

Airborne Laserscanning for Digital Elevation Models - Strip Adjustment and Calibration

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Barbara Haebler

Abstract

Airborne Laserscanning Technology is known for its high accuracy potential. However, in practice variations in the horizontal position of a few decimetres and variations in height, which are usually smaller, are everyday experiences. Consequently, discrepancies in the overlapping laser strip area are visible and cause undesirable effects, e.g. steps, in derived products like DTMs or DSMs.

The reason for this is the existence of biases in the ALS-System, which can not be modelled by conventional calibration methods. The current atmospheric conditions, influences of the environment or instable behaviour of the system are considered to be responsible for this.

Strip adjustment stands for fixing and including these systematic influences, which vary from mission to mission. Strip adjustment as a data based procedure is performed in post-processing operations. A successful strip adjustment is able to recover biases of the system and include them. Therefore the discrepancies in the overlapping strips nearly disappear and the accuracy of the data increases.

This work aims for investigating on the subject focussing on its application with TerraMatch, a software solution for ALS-strip adjustment, and on a possible implementation in the ALS-production process. Chapter 1 is an introduction to this technical report, in chapter 2 the goals are formulated and chapter 3 gives a context to the subject. In chapter 4 a theoretical examination of the system measurements and their uncertain performance is given. In chapter 5 strip adjustment is interpreted and in chapter 6 the investigations with TerraMatch and a possible workflow of the strip adjustment process is presented. The report is completed with conclusions in chapter 7, a list of literature in chapter 8 and an annex in chapter 9.