THE U.S. NAVAL OBSERVATORY

STAR

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The Captain's Corner

CAPT David Gillard, Superintendent

I am very excited to be here as your Superintendent, and consider it a distinct privilege to have this opportunity and responsibility. It is indeed a significant responsibility, in two respects. First, I take very seriously my responsibility for the critical role we play in providing Precise Time, Astrometry and Earth Orientation information to U.S. Navy and Department of Defense forces. Secondly, and more importantly, is my specific role in providing the kind of support and leadership to each of the Observatory employees and personnel that is needed for you to do your jobs. My responsibility to take care of the employees and families of the U.S. Naval Observatory takes precedence over anything else I do as Superintendent, and I seek the help of all supervisors in carrying out this responsibility.

It is indeed a great opportunity as well. You have heard the Secretary of Defense's call for transformation, and you have hopefully become aware that the Navy is answering that call to transform to a Navy structured to meet new challenges and threats. The U.S. Naval Observatory, by virtue of its S&T orienttation and the great talent that you all bring to the mission, is in position to be on the cutting edge of transformation. SEAPOWER 21 is the CNO's vision for the Navy. It envisions a Navy that is shaped to fight jointly; to project offense rapidly far ashore; to defend joint forces against new threats; to conduct operations from an advanced sea basing posture; and to operate in a network-centric way that maximizes our ability to quickly deploy and employ forces and to attain information dominance. Network-centric Warfare is the key to our future operations, and that hinges on knowing very precisely where and "when" you are and where and "when" other friendly and enemy forces are around you. The USNO plays an extremely important part in turning these needs into reality. Additionally, the USNO will be supporting closer than ever the navigation needs of the Fleet through the Navigator of the Navy (N096). I am currently double-hatted as the Deputy Navigator of the Navy (DNoN), and we are rapidly moving the state of Navigation in our Navy into the 21st Century. I am very eager to find ways the Observatory can contribute to this task.

I am greatly impressed with the expertise and accomplishments of the Observatory and the people here, at the Alternate Master Clock site, and in Flagstaff. However, we will not contribute to the Navy's or the Department's needs outlined above, or achieve our own goals, by being satisfied with our current capabilities. We will aggressively and frequently examine ourselves to see how we can improve, what we should change, or what we should cease in order to put resources toward more relevant needs. This is not to create turmoil, disruption or instability. In fact, I would be very pleased if we discovered we are doing exactly what we need to do and find that we need only minor adjustments. But it is possible that we will find that to be synchronized with the Navy's future course, we will need to make more substantial adjustments. I ask for your help and cooperation in finding the solutions to those challenges as we meet them. I pledge to you that the well-being of the Navy, the Naval Observatory, and our people will be foremost in my plans and actions.

I look forward to meeting and knowing each of you. Thanks for allowing me to become a part of the team.

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Meet the New Superintendent

David W. Gillard

Captain, United States Navy

Captain Gillard is the 48th Superintendent of the U.S. Naval Observatory, and concurrently is the Deputy Navigator of the Navy (N096BN). The U.S. Naval Observatory maintains the Master Clock for the United States and determines and provides precise time to the Department of Defense. USNO also determines and promulgates the positions and motions of the Earth and celestial bodies for precise navigation of DoD forces. In support of the Navigator of the Navy, N096BN establishes standards for navigation and advises on the implementation of solutions for all Navy forces, platforms and systems to improve safety and enhance warfighting effectiveness.

Captain Gillard was commissioned from the Naval ROTC Program at Purdue University in May 1978. Operational tours have included: USS KANSAS CITY (AOR 3), 1978-1981, Engineering and Operations Departments; and COMCRUDESGRU FIVE, 1989-1992, Readiness and Training Officer and Staff Oceanographer, including briefing officer on the Naval Component Commander's staff to General Schwartzkopf in Riyadh, Saudi Arabia during Operations *Desert Shield* and *Desert Storm*. Shore duties have included: Instructor at Surface Warfare Officers School (Basic) in Newport, Rhode Island, 1981-1984; Officer in Charge, Naval Oceanography Command Detachment in Atsugi, Japan, and Staff Oceanographer for the Theater Antisubmarine Commander for COMSEVENTHFLT, 1986-1989; Department Head at the Fleet Numerical Meteorology and Oceanography Center in Monterey, California, 1992-1994; Action officer on The Joint Staff, Operations Directorate, 1995-1998; Program manager at the National Reconnaissance Office, Advanced Systems and Technology Directorate, 1998-1999; Military Assistant to the Deputy Under Secretary of Defense (Science and Technology) and Deputy Director, Defense Research and Engineering, 1999-1001; and Branch Head in OPNAV N70 for Technology, Transformation, Experimentation & Doctrine, 2001-2002.

