GEST

GODDARD EARTH SCIENCES AND TECHNOLOGY CENTER

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Quarterly Report
Cooperative Agreement NCC5-494
The Goddard Earth Sciences and Technology Center
Reporting Period: January 1, 2002 through March 31, 2002

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University of Maryland, Baltimore County
1000 Hilltop Circle
Baltimore, MD 21250

UMBC

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Technical Status Report

The following is a technical report of the progress made under Cooperative Agreement NCC5-494, the Goddard Earth Sciences and Technology Center (GEST). The period covered by this report is January 1, 2002 through March 31, 2002.

GEST is a consortium of scientists and engineers, led by the University of Maryland, Baltimore County (UMBC), to conduct scientific research in Earth and information sciences and related technologies in collaboration with the NASA Goddard Space Flight Center (GSFC). GEST was established through a cooperative agreement signed May 11, 2000, following a competitive procurement process initiated by GSFC.

Overview of significant Activities

Publication and distribution of the GEST Faculty Guidebook and Sponsors Handbook.

One new summer program was added to the list of GEST Summer Programs. All programs are listed below.

SUMMER PROGRAMS - "Launch Your Future At NASA" (Recruiting)

VSEP 2002

The Visiting Student Enrichment Program (VSEP) offers students summer employment with Goddard Earth Sciences and Technology Center (GEST), working with NASA/Goddard Space Flight Center's (GSFC). Student projects have included simulating neural networks, preparing image analysis algorithms on supercomputers, developing computational science applications, and crating interactive World Wide Web sites.

Project experiences are available from June 10 to August 16, 2002 (High school students may start/stop later subject to housing availability), at GSFC in Greenbelt, MD. Students are provided opportunities to work with scientists and professionals at a world-class facility while experiencing meaningful work through a project primarily focused on computer science or the application of computers to solve problems in other sciences, VSEP also offers field trips and lectures to broaden appreciation for GSFC's mission and activities.

Eligibility and Selection Criteria

The program is open to full-time students in computer science, the physical sciences, and mathematics. All students will be evaluated relative to their school-level peers. Participants must be either U.S. citizens or foreign nationals in U.S. schools who are either permanent residents or who possess a valid F1 work visa. All selected students will be subject to a pre-employment security background check under current security guidelines.

College: Undergraduate and graduate students must have taken courses in physician and computer sciences directly related to their areas of study.

High School: Students will be evaluated with emphasis on their potential and related extracurricular experiences, as well as on course work. The number of positions available will be limited.

Graduate Student Summer Program (GSSP) in Earth System Science

The Goddard Space Flight Center's Earth Sciences Directorate, in collaboration with the GEST Center, with headquarters at the University of Maryland Baltimore County, is offering a limited number of graduate student research opportunities for the summer of 2002. The program is scheduled for June 10 to August 16, 2002. The program is designed to stimulate interest in interdisciplinary Earth science studies by enabling selected students to pursue specially tailored research projects in conjunction with Goddard scientific mentors. This year's theme is the Global Water Cycle and Climate Change.

The Goddard Space Flight Center (GSFC) is recognized as a world leader in the application of remote sensing and modeling aimed at improving knowledge of the Earth system. The GSFC Directorate is playing a central role in NASA's Earth Observing System (EOS) and the U.S. Global Change Research Program.

EOS requires highly trained professionals with significant interdisciplinary backgrounds for the design, implementation and analysis of data from this comprehensive satellite system. The aim of this program is to attract and introduce promising students to Earth system science career options through hands-on educational research experiences in the Earth sciences at NASA.

Eligibility and Selection Criteria:

The program is open to students enrolled in or accepted to accredited U.S. programs in the Earth, physical or biological sciences, mathematics, or engineering disciplines. Students will be selected on the basis of academic record, demonstrated motivation and qualification to pursue multidisciplinary research in the Earth sciences, clarity and relevance of stated research interests to NASA programs, and letters of recommendation. Preference will be given to students who have completed at least one year of graduate study. Minorities and women are encouraged to apply.

Students must commit for the specific full ten-week period (June 10 – August 16, 2002). Participants must be either U.S. citizens or foreign nationals in U.S. schools who are either permanent residents or who possess a valid F1 visa. All selected students will be subject to a pre-employment security background check under the current security guidelines.

In conjunction with the 2002 Graduate Student Summer Program in Earth System Science, the Goddard Earth Sciences and Technology Center (GEST) and the Earth Sciences Directorate of the Goddard Space Flight Center (GSFC) have organized a lecture series to be held on June 11 to 14, 2002. This series intends to promote the understanding of current scientific knowledge about the challenges of global change, and how NASA supports the research underpinning this knowledge.

HPC - 2002 Summer Program July 8 – 26

The High Performance Computational Earth and Space Sciences (HPC) Summer Program is scheduled for July 8 – 26, 2002.

The NASA Goddard Space Flight Center's (GSFC) Earth and Space Data Computing Division (ESDCD) through the Goddard Earth Sciences and Technology Center (GEST) is soliciting applications from qualified graduate students to participate in the Summer School, now in its 10th year. The ESDCD provides comprehensive research and development support in data handling and computing for NASA and maintains a world-class computing facility.

Approximately 15 students will be selected and will receive hands-on parallel computer training and small group interaction experience. Staff and invited computational scientists will present a series of lectures on advanced topics in computational Earth and space sciences, with emphasis on computational fluid dynamics and particle methods and the development of software for scalable architectures.

Eligibility and Selection Criteria

The program aims to attract Ph.D. students in the Earth and space science disciplines whose present or future research requires large-scale numerical modeling on massively parallel architectures. Eligibility is limited to those students who are U.S. citizens, are enrolled in U.S. universities, and have passed their Ph.D. qualifying exams. Students will receive a stipend and will be reimbursed for domestic transportation to and from Greenbelt, Maryland. Application materials should include: 1) a cover letter explaining your interest in the program and how your research will benefit from your participation; 2) your area of research and thesis title; 3) a statement of your career objectives and goals; 4) a description of your relevant work experience; 5) your curriculum vitae or resume with publication list; 6) your current G.P.A.; 7) two letters of reference; 8) academic transcripts showing two full years of work; and 9) a statement of U.S. citizenship.

