Raytheon

Laboratory for Astronomy and Solar Physics Contract

Support Services for the Laboratory for Astronomy and Solar Physics

FINAL METRIC
AND
PROGRESS REPORTS
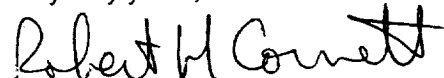
Contract No. NAS5-32993

September 30, 2001

Dawn Fountain,
Contracting Specialist--Code 216
Building 26, Room 235
National Aeronautics and Space Administration
Goddard Space Flight Center
Greenbelt, MD 20771

Dear Ms. Fountain:

We are pleased to submit the Final Progress Reports and Metric Reports
for all tasks under contract NAS5-32993 for LASP Support Services.

If you have any questions, please call me at 301-286-3623.

Very truly yours,

Dr. Robert H. Cornett
Project Manager, Raytheon ITSS Corp.

Edward C. Sullivan, COTR, LASP Assistant Division Chief, Code 680.0 (Bldg. 21, Rm. 114B)
Dr. Richard R. Fisher, LASP Division Chief, Code 680.0 (Bldg. 21, Rm. 114A)
Dr. Charles Bowers, Technical Officer, Code 681.0, (Bldg. 21, Rm. 004)
Dr. Edward Cheng, Technical Officer, Code 685.0 (Bldg. 21, Rm. 169B)
Dr. Steven A. Curtis, Technical Officer, Code 695.0 (Bldg. 2, Rm. 136)
Dr. Joseph Davila, Technical Officer, Code 682.0 (Bldg. 21, Rm. 268)
Dr. Brian Dennis, Technical Officer, Code 682.0 (Bldg. 21, Rm. 152)
Dr. Eliahu Dwek, Technical Officer, Code 685.0 (Bldg. 21, Rm. 177A)
Dr. Jonathan P. Gardner, Technical Officer, Code 681.0 (Bldg. 21, Rm. 262)
Dr. Cornelis Gehrels, Technical Officer, Code 661.0, (Bldg. 2, Rm. 250B)
Dr. Theodore R. Gull, Technical Officer, Code 681.0 (Bldg. 21, Rm. 052)
Dr. Sara R. Heap, Technical Officer, Code 681.0 (Bldg. 21, Rm. 020)
Dr. Gary Hinshaw, Technical Officer, Code 685.0 (Bldg. 21, Rm. 138)
Dr. Randy Kimble, Technical Officer, Code 681.0 (Bldg. 21, Rm. 016)
Dr. Alan Kogut, Technical Officer, Code 685.0 (Bldg. 21, Rm. 246)
Dr. David Leisawitz, Technical Officer, Code 631.0 (Bldg. 26, Rm. 140)
Dr. John C. Mather, Technical Officer, Code 685.0 (Bldg. 21, Rm. 108)
Dr. Harvey Moseley, Technical Officer, Code 685.0 (Bldg. 21, Rm. 130)
Dr. Susan G. Neff, Technical Officer, Code 681.0 (Bldg. 21, Rm. 044)
Joseph Novello, Technical Officer, Code 686.0 (Bldg. 21, Rm. 070)
Dr. Joseph Nuth, Technical Officer, Code 691.0 (Bldg. 2, Rm. 131)
Dr. Ronald Oliversen, Technical Officer, Code 681.0 (Bldg. 21, Rm. 036)
Dr. Robert F. Pfaff, Technical Officer, Code 696.0 (Bldg. 2, Rm. 213)
Dr. Robert Silverberg, Technical Officer, Code 685.0 (Bldg. 21, Rm. 158)
Dr. Eric P. Smith, Technical Officer, Code 681.0 (Bldg. 21, Rm. 028)
Dr. George Sonneborn, Technical Officer, Code 681.0, (Bldg. 21, Rm. 034)
Dr. Theodore P. Stecher, Technical Officer, Code 681.0 (Bldg. 21, Rm. 136)
Christine Baxley, Resource Analyst, Code 603.2, (Bldg. 21, Rm. 018)
Cecelia Johnson, Resource Analyst, Code 603.0 (Bldg. 21, Rm. 018)
NASA Scientific and Technical Information Facility, Attn: Accessioning Department,
800 Elkridge Landing Road, Linthicum Heights, MD 21090
Charmaine Jordan, Raytheon ITSS Corp., Financial Analyst, Lanham
Rosa Fox, Raytheon ITSS Corp., Contracting Office, Lanham

GSFC ATR: Dr. Ronald J. Oliversen
CSC Subcontract Task
CSC Task Leader: Dorothy Appleman

QUARTERLY REPORT JUNE 19 – SEPTEMBER 20, 2001

TASK OBJECTIVES

The objectives of this task are to support activities relative to logistical arrangements for NRA proposals. Support will be provided for the base system, and IUE, ADP, EUVE, ATP, ISO, and LTSA grant data for the EUVE proposal administration.

WORK ELEMENTS

100 Coordination, management and s/w development

Task personnel coordinated activities with the Chief, Science Programs Resources Management Division personnel at NASA Headquarters and with the Program Scientist for the ATP, LTSA, ADP, and FUSE programs.

Task personnel continue to work to refine forms and reports to increase efficiency.

200 Grants database and system support

Database support was provided as requested by the ATR and the ADP/ATP/LTSA/FUSE Project Scientists. Statistics about those projects were provided as needed.

Processing of ATP, ADP, and LTSA grant renewal packages is nearly complete.

300 Grant processing

All spreadsheets of newly awarded grants for peer reviewed programs as well as for Education and Public Outreach awards have been received and incorporated into database tables for ADP, ATP, and LTSA programs.

For the ADP programs, 67 programs are to be funded with FY 2001 funds. Of these 36 are new and 31 are renewals. All new program paperwork has been submitted. Of the renewals, 1 needs a renewal letter and the remainder are complete.

For the ATP programs, 107 programs are to be funded with FY 2001 funds. Of these 37 are new and 70 are renewals. All new program paperwork has been submitted. All renewals are complete or in progress.

For the LTSA programs, 153 programs are to be funded with FY 2001 funds. Of these 26 are new and 127 are renewals. All new program paperwork has been submitted. Of the renewals, 8 are awaiting renewal letters and the remainder are complete or in progress.

For the FUSE programs, approximately 87 programs are to be funded with FY 2001 funds. Of these 66 are complete. Of the remaining, 1 program will await funding for when the FY2002 funds are available.. The FUSE program contains some TOO programs which may or may not be funded.

400 PI, official, and other requests for administrative information

Requests were processed as required.

Non-Local Travel

None

METRIC EVENTS

301   Mean time to process new batch grants to average 0.5 hours per grant
Mean time to process old grants to average 0.25 hours per grant

Total NEW for ADP, LTSA FUSE, and ATP: 140
Total RENEWAL packages for ADP, LTSA, and ATP: 228.

Comments: Details shown under Work Element 300, above.

401   Research and investigation to resolve requests up to 6 hours per day

Approximately 1350 calls and emails were received and responded to this quarter.

GSFC ATR: Dr. John C. Mather
Raytheon ITSS Task Leader: Dr. Sten Odenwald

QUARTERLY REPORT: JUNE 20 – SEPTEMBER 19, 2001

TASK OBJECTIVES

The Contractor shall provide software, analysis, and research support for the Long Term Space Astrophysics grant to study the correlation function of the fluctuations in the infrared background radiation.

WORK ELEMENTS

100 Analysis of 2MASS data

Staff completed the coadds for 2MASS data. The analysis of the noise in the 2MASS data is nearly complete, and we are now in final stages of searches for systematic effects. This will finally permit us to decide whether it is the CIB that is being seen.

200 Publication support

If the signal is indeed cosmological, two papers will be written: an *ApJ Letters* paper (Kashlinsky, Odenwald, Mather et al) and a longer detailed analysis (Odenwald, Kashlinsky, Mather et al.).

Non-Local Travel

None

METRIC EVENTS

101   Draft publication of a paper on the results of current 2MASS field studies
Completion date: June 30, 2001

Percent Complete: 90%

Comments: A tentative detection of a signal in the data has been identified which could be related to the CIRB, but an analysis needs to be completed of the detector noise to establish that the signal seen is not contributed by the instrument. The detector noise is definitely below the signal and systematics checking is under way. If the signal is cosmological, two papers will be written.

NASA Task: 97H0026   UV Advanced Mission Concept

GSFC ATR: Dr. Susan G. Neff
Raytheon ITSS Task Leader: Dr. Robert H. Cornett

QUARTERLY REPORT: JUNE 20 – SEPTEMBER 19, 2001

TASK OBJECTIVES

This task comprises study support for the Iris Advanced Mission Concept and for the eventual preparation of a proposal for an advanced Ultraviolet Imaging mission.

WORK ELEMENTS

To meet funding profiles, no work was done on this task during this quarter.

100 Operations and Instrument concept development

200 Prototype instrument or simulator construction, testing, and operation

300 Scientific, engineering, and environmental studies

400 Science optimization studies

500 Instrument performance characterization

600 Manuscript preparation support

700 Team travel support

Non-Local Travel

None

METRIC EVENTS

101   Participation in development of instrument simulators an design reference missions
Completion date: TBD

Percent complete:

Comments:

201   Initiate design and development of study reports in accord with project schedules, e.g. workshops
for community
Completion date: TBD

Percent complete:

Comments:

NASA Task: 9710016   Infrared Calibration Design Support

GSFC ATR: Dr. Harvey Moseley
Raytheon ITSS Task Leader: Dr. Richard G. Arendt

QUARTERLY REPORT: JUNE 20 - SEPTEMBER 19, 2001

TASK OBJECTIVES

This task supports instrument and mission design with the purpose of optimizing the calibration of infrared astronomical space instrumentation such as SIRTF/IRAC. It includes, but is not limited to, the following activities:

WORK ELEMENTS

100 Hardware design support

200 Pre-flight calibration

300 Pre-flight review support

400 Software development

Staff made further effort in developing software and assisting E. Dwek in making predictions of IR number counts of galaxies, and assessing the scientific results that can be extracted from confusion-limited observations.

A simple procedure was developed for adding approximate astrometry information to the FITS headers of sky maps produced by the least-squares calibration. The procedure simply transfers the information from one of the input frames to the whole coadded map. Development of a more rigorous procedure is still desirable.

A paper is in development on optimum energy estimation from non-linear detectors. Staff developed a program and a formalism that handles the case of signal-dependent noise. The performance of the program is better than that of any linear Wiener filter, and may enable the use of detectors with a lower heat capacity, thus lowering the noise. This paper is nearly complete.

500 Mission operations design support

Staff participated in MO&DA and IOC telecons.

A detailed review of a document outlining the calibration procedures that will address the wavelength variations across the IRAC field of view was given by the author of the document at the SSC, and a revised version was distributed.

600 Data analysis

Analysis of the HDF NICMOS data for the F160W filter has begun. The goals of this analysis are to determine how quickly the procedure could be run on a "known" data set, and to accumulate enough useful information concerning the multiwavelength source counts and colors to be able to write a scientifically interesting paper. The "methods" paper that had been submitted to the *ApJ* was deemed inappropriate for the *ApJ* by that referee, and then flatly rejected by the *PASP* referee. Thus, a more science-oriented paper is being investigated. The existing paper will be shortened and submitted as part of the ADASS XI conference proceedings.

Simulated IRAC data prepared by IRAC team members at the CfA were processed to investigate the differences between median flat-fielding and least-squares derivation of the detector gains. The test was somewhat simplified

(no cosmic rays or other bad data, least-squares solution for gain only). The least squares approach did yield distinctly better results, and correctly identified the zodiacal light gradient in the data as part of the sky rather than putting it into the gain as in the median flat-fielding process.

700 Organizational and documentation support

The *PASP* version of the (rejected) HDF paper was provided to the IRAC team and posted on the CfA web site, where team members may find it useful.

A report on the analysis of the simulated IRAC data (see work element 600) was submitted to the IRAC team and posted on the CfA web site.

A copy of the least-square self-calibration code was delivered to L. Hartmann at CfA. The F110W mosaic and a preliminary F160W mosaic of the HDF-N was given to H. Teplitz for use in a NICMOS proposal for follow-up observations of Chandra sources in the HDF flanking fields.

Non-Local Travel

None.

METRIC EVENTS

401   Support SIRTF teams in use of least squares algorithms
Completion date: TBD per SIRTF team schedule

Percent complete:

Comments: Continuing effort.

402   Deliver codes for scientific analysis of confusion-limited data
Completion date: May 31, 2001

Percent complete: 100%

Comments:

501   Participate in planning for initial IRAC observations, and develop tools required for production of IRAC images
Completion date: TBD per IRAC team schedule

Percent complete:

Comments: Continuing effort.

601   Complete analysis of NICMOS HDF and prepare for publication. This includes development of new error analysis algorithms and software.
Completion date: April 30, 2001

Percent complete: 100%

Comments:

602   Review and report on analysis of spatially confused data. Prepare or collect tools for the analysis
       of such data.
       Completion date: April 30, 2002

       Percent complete: 80%

       Comments: New completion date.

GSFC ATR: Edward C. Sullivan
Raytheon ITSS Task Leader: Dale Humberson

QUARTERLY REPORT: JUNE 20 – SEPTEMBER 19, 2001

TASK OBJECTIVES

This task supports Laboratory logistics through development and maintenance of inventory databases, personal computer (PC) and network maintenance and upgrades, and general maintenance scheduling and tracking.

WORK ELEMENTS

100 Inventory data base development and maintenance

See attached Database Summary Report, supplied as Metric Event 101, below.

200 Personal computer and network maintenance

During this reporting period:

    731 PC hard drive backups were performed.
    744 Macintosh hard drive backups were performed.

Details are reported in the Quarterly Report for task 97L0026.

300 Logistics and scheduling support

During this reporting period:

    10 items of furniture were excessed.
    126 items of controlled equipment were surveyed.

Non-Local Travel

None

METRIC EVENTS

101   DATABASE SUMMARY REPORT (supplied quarterly):

New items for June, July, August, September, 2001

ECN	ITEM NAME	MANUF.	MODEL	USER-NAME
2109211	DISPLAY UNIT	DELL	E771P	HORN, MICHAEL
2110422	COMPUTER, MICRO	DELL	PP01X	STECHER, THEODORE
2110846	PROJECTOR, MULTIMEDIA	PANASONIC	PTL711U	SULLIVAN, EDWARD
2111845	COMPUTER, MICRO	DELL	PRECISION330	SULLIVAN, EDWARD
1105116	DISPLAY UNIT	SONY	CPD1302	WOLFGANG, JOHN
1186252	COMPUTER, MICRO	WIN	80386DX33	WOLFGANG, JOHN
2110116	PRINTER, LASER	HP	C8050A	FEGGANS, JOHN
2110457	DISPLAY UNIT	SUN	GDM5410	BECK, TERRENCE
2110866	ANALZER, GAS	THERMO ONIX	VGQ200D	HILTON, GEORGE
2111408	COMPUTER, MICRO	ASL	C250S	FEGGANS, JOHN
1664391	COMPUTING DEVICE	PALM	PALM100	NIEDNER, MALCOLM
2111843	COMPUTER, MICRO	DELL	4100	FAHEY, RICHARD
2111844	DISPLAY UNIT	OPTIQUEST	VCDTS21463M	FAHEY, RICHARD
2111862	DISPLAY UNIT	VIEWSONIC	P815	SWEIGART, ALLEN
2111863	DISPLAY UNIT	VIEWSONIC	P8153M	SWEIGART, ALLEN
2111865	COMPUTER, MICRO	DELL	PP01X	HEAP, SARA
2111867	DISPLAY UNIT	SONY	GDMF520	SWEIGART, ALLEN
2111867	COMPUTER, MICRO	DELL	PPI	NEFF, SUSAN
2111939	DISPLAY UNIT	SONY	CPD-G500	GARDNER, JONATHAN
2110097	DISK DRIVE UNIT	LA CIE	SDX500C	GURMAN, JOSEPH
2109741	DISPLAY UNIT	COMPAQ	630-P110	GURMAN, JOSEPH
2109737	DISK DRIVE UNIT	SONY	DVP-FX1	GURMAN, JOSEPH
2109738	COMPUTER, MICRO	APPLE	M5183	GURMAN, JOSEPH
2109739	TRANSPORT, MAG TIPE	ECRIX	VXA-1F	YOUNG, ALEX
2109739	COMPUTER, MICRO	APPLE	M7886	YOUNG, ALEX
2110370	PROJECTOR	NEC	LT155	ORWIG, LARRY
2111405	PRINTER, LASER	TEKTRONIX	Z850	GURMAN, JOSEPH
1664277	COMPUTER, MICRO	COMPAQ	DA71BAA-FA	GURMAN, JOSEPH
1664363	DISK DRIVE UNIT	IOMEGA	Z100S2	DESAI, UPENDRA
1664364	DISK DRIVE UNIT	IOMEGA	Z25DUSB3LT	HOLMAN, GORDON
1664496	COMPUTER DEVICE	PALM	V	ORWIG, LARRY
1664497	COMPUTER DEVICE	PALM	V	ORWIG, LARRY
1664498	DETECTOR OPTICAL	GAMMA	24600	ORWIG, LARRY
2110844	PRINTER, SCANNER	HP	G85	HOLMAN, GORDON
2110845	PRINTER, LASER	HP	C4111A	DANCHI, WILLIAM
2110848	PRINTER, LASER	HP	C3917A	DENNIS, BRIAN
2110849	DISPLAY UNIT	DELL	E7705	CRANNELL, CAROL
2111541	DISPLAY UNIT	DELL	E7705	CRANNELL, CAROL
2111542	OPTICAL READER	HP	C7730A	BROWN, SARAH
2111846	COMPUTER, MICRO	DELL	4100	BROWN, SARAH
2111847	DISK DRIVE UNIT	HP	C4456A	ORWIG, LARRY
2111848	OPTICAL READER	VISIONEER	FB61AD	ORWIG, LARRY
2111849	DISPLAY UNIT	DELL	M781P	ORWIG, LARRY
2111850	COMPUTER, MICRO	DELL	220	ORWIG, LARRY
2111851	METER, OPTICAL POWER	GAMMA	DR-1600	ORWIG, LARRY
2111852	PRINTER	HP	C3908A	ORWIG, LARRY
2111853	PRINTER	HP	C4568A	ORWIG, LARRY
2111854	COMPUTER, MICRO	COMPUTECT	NONE	DESAI, UPENDRA
2111855	COMPUTER, MICRO	DELL	4100	DESAI, UPENDRA
2111856	OPTICAL READER	CANON	F914600	DESAI, UPENDRA
2111857	DISPLAY UNIT	DELL	P991	DESAI, UPENDRA
2111858	COMPUTER, MICRO	COMPUTECT	NONE	DENNIS, BRIAN

