



Watters Compares Tectonics Among Planets



DR. WATTERS

Dr. Thomas R. Watters, Research Geologist of the Smithsonian Center for Earth and Planetary Studies, will present results of his studies of the tectonic activity in the differentiated planets, at the February colloquium of National Capital Astronomers, in the National Air and Space Museum.

On the Earth, tectonic deformation is localized at plate margins. Stresses resulting from plate tectonics is not the

rule on the other terrestrial planets, although the role of plate tectonics on Venus is currently under debate.

Although the modes of generating stresses are different, landforms with similar morphologies to those of tectonic features on the Earth have been identified on the terrestrial planets. Some landforms on the Earth have been deformed by a style of tectonics that appears to be common on Mars and Venus. Through field and remote sensing studies, both may be better understood.

Dr. Thomas R. Watters is Acting Chairman of the Center for Earth and Planetary Studies at the National Air and Space Museum. He received his B.S. from West Chester University in 1977, his M.A. from Bryn Mawr College in 1979, and his Ph.D. from George Washington University in 1985. He is a Principal Investigator for NASA's Planetary Geology and Geophysics Program, the Mars: Evolution of Volcanism, Tectonism, and Volatiles Study Project, and the Mars Geologic Mapping Program. His past activities include investigation of the tectonic evolution of the Tharsis Plateau of Mars and kinematic and mechanical modeling of structures in the deformed flood basalts of the Columbia Plateau and similar tectonic features on the terrestrial planets. His research specialties are structural geology, tectonics, tectophysics, and planetary geology.

FEBRUARY CALENDAR — *The public is welcome.*

Friday, February 2, 16, 23, 7:30 pm — Telescope-making classes at American University, McKinley Hall Basement. Information: Jerry Schnall, 362-8872.

Friday, February 2, 9, 16, 23, 8:00 pm — NCA 14-inch telescope open nights with Bob Bolster, 6007 Ridgeview Drive, south of Alexandria off Franconia Road between Telegraph Road and Rose Hill Drive. Call Bob at 960-9126.

Saturday, February 3, 5:45 pm — Dinner with the speaker at the Smithsonian Restaurant, 6th and C Streets, SW, inside the Holiday Inn. Reservations unnecessary. Use the 7th Street and Maryland Avenue exit of the L'Enfant Plaza Metrorail station.

Saturday, February 3, 7:30 pm — NCA monthly colloquium in the Einstein Planetarium of the National Air and Space Museum, Seventh Street and Independence Avenue, SW. Enter Independence Avenue side. Dr. Watters will speak.

Tuesday, February 6, 13, 20, 27, 7:30 pm — Telescope-making classes at Chevy Chase Community Center, Connecticut Avenue and McKinley Street, NW. Information: Jerry Schnall, 362-8872.

The March NCA colloquium will be held on March 3.

For other organizations' events of interest see elsewhere in this issue.

JANUARY COLLOQUIUM

Dr. Carl S. Cole, Astronomer of the U.S. Naval Observatory, addressed the December National Capital Astronomers colloquium in the Einstein Planetarium of the National Air and Space Museum. He described the Observatory's project to generate the new Washington Fundamental Catalog (WFC), to replace the present Fundamental Katalog 5 (FK5) recently published in Heidelberg, with a more versatile and extensive reference.

Cole defined a fundamental star catalog as one which is a practical realization of an inertial reference frame in which Newton's laws and Einstein's extensions hold. Its importance is thus both to provide a list of star positions and to provide a reference frame within which the location of any object can be defined.

Now in its early stages, the work is expected to require at least a decade to complete. As an astronomical reference, the catalog will contain positions, proper motions, radial velocities, parallaxes, magnitudes, spectral and other astrophysical data. It will also be an extensive data base in which the cleaned raw data can be supplemented by future data, allowing the production of a completely new version, rather than merely a corrected one.

The current reference frame adopted by the International Astronomical Union (IAU) is the FK5, which contains 1,535 star positions. It is a correction of the FK4, which was a correction of the FK3. All of the data were not combined in the FK5. Among its classical uses for which it is satisfactory are determination of latitude, Universal Time 1 (UT1), and navigation. However, the classical uses of the optical reference frame are changing, for which the FK5 has some shortcomings.

