Digital Archaeology at a Dinosaur Dig: the recording and integration of Palaeontological and Geological data using Digital Archaeological techniques

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Excavating dinosaurs is often assumed as a rather straightforward ‘digging, bagging and tagging exercise’. However, when dealing with complex bonebeds, traditional 2D-grid bone mapping does not capture the full complexity of the fossil locality. In order to answer questions about sedimentology, taphonomy and palaeobiology, palaeontologists and geologists collaborated with archaeologists to share methodologies on 3D data registration and documentation in the field. Since 2013, the National Natural History Museum of the Netherlands, Naturalis Biodiversity Center, is unearthing the largest bonebed of the horned dinosaur Triceratops discovered so far. At least six individuals of Triceratops have been identified and more than 1000 bone elements have been uncovered from this site of the uppermost Cretaceous Lance Formation (69 to 66 mln. years old) in eastern Wyoming, USA. The bonebed consists of in-situ disarticulated skeletons chaotically positioned on top of each other and embedded in a variable matrix of organic rich silt and claystones and interfingering fluvial sandstones. An accurate 3D-registration of the site, using daily UAV- and close-range photogrammetry combined with Total Station and DGPS survey, provided the needed 3D spatial dataframe. The challenge, however, was to create a datastructure that combined all palaeontological and geological data with this year’s 3D-data and previous year’s unreferenced laserscanning and 2D bone mapping into one consistent dataset, whilst still allowing for lab results of prepared fossils (e.g. ct-scans, histological thin-sections, geochemical analysis) to be appended in the future that will all help in unravelling the taphonomic history of dinosaur bonebeds.