29. Nadir and Oblique Photogrammetry and High-Density LiDAR for Urban Mapping: Evolution of Validation Workflows from Milan to LiDAR-ITA and Pavia

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This paper discusses the evolution of quality-assessment procedures for high-resolution aerial photogrammetry and airborne LiDAR through two complementary operational contexts: successive aerial survey projects in Milan and the nationwide LiDAR-ITA program. Rather than focussing on a single survey, the contribution examines how validation strategies have progressively evolved across different operational conditions. The Milan Project1 comprised two aerial acquisition campaigns, both completed and validated, involving nadir and oblique imagery, high-density LiDAR, and several derived products for urban mapping. Experience gained during these activities led to a progressive shift from project-specific and partly manual checks towards more systematic, repeatable and increasingly automated procedures. LiDAR-ITA provides a complementary national setting in which the extent and volume of airborne pointcloud data require systematic and highly automated approaches to internal consistency and absolute accuracy assessment. The same experience now informs Milan Project 2, whose acquisition has not yet started, and which will test the established procedures on higher-resolution data and textured 3D mesh products while reusing and re-verifying the existing control infrastructure. Recent aerial acquisitions over Pavia provide an additional application context linked to the Laboratory's long-standing experience in aerial photogrammetry and LiDAR. By comparing these contexts, the paper identifies a procedural evolution from project-specific validation to reusable and scalable workflows, while preserving independent reference information, separation between adjustment and control data, spatially explicit indicators, and targeted expert interpretation.