The WFC will incorporate new theories, the new constants recently adopted by the IAU, and about 40,000 stars - about 25 times the number in the FK5. The more dense net of fainter stars will make it useful for connecting with the extragalactic Very Long Base Interferometry (VLBI) radio reference frame.

Before about 1900, transit-circle observations were only accurate to about an arcsecond. With the subsequent corrections for latitude variations, the mean error was reduced to about 0.4 arcsecond. At about that time appeared the use of the moving-wire micrometer to measure right ascension. Also, Newcomb's constants for precession, etc. came into use. For these reasons, Cole is using only

post-1900 data in the new work.

In Washington, a six-inch transit-circle program of about 25,000 stars is about one-third completed. About seven years will be required to finish. A sister program by the U.S. Naval Observatory's seven-inch transit-circle in Black Birch, New Zealand is about at the same stage. The Hipparcos Astrometric Satellite, because of a rocket failure, did not reach the planned geosynchronous orbit. It is, however, expected to provide observations of about 80 percent of the planned objects, with an accuracy degradation of a factor of about two - Still very useful.

The Naval Observatory is embarking on a program to build a revolutionary new optical interferometer using one-meter siderostats on a baseline of tens of meters. It is expected to be operational in 1993.

Some of the former uses for an optical reference frame are now met by radioastronomy. Determination of UT1, precession, nutation, and latitude, and navigation of both Earth vehicles and spacecraft, are served by radioastronomy, including VLBI.

New uses for an optical reference frame include solar-system dynamical parameters, stellar and galactic dynamics, satellite navigation, geodesics, and any use requiring the best proper motions,

making the reference frame time-independent; the new WFC will be useful over decades or centuries. Radio reference frames are only about a decade old, and have yet to develop good separation between precession and the 19.2-year nutation term.

These changing needs require a fundamental catalog of new size and scope. The WFC is designed to meet these new needs.

At the 1988 meeting of the IAU in Baltimore, a resolution was passed stating that future reference frames be based on extragalactic objects, and that the extragalactic frame will be first realized by radio observations. However, the WFS will be based instead on the dynamical solar system, primarily for two main reasons: 1. While the optical reference could be linked to the radio positions of the current epoch, it cannot be linked to a radio reference of 100 years ago, therefore, proper motions cannot be linked to the radio reference system. 2. One of the main involvements for this catalog is with the dynamics of the solar system itself in spacecraft navigation.

Cole outlined three steps to the WFS. Step one will define the zero points in

each coordinate. They will be defined by the dynamical solar system, the equinox and the equator. This requires observations in an absolute sense, that is, with no a priori presumptions about the star positions. The definition of the equator and equinox point will actually consist of about 15,000 star positions and proper motions, or, 15,000 definitions of where the equinox is, and where the equator is. Thus, the interest is not in where the stars are, but where the equinox is and where the equator is. These 15,000 star positions will be used only for this one purpose. Step one is about one-half completed. Step two will establish a coarse celestial grid defined by an ensemble of 40,000 cataloged positions and proper motions. The third step will be to incorporate additional catalog data observed in a differential sense to refine the positions and proper motions of the 40,000 stars.

The final product will be the result of these three steps along with the data and other information used to develop it.

Relatively few instruments have been used in the absolute sense during the 20th century. Cole named the Washington 9- and 6-inch transit circles, the U.S. Naval Observatory's 7-inch transit circle at Black Birch, New Zealand, and fewer than a dozen

others. From these, however, are about 150,000 available observations of star positions. Of these, there are three or more observations of about 13,000 stars. These can be corrected and processed to yield usable positions.

To use the old observations, it is necessary to make a number of corrections. For example, the precessional rate is now known far more accurately. The observer's correction for precession from the time of observation to the epoch of the catalog must be removed, along with other corrections to the observation, to recover the raw observation. New corrections based on current knowledge are then made, to yield a usable observation. Those from observatories at different latitudes will require new corrections for atmospheric refraction. Observations from different instruments will show systematic differences perhaps too small to have been corrected accurately at the time of the observations. These and several other corrections must be updated; the old corrections must be corrected. Several observations of the same star from different sources, instruments, and times are thus compared. Cole finds dispersions in the FK5 are consistently about twice the published error estimates. Robert H. McCracken

COMING NEXT MONTH

At the March 3 National Capital Astronomers colloquium, Dr. Nancy Boggess, Deputy Project Scientist for the recently launched Cosmic Background Explorer (COBE), will

report early results that are consistent with the Big Bang theory. COBE is performing even better than expected, and is delivering very interesting results.

