First AIRS images exceed expectations

By Alan Bair

"First-light" images from the instruments—the Atmospheric Infrared Sounder (AIRS) spectrometer and its two companion instruments, the Advanced Microwave Sounding Unit and the Humidity Sounder for Brazil—are exceeding expectations of the world meteorological community. The result, project scientists say, should be an ability to nearly double the accuracy of short-term weather predictions by this time next year, substantially improving our ability to track severe weather events—such as hurricanes—and advance climate research.

"This experiment will capture, for the first time, a continuous, detailed picture of Earth's atmosphere for use in global weather prediction and climate studies," said JPL's Dr. Mustafa Chafrane, experiment science team leader. "The instruments are in excellent health and are ready to serve NASA, the National Oceanic and Atmospheric Administration and the broader climate research community."

The first-light images may be found at www.jpl.nasa.gov/airs. The AIRS experiment, with its visible, infrared, and microwave detectors, provides a three-dimensional look at Earth's weather. Working in tandem, the three instruments can make simultaneous observations all the way down to the Earth's surface, even in the presence of heavy clouds. The 2,400-channel multispectral AIRS system will be used to map the three-dimensional global distribution of temperature, moisture, and clouds. The primary objectives are to improve the accuracy of weather forecasts and to study climate change.

The infrared and microwave data from AIRS/AIRS/HIRS are integrated to retrieve a single set of temperature, moisture, and cloud values.

Chafrane said the key is increasing the world's range of weather forecasts from the current two to three days to five days to observe today's weather with much higher accuracy.

"The accuracy of computer models is dependent upon the quality of today's weather information," he said. "Our experiment will effectively multiply our existing global armada of 4,000 weather balloons by 100, giving us global coverage over land and sea from the same data quality. This additional data will dramatically reduce errors that have traditionally limited the range of current weather forecast models."

Experiment data is also expected to allow meteorologists to plot the path of hurricane landfalls within 100 kilometers (62 miles) up to three days in advance, saving lives and property and enabling better mobilization and deployment of resources and emergency personnel.

Climate research applications include the study of global carbon dioxide distribution and better understanding interrelationships between weather and climate.

"If we can determine changes in rainfall patterns and amounts, we can better understand the global water cycle and its implications for managing fresh water resources," said Claire Parkinson, Aqua project scientist at NASA's Goddard Space Flight Center. "Global sea-surface temperature predictions will allow commerce to move merchandise and fuel where needed to meet cold or warm weather demands. Other industries strongly dependent on weather include aviation, transportation and agriculture."

The experiment recently completed calibration and is now transmitting continuous, uninterrupted data to the project science team and NOAA. Instrument validation will continue through next June, as NOAA evaluates the new data set, learns how to integrate it and gains confidence in its accuracy.

Following instrument validation, the data will be integrated into existing weather prediction models by NOAAs National Centers for Environmental Prediction and six of the world's leading weather prediction centers. The data will also be distributed to the World Meteorological Organization in Switzerland, where it will be made available to 105 countries.

JPL manages the AIRS experiment for NASA. The AIRS Instrument was built by BAE Systems for JPL. NASA's Goddard Space Flight Center provided the Advanced Microwave Sounding Unit, which was built by Northrop Grumman. The Brazilian Institute for Space Research provided the Humidity Sounder for Brazil, which was built by Astrium.

Launched May 4, 2002, Aqua's six-year mission will collect data on global temperature variation and cycling of water, studying global precipitation, evaporation, changes in ocean circulation and how clouds and surface water processes affect climate. The information will help scientists better understand how global ecosystems change and how they respond to and affect global environmental change.
Canopy helps guards beat the heat

Lab names chief technologist
The chair of the mechanical engineering department at Caltech, DR. ERICK ANTONSSON, has been named chief technologist at JPL.
Antonsson has been a Caltech professor and researcher since 1981. He organized the Engineering Design Research Laboratory at Caltech and has made major research contributions in the area of formal methods for engineering design. He has been chair of mechanical engineering since 1990. He earned his bachelor’s degree in mechanical engineering from Cornell University in 1975, and his master and doctorate degrees in the same field from the Massachusetts Institute of Technology in 1982.
Antonsson will join JPL in early September, and will also remain at Caltech as a professor of mechanical engineering. Until Antonsson begins at JPL, DR. LESLIE DUETSCH will continue as chief technologist to ensure a smooth transition.