Born in Colorado and raised in Ohio, Captain Gillard holds a B.S. in Atmospheric Sciences from Purdue University, an M.S. in Meteorology and Oceanography from the Naval Postgraduate School (1984), and an M.A. in National Security and Strategic Affairs from the Naval War College (1995, distinguished graduate). His awards and decorations include the Legion of Merit, Defense Superior Service Medal, the Defense Meritorious Service Medal, the Joint Service Commendation Medal (two awards), the Navy Commendation Medal (three awards), the Navy Achievement Medal (3 awards), and various service and campaign awards.

Meet the New Deputy Superintendent

Susan N. Greer

Commander, United States Navy

Commander Susan N. Greer was born in Teaneck, New Jersey. She earned a Bachelor of Science Degree from the University of Miami, Florida in September 1981. In February 1983 Commander Greer reported to Officer Candidate School, Newport, Rhode Island.

After commissioning in June 1983, Commander Greer attended Surface Warfare Basic School at Newport, Rhode Island. She reported to USS EMORY S. LAND (AS-39) in December 1983 where she served first as Damage Control Assistant, then as First Lieutenant and ultimately as Operations Officer. During this tour Commander Greer qualified as Engineering Officer of the Watch and Surface Warfare Officer.

In May 1987 Commander Greer attended Surface Warfare Department Head School, Newport, Rhode

Island. Upon graduation Commander Greer reported to Maritime Prepositioning Ships Squadron Two (MPS-2), Diego Garcia, where she served as Operations Officer. During this tour Commander Greer applied for a change in designator and was selected as a Special Duty Officer, Oceanography.

In February 1989 Commander Greer was assigned to the Naval Postgraduate School, Monterey, California. She graduated with a Master of Science Degree in Meteorology and Physical Oceanography in June 1991. Upon graduation she served as Executive Officer of the Naval Oceanography Command Facility, Keflavik, Iceland. In March 1993 Commander Greer reported to Rota, Spain and served as Officer in Charge of the Mobile Environmental Team. In April 1995 she reported to Commander, Carrier Group Seven and served as both the Assistant Surface Operations Officer and METOC Officer. During this tour Commander Greer deployed to the Western Pacific and Arabian Gulf onboard USS NIMITZ (CVN-68), December 1995-May 1996. Commander Greer reported to the staff of the Oceanographer of the Navy in May 1997 where she served as the Personnel Requirements Branch Head (CNO N960E). In December 1999, Commander Greer reported to the Naval Pacific Meteorology and Oceanography Center, San Diego as the Operations Officer. In January 2002 Commander Greer reported to her current assignment as the Deputy Superintendent of the United States Naval Observatory in Washington D.C.

Commander Greer's personal awards include: the Meritorious Service Medal (with two stars), the Joint Commendation Medal and the Navy Commendation Medal (with star).

The Astronomical Almanac: 2003 marks a banner edition.

Sethanne Howard, Chief of the Nautical Almanac Office, Astronomical Applications Deptartment

The Astronomical Almanac has been a continuing best seller in the astronomical world since it began over 150 years ago. Some old-timers may remember the book as *The American Ephemeris and Nautical Almanac.* OK, I am one of those (However, I was NOT here 150 years ago.) The name may have changed since then, and even some of the information, yet the book remains today as it always has - responsive to the needs of the US Navy, the Department of Defense, and the needs of astronomy while maintaining its long tradition of scientific excellence.. We no longer use the once popular method of lunar distances, for example, to handle celestial navigation. I believe Captain Cook was known to have used it. I, ah, never did. I do use it, however, for all the other information there. They tell me that an amazing number of people use the sunrise/set times. Sun, Moon, planets, asteroids, comets, and even lots of stars and galaxies. They all show up. There is even a list of ΔT in there! (It's a time thing.)

