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Chemical and microbiological tools for identifying climate change impacts at Roman fort sites, Northumberland, UK

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Vindolanda and Magna are Roman auxiliary forts situated south of Hadrian's Wall Northumberland, UK. The sites are well known for their exceptional preservation of leather and wooden artefacts that tend to be lost from Roman sites elsewhere in the world. Between Roman occupation periods, wooden and stone buildings were repeatedly destroyed, and sealed with thick layers of clay, which were then re-built upon, forming layers in which oxygen was excluded from the decomposing material underneath. These waterlogged, anaerobic areas provided the ideal environments for preservation. Moisture availability in northeast England is changing with climate change. This is altering the physical, geochemical, and microbiological characteristics of the peat and threatening the still unexcavated artefacts.

Here we present a multiproxy (chemical and microbiological) approach to understanding the conditions that promote decomposition and preservation within these sites. Data (soil characterisation, chemical, and bacterial diversity and community structure) obtained from strategically sampled and radiocarbon dated peat cores and excavation trenches at the Magna Roman Army Museum will be presented. Microbial communities identified by 16S RNA gene amplicon sequencing were dominated by *Firmicutes*, *Bacteroidetes* and *Proteobacteria* at a phylum level. *Methylophilus* occurrence coincides with elevated concentrations of iron, sulphur and phosphorous and may indicate favourable preservation in these anaerobic layers.