

EGU24-8611, updated on 08 Oct 2024

<https://doi.org/10.5194/egusphere-egu24-8611>

EGU General Assembly 2024

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UAV digital photogrammetry as support tool for transmission-based muography

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The employment of unmanned aerial vehicles (UAVs) for digital photogrammetry applications (UAV-DP), together with satellite data, has emerged as a pivotal tool for conducting reliable muographic campaigns. This study aims to present a comprehensive workflow designed specifically to plan and support UAV-derived data for muon radiography objectives. Through a real case study conducted at the Etruscan necropolis of Palazzone (Umbria, Italy), this study shows the creation of high-resolution three-dimensional models of the ground surface/sub-surface by integrating UAV-DP, laser scanner and GPS-acquired data. The accuracy of these three-dimensional environment significantly influences the reliability of the simulated muon flux transmission, which is crucial for inferring the relative transmission values and estimating the density distributions. This study highlights the importance of UAV-derived data in the muography process and their potential to enhance or affect the outcomes of muon imaging results. Furthermore, it emphasizes the need for a multidisciplinary approach in muography applications, particularly focusing on the integration and utilization of UAV-based data to improve spatial environment reconstruction.