Each edition appears a year in advance of its date. [You get too far ahead of most astronomers, and they simply forget what you told them.] The 2003 edition dutifully showed up January 2002, and included some important changes and additions. At the top of the list, yet not directly visible, is the change in the underlying planetary ephemerides. [you too can pronounce it and stun your friends … "eff_eh_MER_i_dees"] I shall use it several more times, so you can practice. Many computations for the book rely on the planetary ephemerides from the Jet Propulsion Laboratory (JPL). These ephemerides are a compilation by JPL of their vast set of planetary data that tell you where the Sun, Moon, and planets are between [drum roll, please…] 1600-2200CE. As part of the continuing effort to bring all almanac data onto the International Celestial Reference Frame (ICRF), the 2003 edition is the first edition to use those JPL ephemerides that are aligned with the ICRF. It is a good thing, too. Not only are these ephemerides the latest and greatest from JPL, but a few years ago, the international community recommended that everybody (astronomers and Earth orientation communities too) use the ICRF.

There are several important visible changes as well. A web site now complements the book: *The Astronomical Almanac Online* at http://asa.usno.navy.mil and http://asa.nao.rl.ac.uk. This is an entirely new service. The site provides an online subset of almanac data. Our USNO/NAO staff designed and produced this site. We hope the site will be useful and popular, raising the visibility not only of the book and its products, but also of USNO and HMNAO. Plans for this site include adding more data and enhancements to those data (similar to the existing AA web site data services).

The Section on Minor Planets and Comets has a large set of new data, thanks to the work of James Hilton (USNO/AA). These new data are the ephemerides for the 15 largest minor planets. There is that word "ephemeredes" again. This time it is not the JPL one, but a set directly from USNO: the USNO/AE minor planet ephemerides (Hilton, Astronomical Journal, **117**, 1077, 1999).

Besides all those ephemerides, the book provides tables of selected celestial objects. We don't just list any old celestial object, mind you. There has to be a good reason to make it into the tables in *The Astronomical Almanac*. Lots of people like the book's Bright Star List. I suspect that one of our bright star positions has even been used on USNO's public tours to help set up the telescopes. With the 2003 edition, we converted the star positions in that list off their old reference frame (FK5, for those of you who were worried) and now use the Hipparcos and USNO's Tycho-2 catalogs.

Some of those tables of stars are international standards. Susan Stewart (USNO/AA) maintains contact with all the international committees that worry about these standards. She assures that our lists are correct. (You try convincing an international committee to get its act together and choose a list of standards. And do this for five or ten more committees.) This year she finally coerced a final list out of the committee that worries about radial velocity standards. The book also gives a list of the photometric standard stars (called the Johnson standards). As a baby astronomer I invested a lot of telescope time doing photometry (measuring the color of a star - and no, they are not all yellow). I used the values listed in this table. Of course time moved on, and now astronomers use the list of standard stars provided by Arlo Landolt (U. Louisiana). Courtesy of Dr. Landolt, the book now provides his list. We moved the old list to the web site. And I finally discarded my old computer programs that used the Johnson standards. We did not stop there. Thanks to the work of Mark Stollberg (USNO/AA) the table of selected x-ray sources was completely revised. And thanks to Dan Pascu (USNO/AD), we added basic physical and photometric data for several new planetary satellites.

The book has always varied its pages to accommodate the different types of solar and lunar eclipses that occur each year. Bob Miller (USNO/AA) does this for us. Well, the Sun and Moon are not the only Solar System objects in the eclipse game. Every six or seven years Jupiter's Galilean satellites eclipse and occult each other far more frequently than they usually do. The year 2003 is one of these high rate years for the Galileans. So this year, for the first time, we included eclipse and occultation pages for the Galileans too. For the following several years, while the Galileans are not so actively eclipsing and occulting, we shall omit these pages, and bring them back again at the right time.

