

CALIBRATION AND FIELD EXPERIENCE WITH THE DIGITAL LARGE FORMAT AERIAL CAMERA ULTRACAMD

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We present the geometric performance of the digital large format camera UltraCamD. The concept of the geometric calibration by means of a bundle adjustment is shown in detail. Based on the specific design of the camera additional parameters are defined and handled by the bundle adjustment software BINGO. During field application we are able to reduce remaining systematic errors, which may be caused by the change of environmental conditions in the air.

The entire calibration procedure consists of four phases. In the first phase a set of images of a well defined geometry target is taken in such way, that highly redundant observations are possible. The second phase is dedicated to image coordinate measurement. Automation and accuracy is derived by image processing techniques exploiting the specific shape of the well defined targets. The third phase consists of the semi automatic adjustment process, where unknown parameters of the camera (e.g. focal length and principal point coordinates, distortion parameters and additional parameters) are estimated. In phase four we distinguish between linear and non linear parameters. Linear parameters are used to reduce the linear effect of distortions of the camera. This is achieved by a linear transform of the measured coordinates in such way, that only small nonlinear effects remain. Those effects are then described in a look up table.

The results from a full calibration campaign, the adjusted parameters and the effect of these parameters are presented. Finally the calibration is approved and justified by field application. A test area is used to perform a bundle adjustment and to introduce camera specific parameters.