DHPS | NY

DOCUMENTARY HERITAGE & PRESERVATION SERVICES FOR NEW YORK

Thanks for joining us! Today's presentation will begin shortly.

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DHPS | NY

TEMPERATURE & RELATIVE HUMIDITY IN COLLECTIONS CARE

Gillian Marcus, DHPSNY Preservation Specialist

Documentary Heritage and Preservation Services for New York is a five year initiative to deliver collections-related training, preservation surveys, archival assessments, and other services to the historical records community in New York.

New York State Library

New York State Archives

DHPS | NY

Documentary Heritage & Preservation Services for New York

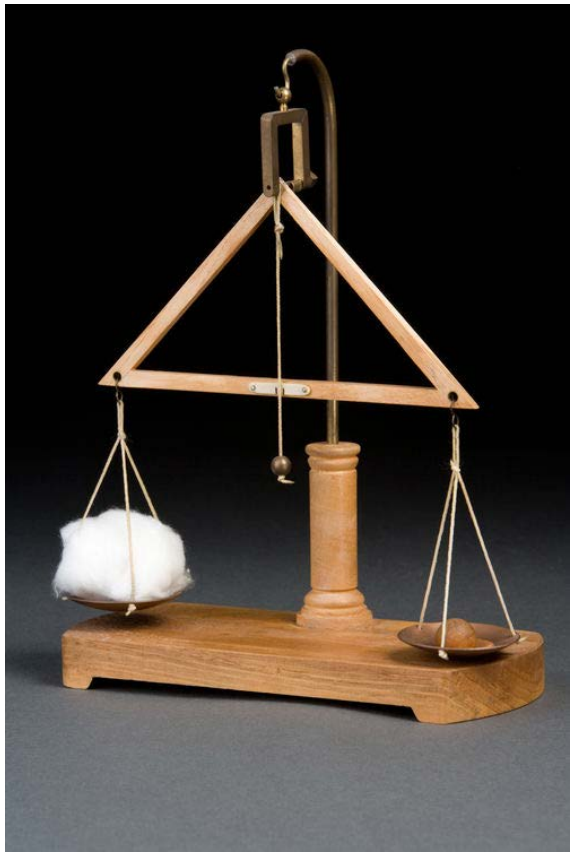
Website: dhpsny.org

The University of the State of New York
The State Education Department
1784

Conservation Center for art & historic artifacts

Let’s talk about:

- How temperature and relative humidity affect collections
- How and why to establish an environmental monitoring program at your institution
- Tools to monitor the environment
- And tools to help control the environment