EXCERPTS FROM THE IAU CIRCULARS

1. December 21 - Kiev Observatory reported that Boris N. Skorichenko of Mezmai, U.S.S.R., had discovered comet 1989e1 with a 15-cm reflector a few hours before George. It will thus be named Skorichenko-George. The comet will reach perihelion on April 14, 1.7 AU from the Sun.

2. December 21 - Patricia McKenzie discovered a comet (1989f1) of 14th magnitude in Orion on a plate taken by Kenneth Russell with the 1.2-m Schmidt telescope at the Anglo-Australian Observatory. The orbital

Robert N. Bolster

elements by Green indicate that comet McKenzie-Russell passed perihelion on November 8 at a distance of 1.98 AU.

3. December 22 - E.E. Roettger and P.D. Feldman, Johns Hopkins University, and M.F. A'Hearn, University of Maryland, made IUE ultraviolet observations of comet Austin (1989c1) showing that it was emitting twice as much water vapor as did comet P/Halley at the same distance from the Sun. The dust-to-gas ratio also appeared to be higher.

OCCULTATION EXPEDITIONS PLANNED

Dr. David Dunham is organizing observers for the following occultations. There is one asteroidal, but no lunar graze expeditions

Date	Time	Place	Vis Mag	Pent Sunlit	Cusp Angle	Min Aper
Crazing Lunar:						
03-03-90	04:10	N. of Boston, MA	5.6	39	11N	6 cm
03-03-90	04:17	Dulles, Fairfax, VA	8.8	39	11	6 cm
03-23-90	04:23	Newark, DE	4.0	39	-10S	6 cm
Asteroidal*:						
02-05-90	08:53	Lake Superior	Star Mag 9.3	Delta Mag 4.3	Name (153) Hilda	6 cm

planned in February. For further information call the NCA-IOTA Information Line: (301) 474-4945 (Greenbelt, MD).

NCA WELCOMES NEW MEMBERS

Ethel Jean Saltz
7936 Inverness Ridge Road.
Potomac, MD 20854

Lois H. Sibenik
8442 Snowden Oaks Place
Laurel, MD 20708

Felicia Wach
5375 Duke Street, #119
Alexandria, VA 22304

NASA GODDARD COLLOQUIA SCHEDULED

The following colloquia will be held at 15:30 in Building 3 Auditorium at Goddard Space Flight Center, Greenbelt, MD. Coffee and tea will be served from 15:00. Enter the main gate and obtain a visitor's pass from the guard. Call Tracy Parlate, 286-8543, for further information.

Friday, February 2 - "Gamma Ray Burst Cold Fusion, Neutron Starquakes, and EMP's," Roger D. Blandford, California Institute of Technology.

Friday, February 9 - "First Results from the COBE Mission," John C. Mather, NASA Goddard Space Flight Center.

UNIVERSITY OF MARYLAND OPEN HOUSE SCHEDULED

The Astronomy Program, University of Maryland, holds open house on the 5th and 20th of each month at the University's observatory on Metzert Road in College Park. Talks and slide shows are presented at 8:00 pm, followed by telescopic sky viewing, weather permitting. The public is invited; there is no charge.

Monday, February 5, - "The Birth of a

Star," Dr. S Vogel, University of Maryland.

Tuesday, February 20, - "Large-Scale Structure of the Universe," Patricia Henning, University of Maryland.

No reservations are necessary for individuals. Groups larger than ten should call (301) 454-3001 at least 5 days prior to the program.

UNIVERSITY OF MARYLAND ASTRONOMY PROGRAM COLLOQUIUM SCHEDULED

The University of Maryland Astronomy Program Colloquia are held each Wednesday at 16:00 at the UMD Computer and Space Sciences Building (CSS), Room 1113. For more information, call Dr. Roger Bell, Astronomy Program, (301) 454-3005.

7 February - "Evolution of the Nuclei of Planetary Nebulae," Dr. Richard Shaw, Computer Sciences Corporation.

14 February - "First Scientific Results from the COBE Satellite," Dr. Michael Hausner, Goddard Space Flight Center. The colloquia are preceded by tea at 15:30 in CCS 0254, and followed by refreshments. Park at meters in the garage at the corner of Regents Drive and Stadium Drive, across the street from the CSS Building.

