

FINAL TECHNICAL REPORT

NAG 2-1044

SECOND INTERNATIONAL AIRBORNE REMOTE SENSING CONFERENCE AND EXHIBITION

NASA Ames Research Center (Ames) and the Environmental Research Institute of Michigan (ERIM) co-hosted the Second International Airborne Remote Sensing Conference and Exhibition, 24 - 27 June 1996 at Moffett Federal Airfield in Mountain View, California. Ames Airborne Science and Flight Research Chief G. Warren Hall and ERIM President Peter M. Banks welcomed 845 participants at the hangar luncheon against the backdrop of the **Naval Air Warfare Center's NP-3D Waterbug** testbed collection aircraft and the exotic array of Ames experimental platforms.

Luncheon speaker 16th District Congresswoman Zoe Lofgren said the key to future prosperity is knowledge-based excellence, as economic strength follows scientific and innovative achievements. She referred to the unique contributions made by NASA's Mission to Planet Earth (MTPE) initiative as part of the U.S. Global Change Research Program, and the ripple effect of Ames airborne environmental missions. She deplored the rhetorical excesses surrounding current environmental discussions, and commended the expansion of cooperative multi-country international airborne remote sensing campaigns.

The conference provided four days of displays and scientific presentations on applications, technology, and science of sub-orbital data gathering and analysis. The twelve displayed aircraft equipped with sophisticated instrumentation represented a wide range of environmental and reconnaissance missions, including marine pollution control, fire detection, Open Skies Treaty verification, thermal mapping, hydrographical measurements, military research, ecological and agricultural observations, geophysical research, atmospheric and meteorological observations, and aerial photography.

The platforms ranged from **U.S. Fish and Wildlife Service's** 3290 pound **Partenavia Observer 2** for low slow telemetry tracking in waterfowl and big game headcounts, to **NASA Ames Research Center's** 170,000 pound **Lockheed C-141A Kuiper Airborne Observatory** with on-board telescope that conducts high-altitude infrared astronomy including analysis of solar eclipses and stellar occultations.

Demonstrating rapid turnaround from airborne data acquisition to information extraction, **Positive Systems** flew **Air Flight Service's Aero Commander 500b** with ADAR 500A on flightlines over famous Bay area landmarks. ERDAS draped the digital aerial images over a digital elevation model creating an interactive 3-D fly-through for the viewer, and Research Systems demonstrated oblique digital photographs taken on the overflight with Kodak's DCS 460 digital camera.

The **U.S. Air Force** and the **On-Site Inspection Agency** displayed the new Open Skies Treaty verification **Boeing OC 135B** that promotes international monitoring of military forces and activities. **SRI's Jetstream 31** uses foliage and ground penetrating SAR for forest inventories, toxic waste delineation, and concealed target and buried unexploded ordnance detection.

Earth Search Sciences's Gulfstream 1 with prototype miniaturized airborne hyperspectral imaging equipment specializes in accurate mineral differentiation, low-cost hydrocarbon exploration, and non-proliferation applications. **John E. Chance** and the **U.S. Army Corps of Engineers** displayed the **Bell 212** helicopter with SHOALS that performs hydrographic surveying of navigation projects, coastal environmental assessment, and nautical charting surveys.

Bechtel Nevada and **U.S. DOE** displayed both the **Beech King AIR B-200** platform equipped to provide first response to nuclear accidents and routine environmental surveillance, and the **MBB BO-105** helicopter used in spectral analysis for environmental assessment and military appraisal.

NASA Ames Research Center's high-altitude **Lockheed ER-2** assists in earth resources monitoring; research in atmospheric chemistry, oceanography, and electronic sensors; ozone and greenhouse studies; and satellite calibration and data validation. **Ames** also showcased the **Learjet 24 Airborne Observatory** that completed missions in Venus cloud cover analysis, Quadrantid meteor shower studies, extra-solar far-infrared ionic structure lines measurement, Cape Kennedy launch support, and studies in air pollution, IR atmospheric radiance, and low-level wind shear.

