T10-46

THE DSS 322 AIRBORNE MAPPING SYSTEM: A VERSATILE FUSION OF DIGITAL PHOTOGRAMMETRIC SENSING WITH DIRECT GEOREFERENCING

M MOSTAFA[1], A IP[2], J HUTTON[3]

(1) Chief Technical Authority - Airborne Products, Applanix Corporation, Richmond Hill, Ontario, Canada. (2) Geomatics Specialist - Airborne Products, Applanix Corporation, Richmond Hill, Ontario, Canada. (3) Director, Airborne Products, Applanix Corporation, Richmond Hill, Ontario, Canada.

Direct Georeferencing of photogrammetric sensors was first pioneered on aerial film cameras in the late 1980s' and early 1990's in the academia. On one hand, highly accurate, decimetre level differential GPS integrated with Inertial Measurement Units (IMU) allows the direct computation of the Exterior Orientation (EO) of each image, thus eliminating the need for aerial triangulation. On the other hand, since the mid-nineties, several efforts have been exerted to deploy the CCD-based digital camera technology into the airborne mapping environment. Some of these efforts focused on using a digital camera in a stand-alone mode, while more efforts focused on using digital cameras as a component of an integrated system where the System integration concept was initially proposed by Prof Schwarz of the University of Calgary.

The DSS 322 is an example of a digital photogrammetric mapping system that has been designed around the concept and requirements of Direct Georeferencing to produce specific geospatial products at a low cost and high efficiency. The DSS 322 is the fusion of a POSTrack Direct Georeferencing and Flight Management System with a full-frame digital camera. The camera uses a single Bayer-array CCD, specially designed high-performance Aerolenses by Carl Zeiss, and has been radiometrically calibrated as a system using a technology called TruSpectrum to produce either true-colour or colour-infrared image products. The CCD chip size is 5436 x 4092 pixels. The system is bundled with complete workflow software required to efficiently use Direct Georeferencing and produce colour balanced imagery for various remote sensing and mapping applications. The system is designed to be low cost, accurate, and easy to install. It is pilot-operated system which produces directly georeferenced digital images that require minimum processing steps due to its excellent radiometry through calibrations and repeatable linear response. The DSS 322 allows for quick turn-around and accurate products for a variety of mapping applications.

The DSS is used on its own for many applications, primarily to generate high-resolution colour and colour infrared digital orthophotos and orthomosaics which are then used for many different mapping, GIS and remote sensing applications. Examples of these are:

1. Updating and maintaining cadastral GIS databases
2. Classifying and mapping pervious and impervious surface areas
3. Identifying wetland areas
4. Update land use maps
5. Estimate crop yields and health
6. Prepare timber stand inventories
7. Plan for new constructions sites
8. Verify areas for licensing and permitting

The other application of the DSS is as the primary source of direct georeferencing and high resolution colour imagery for fusion with other airborne sensors such as LIDAR, hypersepctral scanners, and thermal imagers.

This paper presents the design and technology used in the DSS 322, followed by its geometric and radiometric performance. Real world applications will also be presented and discussed.