

Storage Environments: The Big Picture

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Contact

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Videos from Webinar

Video 1 - **Books** <https://youtu.be/Xen9rQrAT94>

This video was a preliminary study to illustrate how books respond to changes in relative humidity (RH). The books were placed flat on shelves. The starting RH was 60%, which was lowered to 25% and then back to 60% RH. The upper section of the video shows the response of the books in an animated time lapse video. The lower section highlights where the areas of movement occur. As the RH decreases, the binding material desorbs water and contracts causing the cover of the book to open slightly. As the RH increases the material absorbs water and relaxes. The question we have asked is, "So what?" Does this indicate damage or are the books just responding to changes in environment as they have for decades and even centuries in some cases.

Video 2 - **DIC 12 Hour** <https://youtu.be/EEYf-SP3IrE>

This is a time lapse video exported from the Digital Image Correlation software. The samples have a random speckle pattern and are imaged in stereo at regular intervals.

The images are uploaded into software that measures the displacement of the dots as the material expands and contracts in response to changes in relative humidity. Shown here are ten samples of 19th century parchment. The highlighted sample is the one being measured. The colors correspond to the scale on the right, which shows the amount of principal strain experienced by the sample. The starting RH was 50%, it was decreased to 30% and then increased back to 50%. The samples respond by contracting and then relaxing.



Video 3 - **Vellum Bound Books** <https://youtu.be/mWg-oxsX4mQ>

This is another preliminary study of a vellum bound book using DIC to measure strain in the spine. The book dates to 1701, is in its original binding, and shows little to no mechanical deterioration. The book was covered in a random speckle pattern, placed flat on a table, and imaged in stereo at regular intervals. The RH cycled between 50% and 60%, 70%, 80%, 40%, 30%, and 20% returning to 50% between each RH set point. The colors highlighted on the spine correspond to the scale on the right, which shows the primary strain experienced by the spine of the book. While vellum is the most responsive to changes in RH, it is also very strong and typically outlasts most leather and cloth bindings.

Selected Resources

IPI Websites

Image Permanence Institute <https://www.imagepermanenceinstitute.org/>

Dew Point Calculator <http://www.dpcalc.org/>

eClimate Notebook <https://www.eclimatenotebook.com/>

Sustainable Preservation Practices <http://www.ipisustainability.org/>

Journal Articles and Conference Proceedings

Mecklenburg, Marion F., Charles S. Tumosa. "Temperature and Relative Humidity Effects on the Mechanical and Chemical Stability of Collections." **ASHRAE** (April 1999).

Padfield, Tim, Poul Klenz. "Low-energy air conditioning of archives" **ICOM Triennial meeting, The Hague, 12-16 September 2005**, edited by Isabelle Verger, 667-680. London: James & James, 2005.

Padfield, Tim, Franciza Toledo, Ernest Conrad. "Passive design, mechanical systems and doing nothing: a discussion about environmental management." **Conservation: The Getty Conservation Institute Newsletter 22**, no. 1 (2007): 10-16.

Stauderman, Sarah, William G. Tompkins. **Proceedings of the Smithsonian Summit on the Museum Preservation Environment**. Washington, D.C.: Smithsonian Institution Scholarly Press, 2016.
<http://opensi.si.edu/index.php/smithsonian/catalog/book/111>

Publications

Ford, Patricia, ed. **Sustainable Preservation Practices for Managing Storage Environments**. Rochester: Image Permanence Institute, 2012.

Maekawa, Shin, Vincent L. Beltran, Michael C. Henry. **Environmental Management for Collections: Alternative Conservation Strategies for Hot and Humid Climates**. Los Angeles: The Getty Conservation Institute, 2015.

Madan, Rachel. **Sustainable Museums: Strategies for the 21st Century**. Edinburgh: MuseumsEtc Ltd, 2011.



Related Connecting to Collections Care Webinars

Choosing the Datalogger That Is Right for You. (March 6, 2012) <http://bit.ly/2BsuEt9>

Wireless Dataloggers (July 17, 2012) <http://bit.ly/2izXHqC>

When Less is All You Got! Budget-conscious solutions to protect collections on display and in storage. (April 21, 2015) <https://www.connectingtocollections.org/when-less-is-all-you-got/>

Wireless Environmental Monitoring: Is it right for you? (December 8, 2016) <http://bit.ly/2njQ4GI>

Additonal Resource

Environmental Guidelines (AIC Wiki) <http://bit.ly/2njRWiI>