Goddard Coastal Research Graduate Fellowship Program - A New Program June 17—August 16, 2002

The Goddard Space Flight Center's Earth Sciences Directorate and Wallops Flight Facility, in collaboration with the Goddard Earth Sciences and Technology (GEST) Center, led by the University of Maryland Baltimore County, is offering a limited number of graduate student research opportunities for the summer of 2002. This new program is scheduled for June 17 to August 16, 2002. It is designed to stimulate interest in interdisciplinary Earth science studies by enabling selected students to pursue specially tailored research projects on coastal processes in conjunction with Goddard scientific mentors during the program period.

The aim of this new program is to attract and introduce promising students in their first or second year of graduate studies to Oceanography and Earth system science career options through hands-on instrumentation research experiences on coastal processes at NASA's Wallops Flight Facility on the Eastern Shore of Virginia.

Program Activities:
Each student will be teamed with a NASA scientist mentor with parallel scientific interests to jointly develop and carry out an intensive research project over the nine-week period. Most research will be done at GSFC's Wallops Flight Facility, however, there is the possibility that students will have the opportunity to participate in field programs at other locations as well.

Eligibility & Selection
The program is open to students enrolled in or accepted to accredited U.S. graduate program in the Earth sciences, physical or biological oceanography, and biological or environmental sciences disciplines. Students will be selected on the basis of academic record, demonstrated motivation and qualification to pursue multidisciplinary research in the Earth or Oceanographic sciences clarity and relevance of women, and individuals with disabilities are encouraged to apply.

Students must commit for the specific full nine-week period (June 17—August 16, 2002. Participants must be either U.S. citizens or foreign nationals in U.S. schools who either are permanent residents or who posses a valid F1 visa. All selected students will be subject to a pre-employment background check under the current security guidelines.

Compensation:
Students will be paid the equivalent of $12/hour for forty hours per week over the nine-week period. In addition, GEST will reimburse reasonable domestic travel expenses for participants needing to relocate to Wallops Flight Facility, located near Chinoteague, Virginia on the Eastern Shore. Housing will be provided only for the program participants.

Research Milestones for the Reporting Period

Dr. Jiayu Zhou's

Article from the American Meteorological Society, Orland, Fla.
An El Niño Link With A Tropical Disease ?
January 13-17, 2002
SCIENCE NEWS
February 2, 2002 VOL. 161

An analysis of recent outbreaks of an often fatal disease in Peru may strengthen a link between the malady and the warming of the tropical Pacific Ocean known as El Nino. If proven, the connection could help health workers stave off future epidemics. The bacterial disease known as bartonellosis is transmitted to people by the bites of sand flies, similar to the way that malaria is transmitted by mosquitoes, says Jiayu Zhou, an earth scientist at the University of Maryland in Baltimore County. In chronic form of the disease, patients get long-lasting blood filled, wart-like lesions on or under the skin. In its acute form, bartonellosis causes severe anemia that's fatal in as many as 40 percent of untreated patients.

Outbreaks of the disease usually occur in river valleys of the Andes Mountains at altitudes between 800 and 3,500 meters and follow a seasonal pattern, says Zhou. The number of cases begins to rise in December, peaks in February and March—the height of the Peruvian summer—and is lowest between July and November. Over the long term, epidemics seem to follow a 4-to-8 year cycle and appear to be associated with El Nino.

To search for a link between bartonellosis and El Niño, Zhou and his fellow researchers analyzed the incidence of the disease at two Peruvian locations between 1994 and 1999. Caraz, a city in a valley near the Pacific coast, has a long history of epidemics, says Zhou. The residents of Cusco, a city that is farther inland than Caraz and also farther from the equator, never suffered outbreaks of bartonellosis until 1997, the year that marked the beginning of the strongest El Nino of the 20th century.

Data from satellites that monitor the temperature of the tropical Pacific showed that the ocean began to warm about 2 to 3 months before the disease outbreaks began. Zhou cautions that these results are based on a limited set of data and are therefore only preliminary. Also, he notes, there was only one El Niño during the 6 year study period. Nevertheless, he tentative link between the ocean-warming phenomenon and outbreaks of bartonellosis means that health care workers could get advanced warning of possible epidemics.

GEST Faculty and Staff

GEST Administrative Staff

Four GEST administrative staff members were hired during this reporting period. Ms. Cherry Johnson, Administrative Assistant II - GSFC, Ms. Deborah Belevedere, Program Assistant - GSFC, Ms. Arlene Rustmann, Program Assistant - GSFC, and Phuong (Fawn) Ta, Student Support - UMBC. The contact information of each of the GEST administrative staff members are given in Appendix T-1 following this technical report.

GEST Technical Staff

One Gest Council Meeting was held during this report period, February 5, 2002. Members of the GEST Council are noted in Table T-1 below.

Table T-1 GEST Council Members

Name	Position	Code	Section
Robert Curran	Director	900	Administration
Vacant	Associate Director	900	"
L. Anathea Brooks	Assistant Director	900	"
Henry Plotkin	Chief Scientist	900	"
Dr. Julio Bacmeister	Faculty Group Leader	971	Seasonal and Interannual Prediction
Dr. Susan Hoban	Faculty Group Leader	103	Information Science and Technology
Dr. Steven Pawson	Faculty Group Leader	910	Climate and Trace Species
Dr. Susan Sakimoto	Faculty Group Leader	921	Land Surface and Hydrology
Dr. Alexander Smirnov	Faculty Group Leader	923	Aerosols and Clouds

Position advertisements appeared in *EOS and The Chronicle of Higher Education.* Information concerning these advertisements is provided in Table T.2.

Table T.2. Position advertisements published during this reporting period

Advertisement	No. of Positions	Publication Date	Closing Date
EOS	4	1/02	3/11/02
Chron. of Higher Ed. Assoc. Director	1	11/23	Open

Changes in the GEST technical staff during this reporting period are provided in the following two tables, Table T.3 and Table T.4.

Table T.3 GEST technical staff hired during the reporting period

Name	Sponsor	Code
Choi, Wookap	A. Douglas	916
Dong, Jiaru	P. Houser	974
Ginoux, Paul	J. Herman	916
Gu, Guojun	B. Adler	912
Kumar, Sujay	P. Houser	974
Mizogushu, Ken-ichi	S. Hakkinen	971
Tian, Yudong	P. Houser	974
Wang, Zhein	D. Whiteman	924
Yang, Song	E. Smith	913
Zhan, Xiwu	P. Houser	974
Ziemke, Jerry	S. Chandra	916

Table T.4. GEST technical staff who have left during the present reporting period

Name	Sponsor	Code
Entin, Jared	D. Toll	974
Morel, Pierre	L. Olsen	974
Rodell, Matt	P. Houser	974

The subsequent positions that these individuals went to are as follows: (J. E.) Civil Servant; (P.M.) Part-time; (M.R.) Civil Servant.

