



Proposed EuroSDR project  
**Digital Camera Calibration**

**Summary**

This paper gives a short overview on the proposed project on *Digital Camera Calibration* in the framework of EuroSDR. The steering committee is asked to approve the project plan and to recommend on the given project description and project phases.

**Background**

With the advent of first digital airborne photogrammetric imaging sensors in operational environments an immediate focus on certification on digital camera calibration appears. There is a definite need for sensor calibration in the airborne photogrammetric community, which is fully supported by national mapping agencies. This calibration is well established for the traditional analogue frame cameras but the process has to be modified when dealing with new digital sensors. Since the principle architecture of such digital systems is fairly different (i.e. line scanning approaches versus frame based solutions, multi-head large format systems versus single-head medium format systems, synchronous versus syntopic image data acquisition) individual procedures for system calibration are necessary. With an optional combination and in case of line scanning systems mandatory tight integration of additional GPS/inertial components this situation becomes even more complex. Within this context the need for development of a generally accepted calibration procedure is evident. Such procedures will not only support suppliers and producers of digital camera systems but also provide additional means for potential digital camera users to investigate their features. EuroSDR as a scientific organization has already established a key researchers network with the goal to derive the technical background for digital camera procedures based on scientific theory and empirical research. Legal and certification aspects are put to the background for the time being. Within a first initial meeting in September 2003 representatives of all larger camera producers already signaled their willingness to support this EuroSDR initiative.

**Objective**

The objective of this *Digital Camera Calibration* project is two-fold:

- Collection of publicly available material on digital camera calibration to compile an extensive report describing the currently used practice and methods (Phase 1).
- Empirical testing with focus on the development of commonly accepted procedure(s) for camera calibration and testing, based on the experiences and advice of individual experts (Phase 2).

As a result of Phase 1 it is expected to present a report which will be compiled with the help of all project participants, i.e. camera producers and users. We would like to invite all delegates to contribute with their experiences on own test flights. Such a summary will help to create a common knowledge base for the formulation on future strategies and later experimental work in Phase 2. Such status report could be helpful for digital camera system users to gain their experience with digital camera calibration aspects. Furthermore this report should list open problems which need to be solved. All participants of the first initiate meeting welcome the idea that this report is open to producers, users and customers.

The second phase should focus on the development of commonly accepted procedure(s) for camera calibration and testing. It seems to be necessary to concentrate on some of the technical aspects in a sequential order, possibly starting with geometrical aspects and verification in a limited number of test flights by different camera producers and discussion on radiometric and image quality aspects. One aspect is the design for optimal calibration flight procedures to be tested then empirically. Another aspect is a collection of recommendations of producers on how customers should calibrate and do the processing. It requires a fine definition of goals which should *not* lead to direct comparisons of cameras, but to individual recommendations for each major camera type. The definition of goals and the design of empirical tests has to be discussed based on the report compiled in Phase 1.

### **Timetable**

With the acceptance of this project proposal Phase 1 will start immediately. The report will be compiled within 4 months based on the submitted and officially available material and recommendations from camera producers and other experts. After distribution of this report (January 2004) general concepts of camera calibration should be discussed with project participants preferably by email. An additional 1 day meeting for that purpose might be necessary in Spring 2004. The road map for Phase 2 should be fixed in the discussion after analyzing the outcome of Phase 1. It is aspired to finish experimental test investigations, data analysis and documentation within one year from Summer 2004 till Summer 2005.

### **Management**

M. Cramer is prepared to be the project leader supported by the core group of EuroSDR (I. Colomina, E. Gülch, R. Kuittinen and H. Ziemann).

### **Budget and financing**

Phase 1

- Travel-Support for EuroSDR core group for 1 day evaluation meeting, Spring 2004 (possibly in Stuttgart). TBC.
- Travel support for project leader to participate in 104<sup>th</sup> meeting in Denmark, June 2004 to present results of Phase 1. TBC.

Phase 2

- TBD

### **Deliverables**

Phase 1

- Report and evaluation of results by core group and network.
- Commission 3 proposes that M. Cramer presents the results of Phase 1 at the special session of EuroSDR at the ISPRS 2004 congress.

Phase 2:

- TBD (contents open, depends on results of Phase1)

### **Financial contribution of organizations**

Support by national mapping agencies and companies is welcome.