

**Minority University and College Education and Research
Partnership Initiative (MUCERPI) in Space Science
(NRA 03-OSS-03)**

**Year 2 Grant Report
(January 1, 2005 to December 31, 2005)**

Grant Number and Title: NNG04GD62G
“New Directions in Astronomy and Astrobiology”

Principal Investigator: Dr. Donald K. Walter

Institution: South Carolina State University

Address: 300 College St.
Orangeburg, SC 29115

SUMMARY

South Carolina State University (SCSU) has completed a highly successful second year under its NASA MUCERPI-2003 award. A wide range of NASA Science Mission Directorate (SMD) activities have been supported in the areas of research, education and outreach. SCSU has institutionalized its commitment to astronomy and astrobiology by introducing an option in astronomy for physics majors and a minor in astronomy for other majors. New courses in astronomy and astrobiology have been accepted into the curriculum. New collaborations have been developed with astronomers at NASA’s Ames Research Center (ARC) and Vanderbilt University while SCSU has maintained partnerships with research scientists at NASA’s Goddard Space Flight Center (GSFC) and Lawrence Livermore National Lab (LLNL). Under this grant, SCSU has partnered with all four NASA Explorer schools in the state of South Carolina and held a number of workshops for in-service teachers. SCSU has collaborated with faculty members at other minority institutions including Bennett College, Medgar Evers College, Norfolk State University, Talladega College, and Tennessee State University. Other partnerships with institutions in Arizona, Kentucky and North Carolina have been highly productive as has a collaboration with a junior college located near the campus of SCSU. Undergraduate students have completed research projects in radio astronomy, cosmology, modeling of close binary star systems and image analysis of planetary nebulae. Numerous conference presentations were made by faculty members and students. More than \$2.6 million in funding from NASA and NSF has been leveraged by SCSU MUCERPI CoIs.

DETAILS

A. Academic Program Development

Space Science Faculty Positions: Dr. Jennifer Cash
Department/specialty area: Biological & Physical Sciences/Astrophysics
New or redirected?: Redirected
Tenure-track or Temporary?: Tenure-track
Percent of funding paid by this grant: 25%
Hiring status: Release time to conduct faculty & student research and course development for undergraduate astronomy courses
Will university support positions after end of grant?: Yes
If yes, tenure-track or temporary?: Tenure-track

Space Science Faculty Positions: Dr. Nasrollah Hamidi
Department/specialty area: Biological & Physical Sciences/Astrochemistry
New or redirected?: Redirected
Tenure-track or Temporary?: Temporary
Percent of funding paid by this grant: 4%
Hiring status: Summer salary to develop a chemistry collaboration with NASA & develop astrochemistry course materials for the K-12 community
Will university support positions after end of grant?: Yes
If yes, tenure-track or temporary?: Temporary

Space Science Faculty Positions: Dr. James E. Payne
Department/specialty area: Biological & Physical Sciences/Physics & Radio Astronomy
New or redirected?: Redirected
Tenure-track or Temporary?: Tenure-track (already has tenure)
Percent of funding paid by this grant: 5%
Hiring status: Release time to develop collaborations & mentor student research
Will university support positions after end of grant?: Yes
If yes, tenure-track or temporary?: Tenure-track

Space Science Faculty Positions: Dr. Linda L. Payne
Department/specialty area: Teacher Resource Center/Physics & K-12 Education
New or redirected?: Redirected
Tenure-track or Temporary?: Tenure-track (already has tenure)
Percent of funding paid by this grant: 9%
Hiring status: Develops and assists in conducting K-12 teacher programs
Will university support positions after end of grant?: Yes
If yes, tenure-track or temporary?: Tenure-track

Space Science Faculty Positions: Dr. Judith Salley-Guydon
Department/specialty area: Biological & Physical Sciences/Biology
New or redirected?: Redirected
Tenure-track or Temporary?: Tenure-track (already has tenure)
Percent of funding paid by this grant: 0%

Hiring status: Coordinates & supports development of astrobiology projects
Will university support positions after end of grant?: Yes
If yes, tenure-track or temporary?: Tenure-track

Space Science Faculty Positions: Dr. Daniel M. Smith
Department/specialty area: Biological & Physical Sciences/Cosmology
New or redirected?: Redirected
Tenure-track or Temporary?: Tenure-track (already has tenure)
Percent of funding paid by this grant: 18%
Hiring status: Mentors summer student research projects in astrophysics
Will university support positions after end of grant?: Yes
If yes, tenure-track or temporary?: Tenure-track