2111859	COMPUTER, MICRO	COMPUTECT	NONE	DENNIS, BRIAN
2111860	CONTROLLER, MOTOR	ARRICK	MD-2A	DENNIS, BRIAN
2111861	CONTROLLER, MOTOR	ARRICK	MD-2A	DENNIS, BRIAN
2111864	DISPLAY UNIT	SAMSUNG	170T	HEAP, SARA
1664270	COMPUTER, MICRO	COMPAQ	DA71BAA-FA	GURMAN, JOSEPH
2111483	DISPLAY UNIT	COMPAQ	PE1041	GURMAN, JOSEPH
2112468	DISPLAY UNIT	DELL	M991	RABIN, DOUGLAS
2112469	COMPUTER, MICRO	DELL	MMS	RABIN, DOUGLAS
1664186	CAMERA	OLYMPUS	C3030ZOOM	KOGUT, ALAN
1643331	COMPUTER DIVICE	PALM	PALMIIIC	HILL, ROBERT
1645362	COMPUTER DIVICE	PALM	PALMIIIC	CHENG, EDWARD
2045276	DISPLAY UNIT	VIEWSONIC	VCDTS21410-1M	ESKIN, TAMAR
2108585	COMPUTER, MICRO	MICRON	SE440BX2-T	ESKIN, TAMAR
2109485	COMPUTER, MICRO	APPLE	POWERMAC G4	CHENG, EDWARD
1664362	DISK DRIVE UNIT	VST	FW1218	FREUND, MINORU
1664366	COMPUTER DIVICE	PALM	M505	GREENHOUSE, MATTHEW
2110430	METER	NEWPORT	2835C	CHENG, EDWARD
2111023	DISPLAY UNIT	SONY	G520	CANTER, GEORGE
2111024	DISPLAY UNIT	LA CIE LTD	NSH11S7STTUW	CANTER, GEORGE
2110846	DISPLAY UNIT	VIEWSONIC	PT813	FREUND, MINORU
2110960	LASER	MELLES	O6DLZ03A	MOSELEY, SAMUEL
2111506	COMPUTER, MICRO	GATEWAY	1700PC	CANTER, GEORGE
2111507	PRINTER, LASER	XEROX	XTC3	CANTER, GEORGE
2111508	DISPLAY UNIT	SAMSUNG	170T	CANTER, GEORGE
2111509	DISK DRIVE UNIT	QPS	QPS-525	CANTER, GEORGE
1664238	COMPUTER, MICRO	SILICON	SGI 1100	CANTER, GEORGE
1664239	COMPUTER, MICRO	SILICON	SGI 1100	CANTER, GEORGE
1664240	COMPUTER, MICRO	SILICON	SGI 1100	CANTER, GEORGE
1664241	COMPUTER, MICRO	SILICON	SGI 1100	CANTER, GEORGE
1664242	COMPUTER, MICRO	SILICON	SGI 1100	CANTER, GEORGE
1664243	COMPUTER, MICRO	SILICON	SGI 1100	CANTER, GEORGE
1664244	COMPUTER, MICRO	SILICON	SGI 1100	CANTER, GEORGE
1664245	COMPUTER, MICRO	SILICON	SGI 1100	CANTER, GEORGE
1664246	COMPUTER, MICRO	SILICON	SGI 1100	CANTER, GEORGE
1664247	COMPUTER, MICRO	SILICON	SGI 1100	CANTER, GEORGE
1664248	COMPUTER, MICRO	SILICON	SGI 1100	CANTER, GEORGE
1664249	COMPUTER, MICRO	SILICON	SGI 1100	CANTER, GEORGE
2111775	PROJECTOR	PROXIMA	X350	CANTER, GEORGE
2111931	COMPUTER, MICRO	POWER	604120LP	POWER, TIMOTHY
2111932	PRINTER	HP	C3540A	KOGUT, ALAN
2111933	PRINTER	HP	C3952A	GREENHOUSE, MATTHEW
2111934	SCANNER	UMAX	H890	MATHER, JOHN
2111935	DISPLAY UNIT	MITSUBISHI	SD7714C	KONDO, YOJI
2111937	PRINTER	PANASONIC	KX-P1180	BILODEAU, PAUL
2111938	PRINTER	HP	C4172A	BILODEAU, PAUL
2112108	COMPUTER, MICRO	SUN	201	FREUND, MINORU
2112109	DISPLAY UNIT	SUN	NONE	FREUND, MINORU
2112575	COMPUTER, MICRO	SONY	PCG-6122	DANCHI, WILLIAM
2112576	DISPLAY UNIT	GATEWAY	VX920	DANCHI, WILLIAM
2112577	DISPLAY UNIT	GATEWAY	SP41500	DANCHI, WILLIAM
0188860	WORK STATION	STANCRIDGE	NONE	RENT, JAMES
2110325	CHASSIS	CISCO	WS-C4006S2	HORN, MICHAEL
2110326	CHASSIS	CISCO	WS-C4006S2	HORN, MICHAEL
2110327	CHASSIS	CISCO	WS-C4006S2	HORN, MICHAEL
2110328	CHASSIS	CISCO	WS-C4006S2	HORN, MICHAEL
2110329	CHASSIS	CISCO	WS-C4006S2	HORN, MICHAEL
2110847	DISPLAY UNIT	PHILIPS	201P10	HAAS, JAMES
2111840	DISPLAY UNIT	NEC	AS710	RICHARDSON, G.
2111841	COMPUTER, MICRO	DELL	4100	RICHARDSON, G.
2111842	COMPUTER, MICRO	DELL	4100	HORN, MICHAEL
1664513	COMPUTING DEVICE	PALM	M500	HORN, MICHAEL
2112457	COMPUTER, MICRO	DELL	PPO1L	HORN, MICHAEL

ITEMS SURVEY

ECN	ITEM NAME	MODEL	SERIAL-NO	CODE
0731026	SPACELAB EXPER.	SEID	1103T	680
0745311	DISPLAY UNIT	5153-001	0459453	680
1100710	COMPUTER, MICRO	147	122F1232	680
1520933	ELECTRONIC COMP ASS.	NONE	NONE	680
1520934	CONTROLLER	NONE	NONE	680
1520936	POWER SUPPLY	NONE	NONE	680
1520937	POWER SUPPLY	NONE	NONE	680
1523000	COMPUTER, MICRO	PMD5000	8389343	680
1529225	PRINTER, LASER	4676	J055Q22	680
1750797	DISPLAY UNIT	M0401	5316047	680
1752655	DISPLAY UNIT	GDM20E01	7127044	680
1912189	CONTROLLER	NONE	NONE	680
A030539	DECORDER	FR600	280016	680.01
B072718	BLACK-BODY	436	104V	680.01
B082818	ANALYZER WAVE	1900A	679	680.01
B082819	RECORDER GRAPHIC	1521B	2016	680.01
B088655	SPECTROMETER	14K	NONE	680.01
0704215	TERMINAL DATA PROCES	VT100	ABQ9363	680.01
0704216	TERMINAL DATA PROCESS	VT100	ABJ4108	680.01
G035665	DISK DRIVE	RS54FA	WF94207806	681
0087762	COMPUTER PERSONAL	T1200	11716573	681
0092538	MONITOR	VR260	AB85202CIU	681
0092539	COMPUTER MINI	ES410-BA	AB85104068	681
1184477	DISK DRIVE UNIT	CF66S1	B036340	681
1344129	COMPUTER	411-X557-AST	410G3761	681
1344691	DISK DRIVE UNIT	RRD43DA	1L40800431	681
1412713	DISK DRIVE UNIT	AD340DT	283984241	681
1418829	COMPUTER/NOTBOOK	9545	23-LA330	681
G035422	SCANNER OPICAL	MSF300GS	S991701696	682
0085245	CONTROLLER VAX	8350	KA73802846	682
0085246	ADAPTER, UNIBUS	DWBUA-FA	WF71011760	682
0086505	COMPUTER	VS270-82	WF74506199	682
0086506	MONITOR	NONE	FF72013025	682
0097197	MONITOR, COLOR	DECVR290	FF35119	682
0214106	COMPUTER MINI	MICROVAX II 630Q3AA	WF54806317	682
0279359	DISPLAY UNIT	MAX12	81328	682
0307006	RECORDER VIDEO TAPE	YKP900	4267101630	682
0307007	MONITOR TV COLOR	KV-20XBR	204775	682
0506807	POWER SUPPLY	BAL13028	64496	682
0506800	VACUM SYSTEM	NRC703	13458479	682
0509657	DISK DRIVE UNIT	RA81CA	CX01007	682
0509675	TERMINAL DISPLAY	ADM-3A	56993	682
0516773	TDRANSMITTER/RES-BAS-ST	C63RCB1116	UA041L	682
0516774	ANTENNA PARABOLA	NONE	M661	682
0516775	TRAILER UTILITY	ET70-6123	111-260	682
0646329	VACUM SYSTEM	NONE	U2010	682
0744141	TERMINAL	1521	10186	682
1071556	GATEWAY, SERVER	P4100	69841	682
1191404	DISK DRIVE UNIT	JWB040322	210	682
1193088	DISK DRIVE UNIT	320VC	098519	682
1410899	CAMERA	M2613	TL40742T25Q	682
1411594	DISPLAY UNIT	GDM2038	7105201	682

1417550	COMPUTER, MICRO	486DX2	48249	682
1528407	DISK DRIVE	NONE	A388386	682
1531643	COMPUTER/MICRO	HMX	0595R210786	682
1531650	DISPLAY UNIT	GDM20E01	7118419	682
1625026	CHASSIS, ELEC.-ELECT.	XL401R-S022	VSA131500	682
1625035	CHASSIS, ELEC.-ELECT.	DISK9GB72NL1	VSA131511	682
1752862	DISPLAY UNIT	GDM20E01	7122389	682
0261727	CAMERA AUTOMATION	4TN 2200B3	511-11373	685
0567819	CAMERA	101-102	896312	685
0572586	OSCILLOSCOPE	212	B100526	685
0580744	RECEIVER STEREO	LR20	16953	685
0584928	CAMAC CRATE CONTROLLER	3908	12	685
0744911	PRINTER	LA50PC	TA06356	685
1093687	DISPLAY UNIT	4540	2032900351815	685
1185667	DISPLAY UNIT	VRT16DA	IS11503055	685
1186193	COMPUTER/MICRO	80386DX33	AT20603310	685
1194122	COMPUTER, MINI	VS49KCD	AB3040612Q	685
1335111	COMPUTER, MICRO	230	FC312E73C78	685
1336362	COMPUTER, MICRO	M4300	XB32726J677	685
1336363	COMPUTER, MICRO	M4300	XB327220677	685
1336516	DISPLAY UNIT	CPD-1730	5013779-I	685
1337414	COMPUTER, MICRO	M1206	XB30R5KLCA1	685
1338451	PRINTER, ADP, LASER	4SI, MX	USBB172609	685
1341315	DISK DRIVE UNIT	6312SHGS	3091	685
1343547	DISPLAY UNIT	VR290DA	FF39739	685
1343669	DISK DRIVE UNIT	H0020	P1340V1B856B	685
1415774	COMPUTER	PC4501541	45001995	685
1416182	PRINTER, ADP	C2621A	JP3C21JOK1	685
1416183	DISK DRIVE UNIT	TAHOE230	100202612	685
1419153	CAMERA	OMIS10	111Z756	685
1419154	CAMERA	OMIS10	1134573	685
1530950	TAPE DRIVE, BACKUP	NONE	NONE	685
1600015	CAMERA	RSC100	141	685
1750876	DISK DRIVE UNIT	Z100P2	RAB61980086	685
1753070	DISPLAY UNIT	241-115	29087	685
1948217	DISK DRIVE UNIT	NONE	18180516	685
1949354	COMPUTER, MICRO	GOBOOK 266	5118300063385	685
2035127	COMPUTER, MICRO	MMP	O424N	685
2038554	CONDITIONER POWER LINE	711	4179	685
G036936	DISK DRIVE	IDQ10T	00627	686
0092941	COMPUTER, MICRO	M-286	105170	686
0096595	MONITOR	JC1403HMA	97NO5982	686
0183063	SATELLITE CLOCK	1026C	045	686
0189292	COMPUTER, MICRO	831CB-AP	P170607988	686
0189987	COMPUTER PERSONAL	50-021	8102737	686
0189988	MONITOR	8503	118218	686
0211447	EQUIPMENT RACK	15-6130	NONE	686
0215298	COMPUTER, MICRO	5160-068	6431275	686
0502592	DISK DRIVE UNIT	RX02M	33907	686
0583972	TELEPRINTER	43KSR	001-A49	686
0828036	MONITOR	NONE	B1700964	686
0829173	MONITOR	SM12SFLAA7	296247	686
1097150	TAPE DRIVE	CTS82-51	301	686
1104008	INTERFACE UNIT	20010	440	686

1108002	WORKSTATION	147B	149F1003	686
1180577	COMPUTER, MICRO	NB3201	NB562091460B39	686
1180602	DISK DRIVE, OPTICAL	WDD600	81089	686
1183581	DISK DRIVE UNIT	411	206G0451	686
1190546	DISK DRIVE UNIT	IDS1OM	02614	686
1194063	DISPLAY UNIT	JC1402HMA	88K59608	686
1194134	ELECTROMETER	617	539998	686
1331087	COMPUTER, MINI	MVAX3600	WF82206271	686
1333957	DISPLAY UNIT	GDM1962B	9320DX0561	686
1337807	TAPE DRIVE BACKUP	911-GWV811-T	333U4254	686
1337808	DISK DRIVE UNIT	411-X559A-ST	332U6024	686
1340315	DISPLAY UNIT	CPS1760LR	AGO-33100472	686
1343834	SPARCSTSTION	144	410F0826	686
1344279	DISPLAY UNIT	GDM20D10	9407FC0225	686
1344836	DISK DRIVE UNIT	AD1900ST	27373	686
1410941	COMPUTER, MICRO	PN325DSIN	P400674	686
1419722	RECEIVER	1088	A1033	686
1420510	DISK DRIVE UNIT	ST12400N	300944450	686
1520742	DISPLAY UNIT	CPS1760LR	AGO32700385	686
1756918	POWER SUPPLY	205B10R	6191	686

GSFC ATR: Edward C. Sullivan
Raytheon ITSS Task Leader: George Canter

QUARTERLY REPORT: JUNE 20 – SEPTEMBER 19, 2001

TASK OBJECTIVES

This task provides for timely repair of microcomputers, peripherals, and other workstations; support for selection, acquisition, and configuration, including software, of acquired computer hardware; maintenance, upgrade, and user support for applications software; backups and restorations of critical computer files; support for the LASP Local Area Network (LAN) including hardware installation and configuration, and operations improvements through usage, disk space, and performance analysis and implementation of systems tuning.

WORK ELEMENTS

100 Computer repair

Staff provided software support, hardware support and installation/setup on PC's, Macintosh's, notebook computers, workstations, network and associated peripherals. Corrective and preventive maintenance was performed on laser printers. PC computers and workstations were relocated to accommodate office reorganizations and the building renovations. As necessary, staff provided individual instructional training to the user community on operating systems and applications. Staff provided support to ODIN technician staff and end users of ODIN supported computers, as well as hardware and software support for ODIN computers.

Specific repair activities included:

Corrected network connection problem on T. Kelsall PC.
Replaced pickup rollers on HP4050tn laser printer.
Replaced fan in a Micron PC for X. Zhang.
Corrected problem with a CD-RW for D. Gezari.
Cleaned and lubricated fan on an Alpha external disk drive.
Replaced a failed disk drive for R. Oliversen.
Repaired Macintosh system for J. Mather.
Repaired Zip Drive for T. Eskin.
Installed new hard drive for T. Eskin.
Replaced network PCMCIA card for B. Oegerle.

200 New acquisitions

New acquisitions and installations included:

Installed 256MB of memory in L. White's PC.
Purchased a second projector that was setup and tested.
Purchased a new SDLT tape drive that will be used on the LASP NT server for backups.
Purchased wireless network equipment for the conference rooms.
Ordered new PC system for Sunbeams; installed and configured it for use.
Ordered two Zip drives for Sunbeams; installed and configured it for use.
Ordered new UPS for Lab new network switch.
Ordered new Mac system for Sunbeams; installed and configured it for use.
Ordered new laptop for lab; setup and configured it for use.
Ordered USB hub for S. Brown; installed and configured it for use.
Ordered Palm Pilot 500 for S. Brown; installed it and provided training.

Assisted Sunbeams in ordering educational and technical supplies for Summer Teachers Program.
Ordered DVD-Ram external drive for Sunbeams Multimedia hardware set-up.
Ordered and set up new Dell Laptop for Sunbeams.
Ordered, installed and configured USB card for Laboratory Mac.
Ordered, installed and configured new Scanner for Lab.
Ordered Network Card; installed and configured it for S. Brown.
Ordered and installed new monitor for Computer Lab.
Installed and configured new laptop for T. Stecher.
Installed and configured new system for D. Rabin's summer student.
Ordered, configured and installed new system for D. Fahey.
Ordered, installed and configured new PC system for LASP computer lab.
Configured and installed new system for M. Greenhouse.
Installed and configured replacement system for K. Glass.
Installed and configured replacement system for A. Bhatia.

300 Software support

Software support activities included:

Install critical security updates on PCs.
Installed Computrace software on 31 notebooks and laptops so they can be traced if stolen.
Updated anti-virus software and removed software virus from computer.
Assisted T. Eskin with DOS in Windows 2000.
Assisted S. Brown with Powerpoint.
Assisted D. Unkle with Omni you system.
Configured and set up system for T. Strawater.
Configured and set up system for D. Booth.
Assisted L. White with Microsoft PhotoEditor.
Removed virus from K. Glasser's system.
Removed virus from L. Orwig's system.
Removed virus from S. Brown's system.
Removed Virus from C. Crannell's system.
Configured and set up multiple systems for summer students.
Configured and set up multiple systems for Sunbeams summer teachers.
Installed and set up Lotus 123 for C. Johnson.
Restored backup information for K. Feggans.
Repaired Eudora problem for D. Appleman.

400 Backups

For lab-wide backups see Metric Events, below.

500 Local Area Network (LAN) support

Network connectivity was maintained for the computing and printing equipment in the Lab.
Significant numbers of network connectivity moves, caused by building renovations, were supported.
Established new domain accounts for additional users as required for access to the LASP domain.

600 Operational Improvement

700 ODIN Outsourcing Desktop Initiative for NASA

Troubleshot monitor problems for ODIN seat; contacted ODIN, and had monitor replaced.
Updated ODIN database to reflect additional seats.
Created new seat for M. Horn.
Reconfigured and set-up ODIN seat for R. Oliversen.

Non-Local Travel

None

METRIC EVENTS

101　　**Average problem diagnosis time (to be less than 8 hours during working hours)**

Average problem diagnosis time for all problems: 1.6 hours

Average down time per problem (to be less than 3 days)

Average down time for all problems: 3.8 hours

Month	#Problems	Average diagnosis time (hrs)	Average repair time (hrs)
June-July	3	1.5	5.2
August	3	1.0	2.5
September	2	2.5	3.8

Comments: The averages for diagnosis time and downtime have been significantly bettered.

