FINAL REPORT

NASA Grant: NAG2-6001
Principal Investigator: Dr. Doyal A. Harper
Project Title: Real Time Data/Video/Voice Uplink & Downlink for the Kuiper Airborne Observatory
Grant Period: From 1 July 1995 – 30 June 1997 (includes one year no-cost extension)

NAG2-6001 supported the University of Chicago's participation in "Live from the Stratosphere" (LFS), a NASA-sponsored project involving scientists, teacher, students, NASA personnel, a private company, Geoff Haines Styles Productions, and a number of science museums and schools throughout the United State. LFS was an educational outreach adventure which brought the excitement of astronomical exploration on NASA's Kuiper Airborne Observatory (KAO) to a nationwide audience of children, parents and children through live, interactive television, broadcast from the KAO at an altitude of 41,000 feet during an actual scientific observing mission.

The project encompassed three KAO flights during the fall of 1995, including a short practice mission, a daytime observing flight between Moffett Field, California to Houston, Texas, and a nighttime mission from Houston back to Moffett Field. The University of Chicago infrared research team participated in planning the program, developing auxiliary materials including background information and lesson plans, developing software which allowed students on the ground to control the telescope and on-board cameras via the Internet from the Adler Planetarium in Chicago, and acting as on-camera correspondents to explain and answer questions about the scientific research conducted during the flights.

University of Chicago personnel participating in the flights included D.M. Cole (graduate student), R.H. Evans (Research Associate), D.A. Harper (Professor), R.F. Loewenstein (Senior Research Associate), T.J. McMahon (Engineer), J.S. Sweitzer (Outreach Coordinator), and C. Wirth (Engineer).

Products of the project include:

1. A professionally published coursebook including lessons introducing students to airborne and infrared astronomy and worksheets designed to allow students to analyze data from the flights.
2. Software for a graphical interface which allowed students at Adler Planetarium in Chicago to select one of five on-board cameras to view events within the aircraft cabin, to view through one of three cameras mounted on the telescope, and to actually control the KAO telescope itself during flight via an Internet connection established through NASA's ATS satellite. A screen snapshot of one of the graphical user interfaces used during the flight is shown in Figure 1.
3. Questions posted by students to the project Website at Ames Research Center were answered through e-mail by scientists, engineers, graduate students, technicians, and KAO flight crew members.

4. Data collected during the flights were made available on the project Website so that students could view and analyze them after the flight.

5. A professionally produced videotape which recorded and documented the project and the observing flights for use in follow-on activities and future educational programs.

6. Webpages maintained at NASA's Ames Research Center which Document the program and provide a base for ongoing and future Activities based on the LFS project.

Additional details on the program and associated reference materials may be found on these webpages: Live from the Stratosphere Homepage: http://passport.ivv.nasa.gov/lfs/Passport to Knowledge Live from the Stratosphere Homepage: http://passport.ivv.nasa.gov/ptk_lfs.html Hardcopies of selected pages from these websites are also included as an appendix to this report.
Display of the Graphical User Interface written for the LFS flights.

The upper panel permitted small offset commands to be sent the the KAO telescope. Students could select the video view returned in a CUSeeMe window by clicking on one of the blue cameras in the KAO floorplan. A click on one of the four named boxes selected one of three cameras looking out through the various KAO telescopes or a roving camera inside the plane.
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Welcome to Live From the Stratosphere

LIVE FROM THE STRATOSPHERE took off in Fall 1995, for the last flights of NASA's Kuiper Airborne Observatory, but the materials still provide a comprehensive resource on infrared astronomy, and what it's like to live and work 41,000 feet above the earth!

NASA's successor aircraft, SOFIA (a converted Boeing 747), is due to begin observational flights in the first years of the 21st Century.

"Researcher Q&A" is not currently Inter/Active.

Choose one of the following links below - LFS with graphics for those with graphical browsers such as Netscape or Mosaic, or a text-only version for those using programs like Lynx or having very slow Internet connectivity.

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Kuiper Airborne Observatory (KAO)

- Who was Kuiper?
- Information about the KAO
- Take a Virtual Tour of the KAO
- KAO Career Science Highlights
- KAO's Study of Shoemaker-Levy 9
- KAO Highlights '94
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- Help design SOFIA
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What's on the LFS Web

Project Evaluation

Form for teachers

Form for students

Live From the Stratosphere Project News

Thursday, December 14

You can help design SOFIA, the follow-on to the KAO. See http://quest.arc.nasa.gov/lfs/sofia.html for details.

Monday, November 13

Evaluation forms are now available (see above). Please take the time to send us your thoughts about this project. Your input is critical to us.

Wednesday, October 26

New features to the project news have been added to the LFS switchboard.

Weekly Newsletter

Project Update Archive

LFS Home | Give Us Feedback | Help & Help | LFS Overview | Search LFS
Quest Home | Search Quest | Search WWW | Quest Helpdesk | Join List
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Weekly Newsletter

Project Update Archive
Live From...the Stratosphere
The People of the Kuiper Airborne Observatory

Kuiper Staff and Mission Operations
Mission Directors: Wendy Whiting, Steve Patterson, Carl Gillespie, Jim McClanahan, Tom Kalaskey
Engineers: Paul Kes, Walter Miller, Mark Flston, Kaiser Adan, Tom Comans, Paul Delson
Telescope Operators: Juan Rivera, Rick Doll, Terry Richardson
Tracker Operators: Ben Burness, Allan Meyer
Computer Operators: Jim Cockrell, Dennis Kelley, Terry Duncan, Jeff King
Technician: Alan Dunn

Flight Operations
Pilot: Terry Raper, Geary Tiffany, Allan McCrary
Navigator: Gene Muniz
Flight Engineer: Bill Hoss
Ground Crew: Louie Russo, Chico Rijffkogel, Monte Hodges, Jim Mills, Mario Garcia, Randy Hobbs, Lee Monitz

Principal Investigators, Scientists, Astronomers
At Harper, Bob Loewenstein, Ed Erickson, Ann Sprague, Ted Dunham, Mike Hoare, Scott Sandford, Jesse Bregman, Tom Roellig, Sean Colgan, Jim Sweitzer, Paul Harvey, George Gull, David Hollenbach, Dan Lester, Dave Cole

Support team for Scientists
Hardware instrumentation engineer: Tom McMahon

SOFIA Project Development
Project Manager: Chris Wiltsee
Operations Manager: Robert Yee
Engineers: Nans Kunz, Dan Machak

Astronomy Educators
April Whitt, Robin McGlohn, Bob Counts, Kurt Richter, Edna DeVore, Garth Hull, Randy Lau

Team Members' Journals
Team Members' Junior Journals (5th/6th grade reading level)
Ask Questions of the KAO Team (October 5-November 17)
Live From...the Stratosphere
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(approx. 152k of gif previews)

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- An Introduction to Electronic Field Trips (for teachers new to the concept)
- Teacher's Guide designed for this project
- Other related lesson plans
- The value of the learning experience (an essay)

Connecting with other people
- WebChat with other people

A database of teachers who may share your interests
- Register in the LFS teacher database
- Search the Database (once you've registered)

Pointers to other resources
- Other related Web sites
- Bibliography
- LFS materials on disk (look for Disk 13)

Asking the KAO team questions
- Archive of questions and answers
- Asking your own questions (Oct 5 to Nov 17)
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