Space Science Faculty Positions: Dr. Donald K. Walter
Department/specialty area: Biological & Physical Sciences/Astrophysics
New or redirected?: Redirected
Tenure-track or Temporary?: Tenure-track (already has tenure)
Percent of funding paid by this grant: 50%
Hiring status: Manages grant, conducts research in astrophysics, mentors undergraduate research projects
Will university support positions after end of grant?: Yes
If yes, tenure-track or temporary?: Tenure-track

Space Science Degrees:

Subject area: (e.g., Astronomy) Astronomy
New or Revised?: New
Major, minor, or concentration? (If concentration, within what major?): Minor
Leading to what degree? (e.g., B.S.) B.S., B.A.
Development status or term first offered: Fully approved and implemented beginning fall 2005
Outcomes (e.g., numbers of students pursuing or completing the degree):
Program has just started – no results to date.
Will university continue degree program after end of grant?: Yes

Subject area: (e.g., Astronomy) Astronomy
New or Revised?: New
Major, minor, or concentration? (If concentration, within what major?): An astronomy option (similar to a concentration) has been created for physics majors. This is separate from the astronomy minor. The minor is for non-physics majors. The option is for physics majors
Leading to what degree? (e.g., B.S.) B.S.
Development status or term first offered: Fully approved and implemented beginning fall 2005

Outcomes (e.g., numbers of students pursuing or completing the degree):

One student has switched her major from biology to physics as a result of her summer astrophysics internship under this program.

Will university continue degree program after end of grant?: Yes

Space Science Courses: The original SCSU MUCERPI proposal did not call for space science course development. However, as part of our creation and implementation of an astronomy minor and the astronomy option, we have developed several new space science courses and enhanced existing ones.

- Physical Science 203 – Elementary Astronomy: An existing course that was approved for all SCSU students to satisfy part of their science requirement. This change has taken effect in the fall of 2005 and the course will next be offered in the spring of 2006.
- Physics 322 – Introduction to Astrobiology: NEW COURSE: This upper-level course is multidisciplinary and will introduce students to the field of astrobiology. To be first offered in 2007-08.
- Physics 326 – Introduction to Astrophysics: NEW COURSE: This upper-level course covers the application of physics to problems in astrophysics. To be first offered in 2007-08.
- Physics 338 – Scientific Image Analysis: NEW COURSE: This upper-level course provides an introduction to scientific visualization and digital image analysis. To be first offered in 2007-08.

CoI J. Cash spent a significant amount of time developing new or modifying existing course materials for several space science courses. This includes everything from rewriting astronomy labs to preparing PowerPoint lecture slides and developing extensive web resources for students and faculty teaching the courses. Her major results include:

- Prepared PowerPoint lecture slides, tests and homework and web resources for Physical Science 203 – Elementary Astronomy. It will be taught in the spring of 2006 for only the third time in 26 years. This course will now be offered every 1-2 years and used to recruit students to become physics majors.
- Modified the lecture and test materials for Physical Science 152 – Foundations of Earth/Space Science to accommodate the shift of some astronomical material to the Physical Science 203 course.
- Completed version 2.0 of the “Earth/Space Science Laboratory Manual” for the Physical Science 153 course – Laboratory Course in Earth/Space Science

In-Service Teacher Training

July 20, 2005 Eighteen (18) in-service teachers from Grades 6-12 in South Carolina participated in a one-day “**Astrobiology and Update to Space Science for Teachers**” offered at SCSU by PI D. Walter with CoIs L. Payne and J. Cash.

The course provided an overview of the field of astrobiology, a summary of the restructuring at NASA and a look at new space science missions. The session included dissemination of information, hands-on, inquiry-based activities and discussion of the impending, new South Carolina state science standards. NASA resources on the web were accessed and curriculum materials were distributed from the Broker/Facilitator SERCH and the NASA Educator Resource Center (ERC) located on the campus of SCSU.

November 3, 2005 Workshop for fifty (**50**) in-service teachers from Grades K-12 in South Carolina conducted by CoI L. Payne entitled “**What’s In the ERC for Me?**”. An overview was given of the NASA Educator Resource Center Program and the resources available through the South Carolina ERC located on the campus of SCSU. The workshop took place at the 30th annual meeting of the South Carolina Science Council in Myrtle Beach, SC, the largest gathering of science educators in South Carolina with approximately 1,200 people in attendance.

November 4, 2005 Workshop for twenty-five (**25**) in-service teachers from Grades 9-12 in South Carolina conducted by CoI J. Payne entitled “**Radio Astronomy for the Classroom**”. In addition to an overview of the field of radio astronomy, the teachers received hands-on training in running a radio telescope remotely over the Internet. The workshop took place at the 30th annual meeting of the South Carolina Science Council in Myrtle Beach, SC, the largest gathering of science educators in South Carolina with approximately 1,200 people in attendance.