And in case you did not know it, Marie Lukac's (USNO/AA) Observatory List is one of US astronomy's treasures. Yes, the book has published this list since 1855, but it reached its current topmost worldwide reputation due to her care. So the 2003 edition marks a banner year: improvements in the underlying science, and presentation of timely and modern data. So keep checking every year. There's more to come.

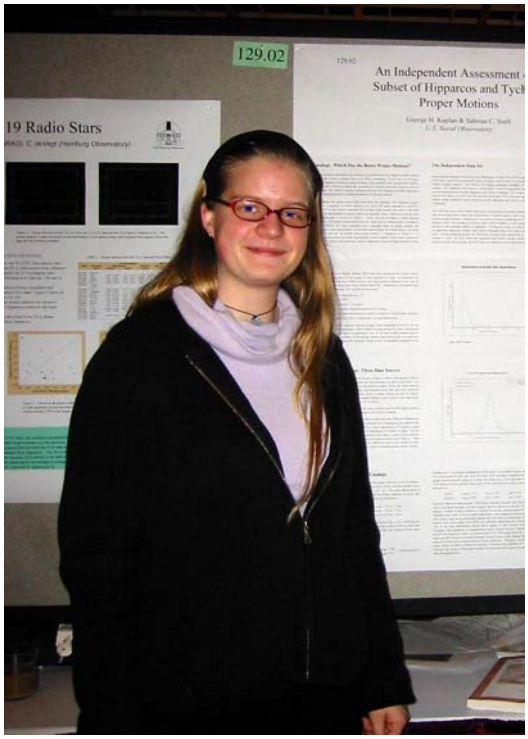
USNO Summer Student Wins International Science Prize

George Kaplan, Astronomical Applications Department

Sabrina Curie Snell, a high school summer student at USNO for the past three years, recently received the first place award in Earth and Space Sciences at the Intel International Science and Engineering Fair. The award was given for her project, titled, "The Optical Divide: An Independent Assessment of a Subset of Hipparcos and Tycho-2 Proper Motions: Phase III," which was based on her work at USNO last summer. Ms. Snell, 17, has participated in the Science and Engineering Apprentice Program (SEAP) here since 1999, working in the AA and AD departments.

The international science fair at which she won the award was held this year in Louisville on May 12-17. She was one of several students representing the DC public school system. Ms. Snell has won various prizes at the DC citywide science fair the last four years and won the overall grand prize at the citywide fair in 2001. She participated in the international fair in 2000 and 2001, both times receiving fourth place in Earth and Space Sciences. Last year she also received the American Astronomical Society's Priscilla and

Bart Bok Award for excellence in a high school student science project related to astronomy.



Sabrina Snell at the AAS Meeting, Washington, DC, January 2002

For this year's first-place award, Ms. Snell will receive $8000, a computer, a full scholarship to the University of Louisville, and a $40,000 scholarship to Florida Tech (she has not yet decided on a college). Her school and the DC science fair also will receive $1000 each. Ms. Snell attends the School Without Walls, a small, innovative DCPS high school that encourages its more advanced students to take college courses at GW University and also participate in work-study projects.

Ms. Snell described the Louisville awards ceremony as "like the Oscars", that is, nobody in the audience had advance knowledge of who the winners were. After fourth and third place in the Earth and Space Sciences category were announced, she said she figured she would go home empty-handed. The first place award was a total surprise but she said it was "pretty cool". Her award was described in a Washington Post article on May 26, which also noted her other activities: swim team, tutoring, and writing. She also works part-time in a law office and recently finished a history project, which she hopes to publish, on a woman who was a Confederate spy in DC. Ms. Snell is related to Marie Curie, the famous pioneer of radioactivity research of a century ago.