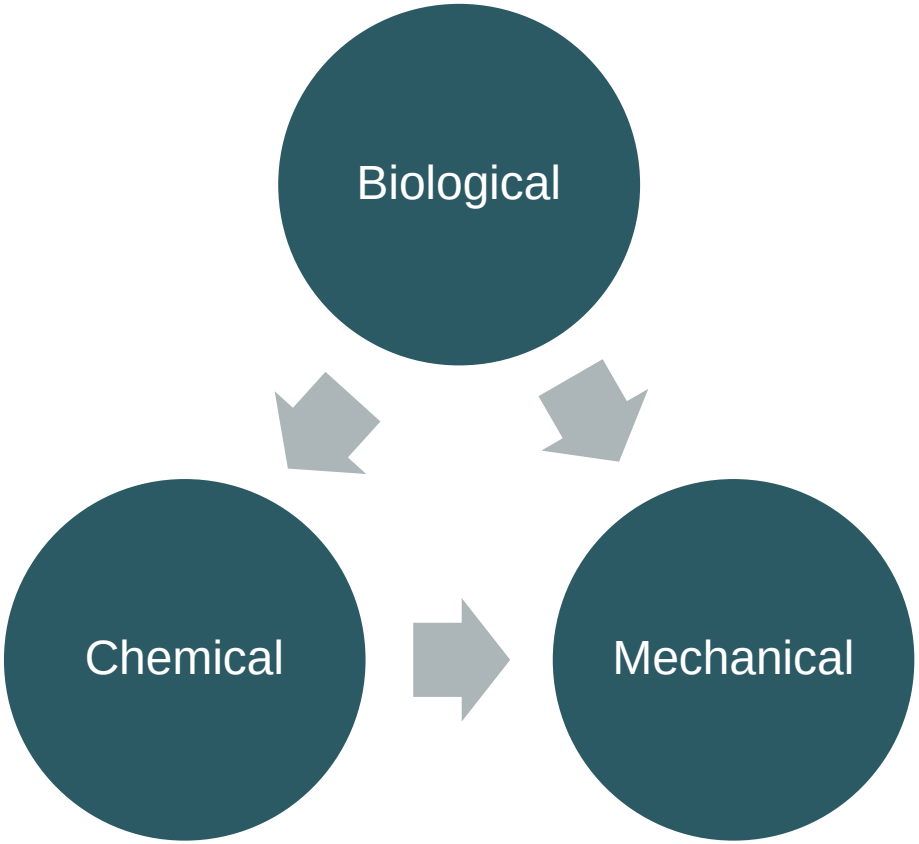


Model of Leonardo da Vinci’s hygrometer

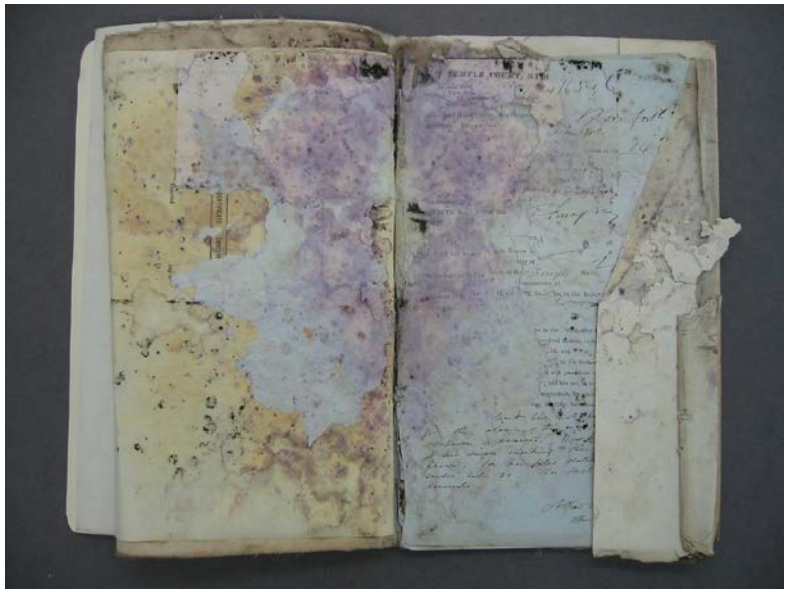
A quick history lesson about climate control…

Moving paintings into Manod Quarry in Wales (Images: the National Gallery)