November 4, 2005 Workshop for twenty-five (**25**) in-service teachers from Grades 6-16 (through college) in South Carolina conducted by PI D. Walter CoI L. Payne and Master Teacher S. Watts. Entitled “**Life on Earth ... and Elsewhere??**”, the workshop included an overview of the field of astrobiology as well as hands-on, activities taken from the NASA Astrobiology Institute’s workbook “Astrobiology in Your Classroom”. The workshop took place at the 30th annual meeting of the South Carolina Science Council in Myrtle Beach, SC, the largest gathering of science educators in South Carolina with approximately 1,200 people in attendance.

Precollege Outreach

November 15, 2005, CoI J. Cash gave a presentation on galaxy types to ten (**10**) K-2 teachers and students in the Christian Home School Cooperative

November 10, 2005 PI D. Walter gave a presentation at a NASA Explorer School to fifty (**50**) parents and students in 8th Grade. The talk, entitled “College and Careers in Space Science”, was given at the “Reach for the Stars” academic and career night at Sandhills Middle School in Lexington County South Carolina.

November 3-5, 2005 PI D. Walter and CoIs L. Payne and J. Payne presented a large exhibit entitled “Physics@SCSU” to the twelve hundred (1,200) educators at the 30th annual meeting of the South Carolina Science Council in Myrtle Beach, SC. The display featured numerous SCSU/NASA programs and partnerships including the MUCERPI award, the Broker/Facilitator SERCH partnership and the NASA ERC facility on the campus of SCSU. A significant amount of NASA ERC materials were distributed to teachers from the K-16 community.

October 8, 2005 CoI L. Payne coordinated the Fall 2005 meeting of the South Carolina Midlands Middle/Elementary School Academy of Science on the campus of SCSU. A total of three hundred and fifty (350) parents, teachers and students in grades 4-8 attended. Individual presentations related to space science were given for smaller groups by PI D. Walter (“Comets Inside Out”), CoI J. Cash (“Light and Color”) and CoI J. Payne (“Physics is PHUN”).

Public Outreach

November 5, 2005 PI D. Walter conducted a night sky observing session for one hundred (100) cub scouts and parents during a campout near Orangeburg, SC.

B. Faculty/Student Professional Enhancement and Development Through Partnerships and Exchange Programs

For each partner institution, briefly describe the following:

Institution Name:	NASA’s Goddard Spaceflight Center (GSFC)
Name(s) of individual(s) involved:	Dr. Donald Walter, SCSU Dr. Michael Mumma, GSFC Dr. Michael DiSanti, GSFC
Nature and Goal of Partnership:	Faculty-level collaborative research
Activities:	Walter is collaborating with this team of researchers and participating in research on comets using IR spectroscopy taken with the NASA Infrared Telescope Facility on the island of Hawaii.
Outcomes:	Future publications and presentations are anticipated
Plans for continuing partnerships after end of grant:	Continued through collaborative proposal writing and related activities.
Institution Name:	NASA’s Goddard Spaceflight Center (GSFC)
Name(s) of individual(s) involved:	Dr. Nasrollah Hamidi, SCSU Dr. Jason Dworkin, GSFC
Nature and Goal of Partnership:	Partnership under development to redirect Hamidi’s research in chemistry to astrobiology-related

subjects & develop a long term partnership between GSFC & SCSU.

Activities: Two meetings have taken place. Topics of mutual interest have been selected. The first laboratory work by Hamidi will take place at SCSU in 2006.

Outcomes: Intended to produce student internships and faculty publications.

Plans for continuing partnerships after end of grant: Continued through collaborative proposal writing and related activities.

Institution Name: NASA's Goddard Spaceflight Center (GSFC)
Tennessee State University (TSU)
Norfolk State University (NSU)
High Schools in SC, GA, TN & NC

Name(s) of individual(s) involved: Dr. Donald Walter, SCSU
Dr. Nasrollah Hamidi, SCSU
Dr. Michael Mumma, GSFC
Dr. Jason Dworkin, GSFC
Ms. Stephanie Stockman, GSFC
Dr. Todd Gary, TSU
Ms. Judy Butler, TSU
Dr. Leroy Salary, NST

Nature and Goal of Partnership: Five teachers from SC, GA, TN & VA
Develop astrochemistry curriculum materials for use in grades 9-12 as part of the outreach program at the Goddard Center for Astrobiology.