Solar system ‘freeway’ envisioned
An “interplanetary Superhighway” through the solar system is envisioned as a vast array of virtual window tunnels and conduits around the Sun and planets, as envisioned by JPL engineer MARTIN LO. Can slash the amount of fuel needed for future space missions.
Most missions are designed to take advantage of the way gravity pulls on spacecraft when it swings by a body, such as a planet or moon. Leso notes the advantage of another feature: the Sun’s pull on the planets or a planet’s pull on its nearby moons. Forces from many directions nearly cancel each other out, leaving paths through the gravity fields in which spacecraft can travel.
So to find the Interplanetary Superhighway, Leso modelled possible flight paths among Lagrange points—where one body’s gravity balances another’s—varying the distance the spacecraft would go and how fast or slow it would travel. Like threads twisted together to form a rope, the possible flight paths formed tubes in space. To plan to map out these tubes for the whole solar system. Leso and his colleagues have turned the underlying mathematics of the Interplanetary Superhighway into a tool for mission design called “L sof.” Using models and algorithms developed at Purdue University in Indiana, the new L sof was used by JPL engineers to envision the flight paths for:

- The work on the Interplanetary Superhighway for space mission design was nominated for a Discover Innovation Award by Discover magazine editors and an outside panel of experts.

Utility signs tech affiliate agreement
Consolidated Edison of New York, Inc. (Con Edison) has turned to JPL to develop sensing technology to detect hazardous materials throughout the Interplanetary Superhighway.

Nancy E. Board Dr. Erick Antonsson

News Briefs

Universe beat the heat
Canopy helps protect architectural rendering of the Interplanetary Superhighway.

MARTIN LO, can slash the amount of fuel needed for future space missions.

A successful ISO 9001 pre-assessment audit was held at JPL July 16 to 18, as two auditors from National Quality Assurance reviewed the key areas of change between the 1994 and 2000 versions of the ISO standard. This resulted in three minor non-conformances and one observation. The auditors will return in late September for both a surveillance audit and the 9001-2000 transition audit. More details are available online at http://iso.jpl.nasa.gov/resource/archives.html.

External ISO surveillance audits are held approximately every six months at JPL. The audit ensured our compliance and maintained the Labs ISO certification. Every three years there is a renewal certification audit, which JPL successfully completed this past April. Now JPL is in the process of adjusting its management system to the revised ISO 9001-2000 standard.

Approximately 75% of the revised standard’s requirements remain the same. Another 14% of the revised standards address work that JPL already does. Only 11% represent new areas that must be incorporated into the management system at JPL. The old standard focused was “Say what you do, do what you say, prove it” and emphasized individual tasks. The revised standard focuses on a big-picture view of a business and how it all works together to create a product. It has a far greater emphasis on management, customer satisfaction, performance measurement, and continual improvement. The pre-assessment audit in July addressed these new areas. The September external audit will address the entire standard.

JPL also holds internal assessments conducted by Lab employees. The assessments are identical to an external audit, but occur over a longer period of time and penetrate more areas of the Lab. They identify areas that require improvement and prepare the Lab for the external audit. The assessments also give employees practice at what they will experience during an external audit and help familiarize people with the auditing process.

If you have any questions, contact the ISO representative in your organization. A list of representatives is available online at http://iso.jpl.nasa.gov/iso-list-organizer.html.
A dozen JPL employees recently gathered to commemorate their 40th year at JPL. Universe talked with five of the veterans to find out what life was like at JPL in the early 1960s, how the Lab has changed, and what they will remember most when they retire.

**Hard Work, Good People, Exciting Times**

40-YEAR VETERANS DISCUSS THEIR CAREERS AT THE LAB

by Mark Whalen

How did you come to stay at the Lab for 45 years?

**Bryant** I am a native of Pasadena. At Oak Grove Park, I built and flew model airplanes, camped out with my Boy Scout troop, and played junior high school sports. Even though the general public was unaware of many of JPL’s research projects, I reasoned that important things happened behind those gated fences, guarded by the military, and projected that I too, would work there one day. The continuing research, the scientific advances and my involvement with the Labs achievements motivated and inspired me to remain.

**Davis** I arrived at JPL in June 1961 from Pittsburgh. Without anyone asking me “What are you going to do next?” I went to Pennsylvania and rode all of the E-Ticket rides. Needless to say, working at JPL for the last 40 years has been better than any E-Ticket ride. I have gone from one interesting project to another, each time pursuing an objective that had never been achieved before.

**Hoffman** I enjoyed the work and the opportunities to support the efforts related to new and challenging missions. We (and still are) doing things no one else in the world had done before.

**Polansky** I have always been excited about space and space missions. To be able to build systems that supported those missions and to participate in many of them in some capacity fulfilled my widest ambitions.

**Siah** My brother Larry worked in the cable shop and I came to join him. I built flight harnesses for eight months. Then I became a spacecraft flight technician. The opportunities kept coming to do more challenging and exciting things. So far, I've worked on 20 projects, including MBIR. It's been a dream come true, a wonderful 40-year experience.

**What makes JPL so special?**

**Bryant** I have derived a great sense of pride and accomplishment in working for JPL, an organization that has done so much to further our knowledge of space, the galaxies beyond, and the universe, and to promote a deeper understanding of science in general.