The technical program included 305 presentations by researchers and scientists from 44 states and territories, and 30 countries including Australia, Austria, Belgium, Brazil, Canada, China, Costa Rica, Denmark, England, Finland, France, Germany, Indonesia, Ireland, Israel, Italy, Japan, Luxembourg, Malaysia, Mexico, the Netherlands, Nigeria, the Philippines, Russia, South Africa, Spain, Sweden, Switzerland, Venezuela, and the United States.

The technical program and Products and Services Exhibit were held at the Hyatt Regency San Francisco Airport Hotel. The technical program included sessions on *Atmospheric and Oceanic Applications; Coastal and Riverine Processes; Geologic Applications; Agriculture and Forestry; Air, Water, and Land Pollution; Active Sensors and Processing; Passive Data Acquisition Systems; Hyperspectral Data Acquisition Systems; Processing and Integration; New Systems and Sensors; Reconnaissance and Infrastructure Mapping; Emergency Response; Airborne Platforms; and R&D Campaigns*. NASA Stennis Space Center's Commercial Remote Sensing Program presented a special session on *Commercial Airborne Data Acquisition*, including the timely Request for Proposals to outsource Stennis flight operations management and oversight.

The new Conference Awards Committee presented certificates for Best of Session papers, and plaques with \$250 for excellence of presentation and scientific merit to:

Best of Conference Plenary Paper

Hydrographic Surveying with an Airborne Lidar Survey System W.J. Lillycrop, L.E. Parson, J.I. Irish, and L.L. Estep, U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS; M.W. Brooks, John E. Chance and Associates, Lafayette, LA, **USA**

Best of Conference Interactive Poster Paper

Tracking Invasive Plant Species in a Southern California Wetland Using ADAR Digital Multispectral Camera Imagery B.B. Nyden, D.A. Stow, and J.B. Zedler, San Diego State University, San Diego, CA, **USA**

The Products and Services Exhibit showcased new sensor and image processing technologies, aircraft data collection services, unmanned vehicle technology, platform equipment, turn-key services, software and workstations, GPS services, publications, and processing and integration systems by 58 exhibitors. The participation of aircraft users and crews provided unique dialogue between those who plan data collection and operate the remote sensing technology, and those who supply the data processing and integration equipment.

Research results using hyperspectral imagery, radar and optical sensors, lidar, digital aerial photography, and integrated systems were presented. Major research and development programs and campaigns were reviewed, including CNR's LARA Project and European Space Agency's 1991-1995 Airborne Campaign. The pre-conference short courses addressed airborne video, photogrammetry, hyperspectral data analysis, digital orthophotography, imagery and GIS integration, IFSAR, GPS, and spectrometer calibration.

Postnote speaker NASA Deputy Associate Administrator Michael B. Mann addressed "MTPE's Science Plan and Observational Strategies." He outlined current themes and priorities; integrated space-based and *in-situ* observational strategy needs; 1995-2000 priorities on land cover change and global productivity, seasonal-to-interannual climate prediction, long-term climate variability, natural hazards assessment, and atmospheric ozone changes; the role of "pathfinder" equipment as aids in international scientific decision-making; the present arsenal of MTPE equipment components; the expanding need for remotely piloted vehicle development; and the *New Millennium Program* and the *Earth System Science Pathfinder Program*.

The conference was organized by the Environmental Research Institute of Michigan, highlighting fifty years as a private non-profit high-technology research institute. ERIM specializes in innovative sensor and image processing applications for environmental assessment, economic development and defense. In addition to ERIM, NASA, and Ames, other significant contributions were made by Daedalus Enterprises, the National Science Foundation, Earth Search Sciences, GER Corporation, Lockheed-Martin, and Positive Systems.

The Third International Airborne Remote Sensing Conference and Exhibition will be held in Copenhagen, Denmark, 7 - 10 July 1997.