BRENDA CORBIN WINS AWARD FROM SPECIAL LIBRARIES ASSOCIATION

Fritz Whitcomb, John Crerar Library Chicago, Illinois

Brenda Corbin received the Physics-Astronomy-Mathematics Achievement Award at this month's Special Libraries Association (SLA) Annual Conference in Los Angeles. This presentation honored Ms. Corbin, who is librarian of the U.S. Naval Observatory Library, for distinction in her work over almost 25 years in the Physics-Astronomy-Mathematics (PAM) Division of SLA and her dedication to librarianship in astronomy. Within PAM, she has held many important posts, including Chair, long-time head of Strategic Planning Committee, Bulletin Editor, and Secretary, and she led the first Astronomy Workshop, the precursor to the Astronomy Roundtable that has become an annual tradition. Beyond these offices, Ms. Corbin has made unique contributions to the PAM Division, such as creating the PAM International Membership Award during her term as Chair, for outreach to librarians in developing countries; initiating the member news column of the PAM Bulletin; and spearheading PAM's program, "Equity of Access to Information Resources: Problems and Possible Solutions in Developing Countries," at the SLA Global 2000 Conference in Brighton, England. Brenda Corbin's dedication to librarianship is evident in the collections and services of the U.S. Naval Observatory Library, which serves as the de facto national library for astronomy. She has been recognized for her organization of the first Library and Information Services in Astronomy (LISA) meeting in 1988, and she has continued to be involved with each of these international conferences for astronomy librarians. Her wise and generous mentoring has helped many astronomy librarians around the world. This PAM Achievement Award is a tribute to her manifold contributions to the profession.

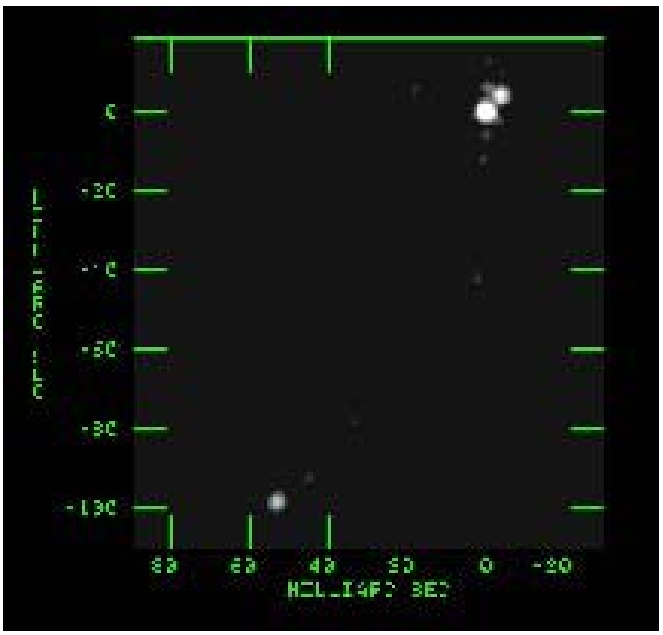
Special Libraries Association (SLA), headquartered in Washington, D.C, is the international association representing the interests of thousands of information professionals in 60 countries. The association offers a variety of programs and services designed to help its members serve their customers more effectively and succeed in an increasingly challenging global information arena. SLA is committed to the professional growth and success of its membership. For more information visit Virtual SLA at www.sla.org. SLA is organized in Divisions representing subject interests, fields, or types of information-handling techniques, and Chapters representing geographic areas. Principal interests of the Physics-Astronomy-Mathematics (PAM) Division include all aspects of librarianship in the fields of physics, astronomy, and mathematics.

What's New at NPOI?

Interferometry using six telescopes simultaneously!

In January of 2002, the Navy Prototype Optical Interferometer at Lowell Observatory became the first optical interferometer to track and record stellar interference fringes with six telescopes simultaneously! Tilt correctors have been used for correcting wavefront tilt errors at each of the siderostats, and all six fringe tracking delay lines have been operated together with our new fringe engine hardware and software.

Most recently, NPOI's six-station array observed the triple star Eta Virginis and detected all three components, as shown in the image below. The close



pair was previously known as a spectroscopic binary with a period of about 72 days, whereas the wide pair has been extensively observed by speckle interferometry and the orbital period determined to be about 13 years.

Security Notes

USNO POLICE EMERGENCY NUMBERS:

34th Street (24/7): 762-1468
South Gate (24/7): 762-1491
MEDICAL/FIRE EMERGENCIES: 99-911

(When calling the local emergency number, please notify the NDW/USNO police in order to escort the emergency personnel and vehicles to the scene).

Naval District Washington (NDW) Force Protection Condition (FPCON) is currently at Bravo +, with FPCON Charlie Measures in effect 33, 35, 36, 38. Force Protection Measures are available for review in NDWINST 5530.14A, Appendix 2.

