# VALIDATION OF THE RADIOMETRIC PROCESSING CHAIN OF THE LEICA ADS40 AIRBORNE PHOTOGRAMMETRIC SENSOR

**L. Markelin[*a] E. Honkavaara[a] U. Beisl[b] I. Korpela[c]**

[c] University of Helsinki , Faculty of Agriculture and Forestry, P.O. Box 27, 00014, Helsinki, Finland
[a] Finnish Geodetic Institute, , Geodeetinrinne 2, 02431, Masala, Finland
[b] Leica Geosystems, , , CH-9435, Heerbrugg, Switzerland

**Technical Commission VII Symposium 2010**

**KEY WORDS:** Calibration, Correction, Camera, Image, Accuracy, Multispectral, Quality, Radiometric

**ABSTRACT:**

Large-format photogrammetric digital airborne imaging sensors have been commercially available for several years. Their excellent radiometric properties compared to film-based imaging have been reported in several studies. Despite these radiometric advantages, up to now, airborne digital images have been exploited in a rather conventional manner in photogrammetric applications, even though methodologies from quantitative remote sensing, e.g. radiometric image correction and classification, could be utilized to raise the performance of photogrammetric applications to a new level. The recent state-of-the-art review revealed that the fundamental problem in the quantitative utilization of image radiometry in photogrammetric applications is the radiometric correction. Among digital photogrammetric large-format mapping sensors, the Airborne Digital Sensor (ADS) of Leica Geosystems is the only commercially available system at the moment having an integrated, physically based, radiometric correction chain. The processing does not require any in situ control information, as the radiometric corrections are based on a priori calibration information and image data. To validate performance of the processing chain, a comprehensive flight campaign was carried out with an ADS40 SH52 sensor in Finland in August 2008. We present the first results of the validation of the Leica ADS40 radiometric processing chain. The results indicated great performance potential. With the challenging data set, the differences of ADS40 and independent ground reference reflectance measurements were even less than 5% for uniform targets; atmospheric state, multispectral channel and flying height were detected as the major factors influencing the accuracy. Leica Geosystem's ADS40 can be considered as an efficient and accurate, 3D, multi-angular, multispectral imaging radiometer, which opens new interesting prospects for 3D remote sensing and characterization of the Earth surface. Results also indicated the importance of the test field validation process, gave improvement ideas for the sensor post-processing software and provided information for the development of validation methods.

**TOPIC:** Multi-spectral and hyperspectral remote sensing
**ALTERNATIVE TOPIC:** Multi-spectral and hyperspectral remote sensing