Monthly Summary Report – June - July 2001

Problem	Call Date/Time	Diagnosis	Diagnosis Date/Time	Resolution	Completion Date/Time
Noisy PC	06/19/01 10:30 AM	PC box fan failing	06/19/01 11:00 AM	Replaced fan	06/20/01 2:00 PM
		0.5 Hour		12 Hours	
PC won't connect to network.	06/20/01 08:30 AM	Problem with network card configuration	06/20/01 11:00 AM	Use configuration utility to setup network card	06/20/01 12:10 AM
		2.0 Hours		3.0 Hours	
Workstation external disk noisy	07/09/01 09:00 AM	Failed fan	07/09/01 11:00 AM	Cleaned and lubricated fan	07/09/01 11:30 AM
		2.0 Hours		2.5 Hours	

Monthly Summary Report – August 2001

Problem	Call Date/Time	Diagnosis	Diagnosis Date/Time	Resolution	Completion Date/Time
IBM 4029 printer will not print	08/03/01 3:30 PM	Service error 50 not worth fixing	08/03/01 4:30 AM	Swapped out with a HP4 laser printer	08/03/01 5:30 AM
		1.0 Hour		2.0 Hours	
8mm tape drive running hot	08/15/01 9:30 AM	Fan going bad	08/15/01 11:00 AM	Replaced fan	08/15/01 12:00 PM
		1.5 Hours		2.0 Hours	
Tekronix printer jamming	08/24/01 12:00 PM	Imaging unit	08/24/01 12:30 PM	Replaced imaging unit and installed replacement	04/24/01 3:30 AM
		0.5 Hour		3.5 Hours	

Monthly Summary Report – September 2001

Problem	Call Date/Time	Diagnosis	Diagnosis Date/Time	Resolution	Completion Date/Time
HP4050tn laser printer jamming	09/06/01 1:30 PM	Pickup roller worn	09/06/01 2:30 PM	Replaced roller	09/06/01 4:00 PM
		1.0 hour		1.5 hours	
PC wont boot	09/07/01 9:00 AM	Failed disk drive	09/07/01 1:00 PM	Replaced disk and restored data	09/07/01 3:30 PM
		4.0 Hours		6.5 Hours	
PC noisy	09/10/01 10:30 AM	Failed fan bearings	09/10/01 01:00 PM	Replaced fan	9/10/01 02:00 PM
		2.5 Hours		3.5 Hours	

301   List of PC software packages currently supported

MS-DOS 6.22, MS-Windows 3.1, MS-Windows 3.11, MS-Windows 95, MS-Windows 98, MS-NT 4.0, MS-Windows 2000, MS-Resource Kit, MS-TechNet, MS Office 97, MS Office 2000, Exceed, OnNet, McAfee Virus Detection, Veritas Backup Exec, HP JetAdmin, ASAP, Adobe, Adaptec EZ CD Creator, Dantz Retrospect, Eudora, FlexLM, Clear Vision, VncViewer, Diskeeper, Computrace and miscellaneous peripheral diagnostics

401   Backups

Month	PC Backups	Macintosh Backups
June	172	192
July	215	216
August	172	216
September	172	120
Summary:		
June -September	731	744

For purposes of backups, Laboratory PCs have been divided into two groups as follows.

Group 1	Volumes		Group 2	Volumes
			c6832h	1
c680e	1		daisy	1
c680s	1		endar	2
c681s	1		kosh	2
c682s	1		lasp-public	2
chrissy	2		newark	1
c685s	1		smokey	2
lasp-nts1	4		struthers	2
norton	2		jet1	1
ufos	1		c684n	1
c680m	1		fisher1	1
OSP3	2		poseidon	2
grichard	2		koronapc	2
birk	2		lasp-public2	2
Total --->	21		Total --->	22

DATE	JOB NAME	METHOD	Vol.	DATE	JOB NAME	METHOD	Vol.
PC Backup Log for June 2001 (total 172)							
6/04/01	Group 1	full	21	6/05/01	Group 2	full	22
6/11/01	Group 1	incremental	21	6/12/01	Group 2	incremental	22
6/18/01	Group 1	incremental	21	6/19/01	Group 2	incremental	22
6/25/01	Group 1	incremental	21	6/26/01	Group 2	incremental	22
PC Backup Log for July 2001 (total 215)							
7/02/01	Group 1	full	21	7/03/01	Group 2	full	22
7/09/01	Group 1	incremental	21	7/10/01	Group 2	incremental	22
7/16/01	Group 1	incremental	21	7/17/01	Group 2	incremental	22
7/23/01	Group 1	incremental	21	7/24/01	Group 2	incremental	22
7/30/01	Group 1	incremental	21	7/31/01	Group 2	incremental	22
PC Backup Log for August 2001 (total 172)							
8/06/01	Group 1	full	21	8/07/01	Group 2	full	22
8/13/01	Group 1	incremental	21	8/14/01	Group 2	incremental	22
8/20/01	Group 1	incremental	21	8/21/01	Group 2	incremental	22
8/27/01	Group 1	incremental	21	8/28/01	Group 2	incremental	22
PC Backup Log for Sept. 2001 (total 172)							
9/04/01	Group 1	full	21	9/05/01	Group 2	full	22
9/10/01	Group 1	incremental	21	9/11/01	Group 2	incremental	22
9/17/01	Group 1	incremental	21	9/18/01	Group 2	incremental	22
9/24/01	Group 1	incremental	21	9/25/01	Group 2	incremental	22

Laboratory Macintosh computers are backed up as a single group, as follows:

Macintosh Backup Log 2000 AND 2001

JOB NAME	Volumes	DATE	JOB NAME	METHOD	Vol.
		Mac Backup for June 2001 (total 192)			
Iasp pubic	1				
Eldar G28	1	06/03/01	same group	full	24
Eli Dwek's	4	06/06/01	same group	incremental	24
Harvey G3	6	06/10/01	same group	incremental	24
Mather's G3	1	06/13/01	same group	incremental	24
Dale Mac	2	06/17/01	same group	incremental	24
Eli Dwek's G-3	1	06/20/01	same group	incremental	24
Asterix	5	06/24/01	same group	incremental	24
Safire	3	06/27/01	same group	incremental	24
Total Volumes	**24**				

DATE	JOB NAME	METHOD	Vol.	DATE	JOB NAME	METHOD	Vol.
Mac Backups for July 2001 (total 216)				**Mac Backups for August 2001 (total 216)**			
07/01/01	same group	full	24	08/01/01	same group	full	24
07/04/01	same group	incremental	24	08/05/01	same group	incremental	24
07/08/01	same group	incremental	24	08/08/01	same group	incremental	24
07/11/01	same group	incremental	24	08/12/01	same group	incremental	24
07/15/01	same group	incremental	24	08/15/01	same group	incremental	24
07/18/01	same group	incremental	24	08/19/01	same group	incremental	24
07/22/01	same group	incremental	24	08/22/01	same group	incremental	24
07/25/01	same group	incremental	24	08/26/01	same group	incremental	24
07/29/01	same group	incremental	24	08/29/01	same group	incremental	24

DATE	JOB NAME	METHOD	Vol.
Mac Backups for September 2001 (total 120)			
09/02/01	same group	full	24
09/05/01	same group	incremental	24
09/09/01	same group	incremental	24
09/12/01	same group	incremental	24
09/16/01	same group	incremental	24

GSFC ATR: Dr. Gary F. Hinshaw
Raytheon ITSS Task Leader: Michael R. Greason

QUARTERLY REPORT: JUNE 20 – SEPTEMBER 19, 2001

TASK OBJECTIVES

The objectives of this task are to provide scientific programming support for the Microwave Anisotropy Probe (MAP).

WORK ELEMENTS

100 Algorithm development

200 Software development

The data quality flags that are set in the time ordered data archive were redefined and the preprocessor is being modified to support them. The flags are now split into general and differencing assembly specific flags. Planet flags for Uranus and Neptune and an observing mode general flag are now supported. Minor changes to the preprocessor were made to allow for idiosyncrasies in the flight data in the form that it is actually being delivered. A text log of time ranges can be used to flag data in the archive as suspect.

The iterate_map application was updated for simulation C1 and flight data. The velocity signal correction was an option that could be turned off in the inputs file; it can no longer be turned off. This correction now removes the CMB dipole.

Beam_Map and Beam_SL_Map were updated for simulation C1 and flight data. An offshoot version of beam_map was written to compute beam profiles from a fixed celestial source (rather than planets).

Minor modifications were made to TelemRead to permit selection of RT, QL or LZP data files for input.

The UTCF system was modified to reduce the number of elements stored in the database file. The UTCF lookup routines in IDL were optimized using a recently available built-in table lookup function called VALUE_LOCATE.

The science data simulator was updated to allow it to get its ephemeris data from spacecraft telemetry. While trying to generate two years of simulated data, a memory leak was discovered in the simulator. This leak is being investigated. Work began on adding thermal susceptibility to the science simulator.

The MAPEPVIEW widget was updated with several new capabilities and shaken down during the first few days of the mission. It displays an optional telemetry stripchart and maintains a continuously updated display of the main beam and star tracker boresight coordinates. These features are synchronized with the sky map display.

The IDL dipole calibration package was shaken down and debugged during the first couple of days of the mission. The main changes were to data reading routines to accommodate duplicated data points by sorting and filtering out non-unique packets. Preparatory to the mission, a routine READ_DIPOLE_CAL was written to read the output FITS binary tables to a "log structure" as used by some individual analysis programs. Also, the software was changed to facilitate calibration over a single time interval rather than in a series of fractions of a day. In order to facilitate trend plotting, the ability to select observing mode data was added. Quaternion interpolation was modified as suggested by the ATR to detect and remove discontinuities resulting from use of only the principal value.

A new daily trending driver procedure was written to accommodate the variable data dump schedule.

Programs were written in Fortran 90 to remove mode-mode coupling in a power spectrum generated from data with partial sky coverage. The method used is that of Hivon et al., astro-ph/0105302, Appendix A. A version for an autocorrelation power spectrum and one for a cross-correlation power spectrum were written and tested. For this

purpose, routines were written in both IDL and Fortran 90 to compute Wigner 3-j symbols with the bottom row zero and integer values in the top row. Also, for the Fortran 90 version, the Numerical Recipes factorial and gamma functions were adapted to return a double precision rather than single precision result (although the original double precision constants in the gamma function were retained).

A thermal susceptibility simulation module for inclusion in the science data simulator was written in Fortran 90 and was tested using a driver program. A subset of the test computations was checked using a spreadsheet.

The Fortran software library was transferred to the Beowulf cluster and is being compiled. Changes necessary to compile the software are being made to the master copy on CMB and transferred to the Beowulf for testing. All that remains are a few minor MPI-related issues in cal_map and iteration_map.

An automatic mechanism for pushing the Fortran and IDL software to a remote data analysis facility at Princeton was implemented; incoming flight data is also pushed to Princeton using the same technique. The same system is being used to automatically push Fortran software to the Beowulf.

The NGST Project Information Control System is being ported to Omega to supply a web-based document library for the science team. Much of the PICS functionality is being removed (internal teams, group access control, action items, etc.).

300 Science data analysis

Preliminary maps have been generated using the early flight data.
Preliminary beam maps were computed from sightings of Cas A and Mars.
A preliminary noise power spectrum was generated from inertial mode data during IOC.

Several IDL dipole calibration runs were made on segments of observing-mode data from the mission, and a fit of optics emissivity was done for one time interval.

Sky-survey data at Hα and radio frequencies are being acquired for use in Galactic foregrounds analysis.
Existing full and partial sky map smoothing programs were recompiled, and tested for this purpose.

Long-term calibration trend plots were made for two periods consisting of DOY 181-216 and 220-246, respectively. The IDL dipole calibration software was run on these time periods. The gain, baseline, and offset for each channel were plotted together with one FPA and one RXB temperature, and the earth distance and earth and moon phases.

400 MAP Project Office software support

Routine system administration such as backups was performed.

The document and configuration management server was moved from Building 15 to the SMOC in Building 3.

500 Flight software group support

600 Integration and Testing support

Trending was supported during mission simulations and during launch and post-launch operations. Further improvements were made to the spacecraft pages based on comments from MAP subsystem leads; additional improvements suggested by the attitude team are also being incorporated. Special sets of plots were made as requested by the subsystems to diagnose features seen in the telemetry prior to launch and during the IOC phase. Preliminary nominal values for drain current and total power were estimated for IOC conditions and indicated on instrument trend plots. PRT window ranging signatures were identified in P1 data.

The web-based housekeeping plotting tool used in the SMOC was augmented to allow access to long-term trend data.

Additional spacecraft packets were identified for archival (OBHX).

Staff assisted in computing the necessary pointing quaternions for the primary mirror differential heating test.

Using data from the first perigee passage on day 189, staff found the critical angle from the boresight at which a bright source (earth or moon) causes the star trackers to lose the star field.

Power spectrum analysis was run to determine if W41 re-biasing improved the 1/f knee value.

Analysis of M-V processor utilization was performed on the first few days of the mission.

The automatic data copying system from the incoming FTP area to the CMB data archive was updated and improved. Incoming LZP data is also being archived to DVD-RAM as a long-term data storage medium.

700 MAP scientific computer and facilities support

Routine system administration and backups on the Omega Unix and MS Windows computer systems were performed.

Routine administration of hardware and software maintenance contracts continued.

A Discus web-based discussion server was installed on the MAP Science team web site.

Additional computer equipment was acquired and procured for the Omega cluster:
- Assorted software and supplies have arrived and have been distributed.
- One of the new PC's arrived and was set up for launch support in Omega.
- The Beowulf cluster computer and network switch arrived and were configured.
- A DVD-RAM device arrived.
- The remaining equipment is being tracked.

The twelve node Beowulf cluster computer system arrived and has been assembled. The operating system on each node has been configured. A faulty disk was discovered and has been replaced through a service call to SGI.

Additional equipment and procurement:
- Two new PC's and two MAC's arrived and were set up for replacement of existing computer equipment.
- An office Fax machine purchased and set up.
- A new MAP Science team projector was acquired.
- A fax machine has arrived and was set up for the MAP science team.

HZ and Ceylon were retrieved from KSC after the MAP launch; data was retrieved from these systems and archived on CMB. These two computer systems were then excessed.

Non-Local Travel

Staff traveled to Kennedy Space Center to support a mission simulation and to correct problems with the science team data display computers on 10 June 2001; staff traveled again to KSC to support the MAP launch, which occurred on 30 June 2001.

METRIC EVENTS

101   Develop a moon signal simulator
Completion date: June 30, 2001

Percent complete: 100%

Comments:

102   Galactic signal analysis by correlation studies
      Completion date: October 31, 2001

      Percent complete: 5%

      Comments: Date changed with ATR concurrence

103   Analyze the utility of the absolute calibration factor in the data calibration software
      Completion date: March 21, 2001

      Percent complete: 100%

      Comments:

104   Dipole calibration from raw data
      Completion date: May 31, 2001

      Percent complete: 100%

      Comments:

206   Develop a phasing loop simulation to determine moon visibility
      Completion date: March 31, 2001

      Percent complete: 100%

      Comments: Date changed with ATR concurrence

207   Port the Princeton power spectrum software to Omega
      Completion date: November 30, 2001

      Percent complete: 0%

      Comments: Date changed with ATR concurrence; this software has not been delivered by Princeton.

208   Complete the C1 pass modifications to the pipeline software
      Completion date: October 31, 2001

      Percent complete: 85%

      Comments: Date changed with ATR concurrence

209   Port the Princeton power spectrum software to Omega
      Completion date: July 31, 2001

      Percent complete: 25%

      Comments: Date changed with ATR concurrence; this software has not been delivered by Princeton.

601   Perform analysis of the observatory test data
      Completion date: April 15, 2001

      Percent complete: 100%

      Comments: Date changed with ATR concurrence

602   **Support Cape and Mission operations as required**
        Completion date: as scheduled

        Percent complete: 100%

        Comments:

603   **Develop web-based trending and analysis plots of spacecraft telemetry**
        Completion date: June 30, 2001

        Percent complete: 100%

        Comments:

NASA Task: 97N0016   NGST Software Support

GSFC ATR: Dr. Eric P. Smith
Raytheon ITSS Task Leader: Michael Greason

QUARTERLY REPORT: JUNE 20 – SEPTEMBER 19, 2001

TASK OBJECTIVES

The objectives of this task are to provide computing and World Wide Web (WWW) support for the Next Generation Space Telescope (NGST) project.

WORK ELEMENTS

100 Hardware selection, procurement, installation, and network integration

200 Software Installation

300 Backups

Routine backups were performed.

400 Maintenance of the WWW site

Routine system administration and security monitoring were performed.

Routine account maintenance was performed.

The NGST Project Document Management Office (DMO) were having problems downloading files from the server using FTP. Task personnel investigated and determined that the problem was with the particular client software in use by the DMO and was not due to a fault on the server.

500 WWW site software enhancements and feature development

The front page was modified to include space for major business opportunities (the observatory RFP and the science instrument AO) as easily-found links.

600 NGST document management system development

Minor software bugs in the document search and update routines were identified and corrected.

Non-Local Travel

None

METRIC EVENTS

101   Maintain monthly system uptime statistics

Server/system availability:

	Public Web Server	Private Web Server	System
June	100%	100%	100%
July	100%	100%	100%
August	94.2%	94.2%	94.2%
September	100%	100%	100%

Comments: The September statistics cover 1 Sept 2001 to 11 Sept 2001.

501   Perform bug fixes and feature updates on PICS 2.0

List of fixes and updates:
Minor software bugs in the document search and update routines were identified and corrected.

NASA Task: 97N0026

NGST Supercomputing Studies

GSFC ATR: Dr. John C. Mather
Raytheon ITSS Task Leader: Joel Offenberg

QUARTERLY REPORT: JUNE 20 – SEPTEMBER 19, 2001

TASK OBJECTIVES

The objectives of this task are to develop, implement, and evaluate algorithms for on-board processing of NGST real-time data.

WORK ELEMENTS

100 Collection of current signal processing programs, theoretical performance, and computational resource requirements (tech report)

200 Emulation of scientific data, analysis, and performance

A review of alternative processing methods was undertaken as part of the final study report (see below).

300 Prototype signal processing code

400 Parametric studies (technical reports, white papers, scientific workshop part of NGST SWG effort)

The following reports were delivered to the REE team, as requested:
--A list of all publications performed as a part of this task
--Electronic versions of all publications
--FY2000 annual report
--Final report covering FY1997 through FY2001.

A final study report was written and delivered to the NGST team.

An abstract was submitted to the Astronomical Data Analysis Systems & Software (ADASS) meeting. Task personnel will attend the meeting in Victoria, BC, Canada, 30 September – 3 October.

Two abstracts have been submitted and accepted for the 2002 IEEE Aerospace conference. Task personnel will attend the meeting in Big Sky, MT, 9-14 March 2002.

Non-Local Travel

None

METRIC EVENTS

301 **Provide final delivery of software for use on REE testbed computer. Assist REE team in implementation and use of software and interpretation of results.**
Completion date: TBD per REE team schedule

Percent complete: 100%

Comments: Most recent software delivery to REE has been declared the final delivery.

401 **Prepare and deliver study summary to NGST project science, detector and software teams**
Completion date: August 31, 2001

Percent complete: 100%

Comments: Two refereed journal papers have been circulated to the NGST project and will be included in the final summary; these papers will be the basis for most of the final report content. An analysis of alternative processing approaches is included in the final summary as well. The report has been circulated to the NGST team.

402 **Participate in analysis of NGST detector test data**
Completion date: TBD per program team requirements

Percent complete: N/A

Comments: Participated in meetings and discussions with NGST Radiation Effects and Analysis Group regarding radiation testing and validation for NGST-type detectors. Made recommendations regarding the type and focus of radiation testing. Participated in analysis of radiation test data.

403 **Provide reports to NGST project team as needed with respect to trade studies, detector modeling and data handling methods**
Completion dates: TBD per program team requirements

Comments: Discussed plan for implementing laboratory cosmic-ray tests with IR-testbed development leads. Delivered information relevant to NGST detector development proposal teams. Provided guidance and documentation to the NEXUS team (an NGST technology testbed mission) regarding the cosmic ray software. Participating in bi-weekly NGST project "micro-glitch" teleconferences and radiation effects studies.

404 **Provide status reports (monthly) and technical reports on task elements 100, 200 and 300 in accord with milestone schedule above**

Comments: Reports delivered monthly.

GSFC ATR: Dr. Sara R. Heap
Raytheon ITSS Task Leader: Robert S. Hill

QUARTERLY REPORT: JUNE 20 – SEPTEMBER 19, 2001

TASK OBJECTIVES

The objective of this task is to assist in Space Telescope Imaging Spectrograph (STIS) science by support of the Guaranteed Time Observers in the areas of scientific software, secretarial and administrative services, ancillary databases, parallel observations, public outreach, training, and data analysis.