Three categories of environmentally induced decay



Biological Damage

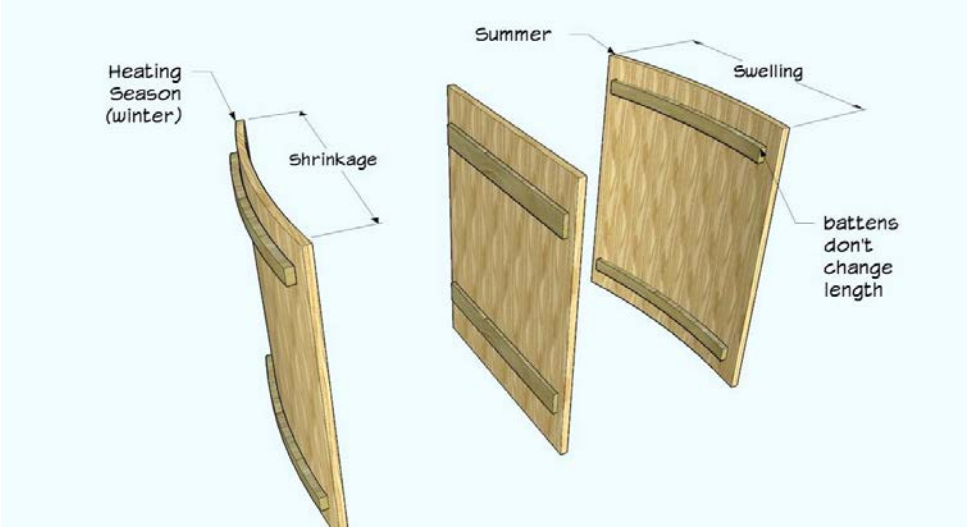


NSW State Archives

Livescience.com

Mechanical Damage

Image: filmcare.org



Chemical Degradation

CentralMaine.com

Yellowing newspapers

The Preservation Lab

Red rot – leather binding

Relative Humidity and Collections

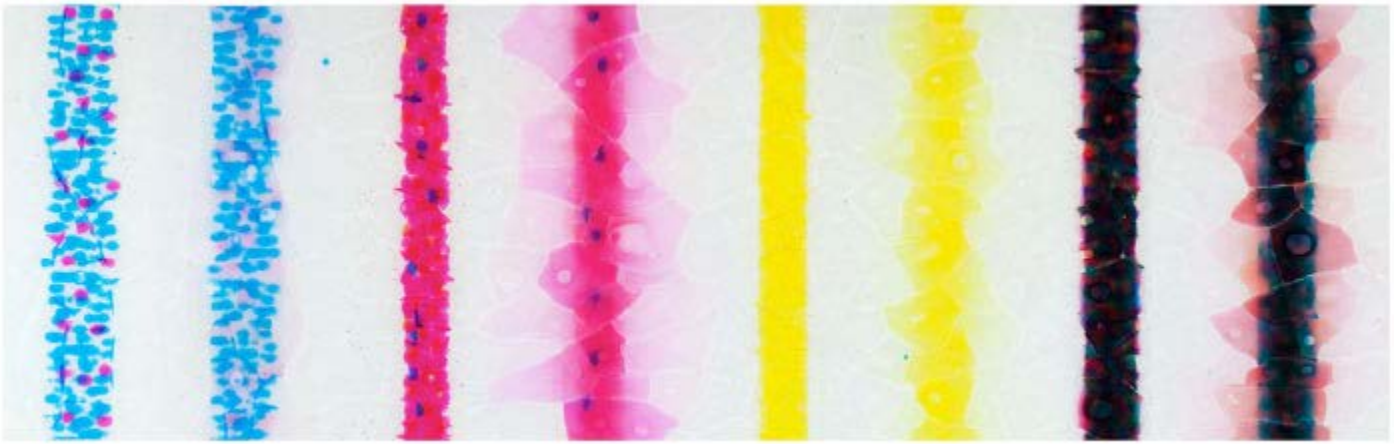


Figure 2. The left line in each pair is untreated. The right line has been exposed to high humidity.

Image: Digital Print Preservation Portal

Incorrect Relative Humidity

- Damp (over 75%)
- RH above or below a critical value for an object
- RH fluctuations

Incorrect Relative Humidity

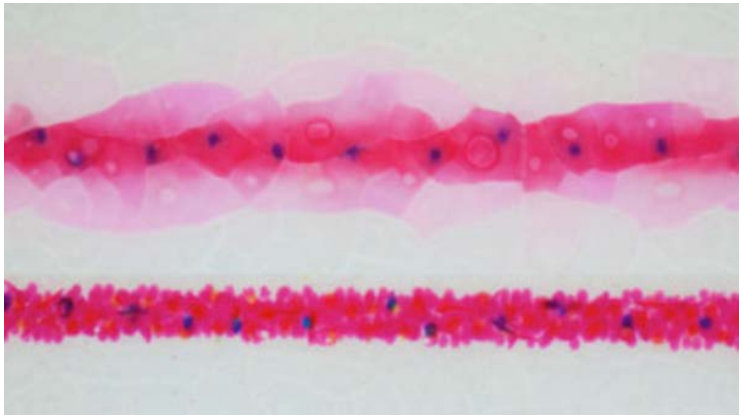
Damp (75%+)	RH too high	RH too low	RH fluctuation
• Biological damage • Mechanical damage • Chemical degradation	• Biological damage • Mechanical damage • Chemical degradation	• Mechanical damage • Less problematic for archival materials such as books, paper, photographic materials	• Mechanical damage • Chemical degradation