Activities: Three working sessions have been held to develop the products in July 2004, July 2005 and September 2005.

Outcomes: Draft materials have been developed and field tested by the participants. A workshop will be held at TSU in the summer of 2006 to expand the group of teachers using the materials. By the year 2008, the materials will be available for widespread use.

Plans for continuing partnerships after end of grant: Continued through collaborative proposal writing and related activities.

Institution Name: NASA's Ames Research Center (ARC)

Name(s) of individual(s) involved: Dr. Donald Walter, SCSU
Dr. Linda Payne, SCSU
Dr. Dana Backman, ARC

Nature and Goal of Partnership: Partnership under development to establish a collaboration that will include faculty & undergraduate student research and K-12 outreach between SCSU and the SOFIA mission.

Activities: The participants have met several times and have a plan by which to implement their partnership.

Outcomes: Application to the American Astronomical Society Harley Shapley Visiting Lectureship Program to have Backman visit SCSU to present talks and a teacher workshop.

Plans for continuing partnerships after end of grant: Continued through collaborative proposal writing and related activities.

Institution Name: NASA's Ames Research Center (ARC)

Name(s) of individual(s) involved: Dr. Kuzman Adziewski, SCSU
Dr. Jeffrey Scargle, ARC

Nature and Goal of Partnership: Partnership under development to establish a faculty research project of mutual interest in the area of applied mathematics and statistics to astronomical problems.

Activities: Dr. Adziewski visited Dr. Scargle at ARC in July 2005. They held three days of meetings. Adziewski continues to read the literature and exchange email and phone conversations with Scargle as they explore possible research projects.

Outcomes: A future research project and possibly an application for a NASA summer faculty fellowship by Adziewski for 2006.

Plans for continuing partnerships after end of grant: Continued through collaborative proposal writing and related activities.

Institution Name: NASA's Ames Research Center (ARC)

Name(s) of individual(s) involved: Dr. Benita Bell, Bennett College (BC)
Dr. George Cooper, ARC

Nature and Goal of Partnership: Faculty & student research in astrochemistry as part of a long-term partnership between BC and ARC. The study of the chemical composition of meteorites is the major thrust of the research.

Activities: Dr. Bell spent part of the summer of 2004 at ARC and Dr. Cooper has visited BC twice.

Outcomes: Cooper has assisted with equipment repair and purchases for the BC lab. Bell and two other BC chemists have been trained in the techniques needed to conduct the research.

Plans for continuing partnerships after end of grant: A NASA proposal is being prepared by Bell and Cooper to further upgrade the BC lab to fully participate in this research.

Institution Name: NASA Explorers School Program

Name(s) of individual(s) involved: Dr. Linda Payne, SCSU
 Dr. Jennifer Cash, SCSU
 Dr. James Payne, SCSU
 Dr. Donald Walter, SCSU
 Ms. Sandra Watts, Carver-Edisto Middle School
 Ms. Ashley Holmes, Sandhills Middle School
 Ms. Barbara Dire, Forest Heights Elem. School
 Ms. Kelly Hawkins, Mid-Carolina Middle School
 Mr. Alan Linder, Newberry Middle School

Nature and Goal of Partnership: SCSU support of NASA Explorer schools

Activities: Teacher workshops, talks to students and collaborative presentations at the South Carolina Science Council meetings.

Outcomes: Anticipated: Enhanced achievement of Explorer School goals and outcomes; greater teacher use of NASA curriculum materials

Plans for continuing partnerships after end of grant: Continued through collaborative proposal writing and related activities.

**Institution Name: SouthEastern Regional Clearinghouse (SERCH)
 NASA Broker/Facilitator**

Name(s) of individual(s) involved: Dr. Donald Walter, SCSU
 Dr. Linda Payne, SCSU
 Dr. Cassandra Runyon, College of Charleston

Nature and Goal of Partnership: SCSU has a subaward from SERCH to enhance minority participation in SMD activities.

Activities: Funding of travel and workshops for faculty from several minority institutions, teacher workshops and minority student research in astrophysics.

Outcomes: Travel, workshops and research described above.

Plans for continuing partnerships after end of grant: Continued through collaborative proposal writing and related activities. Year 5 of 5 under the subaward begins January 2006. SCSU and SERCH have collaborated on several (so far unsuccessful) NASA EPO proposals and will continue to do so in the future.