At the end of the reporting period GEST had approximately 98 research staff on board.

Submitted or Published Papers by GEST Researchers During this Reporting Period

The articles submitted or published during this reporting period are listed in the Appendix T-2 at the end this section of the report.

GEST Related Seminars for this Reporting Period

Several GEST related seminars are listed in Appendix T-3 at the end of this section of the report.

Proposals Submitted by GEST Researchers During this Reporting Period

Proposals submitted by UMBC GEST research faculty are listed in Appendix T-4 at the end of this section of the report.

Appendix T-1. GEST Administrative Staff

GEST Administrative Staff as of March 31, 2002.

Name	Position	Location	Telephone
Robert J. Curran	Director	UMBC/GSFC	410-455-8813 301-286-8951
L. Anathea Brooks	Assistant Director	UMBC/GSFC	301-286-4226
Henry H. Plotkin	Chief Scientist	GSFC	301-286-7992
Debbie Hicks	Business Manager	UMBC	410-455-8815
Grace Roscoe	Executive Assistant	UMBC	410-455-8808
Nancy Flowers	Administrative Assistant II	UMBC	410-455-8899
Cherrie Johnson	Administrative Assistant II	GSFC	301-286-4403
Deborah Belvedere	Program Assistant	GSFC	301-614-5809
Arlene Rustmann	Program Assistant	GSFC	301-614-5733
Frances Lilly	Visitor/School Coordinator	GSFC	301-286-4099
Tom Low	Caelum Lead	Caelum	301-424-8205 x 349
Denise Everhart	Student Support	GSFC	301-286-4099
Phuong Ta	Student Support	GSFC	410-455-8899

Locations:

UMBC
UMBC Technology Center, South Campus
1450 S. Rolling Road, Suite 3.002
Baltimore, MD 21227

GSFC
NASA Goddard Space Flight Center
Mail Code 900.1
Bldg, 28, Room W223
Greenbelt, MD 20771

Appendix T-2. PUBLICATIONS, January 1, 2002 – March 31, 2002

Refereed

Asaph Anyamba

Tucker, C. J, J. M. Wilson, R. Mahoney, **A. Anyamba**, K. J. Linthicum, and M. F. Myers, Climatic and Ecological Context of the 1994-1996 Ebola Outbreaks, Photogrammetric Engineering Remote Sensing: *Special Issue – Remote Sensing and Human Health*, 68(2): 147-152, 2002.

Paul Ginoux

Torres, O., P. K. Bhartia, J. R. Herman, A. Sinyuk, **P. Ginoux**, and B. Holben, A long-term record of aerosol optical depth from TOMS observations and comparison to AERONET measurements, *J. Atmos.Sciences, 59,* 398-413, 2002.

Nickolay Krotkov

Krueger, A. J., **N. Krotkov**, S. Datta, O. Dubovik, D. Flittner, OMI SO2 algorithm, *OMI ATBD*, vol. 4, chapter 4, under review, 2002.

Judit Pap

Turmon, M., **J. Pap**, and S. Mukhtar, Statistical Pattern Recognition for Labeling Solar Active Regions: Application to SOHO/MDI Imagery, *Astrophysical J.*, March 20 issue, 2002.

Joan Rosenfield

Rosenfield, J. E., A. R. Douglass, and D. B. Considine, The impact of increasing carbon dioxide on ozone recovery, *J. Geophys. Res.*, in press 2002.

Adam Schlosser

Schlosser, C. A. and P. C. D. Milly, A model-based investigation of soil-moisture predictability and associated climate predictability, accepted *J. Hydromet*, 2002.

Gail Skofronick-Jackson

Skofronick-Jackson, G. M., A. J. Gasiewski, and J. R. Wang, Influence of microphysical cloud parameterizations on microwave brightness temperatures, *IEEE Trans. Geosc. Rem. Sens., 40(1),* 187-196, 2002.

Alexander Smirnov

Smirnov, A., B. N. Holben, O. Dubovik, N. T. O'Neill, T. F. Eck, D.L. Westphal, A. K. Goroch, C. Pietras, and I. Slutsker, Atmospheric aerosol optical properties in the Persian Gulf region, *J. Atmos. Sci., 59*, 620-634, 2002.

Smirnov, A., B. N. Holben, O. Dubovik, N. T. O'Neill, T. F. Eck, D.L.Westphal, A.K. Goroch, C. Pietras, and I. Slutsker, Atmospheric aerosol optical properties in the persian gulf, *J. Atmos. Sci., 59*, 620-634, 2002.

Smirnov, A., B. N. Holben, Y. J. Kaufman, O. Dubovik, T. F. Eck, I. Slutsker, C. Pietras, and R. Halthore, Optical properties of atmospheric aerosol in maritime environments, *J. Atmos. Sci., 59*, 501-523, 2002.

Smirnov, A., B. N. Holben, Y. J. Kaufman, O. Dubovik, T. F. Eck, I. Slutsker, C. Pietras, and R. Halthore, Optical properties of atmospheric aerosol in maritime environments, *J. Atmos. Sci., 59*, 501-523, 2002.

Chaojiao Sun

Sun, C., Z. Hao, M. Ghil, and J. D. Neelin, Data assimilation for a coupled ocean-atmosphere model. Part I: Sequential state estimation, *Mon. Weather Rev.,* in press, 2002.

Chung-Lin Shie

Tao, W.-K., J. Simpson, D. Baker, S. Braun, M.-D. Chou, B. Ferrier, D. Johnson, A. Khain, S. Lang, B. Lynn, **C.-L. Shie**, D. Starr, C.-H. Sui, Y. Wang and P. Wetzel, Microphysics, radiation and surface processes in a non-hydrostatic model, *Meteorol. and Atmos. Physics,* in press, 2002a.

Tao, W.-K., Y. Wang, J. Qian, **C.-L. Shie**, K.-M. Lau, and R. Kakar, Mesoscale *convective systems during SCSMEX: Simulations with a regional climate model and a cloud-resolving model*, book published by the INDO-US Climate Research Program, in press, 2002b.