U.S. NAVAL OBSERVATORY TOURS IN JANUARY

The next Monday night public tours of the Naval Observatory are scheduled to begin at 7:30 pm EST on February 5, 12, 19, and 26.

Passes will be issued to the first 100 persons in line at the gate across from the British Embassy, at Massachusetts Avenue

and the southeast side of Observatory Circle, at the end of the circular road. Some form of photoidentification will be required. Parking for the tours is not allowed on the grounds except for the handicapped; ample parking is available near the gate. Information: 653-1541.

ASTRONOMY AND PERSONAL COMPUTERS Joan B. Dunham

History — The end of the 89's and the beginning of the 90's is here, and it is time to reflect for a moment on the history of computers. The last 30 years have seen enormous changes, with computers going from exotic items hidden in the basements of select institutions to what we give our children for games. Also, the evolution of calculating equipment is one of continued decrease in price and increase in capability.

The Sixties were the era of the IBM mainframes. There were others (Burroughs, CDC, Univac), but IBM was the premier manufacturer. By the end of the 60's, IBM was ~~sekkubg~~ the 360 series, and many, but not all, of the larger corporations were "computerized."

The Seventies saw the rapid development and spread of the hand calculator, as well as the demise of slide-rule manufacturers. Today, simple calculators are distributed as bonuses for subscribing to magazines, but in the mid-seventies they were expensive. Calculator manufacturers came and went very quickly. Of the early makers, Hewlett-Packard and Texas Instruments survive, but most of the others are no longer making calculators. Virtually all large corporations were using mainframes or minicomputers by the end of the decade. Microcomputer development began, with kits to build computers and stores to sell the kits (and offer sympathy and help). Printers were expensive and slow, with old teletypes or special models of IBM electric typewriters often the hobbyist's choice. You could buy devices to use IBM Selectrics as printers; one had rubber plungers that typed on the keyboard. IBM's 360 line advanced to the 360/95. IBM moved on to the 370 line, which Amdahl cloned. Digital Equipment and Data General made minicomputers.

The Eighties saw the microcomputer become the personal computer. We went from thinking that 16k was a lot of memory to complaining that 4MB was hardly enough. Software products developed very rapidly, as did our expectations of what software could do. Once we were satisfied with line-oriented editors that held a few pages in memory, but now we expect top-of-the-line word processors to be publication systems with the ability to integrate text and figures into a

single document, print the text and graphics, and create indices and tables of contents. The computer languages for PC's also developed, as did the debugging and testing tools, so it is now realistic to expect a PC to do any computation a mainframe can do (although it still may not be practical). The eighties saw the first networks. Now major businesses provide their employees PC's and link them on networks to remain competitive. We had the development of the bulletin board systems, and the advent of commercial computer services, such as Compuserve and Source, for the average person. Source rose and fell during the eighties (and now is a part of Compuserve). Printers became better and cheaper. We still have IBM mainframes, now the 8000 series, as well as DEC minicomputers. During the eighties, some made fortunes, some made and lost fortunes, and some just lost fortunes in the PC business.

Used Equipment and Software — Computers and software do not wear out fast enough. Many of the early PC's are still operable, and the older machine still works. Even when we realize today they are worth nothing, it is hard to toss those old word processors, 5-Meg hard disks, and 300-baud modems. We may have somewhat painful memories of the sacrifices we made to buy them, and perhaps even more painful memories of our struggles to learn how to use them. We can't give them away — no self-respecting school would torment students (or teachers!) with these things. Museums and collectors might take some of the more unusual items, but that still leaves a lot of Z-80, 6800, and 6802-based machines gathering dust. Besides, collectors tend to value items that are in "mint condition" more than those that look used. My old equipment that looks nearly new is equipment that never worked. The software that has an almost pristine manual is the software that did less — much less — than promised on the outside of the shrink wrap. The dictionary, for example, that did not mesh with the word processor, or the mailing-label system that imposed incredible limits (four lines of 30 characters each) on what a label could have. This is so bad no one would ever collect it, let alone ever use it.

COMET AUSTIN (1989c1) POSITIONS FOR EQUINOX 2000.0.

Evening, Sun at -18 degrees.

