

## Comparative analysis of digital models from 3D photogrammetry and structured light scanning for the study of tetrapod tracks

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The present work aims at analyzing the acquisition capacity of different digital reconstruction techniques for three-dimensional models, in the frame of the study of the remarkable Middle Triassic (Ladinic) tetrapod ichnoassemblage from the Quarziti del Monte Serra Formation (Monti Pisani, Tuscany, central Italy). Tracks stored in different Italian museum collections were processed and analyzed through two different digital acquisition methodologies, namely, digital photogrammetry and structured light scanning (with the EinScan Pro HD scanner model, capable of a maximum resolution of 0.2 mm) to evaluate which of these techniques is most suitable for the study of small- to medium-sized tetrapod tracks. Two models were created for each sample, one for each acquisition methodology. These models were processed using the software Meshmixer, Meshlab and CloudCompare, to locate any possible error in the mesh, correct them and compare the models with each other in terms of quality and graphical rendering, respectively. The RStudio software was also used to verify and control, by using statistical tests, the normal distribution of the data, as well as to further process them. We noticed that the average number of triangles is higher for the meshes obtained via photogrammetry; likewise, the values of the metric “Per Face Quality according to triangle shape and aspect ratio – Mean ratio of triangle”, available on Meshlab and used here to evaluate the quality of a mesh, is higher. Photogrammetry is thus preferable in the study of centimetric tracks as it allows for very high levels of mesh detail. That said, more experience and a deeper understanding of the acquisition process by the operator are needed for fruitfully exploiting the full potentialities of photogrammetry.