## ABSTRACT

Laser scanning is a relatively recent remote sensing method which nevertheless quickly gained a prominent position, especially in the area of building detection and 3D modeling.

Methods for building detection and 3D modeling initially used model-driven approaches which compare a laser scanning point cloud to a set of predefined building models. A method for determining building roof types using such approaches was presented in the article of Hofman, Potůčková (2012). An important advantage of model-driven approaches is their relative robustness to various data deficiencies such as low point density or low spatial accuracy. However, output of such methods is limited to a predefined set of building models and does not allow for diversity of actual buildings.

For this reason, approaches used almost exclusively nowadays are data-driven. These methods search in datasets for a set of primitives (mostly roof planes) that are subsequently used to form the final model. This approach benefits from universality of resulting models but requires generally high data quality, especially in respect to input point cloud densities. The study of Hofman, Potůčková (2017) presented a data-driven method that can reliably detect buildings even in a very sparse point cloud in spite of using data-driven approach. At a density of about 1.5 points per $m^2$, the reliability of buildings detection reaches 97% and its completeness reaches 87%.

A major challenge of current research on building modeling from laser scanning data is absence of a standardized quality evaluation metric that prevents objective relative comparison of the methods applied. Potuckova, Hofman (2016) analyze possible assessment approaches and propose the use of area-based assessment metric that is clearly defined, robust, and highly accurate.