Lian Tian

Tian, L., G. M. Heymsfield, and R. C. Srivastava, Measurement of attenuation with airborne and groundbased radar in convective storms over land and its microphysical implications, *J. App. Meteor.*, accepted 2002.

Alberto Troccoli

Troccoli, A., M. A. Balmaseda, J. Segschneider, J. Vialard, D. L. T. Anderson, K. Haines, T. N. Stockdale and F. Vitart, Salinity adjustments in the presence of temperature data assimilation, *Mon. Weather Rev.*, 130 (1), 89-102, 2002.

Guiling Wang

Wang, G. and G. Jenkins, Desert and Desertification, *Encyclopedia of Atmospheric Sciences*, edited by J. Holton, J. Pyle, and J. Curry, Academic Press, in press 2002.

Zhien Wang

Wang, Z. and K. Sassen, Cirrus cloud microphysical property retrieval using lidar and radar measurements: II Mid-latitude cirrus microphysical and radiative properties, *J. Atmos. Sci.*, accepted 2002.

Wang, Z. and K. Sassen, Cirrus cloud microphysical property retrieval using lidar and radar measurements, I Algorithm description and comparison with in-situ data, *J. Appl. Meteor.*, accepted 2002.

Sassen, K., **Z. Wang**, V. I. Khvorostyanov, G. L. Stephens and A. Bennedetti, Cirrus cloud ice water content radar algorithm evaluation using an explicit cloud microphysical model, *J. Appl. Meteor.*, 2002 (accepted).

Clark Weaver

Weaver, C. J., P. Ginoux, N. C. Hsu, M.-D. Chou, and J. Joiner, Radiative forcing of Saharan dust, GOCART Model Simulations Compared with ERBE Data, *J. Atmos. Sci., 59*, 736–747, 2002.

Weaver, C. J., P. Ginoux, N. C. Hsu, M-D. Chou, and J. Joiner, Radiative Impact of Mineral Dust from a three-dimensional Transport Model. *J. Atmos. Sci.,* 59, 736-747, 2002.

Weaver, C., P. Ginoux, N. Hsu, M-D. Chou, and J. Joiner, Radiative forcing of Saharan dust: GOCART model simulations compared with ERBE data, *J. Atmos. Sciences, 59*, 736-747, 2002.

Judd Welton

Welton, E. J., K. J. Voss, P. K. Quinn, J. R. Campbell, J. D. Spinhirne, H. R. Gordon, and J. E. Johnson, Measurements of aerosol vertical profiles and optical properties during INDOEX 1999 using micro-pulse lidars, *J. Geophys. Res.*, accepted 2002.

Cara Wilson

Wilson, C. and D. Adamec, A global view of bio-physical coupling from SeaWiFS and TOPEX/Poseidon satellite data, 1997-2001, *Geophys. Res. Lett.*, in press, Feb. 2002.

Marcia Yamasoe

Schafer, J. S., B. N. Holben, T. F. Eck, **M.A. Yamasoe**, P. Artaxo, Atmospheric effects on insolation in the Brazilian Amazon: Observed modification of solar radiation by clouds and smoke and derived single scattering albedo of fire aerosols, *J. Geophys. Res.*, accepted 2002.

Dongliang Yuan

Yuan, D., A numerical study of barotropicly forced intrusion in DeSoto Canyon. March issue of *J. Geophys. Res.*, 2002.

Yuan, D., A numerical study of the South China Sea deep circulation and its relation to the Luzon Strait transport. *Acta Oceanologica Sinica*, (in press, 2002).

Xiwu Zhan

Zhan, X., R. Sohlberg, J. R. G. Townshend, C. DiMiceli, M. Carroll, J. C. Eastman, M. Hansen, and R. S. DeFries, Detection of Land Cover Changes Using MODIS 250m Data. *Remote Sensing of Environment*, in press, 2002.

Zhao, T. X.-P., L. L. Stowe, A. Smirnov, D. Crosby, J. Sapper, and C. R. McClain, Development of a global validation package for satellite oceanic aerosol retrieval based on AERONET sunphotometer observations and its application to NOAA/NESDIS operational aerosol retrievals, *J. Atmos. Sci., 59*, 294-312, 2002.

Appendix T-3. SEMINARS, January 1, 2002 –March 31, 2002

Alexander M Chekalyuk

Chekalyuk, A.M., F.E. Hoge, R.N. Swift, and J.K Yungel, New Developments in Airborne LIDAR Remote Sensing: Advanced Oceanic LIDAR Biomonitoring, AGU/ASLO Ocean Sciences meeting, Honoluly, HI, Geb. 11-15, 2002.

Jean Paul Boy

Boy, J. P., M. Llubes, J. Hinderer, and N. Florsch, Oceanic tidal loading and surface gravity observations, EGS 27th General Assembly, Nice, Italy, 2002.

Chao, B. F. and **J. P. Boy**, Time-variable gravity signal of China's Three-Gorges Reservoir as a "controlled experiment", EGS 27th General Assembly, Nice, Italy, 2002.

Nieto Ferreria

Nieto Ferreria R., M. Suarez, NSIPP-1 "Simulations of the SALLJ. Poster presentation at the VAMOS/CLIVAR/WCRP Conference on the South American Low-Level Jet, Santa Cruz, Bolivia, February 5-7, 2002.

Nieto Ferreria R., T. Rickenbach, D. L. Herdies, M.A.F. Silva Dias, Easterly and Westerly Wind Regimes in South Amizonia, Oral Presentation at the VAMOS/CLIVAR/WCRP Conference on the South American Low-Level Jet, Santa Cruz, Bolivia, February 5-7, 2002.

Nieto Ferreria R., M. Suarez: Two-way Interacting Regional Climate Model Simulations: Predictability of South American Precipitation on Seasonal To Interannual timescales: Oral Presentation at the XXVI General Assembly of the European Geophysical Society, Nice, France, Santa Cruz, Bolivia, February 5-7, 2002.

Nieto Ferreria R., T. Rickenbach, D. L. Herdies, L. M. Carvalho, Variability of South American Convective Systems During JGM 1998/1999, Oral Presentation at the VAMOS/CLIVAR/WCRP Conference on the South American Low-Level Jet, Santa Cruz, Bolivia, February 5-7, 2002.

Jonathan Gottschalck

Gottschalck, J.C., P. Houser, X. Zeng, M. Rodell, U. Jambor, J. Meng, and K. Arsenault, Impact of A Remotely Sensed Leaf Area Index (LAI) on a global land data assimilation system, 16th Conference on Hydrology, 82nd Annual Meeting of the American Meteorological Society, Orlando, FL, January 13-17, 2002.

