of magnetic separatrices as a site of energy release.

NRC Associates who arrived later included Drs. Hirokazu Yoshimura, Zdzislaw Musielak, K.S. Balasubramaniam, Parame Venkatakrishnan, Ashok Ambastha, and Mukul Kundu. These Associates helped expand solar research in magnetography and into other areas of solar physics in which new members of the MSFC scientific team were involved. With the arrival of Dr. David Hathaway from the National Solar Observatory, the MSFC solar group expanded its research interest into the solar interior. Working with Dr. Hathaway, Dr. Yoshimura investigated dynamo models to explain the 11-year solar cycle. Dr. Musielak, developed analytical solutions to the wave equations for steady vertical compression waves in an isothermal hydrostatic atmosphere. This wave study was a community interaction with NRC Associates Drs. An and Fontenla and MSFC's Drs. Moore and Suess. In 1986, Dr. John M. Davis came from American Science and Engineering and AS&E's solar X-ray program to become the leader of MSFC's solar group. Working with Dr. Davis, Dr. Fontenla had the idea of developing a magnetograph to observe the chromospheric magnetic Zeeman lines. From that initial idea, the MSFC solar group is now developing the SUMI (Solar Ultraviolet Magnetograph Investigation) rocket payload. Drs. Balasubramaniam, Venkatakrishnan, and Ambastha's work

furthered the observation and analysis program for the MSFC vector magnetograph. This work included the exploration of the Stokes spectral profiles using a filter magnetograph, evaluation of magnetic shear in off-disk-center active regions, and magnetic shear variation in solar active regions with MSFC's Dr. Hagyard, Ed West, and Dr. Gary.

Solar physics' next major milestone was the launch of Yohkoh, a Japanese Solar mission with U.S. and U.K. collaborators. It was launched into near-Earth orbit in August of 1991 and was lost December 14, 2001. Over its lifetime, it provided a complete solar cycle worth of valuable data about the Sun's corona and solar flares. During the 1990s, NRC Research Associates included Drs. Reiner Hammer, Steve Nerney, Shyamsundar Parhi, Beverly Stark-Kublin, Debi Choudhary, Silvano Fineschi, Alphonse Sterling, David Falconer, Ted LaRosa, and Francis Fekel. The resulting research led to a better understanding of the million degree coronal in terms of its heating, structure, and dynamics. Dr. Hammer and MSFC colleagues investigated the effects of thermal conduction on the heating and energy balance of open coronal regions. Investigating the magnetic field on the heliopause, Drs. Nerney and Suess described the heliospheric terminal shock and the morphology of the heliosheath. Drs. Parhi and Suess studied the instabilities occurring in the coronal plumes. Working with Dr. Hagyard, the magnetograph was supported with the work of Drs. Stark-Kublin and Choudhary in quantifying active regions and their flare productivity. Dr. Fineschi studied ultraviolet impact line polarization expected in hot solar plasmas during solar flares.

During this period, three additional important solar satellites provided new observations. These were the Transition Region and Coronal Explorer (TRACE-launched April 1, 1998), the ESA/NASA Solar and Heliospheric Observatory (SOHO-launched December 2, 1995), and the ESA/NASA Ulysses Mission (launched October 6, 1990) which explores the inner heliosphere over the Sun's north and south poles. Working with Dr. Moore, Dr. Sterling studied "EIT crinkles" (transient, localized brightenings in the images from the EUV Imaging Telescope) and morphologically homologous solar flares using X-ray observations from Yohkoh and ultraviolet observations from SOHO spacecraft. Working with SOHO, Yohkoh, and TRACE, and the MSFC vector magnetograph, Drs. Falconer and Moore have undertaken detailed investigations of the correlation of coronal mass ejections and coronal heating with magnetic shear measurements from the MSFC magnetograph. In 1994, Dr. James Miller joined Dr. Emslie at UAH. Working with Drs. Moore, Emslie, and Miller, Dr. LaRosa studied electron bulk energization in solar flares and compared the Fermi acceleration of electrons and protons in reconnection-driven magnetohydrodynamic turbulence.