Damp: 75% +

- Mold risk increases at 65% relative humidity or higher; it is very likely that mold will grow above 75%
- An upper limit of 60% RH should prevent most mold growth in storage

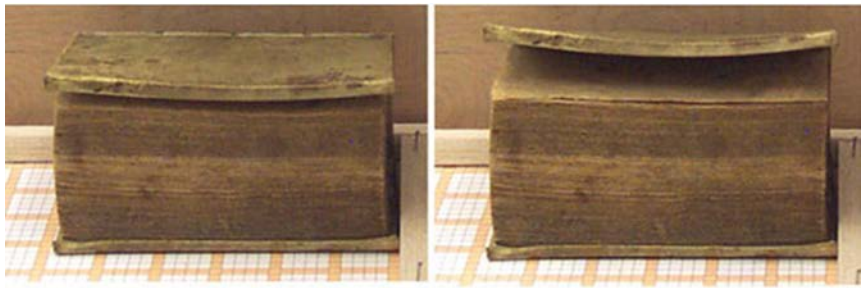
RH too high

- Metal corrosion
- Glass crizzling
- Dye colors can bleed on textiles
- Watercolors can bleed
- Dye-based digital prints can bleed
- Photographic prints “block” together



Digital Print Preservation Portal

RH too low



An example of deformation in the cover of a vellum bound book in a laboratory test of varying RH (20 to 50 percent). The dryness caused by the 20 percent RH level contracts the vellum cover and pulls the book cover up into an arch.

- Less of a problem for archival materials, but still an issue for objects
- Parchment and vellum are especially sensitive

RH Fluctuations

- Wood can crack, split, or delaminate
- Paper adhered to stretchers can tear
- Can be problematic for layered photographic materials
- Glass disease

The Field Museum

Temperature and Collections

Madame Tussaud’s post-fire, 1925

Incorrect Temperature

Temperature too high

- Chemical, biological, and mechanical deterioration

Temperature too low

- Less problematic for archival materials such as paper, books, photographs

Temperature fluctuation

- Less problematic than extremes, though rapid cycling should be avoided

Temperature too High

- Acceleration of chemical degradation – newspapers and other poor quality paper will become more acidic, brittle, and yellow
- Softening of adhesives, emulsions, some paints
- Plastics may become brittle, sticky, or disintegrate
- Magnetic media may disintegrate
- Cellulose nitrate and acetate shrink, distort, crack – nitrate can combust, acetate has “vinegar syndrome”

Yikes! Cellulose acetate doll showing the effects of plasticizer loss and acetic acid attack, Western Australia Museum