Date	UT	R.A.	Dec.	Delta	r	Elong.	h	Az	ml
2 18	0 15	1 0.2	-26 0	1.769	1.253	43	1	231	9.3
2 23	0 20	1 6.0	-22 29	1.716	1.159	41	1	236	8.9
2 28	0 25	1 12.2	-18 43	1.660	1.064	38	1	242	8.4
3 5	0 30	1 18.6	-14 41	1.602	0.966	35	1	248	7.9
3 10	0 35	1 25.2	-10 20	1.541	0.866	31	1	254	7.4
3 15	0 40	1 31.8	-5 35	1.477	0.764	28	1	261	6.8
3 20	0 46	1 38.3	-0 22	1.408	0.661	25	1	268	6.0
3 25	0 51	1 44.1	+5 25	1.333	0.560	22	1	275	5.2
3 30	0 57	1 48.2	+11 48	1.250	0.464	20	1	284	4.2
4 4	1 2	1 48.9	+18 42	1.154	0.388	19	1	293	3.3
4 9	1 8	1 42.8	+25 29	1.042	0.350	20	1	303	2.6
4 14	1 15	1 28.3	+30 57	0.922	0.370	22	-1	313	2.6

Morning, Sun at -18 degrees.

4 14	8 58	1 27.1	+31 14	0.914	0.373	22	-2	46	2.6
4 16	8 55	1 19.1	+32 47	0.867	0.397	23	1	47	2.7
4 18	8 51	1 10.4	+33 60	0.821	0.426	24	4	49	2.9
4 20	8 48	1 1.2	+34 54	0.776	0.459	26	7	50	3.1
4 22	8 44	0 51.6	+35 31	0.733	0.496	28	9	51	3.4
4 24	8 41	0 41.7	+35 55	0.692	0.534	30	12	53	3.5
4 26	8 37	0 31.5	+36 5	0.651	0.574	32	14	55	3.7
4 28	8 34	0 21.0	+36 4	0.612	0.614	35	16	57	3.9
4 30	8 31	0 10.0	+35 52	0.574	0.655	38	19	59	4.0
5 2	8 27	23 58.5	+35 29	0.536	0.696	41	21	61	4.1
5 4	8 24	23 46.2	+34 54	0.500	0.737	44	24	64	4.2
5 6	8 21	23 33.0	+34 6	0.464	0.778	48	27	66	4.3
5 8	8 18	23 18.7	+33 3	0.430	0.819	52	30	70	4.4
5 10	8 15	23 2.8	+31 42	0.397	0.859	57	33	74	4.4
5 12	8 12	22 45.2	+29 57	0.365	0.900	62	36	78	4.4
5 14	8 9	22 25.5	+27 42	0.335	0.940	68	40	84	4.4
5 16	8 6	22 3.4	+24 50	0.308	0.979	75	44	91	4.4
5 18	8 4	21 38.7	+21 12	0.283	1.018	83	48	101	4.4
5 20	8 1	21 11.3	+16 42	0.264	1.057	93	51	114	4.4
5 22	7 59	20 41.5	+11 18	0.249	1.096	103	53	130	4.5
5 24	7 57	20 10.1	+5 10	0.242	1.134	114	52	148	4.5
5 26	7 54	19 38.0	-1 17	0.242	1.172	126	49	166	4.7
5 28	7 52	19 6.5	-7 33	0.249	1.209	138	44	180	4.9

At culmination.

5 30	7 16	18 37.0	-13 7	0.264	1.246	148	38	180	5.1
6 3	6 10	17 45.6	-21 38	0.311	1.318	166	30	180	5.7
6 8	5 3	16 57.5	-27 57	0.393	1.407	175	23	180	6.5

"Delta" and "r" are the distances from the comet to the Earth and the Sun in AU. "Elong." is the angular distance from comet to the Sun. "h" and "Az" are the local altitude and azimuth of the comet at the given time. Comet Austin will remain low

in the west in the evening sky until perihelion on April 9. It will then move into the morning sky, rising from the northeast to east and finally south. The predicted magnitudes are approximate, and may be inaccurate.

Robert N. Bolster



National Capital Astronomers, Inc.

is a non-profit, public-service corporation for advancement of the astronomical sciences. NCA is the astronomy affiliate of the Washington Academy of Sciences. For information, call NCA: (301) 320-3621.