WORK ELEMENTS

100 STIS calibration support

110 Pre-launch calibration

120 Post-launch calibration

Staff participated in the analysis of MSM test data under side 2 operation. The purpose was to determine whether the commanded MSM cylinder positions need to be changed. Staff compared CCD wavecals exercising the full range of all three cylinders with previous wavecals for both the HITM1 lamp, which was used in the test, and the LINE lamp. Positioning of the spectrum had changed by no more than a few pixels in either dimension.

Staff created the weekly superdarks, superbias frames and hot pixel tables, following the resumption of STIS science observations on July 16.

Having finished with producing a STIS CCD thickness map from the fringing data and thin film model of the CCD, staff have begun to rewrite the draft paper on the fringing model. This revised paper will include the new results from using the new more physical model, including how the index of refraction of silicon was revised, defringing the 3 parallel stellar spectra, and more. The revisions are nearly done, so a new draft for the co-authors to review will be ready soon.

Staff wrote a discussion of the Fresnel equation method for the fringing paper. The discussion of the simple model based on coadding wave trains was rewritten in order to better explain some basic insights into the fringing mechanism.

Staff generated plots of the NUV MAMA dark rates versus time and temperature using all darks taken since launch.

Staff investigated the use of the FP-Split slit for taking echelle wavecals. The line confusion resulting from the overlapping echelle formats from the five slits was minimal and the increase in line density if all slits are calibrated simultaneously may improve the calibration.

Thirty-five calibration reference files were installed, as detailed in the monthly Product Reports.

200 Administrative support

Staff updated and circulated the STIS activity database and the GTO observation database. RPS2 Phase II submissions for Cycle 9 target observations were tracked, and discrepancies between planned and actual orbit allocations were investigated and corrected.

Staff took and distributed notes on 8 weekly analysis meetings.

The HST daily reports, STIS and WF analysis and shift reports, STIS weekly analysis meeting summaries, and the STIS schedules and general memos were added to a back-up database.

300 Developing reference astronomical databases

The HST_CATALOG database was updated to contain entries through 4 September 2001.

400 Developing scientific software for analysis of STIS data

Staff updated the database software to support unsigned and 64 bit integer data types.

Staff have written an IDL widget tool (currently called SPECTOOL) which allows the user to make a model spectral image of a slit observation of a star with the star off of the center of the slit (i.e. using the slit for coronographic spectroscopy of faint stars or stellar disks near a bright star). The model is made using a series of TinyTim monochromatic PSF images stacked into cubes (one each for G230LB, G430L, and G750L). The relative brightness scaling the PSF contributed at each wavelength adjusted to match any spectrum; thus, the model spectral image can be a model for a specific primary star. The tool allows for the user to then extract spectra from the model spectral image. The user can save the spectral image formed by placing the slit anywhere with respect to the star and can save the spectra extracted from that spectral image.

Staff created a Web page listing the user-level STIS procedures organized by category, with one-line descriptions.

Staff coded a routine for S. Heap to determine the accuracy of finding the line centers of absorption lines versus signal to noise using Monte Carlo simulations.

Thirty-five routines were updated or installed in the STIS software library, as detailed in the monthly Product Reports.

500 Investigating the properties of the HST/STIS point-spread function

600 STIS IDT information management

610 World Wide Web (WWW) Site

Staff continued updates and additions to the following portions of the STIS team web page: (1) archive of the GSFC local STIS analysis meeting minutes (http://hires.gsfc.nasa.gov/stis/postcal/meetings/ minutes.html); (2) updates of the GTO Proposal Status; (3) updates to the scheduled STIS activities (summaries, detailed and review timelines).

620 Science Data

Staff archived data for STISLOG entries 68003-72439 (19 June – 10 September 2001). A complete list is at http://hires.gsfc.nasa.gov/stis/science/data/data.html.

Staff also acquired WFLOG entries 14730-15505.

To monitor upcoming STIS activities, 9 SMS files were processed.

700 Assisting in public Information programs

Staff continued to get HST Press Releases and update the notebooks.

800 Assisting with STIS GTO and parallel programs

Staff assisted T. Brown (STScI) and A. Sweigart (NASA/GSFC) in final editing of a long paper analyzing the origin of the hottest extreme horizontal branch stars. This paper is based on STIS calibration images and is now accepted for publication in *ApJ*.

Staff assisted M.Sahu (NOAO) in preparation of a long paper on STIS observations of interstellar lines toward G191B2B. Work this quarter included the creation of simulated data to test the fitting code, and software to apply the F-test to determine if an extra interstellar component is needed.

Staff reprocessed 649 parallels, completing the list of 2473.

Staff identified two sources in the Francis cluster WF/PC-2 field with potentially significant Ly-α emission. Seven sources were selected as possible sources from a F450W-F410M vs. F410M color-magnitude diagram. The F410M fluxes were converted to predicted F450W fluxes for these objects using the ratio of of the filter curves. Only two of the seven had fluxes that exceeded the 5-σ limiting magnitude for the F450W band. A paper on these results was drafted.

Staff continued working on fitting the fringing data using the more physically rigorous model of the STIS fringing behavior. The entire CCD chip has now been fit. A map of the STIS CCD thickness has been made. Staff revised the fringe removal IDL widget program to use the new map and function.

Staff continued to examine the STIS parallels for low mass stars. All of the parallel images (and spectra) meeting selection criteria have now been examined. Staff found about 330 candidate M stars at galactic latitudes about +20 deg and below -20 deg. Of these about 290 have been examined in greater detail. About 240 of them have been confirmed as M type stars (nearly all are dwarf stars).

Staff presented a preliminary analysis of the STIS GTO echelle spectrum of the helium rich star UIT-1 in ω Cen at the workshop on ω Centauri in Cambridge, England August 13-16. From its measured luminosity, this star appears to have undergone a final helium flash immediately after leaving the AGB.

Staff used T. Zethson's final emission line list to create line identification plots for the spectrum of blobs B+D in η Car.

Staff made plots and wrote text for two sections of a BTC/HDF-S data paper: comparison with the ESO catalog and the description of the limiting magnitude calculation.

Staff continued work on a memo describing the false low-surface-brightness spatial features in longslit spectra resulting from an apparent CCD bias drift within images.

900 Training and assisting users

Assistance was provided to S. Heap in obtaining calibrated FOS spectra of 3c273 from the ST ECF HST archive.

Non-Local Travel

Staff traveled to the conference, "Deuterium in the Universe" in Paris June 25-27, presenting a poster.

METRIC EVENTS

101   **Monthly: List new and modified calibration files**

Completed as required. Delivered as part of the STIS task monthly report.

201   **Weekly: Write and circulate technical minutes of the analysis status meeting**

Completed as required. Circulated by E-mail weekly.

301   **Monthly: List new and modified reference astronomical databases**

Completed as required. Delivered as part of the STIS task monthly report.

401   **Monthly: List new and modified scientific software for analysis of STIS data**

Completed as required. Delivered as part of the STIS task monthly report.

601   **Monthly: List Web site additions and enhancements**

Completed as required. Delivered as part of the STIS task monthly report.

602   **Monthly: List additions to STIS, NICMOS, and WFPC2 data archives**

Completed as required. Delivered as part of the STIS task monthly report.

801   **TBD dates: Support Cycle 8 and Cycle 9 proposal submission**

Support was provided for tracking of Cycle 9 submissions as required.

NASA Task: 97S0056   STIS GTO Co-investigator Science Support

GSFC ATR: Dr. Theodore R. Gull
Raytheon ITSS Task Leader: Dr. Anthony C. Danks

QUARTERLY REPORT: JUNE 20 – SEPTEMBER 19, 2001

TASK OBJECTIVES

The objectives of this task are to perform all phases of STIS Guaranteed Observing Time (GTO) scientific activities as STIS Co-Investigator including selection of scientific questions based on the current state of knowledge, selection of targets, instrument observing modes and exposure times based upon HST operational and STIS instrumental properties, updating of GTO observing proposals, GTO observing, data reduction, analysis and interpretation, publication, and presentations of scientific results. Travel to domestic and foreign observatories and scientific meetings will be necessary.

WORK ELEMENTS

100 Observation proposal, planning, and preparation

Remaining GTO orbits have been divided between spectral observations of η Carinae and a search for a planet in a nearby solar system.

A successful Cycle 11 GO proposal was submitted for follow-on observations of stars in η Carinae.

200 Observation support

300 Data reduction and analysis

Analysis is nearly complete on the η Carinae stars, and the manuscript is nearly complete.

Further analysis was made of the STIS echelle observations of NGC4151, including detailed comparison with the GHRS observations of Weymann, which identifies many components of the interstellar medium along the line of sight. This analysis culminated in a talk, "ISM within NGC4151 and our Galactic halo". This talk was presented by the task leader at the XVIIth IAP Colloquim, "Gaseous Matter in Galaxies and Intergalactic Space", in Paris, 19-23 June 2001.

We are awaiting GTO data from observations of η Carinae (spectrographic data for ISM studies) and protoplanetary systems (images).

400 Publication development

The talk on NGC 4151 described above, presented at the XVIIth IAP colloquim, is being developed as a publication, due September 15th as part of the *Proceedings* for the conference.

A paper on 4 stars in η Carinae is in the final stages of preparation for submission to *ApJ (Supplements)*; it will have more than 24 illustrations.

The task leader was invited by the University of the Philippines (Manila) to give courses on STIS observations of the ISM on the line of sight to η Carinae and NGC4151.

Non-Local Travel

Staff traveled to the XVIIth IAP Colloquium on Gaseous Matter in Galaxies and Intergalactic Space in Paris from June 19-23, 2001, presenting a paper.

METRIC EVENTS

201   **At least one GTO observation series or ground-based observation per year**

Comments: The observations (of interstellar boron) for the GO proposal submitted with Lambert and Federman were successfully completed. Data analysis is under way.

This metric will be revisited in consideration of current STIS problems.

401   **Completion of reduction, analysis and draft publication of Cycle 8, 9, and 10 results**

Comments: Processing was completed for the second paper on η Carina, and a draft is well under way. A third paper on highly ionized lines (e.g. SiIV) is in preparation.

The third paper on interstellar lines in the direction of NGC4151 is in preparation.

402   **At least one scientific refereed publication per year**

Comments:

Danks, A.C. et al, *Apj* 547 L15, 2001, " Rapid Temporal Variations of Interstellar Absorption Lines in the Carina Nebula".
See 401, above. The IAP Colloquium talk will be the basis for an additional publication on NGC 4151 observations.

GSFC ATR: Theodore P. Stecher
SWRI Subcontract Task
SWRI Task Leader: Dr. Joel Parker

QUARTERLY REPORT: 20 JUNE – 19 SEPTEMBER, 2001

TASK OBJECTIVES

The purpose of this task is to provide support for research on the Large Magellanic Cloud using existing UIT data and ground-based data. The intended final product of this task is a publication to appear in a refereed journal.

WORK ELEMENTS

100 Analysis of UIT data

200 Analysis of ground-based and other non-UIT data

This element involves obtaining and combining UIT data for the entire SMC with photometric data from the Magellanic Cloud Photometric Survey (MCPS). Final versions of these catalogs contain 10,999 and 5,156,057 stars, respectively. A search will be made of the literature and private data sources for stars with high-quality, reliable spectroscopic classifications and astrometry. These classifications will be incorporated into the catalog. The temperatures and intrinsic colors of these stars will be used to calibrate the photometric catalog to allow us to estimate effective temperatures for the remainder of the "photometry-only" stars in the catalog. Using published lists of clusters, cluster membership of stars in the UV+visible catalog will be analyzed and compared against the UIT-based identification of OB associations/clusters (which should be more efficient due to our use of UV data, which have a positive bias for selecting hot stars). Field stars (> 2 arcmin from the boundary of a cluster) and extreme field stars (> 20 arcmin) will then be selected. The projected surface density of candidate O-type stars in the SMC will also be determined.

300 Preparation of manuscript for journal submission

A draft of the manuscript has been started, and progress in parallel to the analysis described above.

400 Publication support

Non-Local Travel

None

METRIC EVENTS

201   **Creation of UV+Optical Photometry Catalog (for Manuscript II)**
      Completion date: March 9, 2001

      Percent complete: 100%

      Comments: It was reported last period that the final catalog of UV+visible photometry was complete. However, collaborators in charge of the MCPS visible catalog made further revisions on the astrometry and photometry of that catalog based on comparisons to new data, and they also included infrared *JHK* photometry from the DENIS/2MASS projects. This revised catalog (nearly a quarter gigabyte in size) was then reprocessed through our software to combine it with the UIT data and create the revised final catalog.

301   **Manuscript (I) ready for submission**
      Completion date: August 31, 2000 (modified w/ATR concurrence May 2000)

      Percent complete: 100%

      Comments: On schedule

302   **Draft of Manuscript II**
      Completion date: August 31, 2001

      Percent complete: 90%

      Comments: A draft of the SMC manuscript has been made, including an introduction and discussion of the catalog generation. Presentation of some preliminary findings were presented at the ``Boulder Hot Star Workshop III'', on August 6-8, 2001. The paper to appear in the proceedings book has been completed and submitted to the editor.

401   **Submission of revised manuscript in response to referee's comments**
      Completion date: TBD upon receiving referee's comments

      Percent complete:

      Comments: To follow completion of above analysis..

GSFC ATR: Dr. Randy A. Kimble
Raytheon ITSS Task Leader: Dr. Timothy J. Norton

QUARTERLY REPORT: JUNE 20 – SEPTEMBER 19, 2001

TASK OBJECTIVES

The purpose of this task is to support the design, specification, fabrication, and evaluation of photon-counting intensified CID (charge injection device) detectors. This work will also include development of novel UV photocathodes including those deposited in silicon microchannel plates.

WORK ELEMENTS

100 Specification and evaluation of microchannel plate intensifiers

200 Specification and evaluation of commercial/custom CIDs and Active Pixel Sensors (APS)

300 Simulation, design, fabrication, and evaluation of CID and APS control electronics, and event centroiding electronics

Progress was made in developing IDL code with improved centroiding accuracy.

400 Design, fabrication, and evaluation of fiber optic coupling of intensifiers, CIDs and APS

500 Testing of components and integrated detector systems

600 Development of laboratory with facilities for vacuum deposition and spectroscopic quantum efficiency measurements

In preparation for operations, extensive purchasing of equipment was supported. This effort included evaluation of existing facilities to evaluate needs, specification of requirements, searches for suitable hardware, alterations of existing designs to ensure compatibility, support for acquiring bids (e.g. sole-source justifications), purchasing, and integration of new hardware. Articles purchased include:

Clean bench
Fume hood
Ultrasonic cleaner and accessories
Chamber heating jacket
Dessicant cabinet
Furniture
Stainless steel sink and pedestal
UHV application spot welder
De-ionized water supply
304l UHV stainless steel (for fabrication of UHV parts)
Crystal Quartz Monitor
Wobble sticks with linear and linear-rotational feedthroughs
Calibrated CsTe NIST photodiode

About half of this equipment has arrived, limited by current security issues.

A new electrical connection for bakeout heating has been specified and requested.

Staff is coordinating recertification of the existing cleanroom including evaluation of quality of the HEPA filtration system. Staff replaced 6 HEPA filters and 7 existing HEPA filtration units. The final delivery and installation of fume hood ventilation tubing will complete the clean room integration and permit certification. .

Redesign of the evaporation column was performed to allow for in situ absolute detector QE determination via a NIST calibrated photodiode.

700 Study and develop techniques for depositing UV photocathodes, including those on doped diamond surfaces

Discussions were held with Dr. Joseph Stock (Swales) covering many areas, including the UHV facility, deposition techniques, and other issues.

800 Test properties of photocathode materials on silicon substrates, including QEλ and noise

900 Dissemination of results, including presentations, reports, and publications

A major documentation effort was begun, covering the design of the facility and plans for its use.

Non-Local Travel

None

METRIC EVENTS

301   Complete modeling study of event-driven APS intrapixel response vs. centroiding accuracy

   Completion date: June 30, 2001

   Comments: Progress has been made on IDL centroiding software.

401   Support design review of event-driven APS devices

   Completion date: August 31, 2001

501   Perform Silicon MCP Characterization, including gain, lifetime, and DGE

   Completion date: August 31, 2001

   Comments: Work is progressing on the UHV chamber and facility.

801   Perform activation and evaluation of ALGaN photocathodes

   Completion date: August 31, 2001

802   Perform activation and evaluation of opaque CsTe photocathodes

   Completion date: August 31, 2001

901   Complete draft publication on RACID results

   Completion date: June 30, 2001

GSFC ATR: Dr. Edward S. Cheng
Raytheon ITSS Task Leader: Dr. Robert J. Hill

QUARTERLY REPORT: JUNE 20 – SEPTEMBER 19, 2001

TASK OBJECTIVES

The contractor will provide support to the Instrument Scientist Office for the Wide Field Camera 3 project. Activities will concentrate in the following areas:

WORK ELEMENTS

100 Instrument simulation development and maintenance

Staff supported the design of the flight IR detector package for WFC3. Final modifications have been made and the design is being implemented on the flight candidate detectors.

Staff supported a review of the procedures used in the construction and processing of the WFC3 flight detector housings.

200 CCD detector characterization

Staff began the CTE characterization of a Marconi frontside engineering grade CCD43 flight model device which has been subjected to the equivalent of 2.5 years of on-orbit radiation damage.

Staff is continuing to support the testing of engineering grade HgCdTe detectors from Rockwell Science Center. Testing of FPAs #15, 18 and 22 was completed. Testing of FPA #25 is ongoing. FPA #18 was delivered to Ball Aerospace for use in the detector enclosure qualification unit.

Staff supported the development of the detector characterization procedures for the testing of the flight candidate CCD and HgCdTe detectors for WFC3.

Staff supported the testing and debugging of several production interfaces for each of the CCD and IR detector test systems. These interfaces will be used in the characterization of the WFC3 flight detectors.

Mechanical and electrical interfaces are being designed to support the operation of the Lockheed CCD 486 device, which is a potential backup device for the WFC3 UVIS channel.

Staff completed construction and implementation of a temperature sensor calibration system with an overall resolution of 0.01K. This system is being used to calibrate the temperature sensors on the IR detectors for WFC3.

Staff continued to manage the development of improvements to the DCL software.

New code has been developed to test the charge injection capability of the Marconi flight model CCDs. New code has also been developed to implement the "sample up the ramp" readout strategy for the IR detectors.

Staff has created a new database for the storage and archiving of DCL data.

Staff is supporting work on the construction of light tight enclosures around the DCL's illumination systems, which will allow simultaneous testing of more than one detector in the DCL.

Staff is supporting the implementation of a single pixel illumination system for the DCL.

300 Presentation and display material support

Staff presented results of recent testing of Marconi CCDs and Rockwell HgCdTe devices to the vendors in order to solicit their input on improvements in the operation of their devices.

Staff supported the development of web-based tools that permit the comparison of WFC3 filter test results and detector quantum efficiencies for different types of detectors.

400 Administrative support

A master record system has been developed to provide documentation configuration control. This system will meet ISO requirements.

500 Instrument calibration and performance analysis

Staff is supporting the initial evaluation of the WFC3 thermal/vacuum test requirements. This includes a first look at the test sequence, staffing requirements and data analysis software needs.

Staff is supporting the development of the science calibration plan for the WFC3 instrument.

Non-Local Travel

Staff attended an IR detector status report meeting at Rockwell Science Center in Thousand Oaks, CA.

METRIC EVENTS

201   Complete evaluation of WFC3-1R MUX
Completion date: March 15, 2001

Percent complete: 100% on schedule

Comments: WFC3-1R MUX is performing as expected.

202   Complete QE and dark current measurements of Hawaii-IR technology demonstration devices
Completion date: N/A

Percent complete:

Comments: Cancelled by direction of ATR.