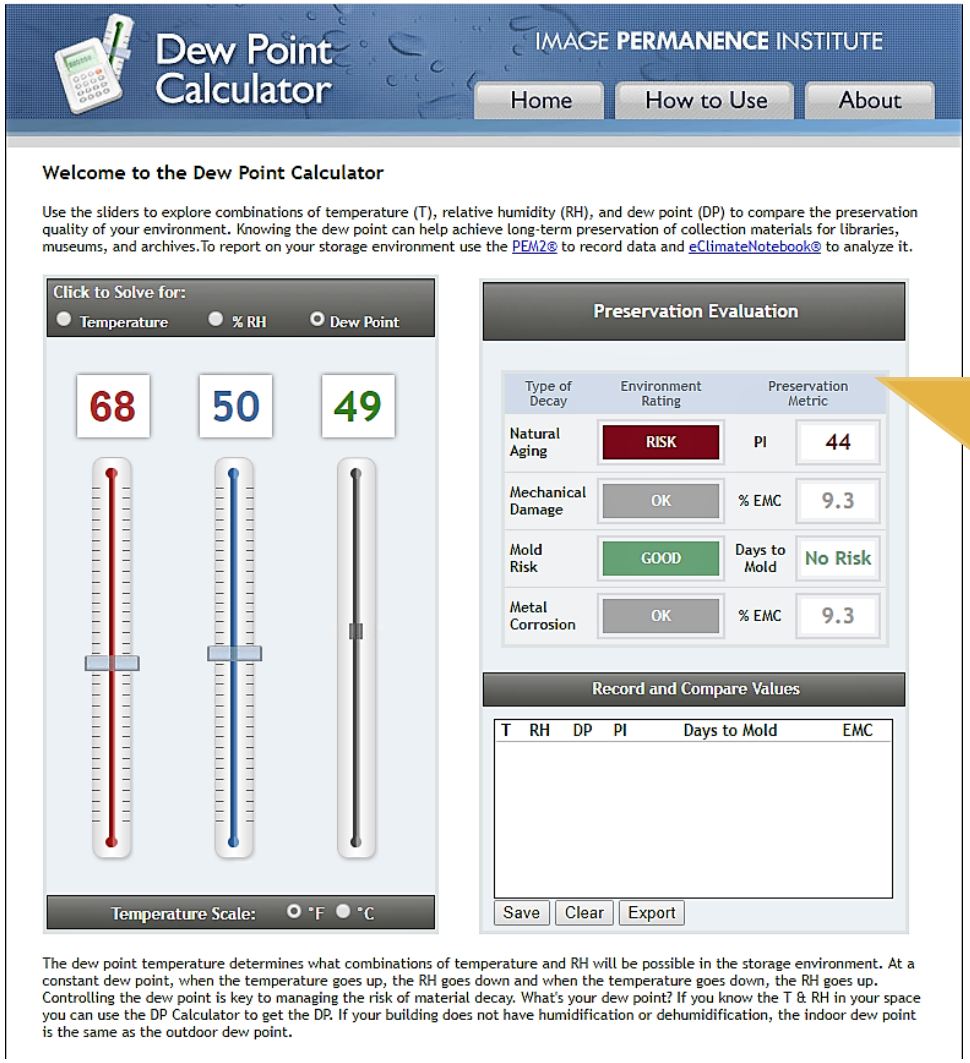
Temperature Too Low

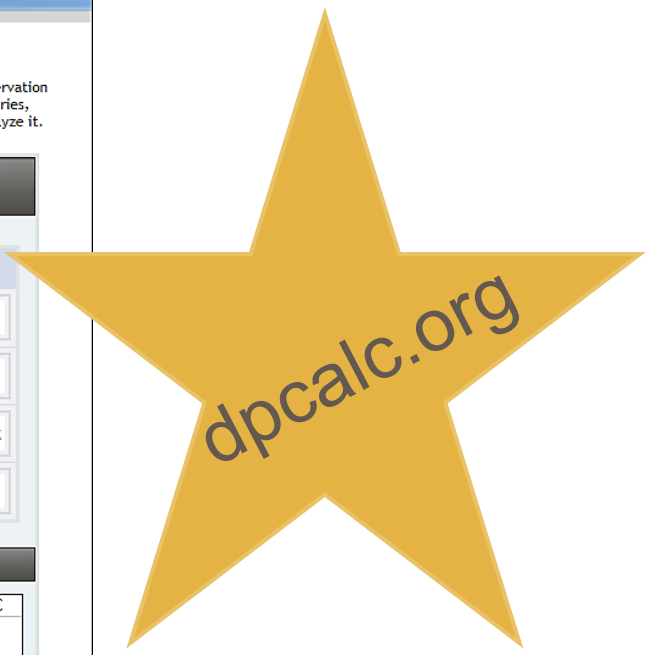
- Not usually problematic for books, paper, or photographic materials
- Can be problematic for oil and acrylic paintings, varnishes, some glass, archaeological materials

Dew Point

- Dew point: the temperature the air needs to be cooled to for RH to reach 100% and water vapor begins to condensate out of the air (something we do not want in our collections!)
- At a constant dew point, **when temperature increases, RH decreases, and when temperature decreases, RH increases.**
- Raising or lowering temperature without accounting for dew point can lead to incorrect RH levels and create a risk of condensation. Humidifying the air raises the dew point and dehumidifying the air will lower it (NPS Museum Collections Environment).