The Ramaty High-Energy Solar Spectroscopic Imager (RHESSI) was launched on February 5, 2002, with Dr. Emslie and Miller studying this data. Since 2000, Drs. Kuniko Hori, Yohei Yamauchi, and Debi Choudhary have been NRC Associates at MSFC.

Dr. Choudhary, now a senior Associate, is working with Dr. Gary in developing a hromospheric-photospheric study of the magnetic field to explore and observe the three-dimensional structure of the solar atmosphere. Drs. Yamauchi and Suess are studying electron heat flux in pressure balance structures (PBS) as observed by Ulysses. They have concluded that PBS's are generated due to network activity at the base of polar plumes and that their magnetic structures are similar to current sheets or plasmoids.

In the near future, three new solar satellites—STEREO (2005), Solar-B (2006), and Solar Dynamics Observatory (2007)—will be launched into orbit and MSFC's sub-orbital SUMI will be flown. With this important new era of solar stereography, chromospheric magnetographs, and high-resolution observations, future NRC Associates will continue to provide a stimulating interaction for the Huntsville solar community. SUMI, which was initially conceived by an NRC Associate, will be flown sometime in 2005. This data and future extensions of this program should provide useful portals for future Associates. In 2001, MSFC's solar group moved into the newly established National Space Science and Technology Center (NSSTC) on the UAH campus. The NSSTC is a collaborative research and education initiative focused on selected key scientific disciplines. In part, it consists of researchers and resources from MSFC and UAH that enable cutting edge basic and applied

research, and fosters education of the next generation of scientists and engineers.

It also provides a closer solar community in Huntsville and allows students and NRC Research Associates to participate fully in MSFC's solar research activities. NASA's Resident Research Associateship Program is a NASA Education program managed by the National Research Council. This program has provided MSFC and the NRC Associates with a productive scientific platform, which has successfully enriched the productivity of the Huntsville solar community.

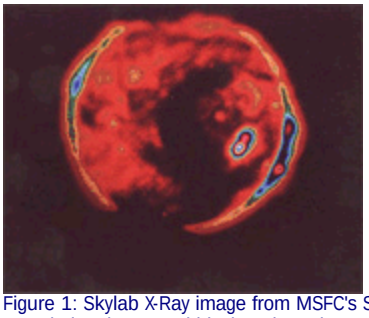


Figure 1: Skylab X-Ray image from MSFC's SO56 of a solar coronal hole. This image is shown in pseudo-color with the coronal hole open being the central black region. The magnetic field from this region opens directly to solar wind.

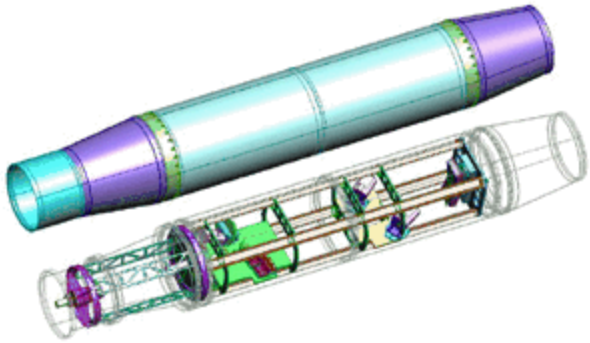


Figure 2: The SUMI sub-orbital rocket instrument being built by MSFC solar physicists to study the chromospheric magnetic fields. The system is composed of a new technology of self-filtering 30-cm telescope and ultraviolet toroidal grating spectrograph.

Figure 3: Photo of NRC Associateship Program participants taken during June 2003 staff visit.

