Sorting of archaeological material using NIR Hyperspectral Imaging and Chemometrics

Damien Vincke[1], Rebecca Miller[2], Édith Stassart[2], Marcel Otte[2], Pierre Dardenne[1], Matthew Collins[3]
Keith Wilkinson[4], John Stewart[5], Sandrine Mauro[1], Nicaise Kayoka Mukendi[1], Vincent Baeten[1], Juan Antonio Fernández Pierna[*1]*

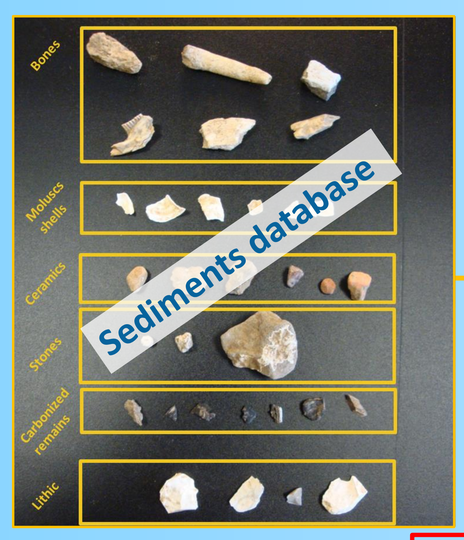
**Contact Person: j.fernandez@cra.wallonie.be ; FoodFeedQuality@cra.wallonie.be*

[1] Walloon Agricultural Research Center (CRA-W) - Belgium, [2] University of Liege - Belgium, [3] University of York - UK, [4] University of Winchester – UK, [5] Bournemouth University – UK

Traditional methods used in archaeology to sort samples are usually manual, requiring then lots of time and a previous step of sieving or sedimentation. In addition, when qualitative parameters are assessed, it often implies the destruction of the samples or the use of chemical products. For these reasons there is an increasing demand in the development of fast and non-destructive analytical methods able to detect constituents of interest in complex matrices such as soil sediments and to assess their qualitative parameters (e.g.: collagen content).

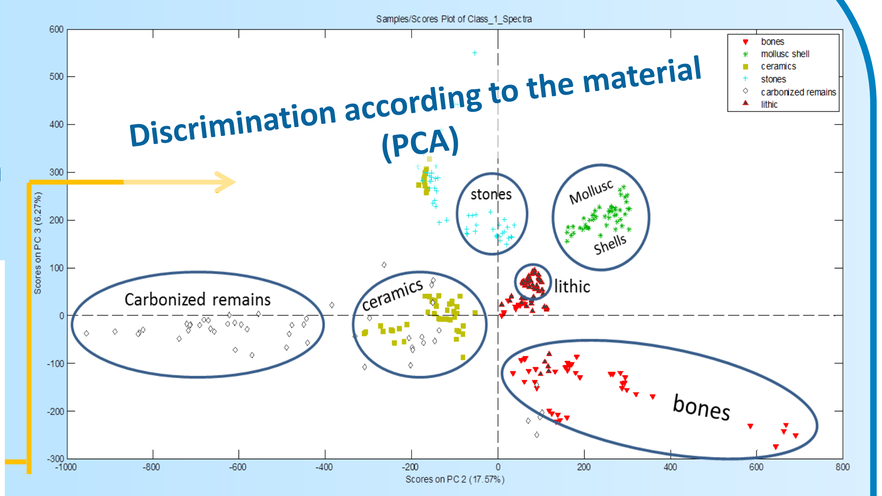
The present work combines Near Infrared Hyperspectral Imaging (NIR-HSI) and chemometric tools for the preliminary sorting of archaeological material.