**Davis** It is the people. The pool of talent never ceases to amaze me. The GRACE project was only possible because of the talented and creative people here. JPL has talented people who can solve a broad menu of problems—not only in the technical divisions but also in the administrative divisions and the Caltech Counsel's Office.

**Hoffman** JPL is a unique place to work. As a federally funded research facility, operated by a prestigious technical university for the nation’s space agency, there is no other place like it in the world.

**Polansky** I enjoy being associated not only with spacecraft-related work, but also working so closely with my very prestigious alma mater, Caltech.

**Siah** The things we do here. There are very few places in the world that do what we do and do it as well as we do it. Of all the projects you've worked on at JPL over the past 40 years, which have been the most exciting, the most memorable?

**Bryant** As a mechanical designer in the Spacecraft Division, my first projects were to assist in the design of the main buss structure of the Mariner and Ranger spacecraft. The drawings were done by hand in those days, unlike the computer-aided design (CAD) generated drawings we create today. It was equally as exciting as a mechanical engineer in Section 333, to assist in the detailed design and construction of the 70-meter antenna extension and the development of the 34-meter beam waveguide antenna at Goldstone.

**Davis** The GRACE mission. I've taken this project from the concept stage in 1992, through the competitive proposal process, development, and into mission operations with a successful launch from the Russian cosmodrome at Plesetsk in March of this year.

**Hoffman** All of the lunar and planetary missions were exciting for me. The project that brought me the most personal satisfaction was the Ranger 7 mission to the moon in 1964. It was the first successful project I had worked on and it made front-page news throughout the world during the height of the Cold War. I helped specify and implement the environmental testing program on the spacecraft hardware.

**Polansky** The most exciting for me was Surveyor. The first U.S. efforts to make soft landings on the moon. I was responsible for specifying, building, testing, and some operating of the data system that supported that mission set. One thing I'll never forget is when I was the first to see one of the three Surveyors land multiple times on the moon when the engines failed to turn off after the first landing. No one believed me at first when I announced, "the darn spacecraft was hopping around on the moon!"

**Siah** My favorite was Mars Pathfinder, for which I was a test engineer responsible for the electronics integration of the spacecraft. I was one of the last people to have my hands on the hardware. Just prior to launch reaching inside the fuselage to install a pyro battery connection comparator. We worked many long hours but it was worth the payoff. What a fantastic success!

**What is the biggest difference between today's JPL and that of 1962?**

**Bryant** In the earlier years the Lab built most of the spacecraft here at JPL rather than contracting the work out. It's the tools of the trade. The tools that we have to do our job today are many orders of magnitude better than the tools we had in 1962. Also, the young talent at JPL today is better educated and more versatile than the talent pool at my alma mater, Caltech.

**Davis** The biggest difference is the number of flight projects that are in the development phase—in 1962 there were three programs: the Rangers, Mariners R and 1964; and Mariners K. Today there are nearly 40.

**Polansky** In 1962, there was a much greater "can do" attitude at JPL. Today's JPL environment lacks the family orientation we once had. Something that needs to be restored. In addition, the Lab has become much more territorial than before (probably true of most organizations that have been around for an extended period of time).

**Siah** We didn't have near the amount of manpower and support back then. Over the years, we have sometimes learned the hard way, by making mistakes. It's now referred to as "Lessons Learned." I guess you could say that I had had 40 years of on-the-job training.

When do you plan to retire? When that day comes, what will be your best memories of JPL, the highlights at the experience? What will you miss the most?

**Bryant** I'm planning to retire on Sept. 6, 2002. Most of all, I will miss the colleagues with whom I worked throughout the years at the Lab and I will miss the ongoing new learning experiences that are inherent in the job at JPL.

**Davis** I will retire as soon as we get the twin GRACE satellites operating at their full potential. This should be soon! The highlight would be, under rather contentious circumstances, Tom Gavin's statement "At JPL, we back our project managers."

I will miss working with some of the most talented people in the world. Charlie Braun (the best of the young talent I know) and Brooks Thomas (already retired), to name two of many.

**Hoffman** I have no plans to retire in the near future.

The best memory will be the one that I am thankful to have been part of the first attempts by humankind to explore the universe methodically. We, and the machines we built, continue to make history.

I will miss the excitement and thrill of exploring some object in space for the first time with a machine I helped build and launch.

---

*Photo by Mark Whalen, JPL Photolab*
Ad of the day... Nanaimo News Bulletin: Telephone inquiries welcome. 250-754-1234. www.nanaimobulletin.com

Classified ads will be available for viewing at www.dailyplanet.com

Passings
HELEN MILLER, 87, a retired senior administrative secretary in Section 294, died of heart failure May 28. Miller worked at JPL from 1966-89. She is survived by three daughters, four grandchildren and five great-grandchildren. Services were private.

JACQUES MACKINTOSH, 71, a retired senior administrative assist

"...classified ads will be available for viewing at dailyplanet.com"