NIST and NIH Joint Postdoctoral Program

The National Research Council Fellowship Office has been asked by the National Institutes of Health (NIH) and the National Institute of Standards and Technology (NIST) to administer a new Joint Postdoctoral Program. The goal is to cultivate a scientific work force competent in both the biological and the physical sciences. The research opportunities will emphasize interdisciplinary research at the interface of the biological and physical sciences including, but not limited to, structural and computational biology, medical and bioinformatics, genomics and proteomics, tissue engineering, single molecule detection, nanotechnology, and imaging techniques. The Joint Program will be supported 50/50 by funding from the NIH and NIST. Each Postdoctoral Associate will have two Advisers, one at the NIH and one at NIST, and the Associate is expected to spend time at both the NIH and the NIST laboratories during the course of the two-year award. The current list of proposed joint Advisers numbers approximately 45 from each agency. Fourteen of the NIH Institutes are represented in the joint program, and six NIST Division are participating. The NIH laboratories are located in Bethesda, Rockville, Frederick, and Baltimore, in Maryland; and in Research Triangle Park, North Carolina. The NIST laboratories are in Gaithersburg, Maryland, and in Boulder, Colorado.

Five awards will be made in 2003 with the competition being open to both U.S. and non-U.S. citizens. The application deadline date was August 1, 2003. Awards will be made in late September. Ph.D. recipients within five years of the doctorate at the time of application are eligible to apply.

In this era of interdisciplinary research, it is anticipated that the NIH/NIST Joint Postdoctoral Program will be the harbinger of future NRC postdoctoral programs to be administered jointly between government agencies in order to foster crosscutting research.

NASA's Goddard Space Flight Center
No Matter How You Slice it, This NASA Center has Many Opportunities for Research

By: Vic Teplitz, Chief, University Programs

When I arrived at Goddard Space Flight Center in late December, it was bustling with activity. Goddard is a billion dollar operation with a workforce of about 10,000 and its fingers in just about every piece of the "space pie." We have four large slices of the pie: Space Sciences, Earth Sciences, Applied Engineering and Technology, and Flight Programs.

The Space Sciences chunk develops instruments, data systems, and spacecraft for scientific exploration of space through four research organizations: the Laboratory for High-Energy Astrophysics (processes in extreme environments), Laboratory for Astronomy and Solar Physics (experimental and theoretical astronomy, solar physics, and cosmology), Laboratory for Extraterrestrial Physics (plasma physics and solar system exploration), and Space Data Operations Office (processes, archives, and distributes).

The Earth Sciences wedge provides leadership in understanding global Earth systems through space technologies. The Earth systems range from the deep interior (core, magnetic field source, mantle) to the surface (plate motion, soil formation, biospheric and hydrospheric processes, and ice) to the atmosphere (chemistry, trends, climate models) and beyond (e.g., ionosphere, solar

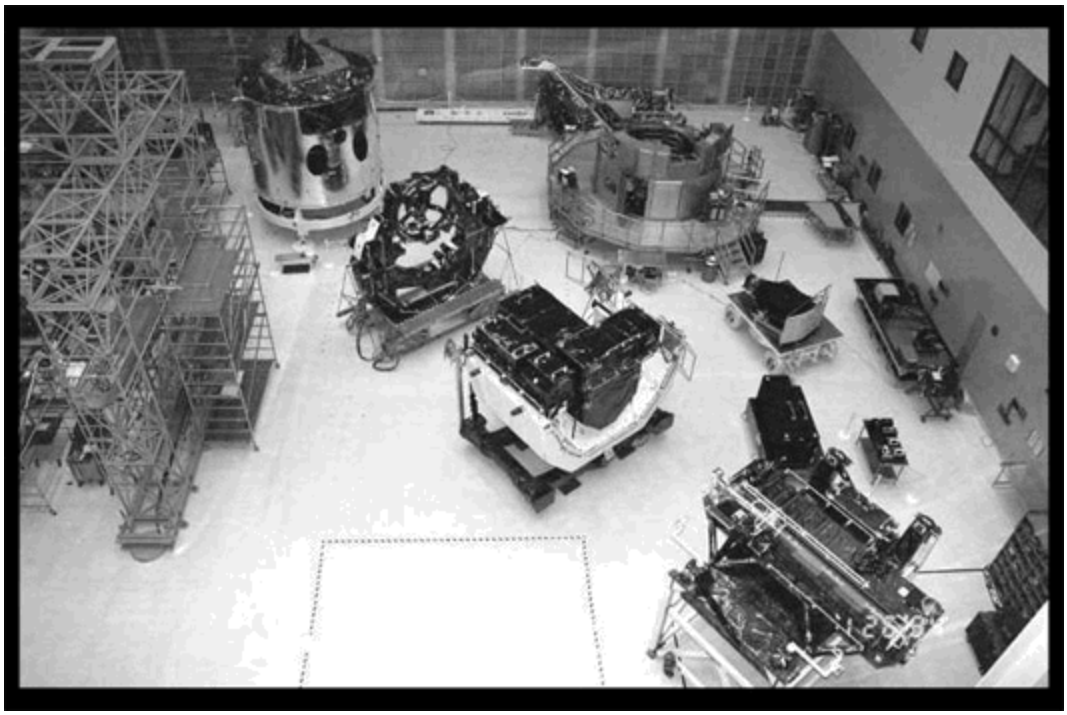
studies, and planetology). It maintains aggressive basic and applied research programs with Laboratories for Atmospheres, Terrestrial Physics, and Hydrospheric Processes, as well as a Data Computing Division.

