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CENTRE FOR DOCTORAL TRAINING IN SCIENCE AND ENGINEERING IN ARTS HERITAGE AND ARCHAEOLOGY

Modelling Collections and Their Environments

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Introduction

Significant recent advances in environmental and material modelling have accompanied the publication of a recent environmental guideline (PAS 198) [1] that recommends institutions to develop individual environmental policies tailored to their collections, which avoid fixed environmental set points and optimise preservation outcomes. In collaboration with the Smithsonian's Museum Conservation Institute (US), the National Archives (UK) and the company Lichtblau e.K. (Germany), this research is working towards modelling collection change and building an integrated software platform to serve as a tool for data upload and interpretation, scenario evaluation as well as for development of environmental strategies for management of diverse collections. We are currently collecting views on inputs and outputs of the platform.

Please arrange the tags and tweet a photograph with the resulting arrangement to **CollectionsModelling @CollModel** to prioritise the development of models. Your participation is greatly appreciated and comments are welcome at any time.

Help us prioritise: (i) Select one sticker per category, (ii) Take a photo of the result, and (iii) Tweet it to @CollModel

Inputs

I. **Material** (paper, wood, paints, textile, stone, metal, plastic, glass, others)

Paper

II. **Environment** (temperature, RH, light, pollution, pests, users)

Temp
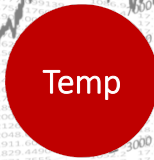
III. **Damage indicators** (material loss, loss of function, discolouration, aesthetics, shape change)

Loss of function

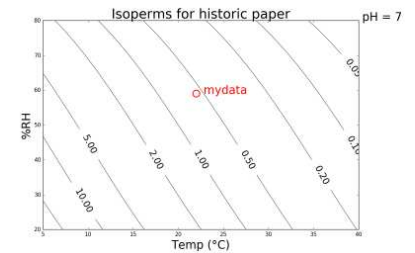## Damage functions [2]

Models
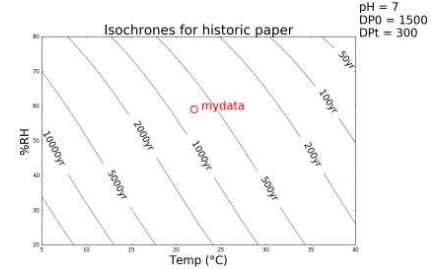
Examples of outputs [3]

A. Mathematical expressions

$$ln(k)$$
$$= 38.039 + 38.057 \cdot \left(\frac{ln(1 - RH)}{1.67 \cdot T - 285.655} \right)^{\frac{1}{2.491 - 0.012 \cdot T}}$$
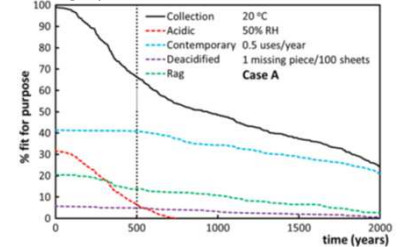$$+ 0.24 \cdot ln\left(10^{-pH}\right) - \frac{14713}{(T + 273.15)}$$

B. Isoperms

Isoperms for historic paper, pH = 7

C. Ischrones

Isochrones for historic paper, pH = 7, DP0 = 1500, DPt = 300

D. Demographic curves

Collection — 20 °C, 50% RH, Acidic, Contemporary 0.5 uses/year, Deacidified 1 missing piece/100 sheets, Rag, Case A

Acceptable uncertainties of outputs

200%

References

[1] PAS 198, 2012. Specification for Environmental Conditions for Cultural Collections. British Standards Institute, London.
[2] Strlič, M., Thickett, D., Taylor, J., Cassar, M., 2013. Damage Functions in Heritage Science. Studies in Conservation 58, 80–87.
[3] Strlič, M., Grossi, C.M., Dillon, C., Bell, N., Fouseki, K., Brimblecombe, P., Menart, E., Ntanos, K., Lindsay, W., Thickett, D., France, F., de Bruin, G., 2015. Damage function for historic paper. Part III: Isochrones and demography of collections. Heritage Science 3, #40.

The National Archives | Smithsonian Museum Conservation Institute | Lichtblau | UCL