**Institution Name: DePaul University NASA Broker/Facilitator
 Medgar Evers College (MEC)**

Name(s) of individual(s) involved: Dr. Donald Walter, SCSU
 Dr. Carolyn Narasimhan, DePaul University
 Dr. Leon Johnson, MEC
 Dr. Shermane Austin, MEC

Nature and Goal of Partnership: To organize and plan workshops that would train faculty members at community colleges and

universities in the Chicago area in the use of NASA mission data, specifically analysis of imagery in space and earth science

Activities: One meeting has been held at DePaul along with several telecons.

Outcomes: The workshops described above.

Plans for continuing partnerships after end of grant: Continued through collaborative proposal writing and related activities.

Institution Name: **Lawrence Livermore National Lab (LLNL)**

Name(s) of individual(s) involved: Dr. Jennifer Cash, SCSU
Dr. David Dearborn, LLNL

Nature and Goal of Partnership: Faculty-level research

Activities: Dearborn visited SCSU in March 2005; gave talks to students, faculty and general public; spent time with Cash developing faculty and student projects related to 3D modeling of stellar systems.

Outcomes: Cash is working on a post-processing program to read the output from the LLNL model and use as input to compute astrophysically meaningful quantities (e.g. optical depth)

Plans for continuing partnerships after end of grant: Continued through collaborative proposal writing and related activities.

Institution Name: **Lawrence Livermore National Lab (LLNL)**

Name(s) of individual(s) involved: Dr. Donald Walter, SCSU
Dr. Jennifer Cash, SCSU
Dr. Kennedy Reed, LLNL

Nature and Goal of Partnership: Faculty exchanges, student research; outreach

Activities: Planning sessions via email and phone

Outcomes: SCSU student Deidrick Capers held a summer internship at LLNL in high-performance computing; this internship resulted from the collaborative effort of SCSU and LLNL.

Plans for continuing partnerships after end of grant: Continued through collaborative proposal writing and related activities. Possible collaboration with Reed and his African travel related to the March 2006 eclipse.

Institution Name: **Pisgah Astronomical Research Institute (PARI)**

Name(s) of individual(s) involved: Dr. James Payne, SCSU
Dr. Michael Castelaz, PARI
Mr. Charles Osborne, PARI

Nature and Goal of Partnership: Student research, teacher training, public outreach all related to radio astronomy

Activities: SCSU students used PARI radio telescopes during their summer internships; South Carolina teachers received hands-on experience in remote control via the Internet of PARI radio telescope.

Outcomes: Teacher use of PARI radio telescope; undergraduate interns exposed to observational radio astronomy.

Plans for continuing partnerships after end of grant: Continued through collaborative proposal writing and related activities.

Institution Name: **Vanderbilt University (VaU)**

Name(s) of individual(s) involved: Dr. Jennifer Cash, SCSU
Dr. Donald Walter, SCSU
Dr. Keivan Stassun, VaU

Nature and Goal of Partnership: Faculty-level and student research

Activities: Stassun visited SCSU in July 2005; he spoke to students and met with faculty to discuss future collaborations.

Outcomes: Cash & Stassun have submitted for internal funding from VaU for faculty-student collaborative research. Walter has provided letter of support for Stassun application to NSF/REU program at VaU.

Plans for continuing partnerships after end of grant: Continued through collaborative proposal writing and related activities including another NSF proposal.

Institution Name: **Orangeburg-Calhoun Technical College (OCTC)**

Name(s) of individual(s) involved: Dr. James Payne, SCSU
Dr. Walter Tobin, OCTC
Mr. David Metts, OCTC
Mr. Jim Link, OCTC
Mr. Gary Foley, OCTC

Nature and Goal of Partnership: Student projects, curriculum enhancement

Activities: Installation of 4.5-m radio telescope at OCTC by SCSU. Scope was accessible via the Internet until damaged beyond repair by wind storm. OCTC will continue to use dual-axis motors, LabVIEW VIs and related materials developed under this collaboration in the classroom.

Outcomes: Future faculty at junior college to propose to NASA, student projects & curriculum enhancement

Plans for continuing partnerships after end of grant: None at this time.

Institution Name: **Bennett College (BC)**
Name(s) of individual(s) involved: Dr. Donald Walter, SCSU
Dr. Benita Bell, BC
Nature and Goal of Partnership: Student research
Activities: Two students from SCSU spoke at NASA Space
Science Week at BC about their research in biology.
Outcomes: Student presentations; greater awareness of
NASA opportunities; future summer research
opportunities
Plans for continuing partnerships after end of grant: Continued through collaborative
proposal writing and related activities.