203   Support development of single pixel illumination capability in the DCL
Completion date: August 1, 2001

Percent complete: 100% on schedule

Comments: Development complete; implementation delayed in order to support characterization of flight devices.

204   Complete CTE characterization of Marconi CCD44UVI at 5 years and
CCD44VI at 2.5 years equivalent radiation damage
Completion date: March 15, 2001

Percent complete: 100% on schedule

Comments: CCD44 radiation testing complete.

205   **Complete characterization of the first flight contract engineering grade Rockwell devices**
Completion date: August 1, 2001

Percent complete: 100% on schedule

Comments:

206   **Complete characterization of Marconi front-side illuminated devices**
Completion date: May 15, 2001

Percent complete: 100% on schedule

Comments:

207   **Complete characterization of Marconi backside illuminated engineering grade devices**
Completion date: September 30, 2001

Percent complete:

Comments: Testing delayed while awaiting redesign of dewar interface.

208   **Complete post-radiation CTE characterization of Marconi CCD43-152**
Completion date: September 1, 2001

Percent complete: 90%

Comments: Testing initially delayed awaiting the availability of a test dewar. Testing now almost complete.

301   **Present CCD and IR detector results to SOC meeting**
Completion date: June 12, 2001

Percent complete: 100% on schedule

Comments:

NASA Task: 98D0036

ACS Calibration and Test Analysis

GSFC ATR: Dr. Edward S. Cheng
Raytheon ITSS Task Leader: Dr. Robert J. Hill

QUARTERLY REPORT: JUNE 20 – SEPTEMBER 19, 2001

TASK OBJECTIVES

The contractor will provide support for analyzing calibration and test data from the ACS instrument during its test period at GSFC.

WORK ELEMENTS

This task ended on June 30, so very little work was performed this quarter.

100 CCD subsystem performance analysis

200 Instrument throughput and performance analysis

300 Instrument calibration and analysis support

Non-Local Travel

None

METRIC EVENTS

101   Report on radiation testing of Lockheed 4kx4k device
Completion date: July 1, 2001

Percent complete: 100% on schedule

Comments:

201   Report on thermal/vac performance of detectors
Completion date: N/A

Percent complete:

Comments: Cancelled by direction of ATR

301   Periodic reports of analyses of specific instrumental characteristics
Completion date: N/A

Percent complete:

Comments: Cancelled by direction of ATR

302   **Support ACS thermal/vac testing**
Completion date: N/A

Percent complete:

Comments: Cancelled by direction of ATR

303   **Support phosphorescence testing of ACS detector dewar window**
Completion date: July 1, 2001

Percent complete: 100% on schedule

Comments: Work complete and a test report was written.

GSFC ATR: Joseph Novello
Raytheon ITSS Task Leader: Ernest Buchanan

QUARTERLY REPORT: MARCH 20 – SEPTEMBER 19, 2001

TASK OBJECTIVES

The purpose of this task is to provide electrical engineering and control software support for development of the XRS/Clark, SAFIRE, HESSI, and other Code 680 projects. In addition, this task supplies electrical engineering, electrical technician, and mechanical fabrication support for other instruments and detector systems developed by Code 680.

WORK ELEMENTS

100 TRIANA development support

200 HESSI development support

300 Develop electronics for test and evaluation of cryogenic detector systems

A significant amount of time was spent designing and fabricating the SQUID electronics test box, an important piece of support equipment. It is an all-in-one unit that minimizes uncertainties in the test setup. It contains a SQUID preamplifier and feedback box, AC/DC power supply and analog multiplexer.

Designs for SQUID drivers were supported.

Staff provided extensive support for preparations and shipping of the BAM instrument for the Mauna Kea run. Staff provided fabrication and modification support for the telescope mount, guidescope CCD camera, telescope, and cabling.

Several test boxes were built for HAWC detector characterization.

400 Electrical technician support for other 680 instrumentation projects

500 Electrical engineering support for other 680 instrumentation projects

600 Fabrication support for 680 instrumentation projects

Non-Local Travel

None

METRIC EVENTS

101   **Update TRIANA flight and ground software**
        Completion date: July 31, 2001

        Percent complete: 100%

        Comments: Flight software delivered.

102   **Provide TRIANA S/C integration support**
Completion date: July 31, 2001

Percent complete: 100%

Comments: Support supplied as required.

301   **Provide electronics support for HAWC and SAFIRE detector evaluation**
and verification
Completion date: August 31, 2001

Percent complete: 100%

Comments: Complete.

302   **Provide electronics support for evaluating electronics for IR instruments**
development
Completion date: August 31, 2001

Percent complete: 100%

Comments: Complete.

303   **Provide electronics GSE for HAWC, SAFIRE, and other IR instruments**
subsystems
Completion date: August 31, 2001

Percent complete: 100%

Comments: Complete

501   **Provide WFC3 software modifications resulting from subsystems evaluation**
Completion date: July 31, 2001

Percent complete: 100% as needed.

Comments: None required during this period

601   **Provide a monthly record of fabrication support for 680 projects**

Dates	Project	Contact
June:		
06/18/01-06/19/01	Micro-D connector box	E. Buchanan
06/20/01-06/22/01	Backing plate mirror mount and rotary disk	M. Swartz
06/25/01-06/26/01	WCF support flange	E. Sharp
06/27/01-06/27/01	Battery bracket	E. Buchanan
06/28/01-06/29/01	Dewar heat switch, FE55 holder	J. Yagelovich
July:		
07/02/01- 07/25/01	BAM parts: Cold plate	D. Benford
	Vacuum feedthrough, shaft brackets, top mount plate	
	Main chassis, back panel	
07/26/01 - 07/27/01	FIBRE array base plate	D. Benford
07/30/01 – 07/31/01	FIBRE array lid	D. Benford

August:
08/01/01-08/13/01   (Machinist on vacation)
08/14/01-08/24/01   3 biotech vacuum jars   M. Swartz
08/27/01-08/31/01   Mirror/filter   J. Davila

September:

09/04/01-09/07/01   Lid for can   M. Swartz
                       Biotech jars and caps
09/10/01-09/14/01   Flange   A. Bier

IR Science and Analysis Support

GSFC ATR: Dr. Eliahu Dwek
Raytheon ITSS Task Leader: Dr. Richard G. Arendt

QUARTERLY REPORT: JUNE 20 - SEPTEMBER 19, 2001

TASK OBJECTIVES

The purpose of this task is to provide support for analysis of infrared (IR) emission from supernova remnants (SNRs), and support for analysis aimed at deriving constraints on the near-IR cosmic background using data from the DIRBE instrument.

WORK ELEMENTS

100 Analysis of the IR emission from SNRs

200 Development of constraints on the near IR background using DIRBE

300 Decomposition of the gamma-ray emission at high Galactic latitudes

The local ISRF determined from Pioneer and DIRBE data was compared with previous determinations.

400 Dust temperature fluctuation analysis

The final version of the IDL code to calculate dust temperature fluctuations is complete. The code can calculate temperature distributions for Draine & Lee graphite and silicate, Li & Draine neutral and ionized PAHs, and four kinds of amorphous carbon. The code uses the Guhathakurta & Draine approach for calculating the temperature distributions. Optionally, for grains approaching or at their equilibrium temperatures, the code can use delta function temperature distributions, ad hoc gaussian distributions, or distributions calculated as outlined by Fioc (similar to that found in Draine's work, but with conventions and notation closer to the present work).

Non-Local Travel

None

METRIC EVENTS

301   **Contribute to preparation of a paper on the decomposition of high latitude EGRET data**
Completion date: December 31, 2001

Percent complete: 0%

Comments: Metric completion date deferred with ATR approval.

302   **Prepare figures showing the results of the decomposition**
Completion date: December 31, 2001

Percent complete: 0%

Comments: Metric completion date deferred with ATR approval.

303   **Present ISRF spectrum as a function of Galactic (l,b)**
        Completion date: December 31, 2001

        Percent complete: 0%

        Comments: Metric completion date deferred with ATR approval.

304   **Present GCR spectrum as a function of Galactic (l,b)**
        Completion date: December 31, 2001

        Percent complete: 0%

        Comments: Metric completion date deferred with ATR approval.

401   **Development of dust temperature algorithms and preparations of corresponding report**
        Completion date: June 30, 2001

        Percent complete: 100%

        Comments: Completed.

402   **Conversion of dust temperature fluctuation code from Fortran to IDL**
        Completion date: April 30, 2001

        Percent complete: 100%

        Comments: Completed.

403   **Development of new dust temperature algorithms and preparation of a corresponding report**
        Completion date: July 31, 2001

        Percent complete: 100%

        Comments: Completed. Paper in progress.

GSFC ATR: Dr. Alan J. Kogut
Raytheon ITSS Task Leader: Paul A. G. Mirel

QUARTERLY REPORT: JUNE 20 – SEPTEMBER 19, 2001

TASK OBJECTIVES

The purpose of this task is to provide support for research on the cosmic microwave background radiation.

WORK ELEMENTS

100 Support ARCADE balloon flight program

Initial cold test was performed on the full system in flight configuration. The instrument functioned well. Modifications are planned for passive cooling of the aperture plane.

The instrument was integrated into the payload. The payload was brought to full flight configuration. The laboratory and instrument were moved to the Cryogenics Research and Integration Facility.

A new flight computer was received and installed in the pressure vessel. Personnel assisted in porting operating system and flight code to new computer. Replacing computer fixed RS-232 communications problem (noisy serial output from existing computer).

The electronics systems were integrated end-to-end so that the computer controls the interface, which then controls all the subsystems. Servo control was established for the target sweep and dewar tilt functions, as well as for cryogenic heater control. Power control and signal routing through the "Black Box" were brought to final configuration. Debugging and minor modifications continue.

The repaired 10 GHz amplifier was installed in the instrument. The instrument was installed in the flight dewar, the lid fitted and supported by final lid mover hardware. Modifications were made to the cooling rods to accommodate the flight dewar. The superfluid pump for the target was repaired and modified to replace a bad solder joint with a new weld, and the riser tube to the target was drilled out to accommodate the new fittings. Personnel made custom drill bit for boring the riser tube.

Current booster cards were obtained from UCSB to drive the cryogenic control heaters. These cards were modified to allow for a 0 mA off condition, to reduce oscillation, and the high power components were relocated to a heat sink plate to permit adequate heat dissipation for flight. Booster circuits were debugged.

The thermometer telemetry hardware was received, tested, and modified. After first tests yielded noise of 120 ohms, the circuit parameters were adjusted, lowering the noise to 15 ohms or about 10 mKelvin. An external calibrator for this system was built. The thermometer reader was characterized and found to have less than two bits noise. The readout board was tested in flight configuration with two failed thermometers. Mounting hardware and wiring harness were built and modified to reduce noise pickup in the sense leads.

The linear bearings for the payload balancing pallet were installed. The actuators for payload balancing and dewar tilt were installed. The lubrication in the sealed ball screw was researched and found to be borderline acceptable. Actuator heat function is planned. The actuator transfer cases were degreased. The ambient heater servo units were built, and debugging has begun.

Clinometers were installed on the gondola and on the dewar. The clinometers were vacuum tested and found acceptable.

The motor for the payload rotator was repaired by removing oxide coatings from the brushes. The main bearing was locked with paraffin. As the rotator was found to rotate too rapidly, a replacement gear box was ordered.

200 Data reduction and analysis

Non-Local Travel

None

METRIC EVENTS

101   Develop hardware and software to process flight thermometer telemetry
Completion date: April 20, 2001

Percent complete: 100%

Comments: Complete circuit design sent to vendor to create PC layout and fabricate boards. Components ordered and prepared for population of two boards by same vendor.

102   Support ARCADE cold systems tests
Completion date: March 25, 2001

Percent complete: 100%

Comments: Cold system test in ground configuration complete.

103   Support ARCADE balloon launch (Palestine, TX)
Completion date: Summer 2001 or as scheduled

Percent complete: 90%

Comments: Full cryogenic system test completed. All instrumentation systems in place and functioning. All major payload components in hand; payload 80% assembled. Non-cryogenics systems 80% assembled; debugging continues.

201   Support flight data acquisition software development
Completion date: Summer 2001 or as scheduled

Percent complete: 80%

Comments: Staff worked closely with JPL staff who are developing flight and ground code. Supplied technical information about instrument and subsystem wiring and architecture; specified software interface needs.

NASA Task: 9810046   Infrared Spectrophotometer Development

GSFC ATR: Dr. Harvey Moseley
Raytheon ITSS Task Leader: Timothy Powers

QUARTERLY REPORT: JUNE 20 – SEPTEMBER 19, 2001

TASK OBJECTIVES

The purpose of this task is to support the development of infrared instruments and detectors (e.g. for the SPIRE instrument), including both software and hardware elements. Support will include fabrication and testing of instrument dewars and bolometers used for infrared (IR) astronomical observations, and in the design of instrument control systems for use in detector testing and operations.

WORK ELEMENTS

100 Prepare and execute cryogenic experiments for evaluation of TES bolometers (e.g., Planar Hybrid Bolometers (PhyBs) and Microbolometers)

Tests on candidate TES's continue. Additional tests, to evaluate transition temperature as a function of doping percentage, are continuing.

200 Execute tests to validate cryogenic and mechanical designs for detector system elements

Operation of the Donovan Microtek motors was achieved by wrapping them in resistive wire used as a heater. The heaters are used only intermittently to heat the temperature to 90K to focus optics, so heat load is not great. Subsequently the lubricant was removed, resulting in complete cold functionality. The motors were used in the BAM instrument at Mauna Kea.

The IRAC shutter problem was solved but additional testing of mechanism is still being done.

Testing and assembly of a detector array characterization package in the dilution refrigerator is ongoing. This package is being used to characterize current SQUID multiplexers and PhyB bolometer arrays. It contains a circuit board with cryogenic superconducting electronics, SQUID chips, inductor chips, and bolometer array chips. Prefabricated cabling was ordered to go into the ADR, to be installed into the "SAFIRE" dewar in the CRIF.

The BAM instrument was tested, saw first light with its new optics, focused, disassembled and packed, and sent to Mauna Kea, where field tests were performed. The fundamental parameters of the instrument were assessed. The sensitivity in present configuration is not good enough for astronomical observations, and is limited by background and readout noise. Further work is necessary.

300 Support the development of instruments using TES bolometers, such as FIBRE and SPIFI

Cabling has been completed and thermometers selected for the "purple dewar". A LabView program is being developed to read thermometry and facilitate use of the dual-stage He3 refrigerators. A programmable power supply was purchased; it will be part of a semi-automated system that will be able to autonomously operate (for data taking and refrigerator cycling).

400 Provide documentation and organizational support to infrared instrument and detector-related projects

Administrative and organizational support was supplied to IR projects. Work included project schedule maintenance, organization of documentation, travel support, facilitating e-mail and telephone communication among project scientific staff, and meeting and visitor support.

Non-Local Travel

Staff took the NIR camera to Wyoming (WIRO) for field testing. Data analysis is pending.
Staff took the BAM instrument to Mauna Kea for field testing.

METRIC EVENTS

101 **Develop second generation MUX testing hardware to support detector development**
Preliminary completion: May 1, 2001
Final delivery: August 31, 2001

Percent complete: 100%

Comments: Initial MUX tests were begun by May 1 and are complete.

102 **Develop and test SQUIDs and associated boards to support detector development**
Preliminary completion: June 1, 2001
Final delivery: August 31, 2001

Percent complete: 100%

Comments: Initial development is complete; SQUIDs operated successfully and on FIBRE at Mauna Kea.

103 **Develop GSE for detector development**
Completion date: August 31, 2001

Percent complete: 90%

Comments: The cryogenic address board is in breadboard form. Automation system is well under way.

201 **Provide test support for validation of detector system elements (e.g., inductors)**
Preliminary completion: March 30, 2001
Final delivery: August 31, 2001

Percent complete: 30%

Comments: First test trial run of SQUID multiplexers in the dilution refrigerator was successful.

202 **Develop test equipment for low-temperature testing (e.g., 2-stage ^{3}He refrigerator)**
Preliminary completion: March 30, 2001
Final delivery: August 31, 2001

Percent complete: 80%

Comments: Integration of the test station setup is under way.

203 **Develop test equipment for optical testing (e.g., FTS setup)**
Preliminary completion: May 1, 2001
Final delivery: August 31, 2001

Percent complete: 0%

Comments: FTS setup had to be returned to manufacturer due to configuration problems.

301   **Provide test support for FIBRE instrument**
Preliminary completion: March 30, 2001
Completion date: August 31, 2001

Percent complete: 90%

Comments: The Mauna Kea run was successful.

302   **Provide test support for SPIFI (South Pole Imaging Fabry-Perot) instrument**
Preliminary completion: March 30, 2001
Completion date: August 31, 2001

Percent complete: 10%

Comments: The plan for supporting the tests is complete.

401   **Provide scientific/technical documentation of detector performance suitable for publication**
Preliminary completion: June 1, 2001
Completion date: August 31, 2001

Percent complete: 90%

Comments: Staff presented three posters at the AAS meeting at Pasadena, CA in June. Papers presenting details of these results are in preparation or, in some cases, published.

GSFC ATR: Dr. Ronald J. Oliversen
Raytheon ITSS Task Leader: Dr. Robert H. Cornett

QUARTERLY REPORT: JUNE 20 – SEPTEMBER 19, 2001

TASK OBJECTIVES

The purpose of this task is to provide support for the maintenance and operations of the Goddard 36-inch Telescope Test Facility and related research projects.

WORK ELEMENTS

No work was performed on this task during this quarter due to funding limitations.

100 Equipment design, construction, and testing

200 Operations and observation support

300 Data reduction and analysis

400 Training and facility use support

500 Facility maintenance and upgrade

Non-Local Travel

None

METRIC EVENTS

101   Upgrades to Fabry-Perot spectrometer
Completion date: August 31, 2001

Percent complete:

Comments:

102   Upgrades to CCD imager
Completion date: May 31, 2001

Percent complete:

Comments:

301   Update observational parameters of the NSO Groundbased Io [OI] database
Completion date: April 30, 2001

Percent complete:

Comments:

302   **Pass 1 reduction of 1999 Io [OI] data for Galileo I25 encounter**
       Completion date: August 31, 2001

       Percent complete:

       Comments:

GSFC ATR: Dr. Brian R. Dennis
Raytheon ITSS Task Leader: Anne K. Tolbert

QUARTERLY REPORT: JUNE 20 – SEPTEMBER 19, 2001

TASK OBJECTIVES

The purpose of this task is to provide support for obtaining, cataloguing, analyzing, archiving, and disseminating various data sets of interest to the members of the Solar Physics Branch.

WORK ELEMENTS

100 HESSI data acquisition, cataloguing, archival, and analysis

The HESSI launch is currently scheduled for mid-October, 2001.

Task members attended HESSI Data Analysis software meetings July 16, August 15, and September 10 conducted by conference calls between GSFC, UCB, Lockheed, and ETH.

Staff continued to improve and extend the HESSI data analysis software. The main effort has been divided between support for existing routines and the development of tools for spectroscopy and additional GUI tools. The work on the existing routines has been to fix identified bugs, and to make modifications that improve the interfaces and reconcile the calibration problems.