South Gate hours: 24/7, Sunday - Saturday.

Wisconsin Avenue gate: 0630 – 0830, 1630 – 1830, Monday – Friday. Pedestrian turnstile (requires swipe card and PIN) open 24/7

All other gates are closed until further notice.

USNO Vehicle Registration, Building #59, Monday - Friday, 0800 - 1400 hours.

Identification Badges can be obtained at Nebraska Avenue, Building #43. Telephone # 764-0507.

Visitor Security Requirements:

All visitors must have a picture identification and a sponsor on the USNO staff. Visitors will be issued a visitor's badge at the South Gate upon arrival, which shall be worn at all times and returned to the NDW Police on departure. Visitors should add additional time prior to arriving at their destination for issuance of a visitor's badge and vehicle inspection. ***All non-U.S. citizens are required to be sponsored by two USNO sponsors***. Visitors without sponsorship will not be authorized to enter the U.S. Naval Observatory grounds.

All visitors must be prepared to submit to a security screening. This may involve passing through a magnetometer and the hand-searching of personal belongings. Security screening will begin at 8:00 pm; please be present at the gate by this time. Refusal to accept these terms will result in denial of admission.

There is considerable walking on hilly ground in darkness during the tour. Please take this into consideration before you request passes. Once on the grounds visitors will be placed into escorted groups. You must stay with your assigned group throughout the tour. Please be aware that USNO is a military installation, and that tours may be suspended at any time by military security considerations.

Tours may be suspended at any time with little or no prior notice. Please check this message for the most current tour status.

…And We Need Volunteers!

With the resumption of public tours, even as limited as they now are, we are still in need of volunteers to show our visitors the time display in the lobby of Building 56 and to operate the telescopes. Staff volunteers are entitled to earn up to 2.5 hours of overtime or compensatory time for each evening worked. Please contact Geoff Chester in the Public Affairs Office if you're interested in helping out.

ANNOUNCEMENTS

Public Tours are back again…

Public tours of the USNO are now offered on alternating Monday evenings from 8:30 pm until 10:00 pm. Tours will include an overview of the Mission and History of the Naval Observatory, a view of the development of USNO's timekeeping responsibilities, and (weather permitting) viewing of celestial objects with the 12-inch Alvan Clark refractor with a staff Astronomer.

Individual tour passes must be reserved in advance for every Monday night tour. You may use the online request form from the USNO website, or call the Public Affairs Office at 202-762-1438 to secure a reservation. Requests for reservations must be submitted by COB of the Thursday before a scheduled tour. You must provide the names and dates-of-birth of all individuals in your party. As a Requestor, you must also provide a daytime telephone number and/or an e-mail address so that we may contact you with the status of your request.

All visitors will be required to present a photo ID that matches their name and date-of birth before they are admitted to the grounds. Visitors who do not have a reservation will not be admitted under any circumstances.

ABSTRACTS OF RECENT PAPERS:

Speckle Interferometry at the U.S. Naval Observatory, VII.

Brian D. Mason, William I. Hartkopf, Gary L. Wycoff, Ellis R. Holdenried, Imants Platais, Theodore J. Rafferty, David M. Hall, Greg S. Hennessy, Sean E. Urban, and Brian L. Pohl

Astronomical Journal Vol. 122, p.1586, September 2001

The results of 2014 speckle-interferometric observations of double stars, made with the 26 inch refractor of the U.S. Naval Observatory, are presented. These observations are averaged into 1266 mean positions and range in separation from 0.21 to 13.41 with a mean separation of 2.61. This is the seventh in a series of papers presenting measures

obtained with this system and covers the period January 10, 2000 through December 8, 2000.

The 2001 USNO Double Star CD. I. The Washington Double Star Catalog

Brian D. Mason, Gary L. Wycoff, William I. Hartkopf, Geoffrey G. Douglass, and Charles E. Worley

Astronomical Journal, Vol. 122, p.3466, December 2001

The Washington Double Star Catalog (WDS), maintained by the United States Naval Observatory, is the world's principal database of astrometric double and multiple star information. The WDS Catalog contains positions (J2000), discoverer designations, epochs, position angles, separations, magnitudes, spectral types, proper motions and, when available, Durchmusterung numbers and notes for the components of 84,486 systems based on 563,326 means. The current version, available online, is updated nightly. This catalog is one of four USNO double star catalogs to be included on a CD-ROM now in preparation. A brief summary and statistical analysis of the contents of the catalog are presented.