Gottschalck, J. C., P. Houser, **X. Zeng, M. Rodell, U. Jambor, J. Meng**, and **K. Arsenault**, Impact of a remotely sensed leaf area index (LAI) on a global land data assimilation system, 16th Conference on Hydrology , 82nd Annual Meeting of the American Meteorological Society, Orlando, FL, January 13-17, 2002.

Daniel Johnson

Shige, S., Y. N. Takayabu, W.-K. Tao, and **D. E. Johnson**, Spectral retrieval of latent heating profiles from TRMM PR data: Algorithm development with a cloud-resolving model, Proc. 25th Conference on Hurricanes and Tropical Meteorology, San Diego, CA, 2002.

Nickolay Krotkov

N.A. Krotkov, J.R. Herman, P.K. Bhartia, C. Seftor, A. Arola, J. Kaurola, L. Koskinen, S. Kalliskota, P. Taalas, A. Vasilkov, OMI/TOMS Surface UV Irradiance algorithm, OMI ATBD Review, Greenbelt, February 2002.

Fioletov, V.E., J.B.Kerr, D.I.Wardle, **N.A.Krotkov**, J.R.Herman, Comparison of Brewer UV irradiance measurements with TOMS satellite retrievals, in Ultraviolet Ground- and Space-based Measurements, models, and Effects, edited by J.R.Slusser, J.R. Herman, and W.Gao, Proceedings of SPIE, 4482, 47-55, 2002.

Krotkov, N.A., J.R.Herman, P.K.Bhartia, C.Seftor, A.Arola, J.Kaurola, L.Koskinen, S.Kalliskota, P.Taalas, I.Geogdzhaev, Version 2 TOMS UV algorithm: problems and enhancements, in Ultraviolet Ground- and Space-based Measurements, models, and Effects, edited by J.R.Slusser, J.R. Herman, and W.Gao, Proceedings of SPIE, vol 4482, 82-93, 2002

Ruei-Fong Lin

Lin, R.F., D. O'C. Starr, On Activation of CCN, submitted to the 11th Conference on Cloud Physics, 2002.

Lin, R.F., D. O'C. Starr, P.J. DeMott, R. Cotton, E Jensen, B. Karchyogi, X. Liu, Cirrus Parcel Model Comparison Project: Phase 2, submitted to the Conference on Cloud Physics, 2002.

Peter Norris

Da Silva, A., **P. Norris**, J. Joiner, Wu, M.L. and the fvDAS Development Team, Recent Developments in DAO's Finite-Volume Data Assimilation System, American Meteorological Society 82nd Annual Meeting, Orlando, Florida, January 13-17, 2002.

Kevin Olson

K. Olson, P. M. Ricker, F. X. Timmes, M. Zingale, P. MacNeice, and H. M. Tufo, Simulations of Laser Astrophysics Experiments for Code Validation, 4th International Conference on High Energy Density Laboratory Astrophysics, February 23-25, 2002, University of Michigan, Ann Arbor, Michigan, 2002.

Judit Pap

Pap, J., Solar Irradiance Variations Measured from Spacecraft, invited review talk, AAS 199th Annual Assembly, Washington, D.C., January 7-12, 2002.

Steven Pawson

GRIPS: Introduction and Present and Future Work. GRIPS workshop, Tsukuba, Japan: March 12-15, 2002.

Wofsy, S. C., R. C. Harriss, A. Andrews, R. Birdsey, J. Collatz, P. Crill, S. Denning, R. Feely, C. Field,
C. Gerbig, E. Gloor, N. Gruber, D. Hollinger, **D. Jacob,** J. Lin, E. Paul, **S. Pawson**, S. Running, C. Sabine, J. Sarmiento, D. Schimel, E. Sundqvist, and P. Tans, *The North American Carbon Program, NACPCommittee of the U.S. Carbon Cycle Science Steering Group*, 2002.

Stratospheric Modeling and Assimilation in NASA's Data Assimilation Office. GFDL, Princeton, N.J., March 28, 2002.

Rolf Reichle

Reichle, R.J., R.D. Koster, J.P. Walker, M.M. Rienecker, P.R. Houser, Aspects of the Extended and Ensemble Kalman filters for land data assimilation in the NASA Seasonal-to-Interannual Prediction Project, Presentation at the 82nd AMS Annual Meeting, Orlando, FL, January 2002.

Joel Sachs

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Appendix T-4.
Proposals Submitted & Funded - Janaury 1 , 2002 March 31, 2002

P.I:	**Judit Pap - funded**
Title:	"Variations in the Solar Radiation Energy Output on time Scales of Years and the Solar Cycle"
Sponsoring Agency:	NASA
Budget/Commitment	$40,451

P.I:	**Judit Pap - funded**
Title:	"Variations in the Solar Radiation Energy Output on time Scales of Years and the Solar Cycle"
Sponsoring Agency:	NASA
Budget/Commitment	$30,474

P.I:	**Judit Pap - funded**
Title:	"Variations in Total Solar and Spectral Irradiance Related to solar Magnetic Activity"
Sponsoring Agency:	NASA
Budget/Commitment	$79,395

P.I:	**Judit Pap - funded**
Title:	"Analysis and Validation of the UARS/ACRIM II Solar Total Irradiance Data"
Sponsoring Agency:	NASA
Budget/Commitment	$36,981

P.I.	**S. Sakimoto – funded**
Title:	"Volanic Evolution and Erosional History of Tyrrhena and Hadriaca Paterae, Mars
Sponsoring Agency:	Research Foundation of SUNY
Budget/Commitment	$12,739

PI:	**S. Sakimoto – funded**
Title:	"Applications of MGS MOC and MOLA Data to Lava Flows: Investigation of Rheology, Topographic Influences and Tetonic Effects"
Sponsoring Agency:	Proxemy Research
Budget/Commitment	$4,638

P.I.	**Jian-Jian Wang - funded**
Title:	"Organization, Structure and Evolutionof Tropical Convections in South China Sea Monsoon and Their Mesoscale Environment
Sponsoring Agency:	NASA
Budget/Commitment	$167,667

Business Status Report

Amendments Received During this Reporting Period

Three amendments to the Cooperative Agreement were received during the present reporting period. At the start of the reporting period a total of $10,770,214 was obligated to the Cooperative Agreement. As of 3/31/02 the total financial obligation was $14,795,729. Table B.1 gives an over view of these amendments.

