

Methodology

In the following paragraph, the methods used to answer the research questions will be elaborated upon.

Literature study

To understand the dynamics of charcoal hearths, their spatial dispersion, and their possible locations in the fieldwork area, one must first read up on the basics of charcoal production using the hearth method. Extensive literature study is done within the relatively small scientific field concerning charcoal hearths, providing the insight needed to detect hearths from LIDAR data and direct observation in the field. The literature study also shows the difference in sloped hearths versus flat ones (further in this text elaborated upon), an important difference which this research sheds more light on.

ArcGIS analysis

From the original 49 UvA-owned LIDAR tiles, four are used to conduct this research – the same ones that are manually explored during the fieldwork period. With the DEM created from the four LIDAR tiles of the fieldwork area, numerous analyses using ArcGIS are done. Firstly, a combination of the DEM and the hillshade map is used to check for the characteristic dimples of relief found on hearth sites. When spotted, any sufficient number of cross sections using the 3D Analyst toolbox found in ArcGIS are made to check whether or not the dimple actually may be a charcoal hearth or not, for example, a tree around which soil has accumulated.

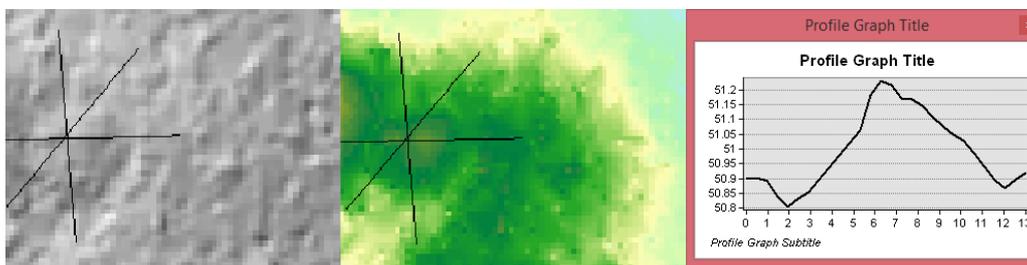


Figure 3: A suspected charcoal hearth in (from left to right) a hillshade map and DEM, with the characteristic two ditches and a higher middle in the right cross section.

Further analyses are needed to answer the three sub questions posed in this research:

ArcGIS analysis - size

Size is the first parameter that is researched. Larger hearths meant more charcoal produced, but also more wood needed to fuel the process and longer burning times (Raab et al., 2016). This may have affected their spatial dispersion. Along with this, hearths built on slopes in other parts of the world were an average smaller than their peers on flat ground due to the need to create a platform for the hearth to stand on, which would complicate the construction of the hearth (Raab et al., 2017). To research this, size data is collected for every hearth by analysis using ArcGIS. The size parameter best suited for quantitative analysis is the size of the inner diameter of the hearth (the distance between the lowest points of both ditches). The first step in taking the measurements is combining the aspect map with the point feature layer containing the hearths, using the Extract Values to Points function to assign the points their respective slope direction as derived from the aspect map. Subsequently, a cross section parallel to the slope direction and as close through the centre of the hearth as visually can be determined is made, followed by a cross section that is perpendicular to the slope direction.