How do I calculate dew point?





Temperature and Relative Humidity Recommendations – Mixed Archival Collections

59-77 °F

45-55%
RH +/- 5%

Temperature and Relative Humidity Recommendations – Photographic Materials

STORAGE CONDITIONS	TEMP F	TEMP C	TRADITIONAL PHOTOGRAPHS		DIGITALLY PRINTED PHOTOGRAPHS		
			B&W	COLOR	INKJET	DYE SUB	EP
ROOM	68°F	20°C	Fair	No	No	Good	Good
COOL	54°F	12°C	Good	No	Fair	Very Good	Very Good
COLD	40°F	4°C	Very Good	Good	Good	Very Good	Very Good
FROZEN	< 32°F	< 0°C	Very Good	Very Good	Very Good	Very Good	Very Good

Note: even though some print types are satisfactory at room temperature, the highest common "good" or "very good" condition for all photograph types, both traditional and digital, is 40°F (4°C) making this the optimal storage condition for the widest variety of objects.

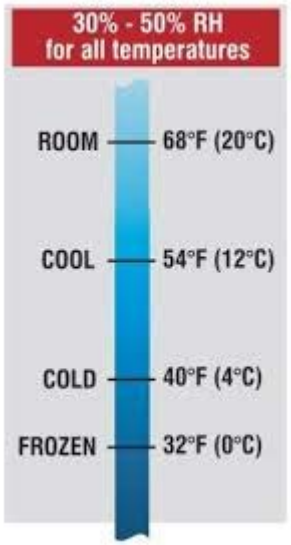


Image Permanence Institute

Establishing an Environmental Monitoring Program

Monitoring the climate in the Welsh slate mines. Image: National Gallery.

Establishing an Environmental Monitoring Program

What are you using to record data?

Where are you recording it?

How often are you recording it?

Is this information being tracked?

Whose job is it anyway?

What do we do with this information?

Monitoring Considerations

Consistency

- Regularity of monitoring
- Responsibility of monitoring

Frequency

- At intervals – once a week, once a month, once a day – it's up to you

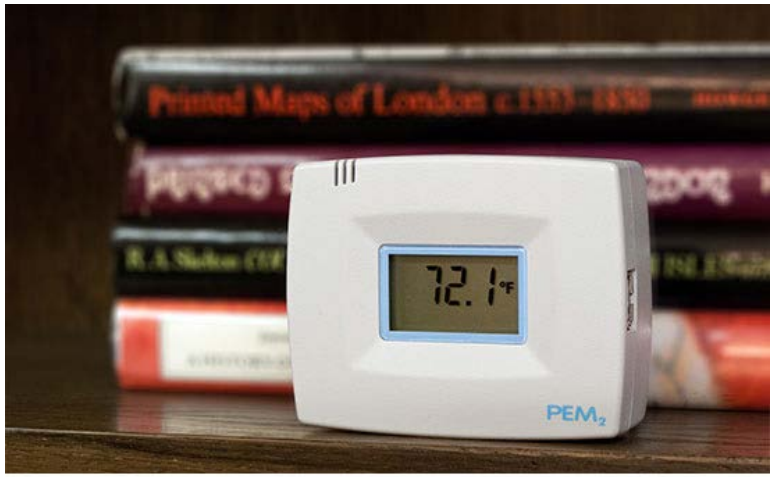
Data analysis

- Spreadsheets
- Charts
- Dataloggers do it for you!

