

## Heritage is Multivariate



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Heritage materials often exhibit extreme variability due to their unknown origin and history. No two objects are alike and not two parts of an object are the same. Heterogeneous raw materials, methods of production, and years of decay have additionally contributed to the complexity. From an analytical point of view, it is a challenge to make sense of this. On the other hand, this variability can be taken as a source of information in its own right. Exploring it enables us to provenance and date objects, develop new methods of analysis and better dose response functions to model material behaviour. This contribution will be an exploration of the multivariate nature of historic materials. The availability of high quality portable spectroscopic techniques has also enabled the collection of huge amounts of data on real objects outside the traditional laboratory. This is extremely important, as for method development, bigger datasets normally mean better accuracy. On the other hand, the importance of well-characterised reference collections has increased considerably. Several approaches will be explored:

- The use of multivariate classification methods in identification and provenancing is well established in the literature, and is at the heart of archaeometry. This approach is less often used in degradation research, where results can often be interpreted to explore the most significant agents of deterioration. Needless to say, these are also multivariate.
- Multivariate calibration methods are less often used, as extensive reference collections are needed, however, very interesting dating methods have been developed for parchment, paper and photographs, in conjunction with near infrared spectrometry. Methods have been developed which enable rapid surveys of collections of paper, photographs, and even painting canvases, and thus contribute to effective collection management.
- Degradation experiments can also be performed using principles of multivariate analysis, and optimisation of experimental runs enables us to use more and real samples in such experiments, thus immediately improving the predictive value of accelerated degradation experiments. Using principles of -omics, degradation pathways can be explored in what we began to call degradomics.

The ubiquity of inexpensive non-destructive analytical tools has enabled, more than ever before, the collection of immense quantities of data on authentic heritage materials. Mining of this data has transformed the way we think about the complexity of heritage materials. Variability is no longer a source of frustration, more of excitement.

### References

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## *Topics in Museum Conservation*

**April 26, 2012**  
**2:45 pm**  
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*MCI Theater*

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