Institution Name: **Western Kentucky University (WKU)**
Name(s) of individual(s) involved: Dr. Donald Walter, SCSU
Dr. Richard Gelderman, WKU
Dr. Louis Strolger, WKU
Nature and Goal of Partnership: Faculty Research & ground-based observational
support of space-based missions.
Activities: Strolger was recently hired by WKU from his
position at the Space Telescope Science Institute. A
subaward under this MUCERPI grant provided
some summer support to Gelderman and Strolger to
restart work on the refurbishment of the 1.3meter
telescope at KPNO.
Outcomes: Gelderman & Strolger assessed what remains to be
done, implemented a plan and hired a consultant to
complete software integration to the observatory
with funds from a NASA award to WKU.
Plans for continuing partnerships after end of grant: Continued through collaborative
proposal writing, mutual & complementary research
projects on the 1.3meter telescope and a visit to
SCSU by Strolger to speak to student researchers.

Institution Name: **Planetary Science Institute (PSI)**
Name(s) of individual(s) involved: Dr. Donald Walter, SCSU
Dr. Donald Davis, PSI
Dr. Mark Everett, PSI
Nature and Goal of Partnership: Faculty research
Activities: PSI provided software support and training for
analysis of imagery taken by the 1.3-m telescope at
Kitt Peak National Observatory.
Outcomes: Software and CCD camera support by a postdoc at
PSI has facilitated the science testing of the 1.3-m
and the research capabilities of SCSU faculty.

Plans for continuing partnerships after end of grant: Continued through collaborative proposal writing and related activities.

Institution Name: Talladega College (TC)
Name(s) of individual(s) involved: Dr. Donald Walter, SCSU
Dr. Eric Richards, TC
Nature and Goal of Partnership: Faculty Research
Activities: Collaborative research & proposal writing
Outcomes: Richards & Walter successfully proposed for an archival proposal in 2004 to the Spitzer mission; their proposal was accepted and funded
Plans for continuing partnerships after end of grant: Continued through collaborative proposal writing and related activities.

Institution Name: Robotically Controlled Telescope Consortium
Name(s) of individual(s) involved: Dr. Donald Walter, SCSU
Dr. Charles McGrudger, Western Kentucky U.
Dr. Richard Gelderman, Western Kentucky U.
Dr. Michael Carini, Western Kentucky U.
Dr. Louis Strolger, Western Kentucky U.
Dr. Edward Guinan, Villanova U.
Dr. John Mattox , Fayetteville State U.
Dr. Steve Howell, National Optical Astronomy Obs.
Dr. Donald Davis, PSI
Dr. Mark Everett, PSI
Nature and Goal of Partnership: Refurbishment & commissioning of the 1.3m telescope at KPNO
Activities: Science testing of the telescope & components
Outcomes: A new contractor has been hired to complete the software interface to the facility. Science operations are expected to begin in the summer of 2006.
Plans for continuing partnerships after end of grant: Continued through collaborative proposal writing and related activities.

ADDITIONAL INFORMATION

Significant Activity – Leveraged Funds – Award

MUCERPI CoI L. Payne receive a \$100,000 award as a PI under NASA (NRA NN-H-04-Z-YO-006-N) entitled “The South Carolina Earth System Science Program”. CoIs include G. Senn from the University of South Carolina at Aiken and B. Jones from the Savannah River National Laboratory. While this award came from the Earth Science Enterprise, its core activities are patterned after the successful “Space Science for Teachers Course” funded under SCSU’s OSS Minority Initiative Award in 2000. The experience gained by L. Payne under the previous and ongoing (see In-Service Teacher

Training) space science experience is the major motivator behind this earth science submission.

Significant Activity – Leveraged Funds – Award

MUCERPI-funded SCSU faculty member D. Smith has been awarded a \$2,500 grant from NASA's South Carolina Space Grant Consortium entitled "Visualization and Analysis of the Large Scale Structure of the Universe". He will use the funds to further enhance online resources he has developed related to the study of cosmology. For additional details see: <http://physics.scsu.edu/%7Edms/cosmology/home2.html>

Significant Activity – Leveraged Funds – Award

MUCERPI CoIs L. Payne and J. Payne and MUCERPI-funded SCSU faculty members D. Smith and K. Adziewski have been awarded \$2.5 million over five years from NSF for their STEM-enhancement proposal "Research-Infused STEM Curriculum at South Carolina State University". This cross-departmental program will enhance student research in the STEM fields and improve recruitment and retention of students in those areas.

Significant Activity – National Publication Highlights SCSU MUCERPI Program

The September 2005 issue of "Physics Today" highlighted the progress of developing the space science programs at a number of minority institutions. SCSU was recognized for the institutionalization of astrophysics at the University through its MUCERPI 2000 and 2003 awards as well as other NASA grants.

