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Title: **The Pilot Land Data System (PLDS) at the Ames Research Center Manages Aircraft Data in Collaboration with an Ecosystem Research Project**

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Discipline: **Aircraft Data Management**

The Pilot Land Data System (PLDS) is a data and information system serving NASA-supported investigators in the land science community. The three nodes of the PLDS, one each at the Ames Research Center (ARC), the Goddard Space Flight Center (GSFC) and the Jet Propulsion Laboratory (JPL), cooperate in providing consistent information describing the various data holdings in the PLDS and other data systems. Each of the nodes operate computer hardware and software (accessible via network and modem) that provide information about and access to PLDS-held data, which is available for distribution. Information is available at each of the nodes about a wide range of land science data, from meteorological data to remote sensing imagery. A large percentage of the data types handled by PLDS is data collected from sensors mounted on low, medium and high altitude aircraft.

A major new activity of the PLDS node at the Ames Research Center involves the interaction of the PLDS with an active NASA ecosystem science project, the Oregon Transect Ecosystem Research (OTTER) project. The collaboration between OTTER and PLDS involves the management of, access to, and distribution of the large volume of widely-varying aircraft data collected by OTTER from different sensors flown on several aircraft.

The OTTER project, funded through NASA Headquarters Codes SEL and SBR, is managed by researchers at the Ames Research Center and Oregon State University. Its principal objective is to estimate major fluxes of carbon, nitrogen, and water of forest ecosystems using an ecosystem process model driven by remote sensing data. Ten researchers at NASA centers and universities are analyzing data for six sites along a temperature- moisture gradient across the western half of central Oregon (called the Oregon Transect). Several types of remotely sensed and ground data, totalling over 13 gigabytes of storage, have been collected mainly during the 1990 growing season.

Sensors mounted on six different aircraft have acquired data over the Oregon Transect in support of the OTTER project. The Daedalus Thematic Mapper Simulator (TMS), the Advanced Visible Infrared Imaging Spectrometer (AVIRIS), the Thermal Infrared

Imaging Spectrometer (TIMS) sensors and a color infrared camera were all mounted on the high altitude ER-2 aircraft. The C-130 Medium Altitude aircraft carried the Advanced Solid State Array Spectrometer (ASAS), the NS001 Thematic Mapper Simulator, an airborne sun photometer, and cameras. The DC-8 aircraft, flown for the OTTER project in the summer of 1990 only, has acquired data from the Synthetic Aperture Radar (SAR) instrument. The Fluoresence Line Imager (FLI) was flown on an Apache, and a Spectron SE590 spectrometer and a Compact Airborne Spectrographic Imager (CASI) were flown on Cessna aircraft. Flights on the small low altitude Ultralight aircraft yielded spectrometer data from the Spectron and Barnes instruments, surface temperature measurements, and video tapes. A summary table listing the sensors by aircraft type is offered in Table 1.

In this collaboration, the PLDS node staff at the Ames Research Center have been and will continue to work closely with OTTER project scientists from both NASA centers and universities to place the information about the aircraft data (as well as other data sets) collected by the OTTER project into an inventory on the ARC PLDS computer and database system. Scientists have access to the data and information via normal PLDS-developed software and procedures which allow flexible database query and data ordering. For most aircraft data, which are stored offline on magnetic tape, the PLDS staff at ARC provides timely tape duplication and distribution services.

Additional capabilities and services for OTTER scientists have been identified for future work. For example, derived data from the OTTER project-selected ecosystem model and from scientist algorithms may be characterized and stored in the PLDS data base. The meteorological and chemical data currently stored at Oregon State University may be integrated into the PLDS data base to complete the full suite of data. Finally, useful OTTER data, including aircraft data, may be published on CD-ROMs for future use by ecosystem scientists.

While this collaboration is important by itself in the verification of the PLDS as a useful data and information system for the management of aircraft data, there are implications that extend beyond the scope of this effort. Optimized techniques for the management of aircraft data in support of the NASA science community by a major NASA data system will be developed. In addition, demonstrated effectiveness here by the PLDS node at Ames could allow PLDS to serve as a model information system for those providing information services to scientists involved in Earth Observing System (EOS) projects. Lessons learned and effective capabilities from this aircraft data-based testbed could enhance the future design and implementation of the EOS Data and Information System.

Table 1

OTTER Aircraft Data Sets
Managed By
PLDS at the Ames Research Center

Aircraft	Data Set Name
ER-2	Daedalus TMS, AVIRIS, TIMS, Color Infrared Photos
C-130	ASAS, NS001-TMS, TIMS, Sun photometer, Photos
DC-8	SAR
Apache	FLI
Cessna	CASI, Spectron SE590
Ultralight	Spectron SE590, Barnes MMR, Temperature, Video