The Applied Engineering and Technology piece is loaded with engineering capability for all phases of NASA's Earth and Space Science programs. Capabilities include information systems; electrical and mechanical systems; guidance, navigation, and control; mission systems engineering; and instrument development. It designs, develops, and tests components, subsystems, instruments, spacecraft, and missions.

The Flight Programs and Projects slice manages Goddard flight programs and projects, including mission design, fabrication integration test, launch operation, and orbital operations. Responsibilities include both small and large Earth and space science programs/projects such as the Hubble and the Geostationary Operational Environmental Satellites.

Even though the NRC Research Opportunity booklet and website contain a wealth of research opportunities in the above areas, they shouldn't be considered complete. There are always new things coming. For example, the President's proposed FY 2004 budget contains a new start on technology for two major satellite observatories and three smaller probes that would investigate the early universe and black holes, with launches next decade and Goddard as the lead NASA Center. Some listed research opportunities are in this program, *Beyond Einstein,* but if accepted by Congress, the effort will now grow. People who have experience, talent, and interest to contribute should contact us, even if they don't find a suitable research opportunity. We can help them look for potential NRC Advisers. Similarly, new material comes in other areas of Earth and Space Sciences with some regularity. For example, Earth sciences is excited about the study of the global carbon cycle and its relation to global warming and sustainability of ecosystems, as well as new techniques of assimilating large volumes of data into such studies.

Obviously, this is just a small taste. You have to be here to really dig in. NRC statistics say that 44% of the Associates who come to do research for a while end up staying. That's well on the way to 51%.



This picture shows the carriers used to hold the flight hardware for the STS-61 mission in 1993. These carriers are transported to Kennedy Space Center where they are integrated into the shuttle bay. The Wide Field and Planetary Camera 2 is visible on the cart on the right side of this photo.

Now on the Web!

The NRC Research Associateship Programs web-site has recently been updated to include most of the forms required in the Associateship Program.

- Travel Authorization Forms
- Travel Expense Reports
- Start Date Forms
- Renewal Applications
- Six Month Reports

These and more, can now be found on our web site.

The RAP Sheet - Postscript

The objectives of this newsletter are to provide NRC Associateship Programs Advisers and Associates with important information regarding our programs and to provide some insight into the diversity and accomplishments of Program participants. We welcome your input in the form of topics you would like to see addressed or the names of Advisers or Associates you would like to see featured in future issues. Please contact us by email at rap@nas.edu with your suggestions.

Ask Dr. J

For future issues, we invite your comments about this newsletter and questions about the Associateship Programs. You may send comments or questions to "Ask Dr. J" at rap@nas.edu. Submissions may be edited for brevity.