Time lines for museum and archive storage

Hoped for durability of the artefacts: 2000 years

Codex Runicus
c. 700 years BP

Codex Sinaiticus
c. 1700 years BP
Time lines for museum and archive storage

Hoped for durability of the artefacts: 2000 years

Durability of the institution keeping the artefact

Copenhagen University
1479 AD

St Catherine's Monastery
Sinai, Egypt, 6th c. AD
Time lines for museum and archive storage

Hoped for durability of the artefacts 2000 years

Durability of the institution keeping the artefact

Durability of the building

Arnamagnææan Archive 2005 AD
St Catherine's Monastery Library 1951 AD
Time lines for museum and archive storage

Hoped for durability of the artefacts 2000 years

Durability of the institution keeping the artefact

Durability of the building

Durability of air conditioning: 20 years
Time lines for museum and archive storage

- Hoped for durability of the artefacts: 2000 years
- Durability of the institution keeping the artefact
- Durability of the building
- Durability of air conditioning: 20 years
- Validity of environmental standards: 10 years
- Period between software security updates: 1 month

The Stuxmus worm set the humidifier too high
Time lines for museum and archive storage

Hoped for durability of the artefacts 2000 years

Durability of the institution keeping the artefact

- Durability of the building
- Durability of air conditioning: 20 years
- Validity of environmental standards: 10 years
- Period between software security updates: 1 month
The natural climate and the standard climate

The temperature in Cambridge, UK, superimposed on the range permitted by BS 4971:2017

Attainable by winter heating and RH buffering without active humidity control
The temperature in Cambridge, UK, superimposed on the range permitted by ISO 11799:2015

Attainable by summer dehumidification without active temperature control
The low energy store

Solar voltaic

Only used in winter heating model

Insulation to U-value ≈ 0.1 W/m²·K

Concrete slab laid directly on the ground

Only used in uncontrolled temperature model

Ground acting as heat sink

Dehumidifier

Valve

Valve

Computer

Sensors

RH

CO₂

RH buffering by absorbent artefacts

Air exchange rate < 1/day
The ground as a heat store

Museum store in Ribe, Denmark
No temperature control, summer de-humidification

The mixing ratio difference shows a large excess of water vapour (brown area) in the air infiltrating from outside

Museum store in Ribe
Winter heating to a fixed temperature - no RH control

The mixing ratio is in balance over the year. Humidity buffering ensures a gentle RH cycle around a constant annual average.
Why is there suspicion of simplicity?

The National Archive of France at Pierrefitte, Paris
The water vapour deficit in winter (blue area) is not compensated in summer, so humidification is needed.
Looking ahead...

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For a complete explanation of our design concept, and to see this lecture again, please visit:
www.conservationphysics.org/coolstorage

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