The 2001 USNO Double Star CD. II. The Fifth Catalog of Orbits of Visual Binary Stars

William I. Hartkopf, Brian D. Mason, & Charles E. Worley

Astronomical Journal, Vol. 122, p.3472, December 2001

The Fifth Catalog of Orbits of Visual Binary Stars continues the series of compilations of visual binary star orbits published by Finsen, Worley, and Heintz from the 1930's to the 1980's. As of 1 January 2001 the new catalog includes 1,465 orbits of 1,430 systems. All orbits have been graded as in earlier catalogs, although the grading scheme has been modified to be more objective. Ephemerides are given for all orbits, as are plots including all associated data in the Washington Double Star (WDS) 2001.0 database. A subset of orbits useful for scale calibration is also presented. This catalog is one of four USNO double star catalogs to be included on a CD-ROM now in preparation.

The 2001 USNO Double Star CD. III. The Third Catalog of Interferometric Measurements of Binary Stars

William I. Hartkopf, Harold A. McAlister, and Brian D. Mason

Astronomical Journal, Vol. 122, p.3480, December 2001

The Third Catalog of Interferometric Measurements of Binary Stars includes all published measures of binary and multiple star systems obtained by high-resolution techniques (speckle interferometry, photoelectric occultation timings, etc.), as well as negative examinations for duplicity, as of 1 January 2001. This catalog is one of four USNO double star catalogs to be included on a CD-ROM now in preparation. A brief summary and statistical analysis of the contents of the catalog are presented.

The 2001 USNO Double Star CD. IV. The Photometric Magnitude Difference Catalog

Charles E. Worley, Brian D. Mason, and Gary L. Wycoff

Astronomical Journal, Vol. 122, p.3482, December 2001

The Photometric Magnitude Difference Catalog, maintained at the United States Naval Observatory, is a collection of magnitude difference measures for double stars and serves as a repository for double star observations where no astrometry is given. At the present time, it consists of 19,594 measures of 10,475 systems with a mean Delta-m of 1.90. Due to the non-uniformity of filters and the possible variability of one or more components in a system no "WDS-like" summary line is provided. Rather, all the data are presented, and their interpretation is left as an "exercise for the reader." This catalog is one of four USNO double star catalogs to be included on a CD-ROM now in preparation. A brief summary and statistical analysis of the contents of the catalog are presented.

USNO
H*A*P*P*E*N*I*N*G*S
Departures

We'd like to wish "Fair winds and following seas" to all who have left USNO in the past few months.

CAPT Ben Jaramillo
Superintendent, USNO
January 28, 2000 – June 20, 2002

CDR Chris Gregerson
Requirements Officer
Receiving a gift certificate from his relief, LCDR Scott Diaz

Jan Robertson
IT Department
Receiving his signed USNO picture from DT Dr. Dennis McCarthy

Marie Lukac
Astronomical Applications Department
Receiving a picture of the orbit of asteroid 4853 Marielukac from NAO Chief Dr. Sethanne Howard

USNO
H*A*P*P*E*N*I*N*G*S
Departures

We'd like to wish "Fair winds and following seas" to all who have left USNO in the past few months.

CDR Doug Groters
Deputy Superintendent, USNO
Cutting the "Hail & Fairwell cake with his relief, **CDR Susan Greer**

Our best wishes in their future endeavors also go out to:

Phyllis Cook (TS)
Brian Luzum (EO)
Phu Mai (TS)
Brian Pohl (AD)
Jim Ray (EO)
Ken Senior (TS)

Arrivals

The U.S. Naval Observatory *Star*
U.S. Naval Observatory, Washington, D.C.

Superintendent
Captain David Gillard

Deputy Superintendent
Commander Susan Greer

Scientific Director
Dr. Ken Johnston

Editor
Geoff Chester

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