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WARFARE AS A NEW FIELD OF STUDY IN ARCHAEO-GEOMORPHOLOGY: THE CASE OF THE BATTLEFIELD OF VERDUN (FRANCE)

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Officially recognised in 1992 by the American archaeologist LuAnn Wandsnider, archaeo-geomorphology is the study of cultural landscapes encompassing geomorphology, archaeology and heritage conservation science. At the intersection of conflict archaeology and geomorphology, conflict archaeo-geomorphology aims more specifically to identify and analyse the morphological traces of past conflicts in the present-day landscape scenery, including not only man-made structures along front lines (e.g., fortifications, trenches, bunkers) but also direct geomorphological evidence of warfare (e.g., bomb and mine craters). Such a multidisciplinary approach was conducted in the battlefield of Verdun, where took place one of the greatest battles of the First World War. By modifying land cover and earth surface through bombing and digging, soldiers have increased erosion rates. New anthropogenic landforms have been generated impacting topography on and beneath the surface. A practical way of dealing with the battlefield is to use LiDAR tool to complete an inventory of conflict-induced landforms. In practice, an airborne laser scan enabled us to acquire high-resolution 3-D images of the battlefield, today covered by a large forest mantle of twelve thousand hectares. By applying a detailed archaeo-geomorphological survey to selected study sites in several parts of the forest, we had the opportunity to evaluate the relief disturbance and to propose a first typology of conflict-induced landforms for the Verdun forest. To complete this challenge, several steps are further required: firstly, it is necessary to make an inventory of the remnants obtained by LiDAR data processing, using GIS and statistical computing softwares. Indeed, automatic extraction of landforms induced by war was possible, especially craters which were located according to their local minima points. Secondly, morphometric measurements on the field sites have to be done on the basis of selected samples. Thirdly, an archaeological characterisation of those samples should permit us to associate a military function to each landform and then, to make a detailed mapping of the battlefield. Eventually, this archaeo-geomorphological approach would greatly improve our knowledge of conflict landscapes evolution, today impacted by natural and human degradations. Since traces of past conflicts are part of the cultural heritage, it should therefore result in many issues of heritage management in the today's protected areas of the Verdun forest.