Task members worked on the following specific software areas:
- Staff developed universal annular sector routines. Within the annular sector routines, the cosine and sine modulations are saved in memory for a half-annulus for a single orientation of the patterns. That pattern is now independent of the initial orientation of the pattern for the first time interval, and can now be re-used provided the Field of View parameters (pixel size and image dimension) remain fixed. In that sense they are universal and re-usable. Although the patterns can be created rapidly, their fixed orientation makes a speed increase of 50% possible for the Pixon method, due to the possibility of pre-processing the convolution of the patterns with a smoothing kernel for re-use as needed. This also will allow the creation of multiple annular sector objects without the need for the memory hungry storage of multiple modulation patterns.
- Staff added support for source variability over imaging interval by modifying the process method of the calibrated eventlist object and annular sector objects to support the demodulation of the observed count rates for the intrinsic source variability. The method also includes a first cut at determining the intrinsic source time history.
- Team members integrated Dr. E. Schmahl's (University of Maryland) automatic time bin algorithm into the calibrated eventlist. Based on a single quality control parameter, the cbe_digital_quality, the time_bin_def and time_bin_min parameters are set to values consistent with the distance from the imaging axis to the center of the imaging field of view.
- Staff is in the midst of a major rework of the process method of the spectrogram class, which will allow the binned eventlist to be created from this class and will create a single pass 3D spectrogram (energy, time, a2d).
- Task members advised Dr. G. Holman (GSFC) on the development of his Xray Bremsstrahlung routines and helped integrate them into SSW.
- Task members discussed the problem of time jumps due to correction for spacecraft clock drift with M. Fivian (PSI). As a result, staff will modify the HESSI native time routines to eliminate these jumps by interpolating the conversion in both directions between spacecraft/UT clock fiducials provided in the data stream.

- The fitting object now handles all data via objects. It has been tested and is now being used to write an object for time series fitting of background spectra for use in HESSI data analysis software.
- The HESSI FITS and GENX writer routines have been merged into a single routine. Nuclear line templates have been merged into SPEX. There are a few minor bugs that must be resolved.
- The imaging widget in the HESSI GUI now allows for reconstructing images for multiple energy and time intervals. The image cube generated can either be made available for display and manipulation in the GUI, or is written to an image cube FITS file.
- A HESSI image movie feature was added to the HESSI GUI. The image movie widget reads an image cube FITS file and displays movies in time or energy, with options to show ratios, difference or sums of intervals, options for scaling, surface vs. flat image, and more.
- Staff added a feature to the HESSI GUI to allow stacking of plots on the same x-axis scale. Zooming in on the primary plot will force the stacked plots to zoom to the same interval. This allows different data types, for example HESSI and GOES time profiles, to be compared for the same interval.

Task members serviced the XGCF equipment as part of routine maintenance. Per Dr. G. Hurford's (UCB) request, staff has begun development of scan programs for full Fe55 scans of spare grids 1-4.

Task members continued to work with S. Freeland (Lockheed) and R. Bentley (MSSL) to improve the SSW installation scripts for PC's and to improve and streamline the Web documentation for SSW installation.

Task members researched the current computer market and advised HESSI staff on computer purchases. Seven DELL 1.7 GHZ computers were purchased and configured, two as Linux machines, and five as Windows machines.

Staff submitted purchase orders for PCs, laptops, printers, software, disk drives, and more.

RITSS staff continued to update and improve the HESSI and SUNBEAMS web sites.

Task members performed the following tasks related to the Summer Student Program:
- Updated the LASP Summer Student Web Page
- Recruited and placed students within LASP for the summer
- Organized student presentations and seminars with guest speakers
- Organized student luncheons and field trips
- Tracked summer student budget and Catholic University expenses

Task members provided PC and Unix system administration support.

200 Complementary data acquisition, cataloguing, archival, and analysis

RITSS staff supports the Solar Software (SSW) IDL tree used by the solar scientific community by contributing useful software and maintaining existing software.

Non-Local Travel

Staff made one trip to U. California (Berkeley).

Publications

Accepted by *Solar Physics*:
Gamma-Ray Line Observations of the 2000 July 14 Flare and SEP Impact on the Earth
G.H. Share, R.J. Murphy, A.J. Tylka, R.A. Schwartz, M. Yoshimori, K. Suga, S. Nakayama, H. Takeda

Accepted by *Ap Journal Letters*:
Solar Hard X-Ray Bursts And Electron Acceleration Down To 8 Kev
R P Lin, P T Pfeffer, R A Schwartz

METRIC EVENTS

101   HESSI data analysis pre-launch software
Completion date: TBD dependent on launch date currently scheduled for mid-October, 2001

Percent complete: 97%

Comments: Date changed 6/20/01 with concurrence of ATR. Launch date postponed to be
no earlier than mid-September 2001.
Date changed again 9/10/01 with concurrence of ATR. Launch date postponed to be no
earlier than mid-October 2001.
Release 6.0 scheduled for October 1, 2001

102   Launch and turn-on support
Start date: Unknown
Completion date: TBD dependent on launch date currently scheduled for mid-October, 2001

Percent complete:

Comments: Date changed 6/20/01 with concurrence of ATR. Launch date postponed to be no
earlier than mid-September 2001.
Date changed again 9/10/01 with concurrence of ATR. Launch date postponed to be no earlier
than mid-October 2001.

103   Documentation - HESSI User's Guide
Completion date for Version 1: mid-October, 2001

Percent complete: 70%

Comments: Completion date changed 6/20/01 with concurrence of ATR.
Date changed again 9/10/01 with concurrence of ATF.

104   Documentation – Web Site Archive of HESSI Documentation
Completion date for Version 1: mid-October, 2001

Percent complete: 88%

Comments: Completion date changed 6/20/01 with concurrence of ATR.
Date changed again 9/10/01 with concurrence of ATR.

GSFC ATR: Dr. Joseph M. Davila
Raytheon ITSS Task Leader: Dr. Leon Ofman

QUARTERLY REPORT: JUNE 20 – SEPTEMBER 19, 2001

TASK OBJECTIVES

The purpose of this task is to provide numerical simulations of the magnetohydrodynamic dissipation processes in the solar wind and the solar corona.

WORK ELEMENTS

100 Data analysis

Development of a new technique for the determination of the magnetic field in an active region loop was completed. The method is based on the determination of the Alfven speed in the loop from the loop oscillations and geometry observed by TRACE, and the determination of the loop density from two or three EUV emission line images of the loop using the SolarSoft TRACE data analysis library. The description of the new method and the first successful use of this method of measurement of the magnetic field in an active region loop were published in *Astronomy & Astrophysics Letters* (see New Metric event 301).

200 Model development

Development of the 3D MHD model of waves in curved active region magnetic field with gravitationally stratified atmosphere was completed. The results of the model were presented at scientific conferences and are in preparation for publication (see New Metric events 201-401).

300 Preparation of publications

See Metric Event 301, below.

400 Dissemination of results

See Metric Event 401, below.

Non-Local Travel

None

METRIC EVENTS

201   Develop three-dimensional MHD model of waves in a curved, gravitationally stratified, coronal magnetic field structure
Completion date: August 31, 2001

Percent complete: 100%

Comments: The task leader has developed a 3D MHD model of active region magnetic fields in a gravitationally stratified atmosphere. The task leader has successfully modeled the interaction of fast magnetosonic waves with the curved magnetic field structure. The results of this study were presented at the IAGA meeting (August 2001). A paper describing these results is in preparation for publication.

301   Prepare at least one scientific paper discussing research

Percent complete: 100%

Comments: The following papers discussing research were published during the task year:

- Ofman, L., Vinas, A., Gary, S.P., Constraints on the O^{5+} Anisotropy in the Solar Corona, *The Astrophysical Journal Letters 547*, L175, 2001.
- Gary, S.P., Yin, L., Winske, D., and Ofman, L., Electromagnetic Heavy Ion Cyclotron Instability: Anisotropy Constraint in the Solar Corona, *Journal of Geophysical Research 106*, 10715, 2001.
- Ofman, L., Davila, J.M., Three-fluid 2.5D MHD Model of the Effective Temperature in Coronal Holes, *The Astrophysical Journal 553*, 935, 2001.
- Nakariakov, V.M., Ofman, L., Determination of the coronal magnetic field by coronal loop oscillations, *Astronomy and Astrophysics 372*, L53, 2001.
- Collier, M.R., Szabo, A., Farrell, W.M., Slavin, J.A., Lepping, R.P., Fitzenreiter, R., Thompson, B., Hamilton, D.C., Gloeckler, G., Ho, G.C., Bochsler, P., Larson, D., Ofman, L., Reconnection remnants in the magnetic cloud of October 18-19, 1995: A shock, monochromatic wave, heat flux dropout, and energetic ion beam, *Journal of Geophysical Research 106*, 15985, 2001.

401   Present research results at at least one scientific meeting per year

Percent complete: 100%

Comments: The task leader has presented the results of research at the EGS meeting (Nice, France, April 2001); the Spring AGU/SPD meeting (San Francisco, CA, May 2001); and at the IAGA meeting (Hanoi, Vietnam, August 2001).

GSFC ATR: Dr. Joseph M. Davila
Raytheon ITSS Task Leader: Dr. Jeffrey W. Brosius

QUARTERLY REPORT: JUNE 20 – SEPTEMBER 19, 2001

TASK OBJECTIVES

The purpose of this task is to develop models for the microwave, EUV, and related emissions from thermal structures in the solar atmosphere.

WORK ELEMENTS

100 Data analysis

Staff completed the IDL code that utilizes the new procedure for deriving 3-dimensional coronal magnetograms from coordinated EUV and microwave observations. The method involves placing gyroresonance harmonics for each of the X- and O-modes for all available microwave observing frequencies into appropriate atmospheric temperature regimes such that model calculations reproduce the observations. This new, iterative procedure is flexible, and capable of handling numerous microwave observing frequencies simultaneously. The manuscript "Measurements of Three-Dimensional Coronal Magnetic Fields from Coordinated Extreme-Ultraviolet and Radio Observations of a Solar Active Region," intended for submission to ApJ, was distributed among coauthors. The reliability of coronal magnetograms depends upon the accuracy of the CDS and EIT calibrations, the former of which is established by the cordinated SERTS and CDS observations.

Staff coordinated a 5-day solar coronal magnetography observing campaign involving three instruments aboard the SOHO satellite (CDS, EIT, MDI), Yohkoh/SXT, TRACE, the VLA, the OVSA, and the BBSO during July.

200 Model development

Detailed work on coronal magnetography continued. Effort focused on completing the iterative procedure that places the gyroresonance harmonics for each of the X- and O-modes in appropriate atmospheric temperature regimes such that model calculations reproduce the observed microwave emission. Calculations based upon this method reproduce the observed sunspot radio emission at all observation frequencies very well. This yields magnetic field strength as a function of temperature. This was converted to a function of height using the magnetic scale height as estimated from the radio brightness temperature maps. This, when compared with the height derived from the emission measure and the electron density, yields volume filling factors around 5%. It was decided that the magnetic scale height as measured from the microwave data may be interpreted as an upper limit on the actual magnetic scale height. Height calculations were repeated, using a more canonical value for the magnetic scale height. Comparisons were made with potential extrapolations from MDI photospheric magnetograms. Not only are the potential fields lower in height than the fields derived from our procedure, but they are substantially lower in magnitude as well, indicating the presence of coronal electric currents. Alfven speeds between 30,000 and 50,000 km/sec were derived.

300 Preparation of publications

(a) "Measurements of Three-Dimensional Coronal Magnetic Fields from Coordinated Extreme-Ultraviolet and Radio Observations of a Solar Active Region," J. W. Brosius, E. Landi, J. Cook, J. Newmark, N. Gopalswamy, and A. Lara, Ap. J., submitted (2001).

400 Dissemination of results

An educational talk, "Squeezing Information out of Light From the Sun and Other Stars," was presented to summer students at GSFC

Non-Local Travel

None

METRIC EVENTS

201   Develop models that use SERTS data to understand solar processes
Completion date: August 31, 2001

Percent complete: 100%

Comments: Sunspot coronal magnetography modeling based upon EUV data from the SOHO satellite (calibrated with SERTS) is completed, and has been written up for publication in ApJ.

301   Prepare at least one scientific paper discussing research

Percent complete: 100%

Comments: (a) "Analysis of a Solar Active Region EUV Spectrum From SERTS-97," J.W. Brosius, R.J. Thomas (GSFC), J.M. Davila (GSFC), & E. Landi (MPIA), *ApJ* 543, 1016 (10 Nov 2000).

(b) "A Comparison Between Theoretical and Solar Fe XII UV Line Intensity Ratios," A. M. Binello, E. Landi, H. E. Mason, P. J. Storey, and J. W. Brosius, *Astron. Astrophys.*, in press, 2001

(c) "A Comparison of Theoretical Mg VI Emission Line Strengths with Active Region Observations from the Solar EUV Rocket Telescope and Spectrograph (SERTS)," F. P. Keenan, M. Mathioudakis, A. C. Katsiyannis, C. A. Ramsbottom, K. L. Bell, R. J. Thomas, and J. W. Brosius, submitted (2001).

(d) "Measurements of Three-Dimensional Coronal Magnetic Fields from Coordinated Extreme-Ultraviolet and Radio Observations of a Solar Active Region," J. W. Brosius, E. Landi, J. Cook, J. Newmark, N. Gopalswamy, and A. Lara, *Ap. J.*, submitted (2001).

401   Present research results at at least one scientific meeting per year

Percent complete: 100%

Comments: Results of SERTS solar EUV spectra presented at the SPD meeting in Stateline, NV (*BAAS*, vol. 32, pg. 845, 2000).

Results of coronal magnetographic work presented at the SPD meeting in Boston, MA, May 29 - June 2, 2001: "Measurements of 3-D Sunspot Coronal Magnetic Fields From Coordinated SOHO EUV and VLA Radio Observations," J. W. Brosius, E. Landi, J. Cook, J. Newmark, N. Gopalswamy, and A. Lara, *Eos* (*Supplement*), vol. 82, p. s315 (2001).

GSFC ATR: Dr. Susan G. Neff
Raytheon ITSS Task Leader: Dr. Robert Cornett

QUARTERLY REPORT: JUNE 19 – SEPTEMBER 20, 2001

TASK OBJECTIVES

The purpose of this task is to support research aimed at assessing the relationship between the star formation history and the apparent dynamical state of merging galaxies.

WORK ELEMENTS

New task member Scott Campion joined this task in mid-June.

100 Observation planning, preparation, and execution

200 Data reduction and analysis

Sixteen VLA datasets on two merging galaxies were reduced, combined, and analyzed.

300 Modeling and software development

Using multibandpass flux data derived from VLA maps, supernova rates were derived for sources in the above-mentioned VLA maps.

400 Publication development

The flux and model results derived from analysis of the maps (source list, fluxes, spectral indices, and SN rates) were combined into a table for a future publication. It is expected that this paper will be submitted by the end of the calendar year.

Non-Local Travel

None

METRIC EVENTS

101   **Planning and execution of observing at Kitt Peak National Observatory:**
        One trip per year, depending on proposal success

        Comments:

201   **Reduction and calibration of data from observing runs:**
        Three months after return from observation trip

        Comments: Reduction, calibration and some analysis of the VLA data above were completed.

401   **Presentation of paper or poster on results at scientific meeting or colloquium:**
        One per year

        Comments: Work is under way on a publication on the VLA results described above.

GSFC ATR: Dr. Robert F. Silverberg
Raytheon ITSS Task Leader: Dr. Dale J. Fixsen

QUARTERLY REPORT: JUNE 20 – SEPTEMBER 19, 2001

TASK OBJECTIVES

The purpose of this task is to provide support for design, testing, flight preparations, flight operations, and data analysis for the Medium Scale Anisotropy Measurement (MSAM) and top-mounted balloon borne instrument.

WORK ELEMENTS

100 Data reduction and analysis

Staff created 5 sky maps using the flight data, one for each frequency. They show the structure of the Galaxy, verify the pointing and permit calculating the gain. The next step will be to deconvolve the 5 maps into two, one for the CMBR and one of the Galaxy. Discussions were held with staff at U. Chicago on the map-making, to support the efforts in creating maps at U. Chicago as well as at GSFC.

Contributions were made to the TopHat instrument paper, submitted September 18, 2001.

Non-Local Travel

Staff traveled to San Diego July 29-August 3 to present a paper on multi-mode antenna optimization.

METRIC EVENTS

101   **Complete flight data analysis, including special-purpose analysis software**
        Completion date: September 19, 2001

        Percent complete: 80%

        Comments: Single-frequency maps are under way; algorithms and techniques are written.

NASA Task: 99F0026   FIR/Submillimeter Interferometer Design Studies

GSFC ATR: Dr. David Leisawitz
Raytheon ITSS Task Leader: Dr. Xiaolei Zhang

QUARTERLY REPORT: JUNE 20 – SEPTEMBER 19, 2001

TASK OBJECTIVES

The purpose of this task is to provide support for science requirement specification, mission concept development, optical/mechanical design studies, laboratory testbed interferometer assembly and development, and proposal support for the Submillimeter Probe of the Evolution of Cosmic Structure (SPECS) and related precursor missions.

WORK ELEMENTS

100 Science requirement specification

Studies continued on the cosmological evolution of galaxies to provide additional science background for the design studies of the far IR missions. In July, staff wrote and submitted a proposal to NASA's Astrophysics Theory Program (with co-investigators from U.C. Berkeley, Univ. of Alabama, Univ. of Arizona, and the Space Telescope Science Institute). This proposal detailed further studies to be carried out on the theoretical foundations and observational consequences of the secular evolution process in galaxies, as well as ways to compare these with the available and soon-to-be available observations.

200 Mission concept development

Mission concept studies were continued in conjunction with the development of the testbed.

300 Optical/mechanical design studies

Further optical/mechanical design studies were carried out on the WIIT testbed. The servo-vibration problem on the delay-line translation stage was diagnosed, and a solution was worked out to resolve the problem. Currently the delay-line travel smoothness is improved to a degree that enabled white-light fringe acquisition through the CCD camera (which requires the stage to move at an extremely slow 0.01 mm/minute speed with minimal servo jitter). Further optical layout improvement has been discussed, which will upgrade the current all-flat-mirror relay system to a system that involves cat's eyes or cube corners, reducing the sensitivity to pitch and yaw errors.

400 Laboratory assembly and development of the Wide-field Imaging Interferometry Testbed (WIIT)

Staff led the continued effort in the alignment and trouble-shooting of the WIIT testbed assembly. Apart from installing the newly manufactured custom beam splitter, staff also improved the servo performance, detector sensitivity, alignment accuracy, mirror coating uniformity, and the filter assembly. A LabWindows-CVI routine was written that acquires image frames through the CCD camera. A milestone was reached on Aug, 16, 2001 when WIIT detected the first white light fringes through both the oscilloscope/detector scheme and the CCD camera recording scheme. WIIT is now a Michelson spatial-spectral interferometer ready to proceed to imaging studies.

500 Proposal support

Staff supported various SPECS related proposal efforts, and supported tours to the WIIT lab by NASA Headquarters.

Non-Local Travel

None.

METRICS

201   **Support biweekly meetings of the FAR/IR Mission Study Working Group**
Biweekly per meeting schedule

Percent complete: on-going throughout the contract period

Comments: on schedule

301   **Present paper on WIIT at IEEE conference in Big Sky, Montana**
Completion date: March 31, 2001

Percent complete: 100%

Comments: on schedule

401   **Use the WIIT testbed to detect fringes**
Completion date: March 01, 2001

Percent complete: 100%

Comments: on schedule

402   **Reconstruct a 1-dimensional image using the WIIT testbed**
Completion date: November, 2001

Percent complete: 80%

Comments: New completion date to be provided by ATR.

GSFC ATR: Dr. Neil Gehrels
Raytheon ITSS Task Leader: Dr. Peter J.T. Leonard

QUARTERLY REPORT: JUNE 20 - SEPTEMBER 19, 2001

TASK OBJECTIVES

The purpose of this task is to provide support for the publication of a feature article on gamma-ray bursts (GRBs) for Scientific American magazine, and a review article on the scientific accomplishments of the Compton Gamma Ray Observatory (CGRO) for Reviews of Modern Physics.