SERVICES AND ACTIVITIES

A **Forum** for dissemination of the status and results of current work by scientists at the horizons of their fields is provided through the monthly NCA colloquia held at the National Air and Space Museum of the Smithsonian Institution. All interested persons are welcome; there is no charge.

Expeditions frequently go to many parts of the world to acquire observational data from occultations and eclipses which contribute significantly to refinement of orbital parameters, the coordinate system, navigation tables, and timekeeping. Other results of this work under continuing study include the discovery of apparent satellites of some asteroids, discovery of apparent small variations in the solar radius, and profiles of asteroids.

Discussion Groups provide opportunities for participants to exchange information, ideas, and questions on preselected topics, moderated by a member or guest expert.

Publications received by members include *Sky & Telescope* magazine and the NCA newsletter, *Star Dust*.

The **NCA Public Information Service** answers many astronomy-related questions, provides predictions of the paths and times of eclipses and occultations, schedules of expeditions and resulting data, assistance in developing programs, and locating references.

The **Telescope Selection, Use, and Care Seminar**, held annually in November, offers the public guidance for those contemplating the acquisition of a first telescope, and dispels the many common misconceptions which often lead to disappointment.

Working Groups support areas such as computer science and software, photographic materials and techniques, instrumentation, and others.

Telescope-Making Classes teach the student to grind and polish, by hand, the precise optical surface that becomes the heart of a fine astronomical telescope.

NCA Travel offers occasional tours, local and world-wide, to observatories, laboratories, and other points of interest. NCA sponsored tours for comet Halley to many parts of the southern hemisphere.

Discounts are available to members on many publications and other astronomical items.

Public programs are offered jointly with the National Park Service, the Smithsonian Institution, the U. S. Naval Observatory, and others.

PLEASE ENROLL ME IN NATIONAL CAPITAL ASTRONOMERS MEMBERSHIP

Regular (\$32 per year) Each regular member receives *Sky & Telescope* and *Star Dust*.

Junior (Only open to those under age 18.) Date of birth _____

Junior members pay a reduced rate and may elect not to receive *Sky & Telescope*.

Sky & Telescope and *Star Dust* (\$25 per year)

Star Dust only (\$10 per year)

First name or initial _____ Middle or initial _____ Last _____ Telephone _____

Street or box _____ Apartment _____ City _____ State _____ Zip _____

If family membership, list names of additional participating immediate family members in same household, with birthdates of all those under 18 years old: _____

NOTE: If you already subscribe to *Sky & Telescope*, please attach a recent mail label, or indicate expiration date: _____. A prorata adjustment will be made.

Make check payable to National Capital Astronomers, Inc., and send with this form to: Patricia B. Trueblood, Secretary, 10912 Broad Green Terrace, Potomac, MD 20854.

The following information is optional. If you would like to participate actively in NCA affairs, please indicate briefly any special interest, skills, vocation, education, experience, or other qualifications which you might contribute. Thank you, and welcome!

FOR SALE

Telescope: Dynamax-8 Schmidt-Cassegrain with clock drive, drive corrector, right-angle finder, offset guider, illuminated guide ocular, Lunicon deep-sky filter, mount for guide scope, "piggy-back" for camera, T-adapter for Minolta. Hastings 50-mm, AR9- and 12.7-mm Oculars. Field tripod with latitude adjusters, carrying case, instruction manual. Complete for astrophotography. Price negotiable. Dana Tsakanikas, H: (703) 522-2268, O: (703) 893-3410.

Aero-Tessar Lens: 4-inches diameter, F/6, in cone. Covers 9 X 9-inch field. Excellent condition, with filter and shipping trunk. Price negotiable. Dr. John Mather, O: (301) 286-8720; H: (301) 422-7336.

STAR DUST may be reproduced with credit to National Capital Astronomers.



Published eleven times yearly by NATIONAL CAPITAL ASTRONOMERS, INC., a non-profit, public-service corporation for advancement of astronomy and related sciences through lectures, expeditions, discussion groups, conferences, tours, classes, public programs, and

publications. NCA is an affiliate of the Washington Academy of Sciences. President, Kenneth R. Short. Star Dust deadline 15th of preceding month. Information: (301) 320-3621. Material for publication: Robert H. McCracken, Editor, 5120 Newport Avenue, Bethesda, MD 20816.

WARREN, WAYNE H.
8001 BRETT PL.
GREENBELT, MD 20770



FIRST CLASS