Table B.1. Amendments to NCC5-494, received between 1/1/02 and 3/31/02.

Amendment Number	Date	Amount	Activities Added/Augmented	Activities Deleted
28	1/17/02	12,250,323	3	1
29	2/14/02	13,233,703	2	0
30	3/19/02	14,795,729	1	0

The attached Table B.2 gives a detailed breakdown of the new or augmented activities in amendments 25, 26 and 27.

Summary of Account Activity

The most recent cost analysis for GEST, giving actual costs accrued during the reporting period was dated 3/31/02. Table B.3 gives a detailed breakdown, by task number of the costs incurred, he approved budget and remaining balance, during the reporting period.

TABLE B-3. DETAILED COST BREAKDOWN FOR THE LAST THREE MONTHS OF THE REPORTING PERIOD

GEST Monthly Cost Analysis - January 1, 2002 - March 31, 2002

GEST Task # and Sponsor	A Salary	C Fringe	T Travel	Subcontracts	U Supplies	A Publications	Contractual	L Equipment	ODC	Total Direct Costs	Indirect	Total Costs 1/1/02-3/31/02	Total Costs thru 12/31/01	Total Year to Date	Approved Budget 1/1/02 - 3/31/02	Projected Costs	Balance Remaining 3/31/2002
#931-00-001 Macie	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
#971-00-002 Rienecker/Adamec	116,216	30,481	6,008	0	52	0	0	0	830	153,587	30,717	184,304	1,166,341	1,350,646	1,630,383	0	279,738
#931-00-003 Palm	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
#930-00-004 Mitchell	0	0	0	0	0	0	0	0	0	0	0	0	56,494	56,494	56,494	0	0
#902-00-005 Olsen	28,021	7,444	3,330	0	0	0	0	0	0	38,795	7,759	46,554	307,655	354,209	302,000	0	(52,209)
#902-00-006 Olsen	27,952	6,784	212	0	0	0	0	0	0	34,948	6,990	41,938	285,037	326,975	474,148	0	147,174
#910-01-008 Hou/Rood	28,861	7,930	3,104	0	0	0	0	0	23	39,918	7,984	47,902	183,245	231,147	301,108	0	69,961
#910-01-009 Atlas/Hou	19,024	5,914	0	0	0	0	0	0	0	24,938	4,988	29,926	201,933	231,859	218,218	0	(13,641)
#910-01-010 Atlas	24,121	6,340	2,295	0	0	0	0	0	0	32,756	6,551	39,307	232,923	272,230	226,221	0	(46,009)
#912-01-011 Spinhirne	27,934	6,392	1,513	0	0	0	0	0	0	35,839	7,168	43,007	267,926	310,933	220,023	0	(90,910)
#912-01-012 Spinhirne	13,021	3,615	0	0	0	0	0	0	0	16,636	3,327	19,963	103,100	123,063	122,387	0	(676)
#910-01-014 Schoeberl	22,716	5,075	642	0	0	0	0	0	0	28,433	5,687	34,120	142,320	176,440	172,484	0	(3,956)
#916-01-016 Kawa	16,026	2,647	0	0	0	0	1,145	0	0	19,818	3,964	23,782	15,491	39,273	9,377	0	(29,896)
#916-01-017 Bhartia	0	0	0	0	0	0	0	0	0	0	0	0	21,228	21,228	15,516	0	(5,712)
#921-01-018 Frey	25,241	3,213	3,506	0	592	0	0	0	0	32,552	9,078	41,630	253,088	294,719	239,196	0	(55,523)
#923-01-019 Deering - CAELUM	317	0	0	0	0	0	0	0	0	317	185	502	23,566	24,068	25,000	0	932
#930-01-020 Fischer - CAELUM	96	0	0	0	0	0	0	0	0	96	19	115	1,534	1,649	15,000	0	13,351
#930-01-021 Fischer	0	0	0	0	0	0	0	0	0	0	0	0	17,277	17,277	57,277	0	40,000
#935-01-022 Dorband	17,315	5,198	0	0	0	0	0	0	0	22,513	4,503	27,016	185,104	212,120	278,482	0	66,362
#930-01-023 Fischer	22,989	6,713	0	0	0	0	0	0	0	29,702	5,940	35,642	255,822	291,465	270,000	0	(21,465)
#930-01-024 Fischer	0	0	0	0	0	0	0	0	0	0	0	0	3,718	3,718	5,700	0	1,982
#912-02-027 Heymsfield	13,648	2,250	-120	0	0	0	0	0	0	15,778	3,156	18,934	121,580	140,514	99,846	0	(40,668)
#912-02-029 Tao	14,210	5,012	360	0	0	0	0	0	18	19,600	3,920	23,520	138,316	161,836	145,400	0	(16,436)
#912-02-034 Tao/Negri	0	0	0	0	0	0	0	0	0	0	0	0	49,019	49,019	49,020	0	1
#913-02-035 Chao	11,669	4,199	357	0	0	0	0	0	16	16,241	3,248	19,489	104,114	123,603	145,988	0	22,385
#912-02-036 Starr	12,435	3,257	0	0	0	0	0	0	0	15,692	3,138	18,830	112,493	131,323	154,875	0	23,552
#913-02-037 Lau - CAELUM	39	0	349	0	0	0	0	0	0	388	93	481	5,620	6,101	10,000	0	3,899
#913-02-038 Kaufman - CAELUM	174	0	5,216	0	0	0	0	0	44	5,434	1,011	6,445	38,185	44,630	39,241	0	(5,389)
#971-02-040 Hakkinen	13,845	4,011	0	0	0	0	0	0	0	17,856	3,571	21,427	138,620	160,047	133,420	0	(26,627)
#900-03-041 King	13,863	3,669	1,207	0	900	0	0	0	0	19,639	3,928	23,567	136,016	159,583	125,000	0	(34,583)
#910-03-042 Cohn - CAELUM	3,347	0	2,385	0	0	0	0	0	0	5,732	987	6,719	25,937	32,656	40,000	0	7,344
#910-03-043 Richards - CAELUM	1,059	77	1,500	0	0	0	0	0	38	2,674	480	3,154	71,984	75,138	70,509	0	(4,629)
#910-03-047 Richards	24,117	6,621	0	0	0	0	3,812	0	0	34,550	6,910	41,460	126,766	168,226	340,597	0	172,371
#912-03-064 Negri - CAELUM	296	23	540	0	0	0	0	0	0	859	204	1,063	12,503	13,566	6,139	0	(7,427)
#913-03-065 Lau	0	0	0	0	0	0	0	0	0	0	0	0	36,227	36,227	36,227	0	0
#913-03-066 Lau	0	0	0	0	0	0	0	0	0	0	0	0	41,698	41,698	41,898	0	200
#923-03-067 Holben	54,691	17,351	3,076	0	0	0	0	0	0	75,118	15,024	90,142	318,943	409,085	537,000	0	127,915
#930-03-068 Halem	17,600	3,604	388	0	0	0	0	0	0	21,592	4,318	25,910	230,019	255,929	342,820	0	86,891
#935-03-069 Coronado/Shamann	2,899	0	0	0	0	0	0	0	0	2,899	1,687	4,586	158,634	163,220	142,111	0	(21,109)
#974-03-070 Houser	114,611	28,117	10,995	0	157	0	1,316	0	0	155,196	32,188	187,384	895,676	1,083,060	1,064,731	0	(18,329)
#693-04-073 Reuter	0	0	0	0	0	0	0	0	0	0	0	0	19,853	19,853	20,802	0	949
#910-04-074 Rood	31,080	8,995	0	0	0	0	0	0	279	40,354	8,071	48,425	217,502	265,927	342,000	0	76,073
#916-04-076 Herman/Krueger	15,244	4,804	40	0	0	0	0	0	0	20,088	4,018	24,106	175,401	199,507	166,212	0	(33,295)
#930-04-077 Halem	0	0	0	0	0	0	0	0	0	0	0	0	28,351	28,351	28,351	0	(1)
#586-05-081 Behnke	3,842	0	0	0	0	0	0	0	0	3,842	768	4,610	76,050	80,660	100,000	0	19,340
#910-05-082 Rood	11,477	2,781	0	0	0	0	0	0	0	14,258	2,852	17,110	86,954	104,064	137,000	0	32,936
#130-05-083 Gabrys	0	0	0	0	0	0	0	0	0	0	0	0	0	0	(14,656)	0	(14,656)
#550-05-084 Lyon	0	0	0	0	0	0	0	0	0	0	0	0	54,281	54,281	113,300	0	59,019
#130-05-085 Gabrys	21,086	6,463	181	0	0	0	0	0	0	27,730	5,546	33,276	224,353	257,629	239,045	0	(18,585)
#974-05-086 Chang	15,625	4,179	1,685	0	0	0	0	0	0	21,489	4,298	25,787	143,347	169,134	184,582	0	15,448