WORK ELEMENTS

100 Literature searches on GRBs and scientific results of CGRO

Searches through *Nature* and *Science* magazines for articles on GRBs, CGRO and gamma-ray astronomy have been kept up to date. Many papers from other journals, such as the *Astrophysical Journal*, have been studied.

200 Preparation of manuscripts on GRBs and scientific results of CGRO

The article on GRBs was submitted to *Scientific American* on August 10. The first draft of the manuscript on the scientific results of CGRO is more than 50% complete.

300 Subsequent publication support

The article on GRBs is being revised according to the comments received from the *Scientific American* editor.

Non-Local Travel

None.

METRIC EVENTS

201   **Manuscript on GRBs ready for submission to *Scientific American*:**
        Completion: August 10, 2001

        Percent complete: 100%

        Comments: Article was submitted to *Scientific American* on August 10.

202   **Support development of a manuscript on scientific results of CGRO ready for submission to *Reviews of Modern Physics*:**
        Completion: September 20, 2001

        Percent complete: 40%

        Comments: First draft of manuscript is more than 50% complete.

301   **Submission of revised manuscript on GRBs in response to editor's comments:**
Completion: September 20, 2001

Percent complete: 40%

Comments: Article is being revised according to comments from *Scientific American* editor.

302   **Submission of revised manuscript on scientific results of CGRO in response to referee's comments:**
Completion: TBD upon receipt of comments

Percent complete:

Comments:

GSFC ATR: Dr. Alan J. Kogut
Raytheon ITSS Task Leader: Dr. Nicholas Phillips

QUARTERLY REPORT: JUNE 20 – SEPTEMBER 19, 2001

TASK OBJECTIVES

This task provides support for research and simulations of the cosmic microwave background radiation.

WORK ELEMENTS

100 Support simulations and analysis of CMB anisotropy

The neural network analysis code now operates at the resolution and noise profiles of COBE/DMR.
A more robust formalism was developed and applied.

We have developed and included an algorithm and formalism for predicting uncertainties in the parameter fit. This is a major step forward, because we have now made one complete design and implementation pass through the requirements for this project. We now have all the elements that a traditional maximum likelihood analysis provides, and they can be compared with other methods directly. The results of the comparison show good agreement with the traditional maximum likelihood analysis developed by the COBE/DMR team. A draft manuscript that incorporates the algorithm and formalism, titled The draft manuscript, *"Neural Networks as a tool for parameter estimation in mega-pixel data sets"* was submitted to *ApJ* in August.

200 Support polarization mapping of diffuse microwave emission

Non-Local Travel

None

METRIC EVENTS

101   **Draft publication for parameter estimation using neural networks**
        Completion date: June 30, 2001 (revised w/ATR concurrence)

        Percent complete: 100%

        Comments: Completed manuscript incorporating comments and refinements was submitted in August.

102   **Develop algorithm for neural network tied to HEALPIX pixelization**
        Completion date: June 30, 2001

        Percent complete:

        Comments: To follow draft publication above.

103   **Draft publication for Galactic polarization signals from COBE/DMR data**
       Completion date: August 31, 2001

       Percent complete:

       Comments: To follow draft publication above.

GSFC ATR: Dr. Harvey Moseley
Raytheon ITSS Task Leader: Timothy Powers

QUARTERLY REPORT: JUNE 20 – SEPTEMBER 19, 2001

TASK OBJECTIVES

The purpose of this task is to provide technical support for evaluation and test of cryogenic components used in the SAFIRE and HAWC SOFIA instruments. This work will include design of test fixtures, interfacing components to test cryostats, executing experiments, and reporting the results to the team. Documentation and organizational support for this effort are included.

WORK ELEMENTS

100 Development of test equipment and environments

Staff completed the wiring and preparation of a 2-stage ^{3}He cryostat for testing a prototype 2-dimensional popup detector array for SAFIRE. This cryostat is designed to reach 220 mK, which is sufficient to test ultralow background bolometer arrays.

Plans were made to move SAFIRE testing to the ADR system in the CRIF. Cabling for this system was ordered.

200 Component and system test support

Support continued for detector responsivity tests for the HAWC instrument, with typically one series of detectors being tested per week.

300 Documentation and organizational support

Administrative and organizational support were supplied to the HAWC and SAFIRE projects. Work included project schedule maintenance, organization of documentation, travel support, facilitating e-mail and telephone communication among project scientific staff, and meeting and visitor support.

Non-Local Travel

None

METRIC EVENTS

101   **Provide cryogenics and electronics engineering support for detector research and development, including test and verification, for the SAFIRE detectors, optics, and electronics**
Completion date: August 31, 2001

Percent complete: 100%

Comments: Extensive support was supplied for the Mauna Kea tests.

102   Provide scientific analysis, oversight, management, and support, for test equipment and facilities for the SAFIRE instrument
Completion date: August 31, 2001

Percent complete: 100%

Comments: Extensive support was supplied for the Mauna Kea tests and related laboratory work.

103   Provide cryogenics and electronics engineering support, scientific oversight, and evaluation for detector testing/screening component of the HAWC project
Completion date: August 31, 2001

Percent complete: 100%

Comments: Complete as required

201   Provide cryogenics and electronics engineering support for detector research and development, including test and verification, for the SAFIRE instrument
Completion date: August 31, 2001

Percent complete: 100%

Comments: Extensive support was supplied for the Mauna Kea tests.

202   Provide scientific analysis and oversight, scientific/technical management, and scientific/engineering support, for the SAFIRE project
Completion date: August 31, 2001

Percent complete: 100%

Comments: Extensive support was supplied for the Mauna Kea tests.

203   Provide cryogenics and electronics engineering support, scientific oversight, and evaluation for detector research and development, specifically for test and verification, for the HAWC project
Completion date: August 31, 2001

Percent complete: 70%

Comments: The first series of detector tests is complete.

301   Transfer experience-based knowledge of HAWC detector fabrication and assembly to U. of Chicago staff on the HAWC team
Completion date: August 31, 2001

Percent complete: 100%

Comments:

302   Transfer experience-based knowledge of HAWC detector testing, calibration, and operation to U. of Chicago staff on the HAWC team
Completion date: August 31, 2001

Percent complete: 100%

Comments:

303   Provide documentation as necessary for reviews, especially FAA airworthiness reviews, for the HAWC and SAFIRE instruments
Completion date: August 31, 2001

Percent complete: 100%

Comments: Provided as required.

GSFC ATR: Edward Sullivan
Raytheon ITSS Task Leader: Susan Wright

QUARTERLY REPORT: JUNE 20 – SEPTEMBER 19, 2001

TASK OBJECTIVES

This task supports IR program activities in the following elements including the Microwave Anisotropy Probe, IR balloon flights, and instrument development for FIRST/SPIRE, SOFIA/HAWC, and SOFIA/SAFIRE.

WORK ELEMENTS

100 Project documentation support

- An annual calendar of events and deadlines for the branch was maintained and updated, as needed. The new activities for year 2001 are now updated currently and available in the calendar.

- The e-mail list for the IR Program staff is currently up to date and is being maintained and updated as needed. The list has also been incorporated into the IR branch website for access only by NASA Goddard Space Flight Center employees.

- An organization diagram, including location and contact information for all IR Program staff is also maintained and updated as needed. The long-term goal of this effort is aimed toward development of a web page as the primary database for IR Program reference material. The branch organization chart is maintained and updated as new employees join the branch. Also included in the organization diagram is a current list of long-term visitors.

Other program support included continuing logistics support for travel to scientific meetings. Travel arrangements were supported for the 198th Annual American Astronomical Society Meeting in Pasadena, California, the 36th International Colloquium in Belgium, the 2K1BC Workshop "Experimental Cosmology at mm waves" in Breuil-Cervinia, Italy, and the Microwave Anisotropy Probe launch at Kennedy Space Flight Center, Florida. During this time, there were also numerous Next Generation Telescope conferences and meetings, requiring coordination with Code 443.

200 Proposal preparation support

Logistical support was provided for proposal preparation within the IR Program.

300 Database development and maintenance

Database development during this quarter included acquiring and formatting material for:

- The annual events calendar, updated and maintained through December, 2001. The task leader is currently getting all pertinent dates for the next year and incorporating them into the calendar.

- Development of an e-mail address list for IR Program staff, which is now accessible on the IR web page at: http://lasp-nts1.gsfc.nasa.gov/lasp_only/branch_list.html.

- The organization diagram is updated and reflects the newest room assignments resulting from the building renovation.

As described above, the long-term goal of this effort is aimed toward development of an IR Program web page as the primary database for IR Program reference material.

Other database development and maintenance included:

- The task leader updates and edits the IR staff experience (Biographies) database on the IR web site. This involves eliciting information from the staff and incorporating it into the IR web page.

- Maintenance of a travel surveillance database is continuing. This ensures that the IR Program's travel expenditures do not exceed the travel budget. The tracking is done on a trip-by-trip basis via interaction with
- the branch Resource Analyst.

400 Visiting scientist travel support

Non-Local Travel

None

METRIC EVENTS

101   **Develop and maintain a Branch annual calendar online. Deliver updated hardcopies quarterly as part of contract's Quarterly reports.**
      Completion dates: June 19, 2001
                            September 19 2001

      Comments: The Branch's annual calendar is maintained and kept updated online. Hard copies are attached to the Quarterly Reports.

102   **Develop and maintain appropriate e-mail lists (e.g. for engineering, scientific, civil service, and contractor staff, and for specific projects) for circulation of relevant Branch information. Deliver updated lists quarterly as part of contract's Quarterly reports.**
      Completion dates: June 19, 2001
                            September 19, 2001

      Comments: E-mail lists for the IR Program are updated and maintained online and are now accessible on the IR branch website. The list now includes long-term visitors as well as 685 staff. Hard copies are attached to the Quarterly Reports.

103   **Develop and maintain a Branch website**
      Draft completion date: August 31, 2001

      Percent complete: 100%

      Comments: The e-mail/telephone extension list is now updated on the IR Branch website. This e-mail/ telephone list is currently accessible on the IR Branch website at: http://lasp_nts1.gsfc.nasa.gov/lasp_only/branch_list.html. The IR branch web page will continue to be maintained and updated as necessary. The updating of the e-mail/telephone extension list is now completed with the most current information on branch employees. Continuing HTML courses, available on-site, are being utilized to maintain HTML skills.

201   **Branch proposal support**

      Completion dates as driven by Announcements of Opportunity

      Comments: Staff continues to provide logistical support for proposals as required.

INFRARED ASTROPHYSICS BRANCH
CODE 685 ORGANIZATION CHART

Branch Head
C. Bennett   059   3902

IR Program Support Specialist
S. Wright   166   8528

Civil Servants

Name	Room	Ext.
D. Benford	222	9832
E. Cheng	253	5038
W. Danchi	160	4586*
E. Dwek	232	6209
M. Freund	281	7509
M. Greenhouse	104	0596
G. Hinshaw	138	0851
A. Kogut	059B	0853
J. Mather	108	8720
H. Moseley	130	2347
R. Shafer	222	2596
R. Silverberg	216A	7468
E. Wollack	134	1379
* Acting Branch Head		

Contractors

Name	Room	Ext.
HST		
D. Cottingham	257	0872
A. Russell	257	9629
E. Sharp	L108	3690
MAP		
G. Canter	067	7346
B. Griswold	063	3381
M. Greason	063F	4529
M. Limon	063D	5317
J. Weiland	063C	5749
TOPHAT		
A. Bier	241	5079
B. Compano	257B	8445
T. Chen	241	7098
D. Fixsen	257	0873
OTHER		
R. Arendt	C129	8607
E. Buchanan	163	5018
D. Humberson	071	5109
S. Kashlinsky	064	2176
A. Kutyrev	228	2150
P. Mirel	145	4382
N. Phillips	T21A	8679
T. Powers	163	7659
J. Rebar	C129	7860
D. Schlossberg	253	5059
T. Sodroski	181	9275
J. Staguhn	281	7840
P. Struthers	C129	0850
X. Zhang	236	4639

Long Term Visitors

Name	Room	Ext.
D. Adler	229	0956
J. Felten	L108	6364
D. Halevi	145	9462
C. Holt	125	4559
T. Kelsall	C129	7865
S. Khan	218	4065
K. Long	120	7422
K. Misselt	232	2841
L. Ozernoy	C129	0849
M. Tanaka	234	4514
R. Windhorst	C215	TBA
V. Zubko	232	TBA

Other Contractors

Name	Room	Ext.
WFC3		
G. Delo	269	7806
T. Eskin	245	3994
K. Glasser	253	0874
S. Gross	245	5339
R. Hill	253	8531
D. Hsu	245	0089
S. Johnson	265B	3673
M. Lacorte	245	7891
E. Polidan	245B	4689
E. Wassell	257	5352
Y. Wen	257	7540

BRANCH CALENDAR

January	February	March	April	May	June
Mid-Jan. - Cash awards due	**Feb. 5** - Call for ATP Proposals	**March 15** - Reminder of NRC Dead.	**April 15** - NRC Deadline	**May 6** - ADP Proposals Due	**June 15** - Call for GSFC 1st Quarter Awards
Mid. Jan. - Call for GSFC 3rd Quarter Awards	**Late Feb.** - 3rd Quarter GSFC Awards Due		**Mid-April** - Call for GSFC 4th Quarter Awards	**May 15** - Do Perf. reviews: Mather & Moseley	**Mid-June** RTOP Summaries due
Jan. 15 - NRC Deadline				**Mid-May** RTOP Summary Call	
Jan. 19 - Call for ADP Proposals				**Late May** - 4th Quarter GSFC Awards Due	
				Late May - Perf. Reviews due for Mather & Mosely	

BRANCH CALENDAR

July	Aug.	Sept.	Oct.	Nov.	Dec.
1st Week of July - Call for Cap. equipment	1st Week of Aug. - Cap. Equipment due	Sept. 1 - Call for SOWs	Oct. 1 - SOWs due		
Mid. July Observatory Rpt. assig.	Mid-August Observatory Rpt. due				
July 15 - Reminder of NRC Dead.	Aug. 15 - NRC Deadline				Dec. 15 - Reminder of NRC Deadline
Mid. July - Call for Annual NASA Awards	Aug. 18 - DDF Call	Sept. 15 - Reminder to do perf. reviews for everyone but Mather & Moseley		Nov. 15 - Call for GSFC 2nd Quarter Awards	
		Sept. 17 - NASA Merit Award due			
	Aug. 31 - ATP Proposals Due	Sept. 24 - DDF due			
Late July - GSFC 1st Quarter Awards due	Late August - Begin compiling branch travel for upcoming year	Sept. 30 - Performance reviews due:		Nov. 2001 (date?) (Date to be determ.) Visiting comm.arrives	
Late July - Call for Merit Award Nominations	Late August - Annual NASA Awards due	Cheng Danchi Freund Greenhouse Hinshaw Kogut Silverberg Wollack	Late Oct. - Branch travel input due	Late Nov. - Cash Awards call	Late Dec. - GSFC 2nd Quarter Awards due

BRANCH 685-E-Mail Addresses/Extensions

EMPLOYEE	EXTENSION	E-MAIL ADDRESS
Civil Servants		
Dominic Benford	6-8771	Dominic.J.Benford.1@gsfc.nasa.gov
Chuck Bennett	6-3902	Charles.L.Bennett.1@gsfc.nasa.gov
Ed Cheng	6-5038	ec@cobi.gsfc.nasa.gov
Bill Danchi	6-4584	danchi@snoopy.gsfc.nasa.gov
Eliahu Dwek	6-6209	Eliahu.Dwek.1@gsfc.nasa.gov
Minoru Freund	6-7509	Mino@stars.gsfc.nasa.gov
Matt Greenhouse	6-0596	Matthew.A.Greenhouse.1@gsfc.nasa.gov
Gary Hinshaw	6-0851	Gary.F.Hinshaw.1@gsfc.nasa.gov
Alan Kogut	6-0853	Alan.J.Kogut.1@gsfc.nasa.gov
John Mather	6-8720	John.C.Mather.1@gsfc.nasa.gov
Harvey Moseley	6-2347	Samuel.H.Moseley.1@gsfc.nasa.gov
Rick Shafer	6-3463	Richard.A.Shafer.1@gsfc.nasa.gov
Bob Silverberg	6-7468	Robert.F.Silverberg.1@gsfc.nasa.gov
Ed Wollack	6-1379	Edward.J.Wollack.1@gsfc.nasa.gov
Contractors		
HST		
Dave Cottingham	6-0872	dc@stars.gsfc.nasa.gov
Anne Marie Russell	6-9629	amr@buckeyball.gsfc.nasa.gov
Elmer Sharp	6-3690	esharp@tophat.gsfc.nasa.gov
MAP		
George Canter	6-7346	George.L.Canter.1@gsfc.nasa.gov
Britt Griswold	6-3381	bgriswol@pop200.gsfc.nasa.gov
Mike Greason	6-4529	Michael.R.Greason.1@gsfc.nasa.gov
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TOPHAT		
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Dale Fixsen	6-0873	fixsen@stars.gsfc.nasa.gov
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Other Contractors		
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Ernie Buchanen	6-5018	buchanan@stars.gsfc.nasa.gov

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Tom Kelsall	6-7865	N/A
Sophia Khan	6-4065	skhan@pop600.gsfc.nasa.gov
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Elizabeth Polidan	6-4689	epolidan@stars.gsfc.nasa.gov
Yiting Wen	6-7540	yiting@tophat.gsfc.nasa.gov
Ed Wassell	6-5352	edward@tophat.gsfc.nasa.gov

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NASA Task: 99I0096   **IR Emission from the Warm Ionized Medium**

GSFC ATR: Dr. Eliahu Dwek
Raytheon ITSS Task Leader: Dr. Richard G. Arendt

QUARTERLY REPORT: JUNE 20 - SEPTEMBER 19, 2001

TASK OBJECTIVES

The purpose of this task is to provide support for analysis of infrared (IR) emission from the Warm Ionized Medium using data from the Wisconsin H Alpha Mapper (WHAM), and to use that analysis to determine the intensity of the Cosmic Infrared Background.

WORK ELEMENTS

100 Reduction and analysis of WHAM data

200 Comparison of WHAM data with other datasets

300 Studies of the Cosmic Infrared Background

Hα data from the recent public release of the WHAM survey were compared with preliminary data we received from the WHAM team in July 2000. Significant differences were found for the HQB North region so our analyses will need to be redone. Maps of the new Hα data at |b| > 30 degrees were compared with maps of residual 100-μm intensity after subtraction of the H I - correlated component. A clear correlation between these maps is not seen, suggesting that the 100μm emissivity of the warm ionized medium is low.

Non-Local Travel

None

METRIC EVENTS

101   **Repeat IR decomposition for HQB North region using adjustments to the WHAM data recommended by M. Haffner**
         Completion date: May 31, 2001

         Percent complete: 100%

         Comments: Completed ahead of schedule.

201   **Reanalyze low galactic latitude regions studied by Lagache et al. (2000), and compare our results with theirs**
         Completion date: June 30, 2001

         Percent complete: 100%

         Comments: Completed on schedule.

202   **Write the draft section of a paper on datasets used in our analysis**
         Completion date: December 31, 2001

         Percent complete: 0%

         Comments: Completion date deferred with ATR approval.

GSFC ATR: Dr. S. Harvey Moseley
Raytheon ITSS Task Leader: Dr. Alexander Kutyrev

QUARTERLY REPORT: JUNE 20 – SEPTEMBER 19, 2001

TASK OBJECTIVES

The purpose of this task is to provide technical support for development of microshutter arrays for NGST applications, and to support the development of a concept for an NGST spectrometer using such a device. Work includes optical design and evaluation of instrument performance; and fabrication, test, and evaluation of microshutter arrays for use on NGST, including mechanical analysis and comparison of measurements to models. Documentation and organizational support for this effort, including support for a follow-on proposal, are included.