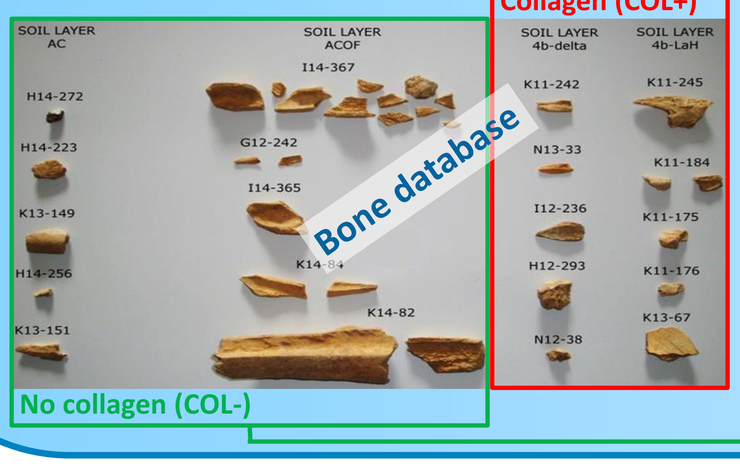
Databases & Model design

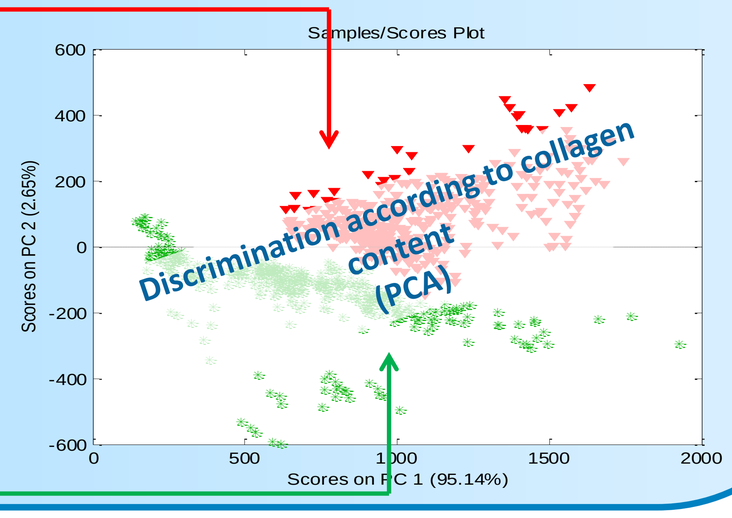


Sample scanning & creation of spectral libraries

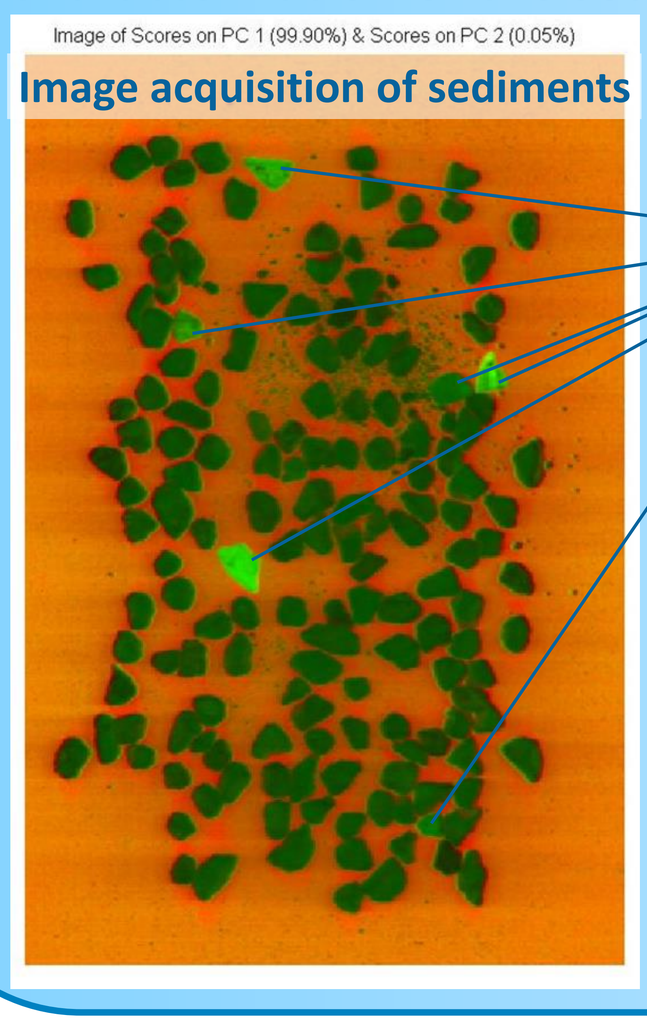
Near Infrared Hyperspectral Imaging (NIR-HSI)