TABLE B-3. DETAILED COST BREAKDOWN FOR THE LAST THREE MONTHS OF THE REPORTING PERIOD

GEST Monthly Cost Analysis - January 1, 2002 - March 31, 2002

GEST Task # and Sponsor	A Salary	C Fringe	T Travel	Subcontracts	U Supplies	A Publications	Contractual	L Equipment	ODC	Total Direct Costs	Indirect	Total Costs 1/1/02-3/31/02	Total Costs thru 12/31/01	Total Year to Date	Approved Budget 1/1/02 - 3/31/02	Projected Costs	Balance Remaining 3/31/2002
#550-06-087 Lyon	16,116	5,417	15	0	57	0	0	0	0	21,605	4,321	25,926	177,796	203,722	228,953	0	25,231
#912-06-088 Spinhirne	13,008	3,230	0	0	0	0	0	0	0	16,238	3,248	19,486	126,228	145,714	150,418	0	4,704
#910-06-091 Schoeberl	0	0	0	0	0	0	0	0	0	0	0	0	22,408	22,408	22,408	0	0
#923-06-092 Tucker	14,345	3,476	5,116	0	0	0	0	0	0	22,937	4,587	27,524	133,815	161,340	157,429	0	(3,910)
#935-06-094 Le Moigne	0	0	0	0	0	0	0	0	0	0	0	0	7,092	7,092	10,000	0	2,908
#926-07-096 Chao - CAELUM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	33,337	0	33,337
#681-08-097 Bowers	0	0	0	0	0	0	0	0	0	0	0	0	0	0	(35,000)	0	(35,000)
#910-08-098 Hou	12,459	5,261	1,361	0	0	0	0	0	0	19,081	3,816	22,897	13,161	36,058	80,000	0	43,942
#910-08-099 Atlas	29,239	9,218	0	0	0	0	0	0	0	38,457	7,691	46,148	224,735	270,884	260,452	0	(10,432)
#910-08-100 da Silva	0	0	0	0	0	0	0	0	0	0	0	0	65,817	65,817	76,104	0	10,287
#916-08-101 Herman	11,910	2,866	1,398	0	0	0	0	0	0	16,174	3,235	19,409	92,873	112,282	195,780	0	83,498
#930-08-102 Gubrys	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10,267	0	10,267
#902-09-103 Olsen	2,620	641	0	0	59	0	0	0	477	3,797	780	4,577	239,637	244,214	214,600	0	(29,614)
#970-09-104 Ormsby - CAELUM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4,392	0	4,392
#970-09-105 Ormsby - CAELUM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,000	0	1,000
#971-09-106 Bindschadler	0	0	0	0	0	0	0	0	0	0	0	0	31,659	31,659	35,800	0	4,141
#971-10-107 Liu	0	0	0	0	0	0	0	0	0	0	0	0	1,107	1,107	10,000	0	8,893
#912-10-108 Spinhirne	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
#912-10-109 Tao	14,108	5,066	0	0	0	0	0	0	0	19,174	3,835	23,009	91,061	114,070	77,505	0	(36,565)
#931-10-110 Zlesak/Fischer	1,078	0	2,174	0	0	0	81	0	0	3,333	1,085	4,418	79,026	83,444	86,521	0	3,077
#931-10-111 Lawrence	39	0	0	0	0	0	0	0	0	39	23	62	20,333	20,395	80,000	0	59,605
#903-11-112 Reising	563	0	191	0	50	0	81	0	0	885	390	1,275	113,067	114,342	124,657	0	10,315
#935-11-113 LeMoigne	0	0	0	0	0	0	0	0	0	0	0	0	34,456	34,456	45,000	0	10,544
#930-11-114 Mack/Halem	2,000	0	0	0	50	0	81	0	0	2,131	1,184	3,315	175,073	178,388	149,060	0	(29,328)
#930-12-115 Spicer	19,129	4,411	388	0	0	0	0	0	0	23,928	4,786	28,714	123,177	151,891	262,723	0	110,832
#912-10-116 Tao	16,640	4,983	0	0	0	0	0	0	0	21,623	4,325	25,948	98,900	124,848	130,298	0	5,450
#913-12-117 Lau	13,869	4,166	1,423	0	53	0	0	0	0	19,511	3,902	23,413	92,870	116,283	148,968	0	32,685
#913-12-118 Wiscombe	0	0	-1,421	0	0	0	0	0	38	-1,383	-277	-1,660	103,168	101,508	85,000	0	85,277
#972-13-119 Vandemark	0	0	0	0	0	0	0	0	0	0	0	0	0	0	13,200	0	13,200
#913-13-120 Tsay	17,122	4,962	1,049	0	0	0	0	0	0	23,133	4,627	27,760	110,115	137,875	147,750	0	9,875
#916-13-121 Gleason	15,304	3,757	0	0	0	0	0	0	0	19,061	3,812	22,873	97,563	120,436	158,200	0	37,764