Significant Activity – Bennett College Space Week

Partner school Bennett College held its 3rd annual "Space Week" March 21-23, 2005. A total of seven hundred (**700**) K-16 students attended. Activities included a wide range of talks, workshops and presentations promoting NASA, space science, women in science, minorities in science and other topics.

Significant Activities – Presentations at Professional Conferences

Faculty members at SCSU presented at a number of professional conferences. The SCSU MUCERPI award from the NASA SMD provided support for the work reported below and/or the travel to present at these conferences. SCSU faculty members are indicated in **bold**.

"Comparison of PC Simulations of Large Scale Structure with Data", **Smith, D.M.**; Faculty oral presentation at the Summer 2005 meeting of the American Association of Physics Teachers; Salt Lake City, Utah, August 6-10, 2005.

"Astrophysical Research and EPO at SCSU", **Walter, D.K.**; Faculty poster presentation at the NASA Balloon Science Workshop "Fostering New Research Partnerships" at Cornell University; Ithaca, NY; August 1-2, 2005.

"Modeling and analysis of the accretion streams and secondaries in magnetic CV's", **Cash, J.L.**; Faculty oral presentation at the 4th annual Meeting of South Carolina Astronomers; Columbia, SC; April 16, 2005

"Extraction of synthetic data from model accretion streams in POLARS", **Cash, J.L.**; Faculty poster presentation at the 205th American Astronomical Society Meeting; San Diego, CA.; January 10, 2005.

Significant Activities – Conference Attendance

SCSU faculty members participated in professional development activities supported by this SMD grant in addition to those reported under "Significant Activities – Presentations at Professional Conferences".

PI D. Walter attend the NSF Senior Review Town Hall meeting at Clemson University. This is one of several meetings being held nationwide to allow the astronomical community the opportunity to provide input regarding the future funding of NSF astronomical projects.; Clemson, South Carolina; October 15, 2005

PI D. Walter and CoI L. Payne attended the 117th meeting of the American Astronomical Society. The emphasis of this particular conference was on education and public outreach (EPO) related to the fields of astronomy, astrobiology and space and earth science; Tucson, Arizona; September 13-16, 2005

PI. D. Walter and CoI. J. Cash attended the 4th annual Meeting of South Carolina Astronomers; Columbia, South Carolina; April 16, 2005

PI D. Walter attended the NASA Astrobiology Conference; Boulder, Colorado; April 10-14, 2005.

PI D. Walter attended the Bennett College Space Week. This three day event is partially supported under this MUCERPI award through a subaward to Bennett College with Dr. Benita Bell as the Bennett CoI and person responsible for the Space Week Activities. These activities and are described elsewhere in this report.; Greensboro, North Carolina; March 21-23, 2005

Significant Activities – Space Science Researchers Who Visited SCSU

Dr. Keivan Stassun, Vanderbilt University, visited in July 2005; he spoke to students and faculty about his research in stellar formation and student opportunities for graduate studies as well as discussing possible faculty research collaborations.

Dr. Varsha Kulkarni, University of South Carolina, visited in July 2005; she spoke about her research in extragalactic astronomy, about graduate school opportunities at her institution and possible research collaborations with SCSU faculty.

Dr. Stephan Katzberg, NASA Langley, is on temporary assignment to SCSU; he spoke to students and faculty in July 2005 about his past and present research on NASA missions as well as discussing possible collaborations with SCSU faculty.

Dr. David Dearborn, Lawrence Livermore National Lab (LLNL); visited in March 2005; he spent several days working with MUCERPI CoI J. Cash on their collaboration dealing with 3D modeling of stellar systems. Additionally, he gave three talks, one on Incan astronomy, one on asteroid collisions and one on his research at LLNL.

Dr. Jody Deming, University of Washington; visited in February 2005; she gave talks to faculty & students on astrobiology and her research on the existence of life inside terrestrial arctic ice and its implications for life on Europa and other extraterrestrial sites.

Dr. Mark Everett, Planetary Science Institute; visited in January 2005; he trained PI D. Walter in the use of specialized software used to automate the reduction of images from the 1.3meter telescope at KPNO.

Significant Activities – New Planetarium Manager at SCSU

PI D. Walter and CoIs J. Cash, J. Payne, L. Payne and J. Salley-Guydon were instrumental in recruiting, interviewing and selecting the new SCSU Planetarium Manager. SCSU has been without a Planetarium Manager for over two years. The facility has been closed during that time despite numerous requests from the K-16 community and the general public for programs. It is anticipated that the new manager and the MUCERPI faculty will collaborate extensively and further grow space science at SCSU.