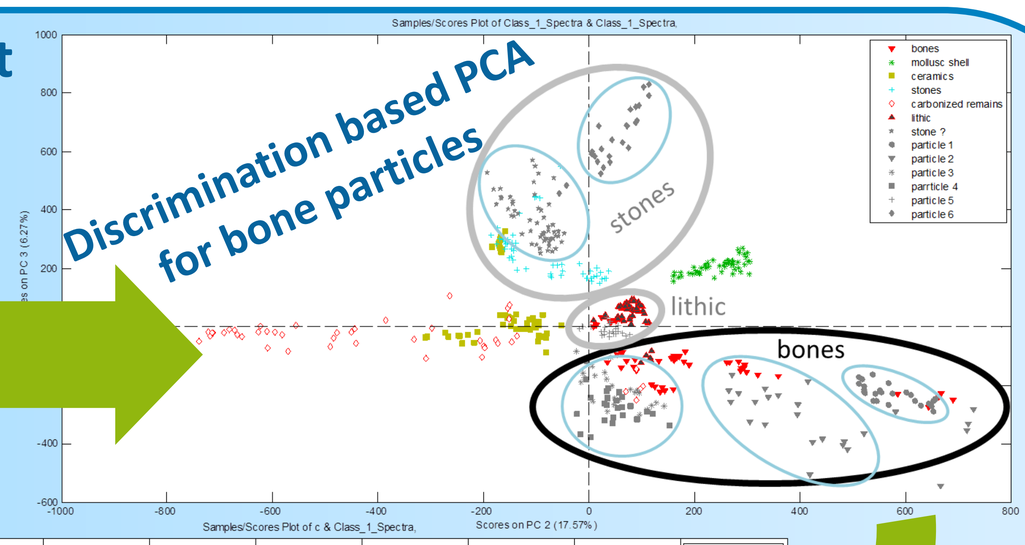


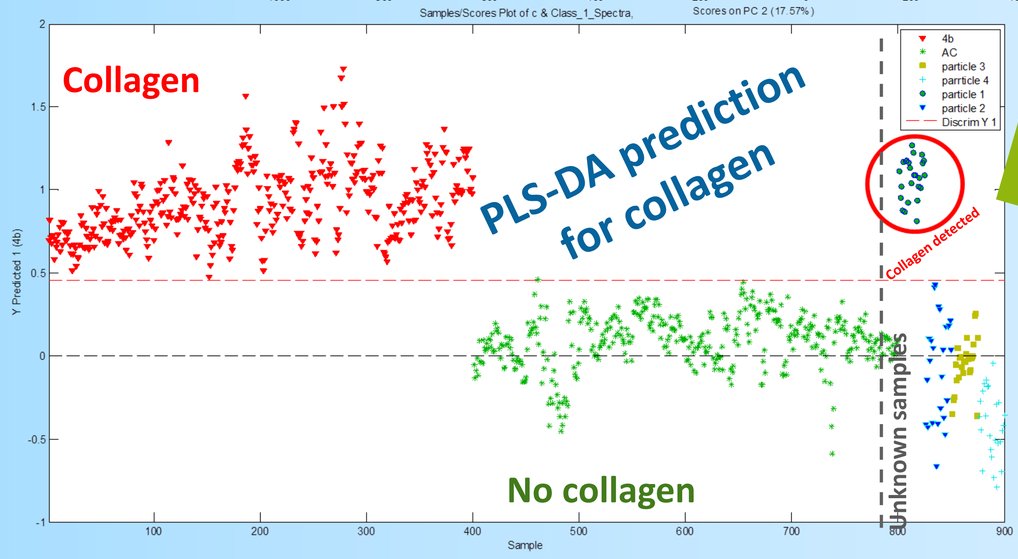


Characterization of the sediment content



Creation of spectral libraries





Prediction of collagen in bone particles

The results shown here indicate that NIR hyperspectral imaging and chemometrics could be useful tools for the discrimination of bone particles in a complex matrix (soil sediments) as well as for the prediction of collagen content in bone particles. Moreover, the PLS-DA prediction of collagen in bone particles is currently used as a preliminary analysis to select samples suitable for further analyses requiring collagen (e.g., ancient DNA analysis, 14C, MS).

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Walloon Agricultural Research Centre
Valorisation of Agricultural Products Department
Food and Feed Quality Unit
www.cra.wallonie.be

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