WORK ELEMENTS

100 Technology development

Design of the instrument has reached the phase of mechanical design of optical bench and the dewar.

Magnetic actuation has been demonstrated for a subarray of 32x32 microshutters. In addition, addressing and latching of microshutters has been demonstrated at room temperature. Two samples of shutter arrays have been tested for scatter and transmission (one array with shutters closed and one with shutters open). The data have been analyzed.

The cryogenic motors received last quarter were made to function by disassembling and cleaning the gearbox and removing the lubricant. They may potentially be used for transport mechanisms to move the magnets that actuate microshutters

200 Instrument concept definition

300 Follow-on proposal development

400 Documentation and organizational support

Non-Local Travel

None

METRIC EVENTS

101   Optical tests of microshutters
Completion date: August 31, 2001

Percent complete: 100%

Comments: Complete as planned.

102   **Develop spectrograph test station for microshutters**
       First stage completion date: August 31, 2001
       Final completion date: February 28, 2002

       Percent complete: 20%

       Comments: Design phase will be complete in December 2001. Parts and suppliers are identified. Procurement process of optics has begun.

301   **Support the development of a follow-on proposal**
       Completion date: TBD pending AO schedule

       Percent complete:

       Comments: No proposal was submitted.

GSFC ATR: Dr. Charles Bowers
Sigma Subcontract Task
Sigma Task Leader: Ratnabali Sengupta

QUARTERLY REPORT: JUNE 20 – SEPTEMBER 19, 2001

TASK OBJECTIVES

The purpose of this task is to provide general software and experimental operations support to the WCT project.

WORK ELEMENTS

100 Development of custom control code for the WCT testbed, including developing and modifying the existing code developed for the testbed.

Staff is working on a new requirement for a MATLab GUI for the OCC (Optical Control Computer). The GUI will incorporate all existing control features and will interface with the Executive Software for the WCT.

200 Support for ongoing experiments including experiment operations; help in design and implementation of experiments on the WCT testbed; and responsibility for recording and archiving the data obtained from the experiments.

A first version of a temperature monitoring GUI in LabVIEW for the safety monitoring system for the Wavefront Control Testbed was delivered. Several changes and enhancements were suggested and work is underway to complete the task. The final code will be delivered to the WCT testbed clear room area during the next three months.

Staff provided assistance to the team in experiments using the WCT testbed. Several tests were run with the Executive Software connected to the WCT testbed to take data. Several sets of data were taken with and without the PSF magnifier, with the FSM powered on and off.

Staff will do a presentation on the 19th of September on the Safety Monitoring System for the WCT testbed, during the three day WCT workshop.

300 Assistance in the interface with NGST contractors, providing training on the WCT testbed and operations as necessary

Due to the NGST proposal blackout period there has been no interaction with the prime contractors during this quarter.

Non-Local Travel

None

METRIC EVENTS

101   **Provide support for WCT custom control code for testbed development:**
        Completion date: August 31, 2001

        Percent complete: 100%

        Comments: This task supports LabView code on the testbed safety monitoring system.

201   **Support design for specific experiments in ongoing WCT experiment program:**
        Completion dates: TBD per WCT testbed experiment program

        Percent complete: 33%

        Comments: New assignments were given for this task.

202   **Support operations for specific experiments in ongoing WCT experiment program:**
        Completion dates: TBD per WCT testbed experiment program

        Percent complete: 100% as required.

        Comments: Supported as required. This work is ongoing.

203   **Develop and submit monthly log of WCT experiments designed and performed:**
        Completion dates: Monthly

        All data taken for the FSM experiments were logged.
        This log is maintained at the WCT facility, on the Unix machines DCATTMOON and DCATTSUN.

GSFC ATR: Dr. John C. Mather
Raytheon ITSS Task Leader: Dr. Xiaolei Zhang

QUARTERLY REPORT: JUNE 20 – SEPTEMBER 19, 2001

TASK OBJECTIVES

The purpose of this task is to provide studies, models, simulations, and algorithms for wavefront sensing and optical control systems in support of the Next Generation Space Telescope.

WORK ELEMENTS

100 Perform an analytical and computational modeling study of sensitivity to optical prescription

Staff continued familiarization with the existing software and algorithms for using phase-retrieval to do NGST wavefront sensing. Analytical and computational studies continued of the sensitivity of phase retrieval quality to the optical prescription errors, and of documenting the result in a technical memo. Staff wrote computational software to carry out the statistical Cramer-Rao bound analysis on the estimation errors of optical parameters.

200 Research methods to monitor in-situ image quality and wavefront quality during NGST observations

300 Parametrically study stability and bandwidth issues of the optical control loop

400 Liaison and reporting to REE group at JPL

Liaison has been established with the JPL group, including producing reports and conducting the maintenance and upgrade of the phase-retrieval software package.

Non-Local Travel

None

METRIC EVENTS

101 **Provide a technical memorandum on sensitivity to optical prescription:**
Completion date: September 30, 2001

Percent complete: 95%

Comments: Completion date updated by ATR due to additional assignment on Cramer-Rao bound studies to be carried out in relation to the sensitivity studies.

201 **Provide a technical memorandum on methods to measure in-situ image quality and wavefront quality:**
Completion date: New date to be supplied by ATR

Percent complete:

Comments:

301   **Provide support for existing software package maintenance and upgrade**
       Completion dates: on-going

       Percent complete: 100%

       Comments: Completed the upgrade of actuator fitting package for JPL during May.

401   **Provide brief (~1 paragraph) monthly e-mail reports to D. Katz (JPL):**
       Completion dates: Monthly

       Comments: Completed as required

NASA Task: 99P0016 Dynamic Magnetospheric Models Based on ISTP Data

GSFC ATR: Dr. Steven A. Curtis
Raytheon ITSS Task Leader: Dr. Nikolai A. Tsyganenko

QUARTERLY REPORT: JUNE 20 – SEPTEMBER 20, 2001

TASK OBJECTIVES

The purpose of this task is to develop dynamic models of the magnetospheric magnetic field allowing for variable conditions in the solar wind and including substorm-related reconfigurations of the magnetosphere.

WORK ELEMENTS

Work on this task ended in July with the transfer of the task leader to another contractor.

100 Module development

200 Model development

A new model of the near magnetosphere was assembled and the first fitting calculations were made of the model Parameters. (Two companion papers describing this work, submitted to J.*Geophys.Res.* July 20, 2001, are described in Metric Element 5012, below).

300 Database enhancement

A new multi-spacecraft data base has been compiled, including the magnetometer data of POLAR, Geotail, AMPTE/CCE, AMPTE/IRM, ISEE-1/2, CRRES, and DE-1, covering the period 1984-1999 and having a 5-min resolution of all individual magnetic field data records. All the magnetospheric data have been tagged by the concurrent data on the state of the solar wind (provided by WIND and IMP-8 spacecraft) and by the corresponding values of the ground Dst field. In addition, each data record was provided with a "trail" of the solar wind data, covering the preceding 2-hour interval, with the goal to study and include in the model the effect of the delayed response of the magnetosphere to changing conditions in the solar wind.

400 Dissemination of results

Four significant publications resulted from work done during this period:

Israelevich, P. L., A. I. Ershkovich, and N. A. Tsyganenko, Magnetic field and electric current density distribution in the geomagnetic tail, based on Geotail data, J. *Geophys. Res.*, v. 106, 2001, in press.

Tsyganenko, N. A., Empirical magnetic field models for the Space Weather Program, in: *AGU Geophysical Monograph 125*, "Space Weather", edited by P. Song, G. L. Siscoe, and H. Singer, pp. 273-280, 2001a.

Tsyganenko, N. A., A new data-based model of the near magnetosphere magnetic field. 1. Mathematical structure, J. *Geophys. Res.*, submitted, July 2001.

Tsyganenko, N. A., A new data-based model of the near magnetosphere magnetic field. 2. Parameterization and fitting to observations, J. *Geophys. Res.*, submitted, July 2001.

Non-Local Travel

None

METRIC EVENTS

101 **Extend the newly developed Birkeland current model by adding the effects of strong IMF By component, found in the POLAR data**
Completion date: August 31, 2001

Percent Complete: 100%

Comment: A new flexible model was developed of the magnetic field of large-scale Region 1 and 2 Birkeland currents, connecting the ionosphere with the distant magnetosphere and the solar wind. A new model for the cross-tail current magnetic field was developed, allowing more flexibility in the spatial distribution of the electric current.

201 **Prepare and include in the existing database data from Geotail (1995-1999) and AMPTE IRM magnetometer experiments**
Completion date: August 31, 2001

Percent Complete: 100%

Comment: As the Geotail mission remains healthy and keeps returning good data, the database will be periodically extended by adding the newest observations to the existing data set.

301 **Develop and test fitting algorithms and create preliminary test versions of the new model**
Completion date: August 31, 2001

Percent Complete: 100%

Comment: This is actually a continuing task; its strategy may vary, depending on results, obtained in individual test runs. The eventual goal is to establish an optimal set of the model field sources and to find a best way to parameterize them with the solar wind input and ground-based indices of geomagnetic activity.

401 **Develop simplified variants of the model magnetic field, which could be used in computer-intensive massive processing of ENA images of the magnetosphere and/or particle orbit tracing**
Completion date: August 31, 2001

Percent Complete: 60%

Comment: A method of fast field line mapping was developed, based on a simple Euler potential model, fitted by least squares to the T96 model field. This research is being pursued, in part, as an attempt to implement realistic empirical field models in the processing of IMAGE spacecraft data, under a joint work task with Dr. E. C. Roelof (Applied Physics Laboratory, Johns Hopkins University, Laurel).

501 **Present task results at XXVI EGS General Assembly**
Completion date: March 30, 2001

Percent Complete: 100%

502 **Prepare a draft paper for the JGR**
Completion date: June 30, 2001

Percent Complete: 100%. Two companion papers submitted in July.

Comments: Tsyganenko, N. A., A new data-based model of the near magnetosphere magnetic field. 1. Mathematical structure, J. *Geophys. Res.,* submitted, July 2001.

Tsyganenko, N. A., A new data-based model of the near magnetosphere magnetic field. 2. Parameterization and fitting to observations, J. *Geophys. Res.,* submitted, July 2001.

_ GSFC ATR: Dr. Joseph Nuth
_ Raytheon ITSS Task Leader: Dr. Ashraf Ali

QUARTERLY REPORT: JUNE 20 – SEPTEMBER 19, 2001

TASK OBJECTIVES

The purpose of this task is to analyze the atomic and molecular species that evaporate from refractory materials, including naturally occurring minerals. This data will be used in conjunction with data obtained from a ThermoGravimetric Differential Thermal Analysis system in order to develop quantitative models of the evaporation process.

WORK ELEMENTS

100 Module development – build the evaporation system & test to ~2000K

200 Module development – integrate furnace & Mass Spectrometer

300 Module development – test end-to-end system: begin data acquisition

400 Dissemination of results

More experiments have been done at PSU on the nucleation of SiO. The results suggest that the role of chemical processes must be seriously considered in grain formation.

Work is underway on three papers:

--on the nucleation of SiO (Leskaw, Kooi, Ali, Castleman, Donn, and Nuth)

--on the isotopic composition of SiO, (Kooi, Ali, Castleman, and Nuth)

--on general aspects of grain formation (Kooi, Ali, Castleman, Donn, and Nuth)

METRIC EVENTS

101 Design furnace system & begin fabrication:
Completion date (final form): February 28, 2001

Percent complete: 100%

Comments: The success of the PSU effort has resulted in a decision to continue the work there, and not further pursue the experimental work at GSFC.

102 Integrate furnace with Vacuum system & Power Supply: begin testing.
Completion date (final form): April 30, 2001

Percent complete:

Comments: Proceeding at lower priority, per ATR concurrence, as described above.

201   Align evaporation furnace and mass spectrometer inlet for best transmission:
Completion date: June 30, 2001

Percent complete:

Comments: Proceeding at lower priority, per ATR concurrence, as described above.

301   Begin evaporation tests on natural silicates as a function of temperature:
Completion date: August 31, 2001

Percent complete:

Comments: Proceeding at lower priority, per ATR concurrence, as described above.

401   Present task results at Annual Lunar and Planetary Sciences Conference:
Completion date: March 15, 2002

Percent complete:

Comments: Future event

402   Submit a publication on task results to *JCP*, *MAPS* or similar journal:
Completion date: May 30, 2002

Percent complete: 80%

Comments: Papers described above are near completion.

NASA Task: 99P0036   Advanced Digital Engineering for Electric Field Experiment

GSFC ATR: Dr. Robert F. Pfaff
Raytheon ITSS Task Leader: Paulo Uribe

QUARTERLY REPORT: JUNE 20 – SEPTEMBER 20, 2001

TASK OBJECTIVES

The purpose of this task is to provide advanced digital engineering in support of Goddard's Electric Field Experiments. Specific areas where expertise is needed include: on board digital signal processing and a high speed burst memory that triggers when interesting events are encountered in space.

WORK ELEMENTS

100 Provide overall design for electric field digital electronics for the C/NOFS satellite

Preparations for the PDR were completed.   Staff presented at the PDR, and incorporated suggestions into the design.

200 Provide detailed design and software for digital processor and burst memory.

Design of digital part of the instrument is proceeding. The instrument's Digital Processing Unit (DPU) is 75% complete. It was decided to decrease sampling rates by a factor of two because of CPU limitations.

The design is implemented in two Actel 1020 FPGA's. Firmware for the memory decode FPGA is 100% complete, and that for the sampling FPGA is 50% complete. We are now awaiting the arrival of commercial software to perform simulation of the FPGA's before they actually are burned.

Choosing parts has been a significant concern because of the stringent specifications; the MILSPEC 883 parts often have a very long lead time. This has led to part substitutions and resulting changes in the design.

Design of burst memory system and of the GSE equipment began. The burst memory system is a high speed, 8Mbyte system controlled by a TI 320C25 DSP.

300 Provide interface documentation between GSFC experiment and satellite.

400 Provide GSE software and check out as needed.

METRIC EVENTS

101   **Provide overall design hardware layout, and interface information for Preliminary Design Review**
Completion date: July 31, 2001

Percent complete: 100%

Comments: Complete on time as required.

201   **Provide detailed design hardware layout, and interface information for Critical Design Review**
Completion date: December 31, 2001

Percent complete: 40%

Comments: Awaiting simulation software for FPGA's

301   **Design, implement, and verify flight software before integration**
Completion date: September 30, 2002

Percent complete:

Comments: Future activity

401   **Participate in check out of instrument during integration and pre-launch activities**
Completion date: January 31, 2003

Percent complete:

Comments:

501   **Provide on-orbit instrument health monitoring and software upgrades after launch**
Completion date: October 31, 2003, and subsequently as needed

Percent complete:

Comments:

GSFC ATR: Dr. Jonathan P. Gardner
Raytheon ITSS Task Leader: Dr. Robert H. Cornett

QUARTERLY REPORT: JUNE 20 – SEPTEMBER 19, 2001

TASK OBJECTIVES

The purpose of this task is to provide scientific and analysis support, including preparation of publications, for the study of the morphology of galaxies in ultraviolet observations.

WORK ELEMENTS

100 Data processing and reduction

Work began on determining a multi-wavelength galaxy luminosity function, using Sloan (and eventually) 2MASS data. This process will involve 3 steps:

(1) selection of the galaxy sample and determination of the K-correction and absolute magnitudes,
(2) use of principal component analysis (PCA) to summarize the multi-wavelength photometry using a minimum number of parameters, and
(3) use of a step-wise maximum likelihood function (Ellis & Peterson 1998) to determine the luminosity function of the PCA variables.

The first completed step was the determination of an absolute r magnitudes of 40043 Sloan galaxies with measured redshifts.

200 Development of figures and text for publication

300 Editing and submission of publications

Non-Local Travel

None

METRIC EVENTS

301   **Develop outline and overall design for senior thesis**
       Completion date: February 28, 2001

       Percent Complete:

       Comments: Redirected due to commitments of staff and ATR

302   **Submission of publication on thesis**
       Completion date: TBD; expected on approximately August 31, 2001

       Percent Complete:

       Comments: Redirected due to commitments of staff and ATR

GSFC ATR: Dr. Sara R. Heap
ACC Subcontract Task
ACC Task Leader: Don J. Lindler

QUARTERLY REPORT: JUNE 20 – SEPTEMBER 19, 2001

TASK OBJECTIVES

The purpose of this task is to support the Goddard Internal Research and Development program, "Goddard Visualization System for Astronomy (GOVISA)".

WORK ELEMENTS

100 Survey and study available public and commercial visualization software to provide a basis for make-or-buy decisions on GOVISA elements

Staff continued evaluation of the use IDL and ION (IDL On the Net) for development of search and visualization tools for multi-dimensional data from large astronomical data bases. Staff attended a two-day IDL course given locally by RSI on "Object Oriented Programming and Graphics in IDL." Evaluation indicates that the IDL object graphics system will supply the needed capabilities for interactive 3-dimensional volume visualization and display and manipulation of multidimensional parameters. IDL direct graphics (as opposed to object graphics) currently appear to be a better approach for visualization of 2-dimension image data. Discussions with Research Systems, Inc. indicate that the problems with 2-dimensional image objects will not be improved with the next release of IDL. Staff continued surveying and testing public domain software for multivariate data analysis including principal component and cluster analyses. Currently available IDL routines should be sufficient for any principal component analysis requirements. A large number of cluster analyses packages are available without cost and selection of which package to use will vary with the analyses being performed.

200 Carry out case-study #1

Work on this case study has not been started.

300 Carry out case-study #2

Case study #2 has been completed by GOVISA team member K. Grogan.

400 Carry out case-study #3

Staff implemented an IDL widget program to perform analysis and display of multivariate catalog data. The Sloan Digital Sky Survey (SDSS) early release spectral catalog was used as a test case. Staff demonstrated this routine at the Statistical Challenges in Astronomy III conference and at the SPIE's 46th Annual Meeting.

500 Reports and documentation

600 Support a NASA AISR proposal, emphasizing (1) visualization of astronomical data and (2) scalability of GOVISA to very large and/or remote databases

Non-Local Travel

None

METRIC EVENTS

101 In conjunction with case studies #1-3, conduct a survey of public (e.g. NCSA) and commercial visualization software. Prepare survey report (date TBD).

Percent Complete: 60%

Comments: Staff has evaluated IDL object graphics and IDL ION.

102 Make formal make-or-buy analyses of supplemental software such as cluster statistics, PCA, etc. (date TBD);

Percent Complete: 50%

Comments:

103 Develop a proficiency with primary visualization, analysis, and scripting languages including Interactive Data Language (IDL) and Python

Percent Complete: 60%

Comments:

201 Give a demonstration of GOVISA using the three case studies as examples
Completion date: September 4, 2001

Percent Complete: 60%

Comments: Case study 2 is complete.

501 Deliver programs and documentation, and any results from the three case studies
Completion date: September 19, 2001

Percent Complete: 100%

Comments: Will be delivered at contract close.

502 Prepare a monthly report a) listing software developed or integrating within GOVISA, and including b) 2-sentence progress statements on each case study

Percent Complete: 100%

Comments: All required monthly reports have been submitted.

601 Assist in preparation of proposal for Applied Information Systems Research
NOI due: July 27, 2001
proposal due: September 26, 2001

Percent Complete: 0%

Comments: Supported as required

NASA

National Aeronautics and Space Administration

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15. Supplementary Notes

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