#423-14-122 Behnke	0	0	0	0	0	0	0	0	0	0	0	0	68,674	68,674	50,000	0	(18,674)
#910-14-123 Schubert	16,739	4,928	0	0	0	0	0	0	0	21,667	4,333	26,000	60,386	86,386	55,430	0	(30,956)
#910-14-124 Hou	15,304	3,647	0	0	0	0	0	0	0	18,951	3,790	22,741	74,603	97,344	121,000	0	23,656
#910-14-125 Lin	16,375	3,171	0	0	0	0	0	0	0	19,546	3,909	23,455	0	23,455	82,355	0	58,900
#975-14-126 Kim	0	0	(191)	0	0	0	0	0	0	(191)	(38)	(229)	16,153	15,924	9,155	0	(6,769)
#935-16-127 LeMoigne	0	0	1,955	0	0	0	0	0	0	1,955	316	2,271	13,302	15,573	33,608	0	18,035
#930-16-128 Degnan	15,453	0	3,298	0	0	0	0	0	0	18,751	3,757	22,508	58,819	81,327	40,000	0	(41,327)
#912-18-129 Braun	0	0	0	0	0	0	504	0	0	504	101	605	0	605	74,469	0	73,864
#913-18-130 Bell	15,304	2,624	0	0	0	0	0	0	0	17,928	3,586	21,514	44,255	65,769	91,848	0	26,079
#912-19-131 Heymsfield	14,348	4,658	0	0	0	0	279	0	0	19,285	3,857	23,142	46,402	69,544	136,716	0	67,172
#926-19-132 Chao, Ben	10,760	1,992	0	0	0	0	0	0	0	12,752	2,550	15,302	30,316	45,618	83,500	0	37,882
#915-19-133 Niemann	0	0	0	0	0	0	2,212	0	0	2,212	442	2,654	0	2,654	100,000	0	97,346
#915-19-134 LeMoigne	10,904	4,070	422	0	0	0	1,013	0	0	16,409	3,282	19,691	37,836	57,527	84,190	0	26,663
#910-19-135 Pawson	0	0	189	0	0	0	1,013	0	0	1,202	240	1,442	0	1,442	43,606	0	42,164
#900-19-136 King	11,507	1,087	0	0	0	0	2,055	0	10	14,659	2,932	17,591	11,592	29,183	43,000	0	13,817
#971-20-137 Koblinsky	0	0	0	0	0	0	0	0	0	0	0	0	0	0	77,500	0	77,500
#910-20-138 DaSilva	12,968	4,389	196	0	0	0	277	0	0	17,830	3,566	21,396	0	21,396	94,414	0	73,018
#912-21-140 Adler	0	0	0	0	0	0	339	0	22	361	68	429	0	429	115,755	0	115,326
#900-21-141 Meeson	343	22	782	0	0	0	0	0	0	1,147	303	1,450	2,634	4,084	24,765	0	20,681
#924-21-142 Whiteman	7,733	1,627	1,858	0	0	0	0	0	0	11,218	2,244	13,462	616	14,078	39,356	0	25,278

TABLE B-3. DETAILED COST BREAKDOWN FOR THE LAST THREE MONTHS OF THE REPORTING PERIOD

GEST Monthly Cost Analysis - January 1, 2002 - March 31, 2002																	
	A	C	T		U	A		L		Total		Total	Total		Approved	Projected	Balance
GEST Task # and Sponsor	Salary	Fringe	Travel	Subcontracts	Supplies	Publications	Contractual	Equipment	ODC	Direct Costs	Indirect	Costs	Costs	Total	Budget	Costs	Remaining
												1/1/02-3/31/02	thru 12/31/01	Year to Date	1/1/02 - 3/31/02		3/31/2002
#972-21-143 Gerlach	14,130	0	0	0	0	0	0	0	0	14,130	2,826	16,956	0	16,956	112,000	0	95,044
#916-21-144 Chandra	3,713	555	196	0	0	0	0	0	0	4,464	893	5,357	0	5,357	60,775	0	55,418
#912-21-145 Adler	0	0	2,497	0	0	0	0	0	2,497	4,994	999	5,993	0	5,993	56,697	0	50,704
#913-21-146 Calahan	0	0	0	0	0	0	0	0	0	0	0	0	0	0	50,000	0	50,000
#912-23-147 Smith, E.	7,302	0	5,000	0	0	0	0	0	0	12,302	5,644	17,946	0	17,946	497,618	0	479,672
#920-25-148 Carter, D.	6,440	0	0	0	0	0	0	0	0	6,440	837	7,277	76	7,353	5,000	0	(2,353)
#971-26-149 Hakkinen	0	0	0	0	0	0	0	0	0	0	0	0	0	0	58,679	0	58,679
#920-25-150 Houser	0	0	0	0	0	0	0	0	28	28	6	34	0	34	4,000	0	3,966
#900-29-151 King	0	0	0	0	0	0	0	0	0	0	0	0	0	0	70,000	0	70,000
#912-29-152 Tao	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20,000	0	20,000
#930-30-153 Mack/Halem	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15,000	0	15,000
Totals	1,165,579	293,383	76,665	0	1,970	0	14,208	0	4,320	1,556,125	320,087	1,876,212	10,253,049	12,129,260	14,795,729	0	2,768,254