Significant Activities – Faculty Service

CoI J. Cash serves as the SCSU Campus Director of the Space Grant Program, which is part of the state-wide, NASA Space Grant Consortium

CoI J. Payne serves on the Board of Directors of the Pisgah Astronomical Research Institute (PARI). Located near Rosman, North Carolina, PARI is a non-profit radio and optical astronomy research, education and outreach facility.

CoI L. Payne serves as the SCSU Director of the NASA Educator Resource Center (ERC), the only ERC in the state. She distributes NASA materials to K-12 teachers throughout South Carolina.

CoI J. Salley-Guydon is the statewide Director of the NSF-funded Louis Stokes Alliances for Minority Participation Program. In this role, she not only motivates and facilitates undergraduate student research and STEM recruitment and retention at SCSU, but also at a number of other colleges and universities in South Carolina.

Significant Activities – Undergraduate Student Research Presentations

The SCSU MUCERPI award funded stipends and travel for a number of students to give presentations. These included:

“Isolation and Phenanthrene Screening of Sphingomonas Strain BPH Transconjugants”

Sydnee Battle, SCSU, Biology Major

Oral presentation at SCSU student research program; Orangeburg, SC; April 3, 2005

“3-D Visualization of Cataclysmic Variables with Interactive Data Language”

Deidrick Capers, SCSU, Computer Science Major

Oral presentation at SCSU student research program; Orangeburg, SC; April 3, 2005

“Developing Nano-material Luminance Sensors for G-Quartet DNA”

Keira-Nicole Lee, SCSU, Chemistry Major

Oral presentation at SCSU student research program; Orangeburg, SC; April 3, 2005

“Determining the Peculiar Velocity of Galaxies Found in SDSS”

Jennifer Sanders, SCSU, Math Education Major

Oral presentation at SCSU student research program; Orangeburg, SC; April 3, 2005

“Identification of Plasmids from Two Novel Sphingomonas Strains”

Bradford Gillens, SCSU, Biology Major

Oral presentation at the Bennett College Space Week Conference; Greensboro, NC; March 22, 2005

“Employing a System of Random Transpositional Mutagenesis to Create Polycyclic Aromatic Hydrocarbons Utilization Mutants of Sphingomonas strain BPH”

Daniel Howard, SCSU, Biology Major

Oral presentation at the Bennett College Space Week Conference; Greensboro, NC; March 22, 2005

“Computational Materials Science: From Chemical Reactions to Drug Design”

Kara Beharry, SCSU, Physics Major

Poster presentation at the South Carolina Academy of Science meeting; Rock Hill, SC; March 16, 2005

“Contrast Comparison Experiments”

Keisha McCall, SCSU, physics major

Poster presentation at the South Carolina Academy of Science meeting; Rock Hill, SC; March 16, 2005

“Comparison Study of the Sun at Various Frequencies”

Kayla Hayward, South Carolina Governors School for Science & Mathematics, High School Senior

Poster presentation at the South Carolina Academy of Science meeting; Rock Hill, SC;
March 16, 2005

Significant Activities – Undergraduate Student Research Projects

J. Cash, J. Payne, D. Smith and D. Walter mentored a total of eight (8) undergraduates during the spring, summer & fall of 2005. Seven of the eight were part of the Undergraduate Research Institute in Astrophysics (URIA) held at SCSU every summer since 1998. This “pre-REU” residential program in astrophysics lasts eight weeks and prepares the students to be more competitive in other, REU-type programs in the future. The students and their projects included:

“Analysis of Synthetic Radial Velocity Curves for Model Accretion Streams in Polars”,
Deidrick Capers, SCSU Computer Science Major
(Fall 2005)

“Line of Sight Column Densities of Polars”
Scott Swindell, North Carolina A&T, Physics Major
(Summer 2005)

“LabVIEW”
Shawn Blake, SCSU, Industrial Engineering Technology
Chris Carter, SCSU, Electrical Engineering Technology
(Summer 2005)

“Comparison of PC Simulations of Large Scale Structure with Data”
Patrick Shealy, Elizabeth City State University, Physics Major
Troy Young, North Carolina A&T, Physics Major
(Summer 2005)

“Image Analysis of the Planetary Nebula NGC 6543”
Jennifer Sanders, SCSU, Math Education Major
Korressa Williams, SCSU, Biology Major
(Summer 2005)

“Visualization and Analysis of Secondary Star models in Polars”
Deidrick Capers, SCSU Computer Science Major
(Spring 2005)