



Airborne LiDAR and UAV-derived data for mapping Roman gold mining infrastructure: New insights into the anthropogenic landscape evolution in NW Spain

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Northwest Spain possesses the largest Roman gold mining complex in Europe. The extent and scale of the mining works as well as the astonishing hydraulic infrastructure developed to supply water to the mining sectors caused a strong impact on the landscape. Within this scenario, the Teleno Mountains represents a natural laboratory to figure out the impact of the Roman mining anthropic activity both underground and superficial. However, the dense vegetation cover and the impact of more recent human activity in the area hinders most of the mining remains. To explore, re-evaluate and describe in detail the Roman elements, a detailed geomorphological survey is required. The location of geomorphic features on the landscape is particularly helpful in areas where neither archaeological, epigraphic nor literary sources are available. Thus, the use of geomatic methods such as airborne Light Detection and Ranging (LiDAR) and UAV-assisted photogrammetry provide high-resolution digital elevation models used for the identification, description and preservation of mining heritage remains. The image enhancement treatment of derived products is a rapid and cost-effective method for accurate mapping of the infrastructure remains with different degrees of preservation. The evaluation of the results suggests that large-scale and profound changes took place in the landscape, were linked to Roman mining, and provides a broad overview of the important human environmental impact in the light of the possible New Epoch, the Anthropocene.