Tools for Monitoring the Environment

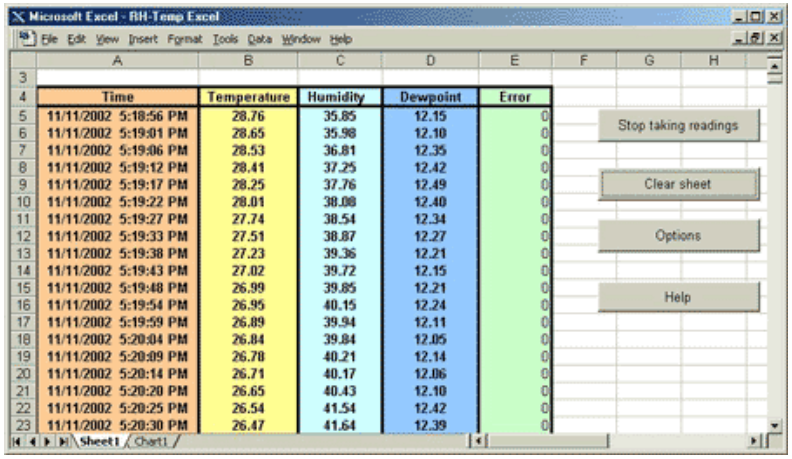
Image: Museo Nazionale della Scienza e della Tecnologia

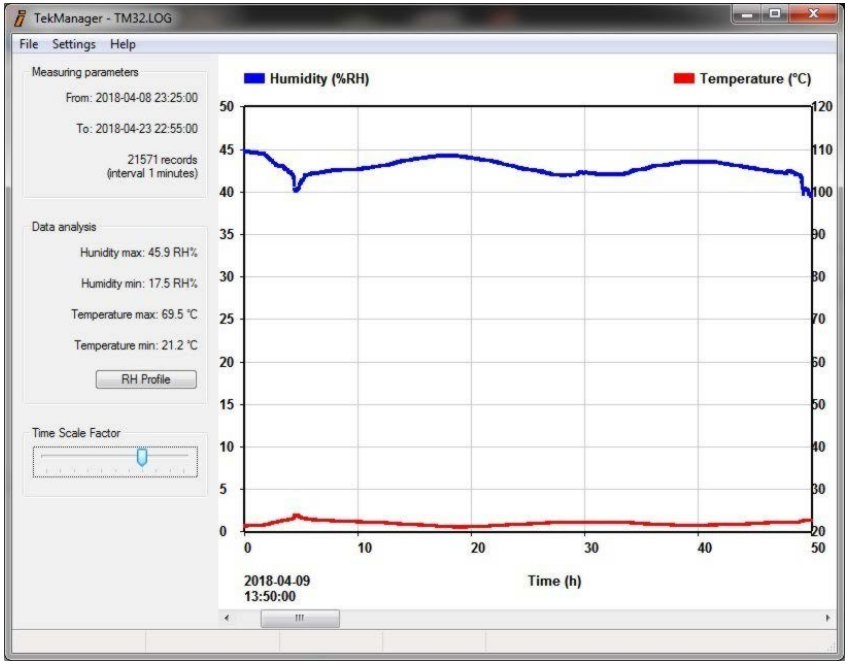
Tools for Monitoring the Environment



IPI's PEM2® can be used to measure and monitor conditions in a flooded environment or a drying area during salvage

Recording Climate Data





Climate Control Solutions for Collections Storage

- HVAC system
- Dehumidifiers
- Window air conditioners
- Sealing windows and doors
- Fans

Passive Control

- Building design
- Correcting design faults
- Cases/enclosures/microclimates for very fragile objects

Passive Control

- Basic control: No moving parts, no machinery, no energy consumption!
- Ensure reliable walls, roof, windows, doors, with good vapor barriers. In new buildings, explore low energy designs, high thermal mass, high insulation, high airtightness, used by some recent museums and archives.
- Identify and eliminate sources of damp.
- Use bags, envelopes, or encapsulation on all objects vulnerable to any type of incorrect RH. Transparent polyethylene or polyester is the most reliable, such as food quality bags, e.g. "Zip-Loc“.
- Use simple cases on the most sensitive and valuable objects on display. Use backing boards on all paintings (Consult Daly-Hartin 1993) (Michalski, “Agent of Deterioration: Incorrect Relative Humidity,” Canadian Conservation Institute)

Questions?


Why yes, it is a little humid outside,
why do you ask?
ICANHASCHEEZBURGER.COM

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Documentary Heritage & Preservation Services

FOR NEW YORK

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