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

Arnamagnæan 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

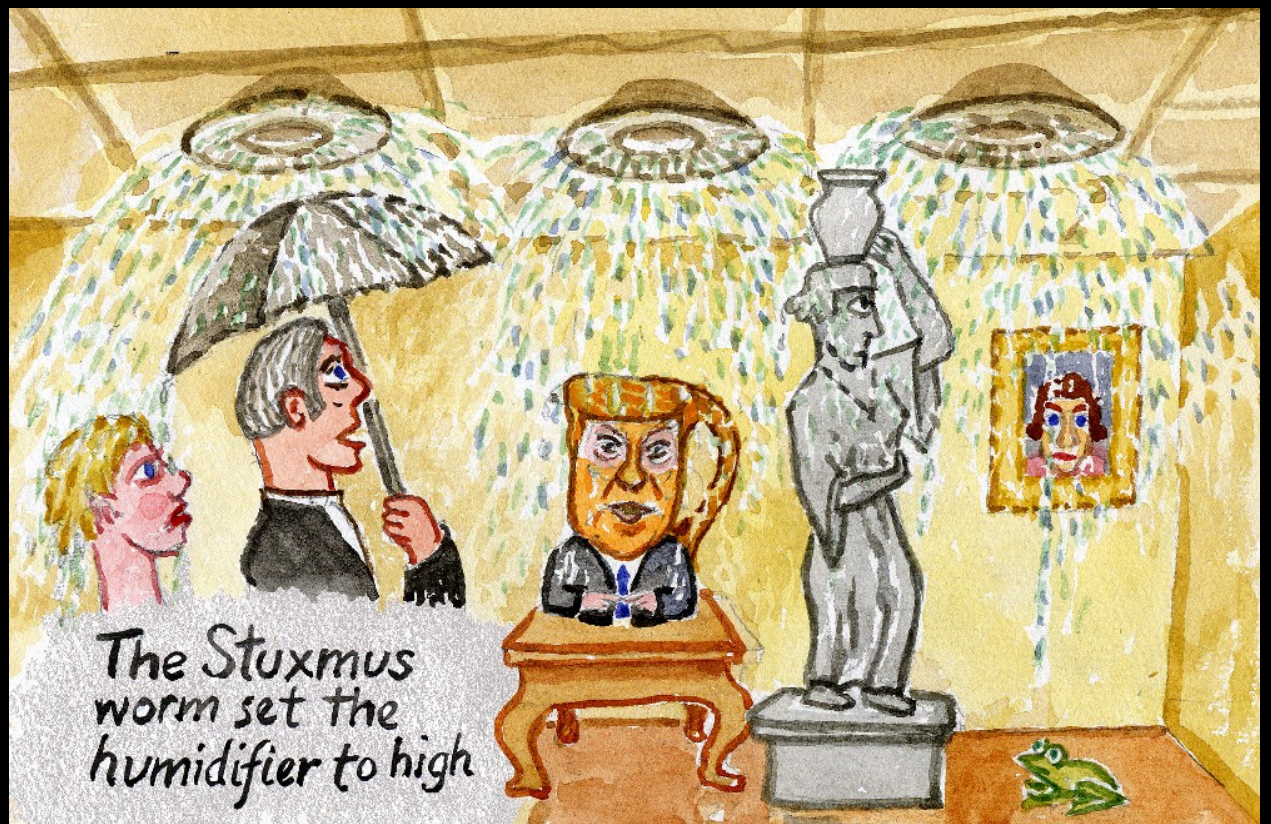
Time lines for museum and archive storage

Hoped for durability of the artefacts 2000 years

Durability of the institution keeping the artefact

Durability of the building

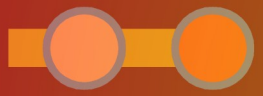
- Durability of air conditioning: 20 years
- Validity of environmental standards: 10 years
- Period between software security updates: 1 month



Time lines for museum and archive storage

Hoped for durability of the artefacts 2000 years

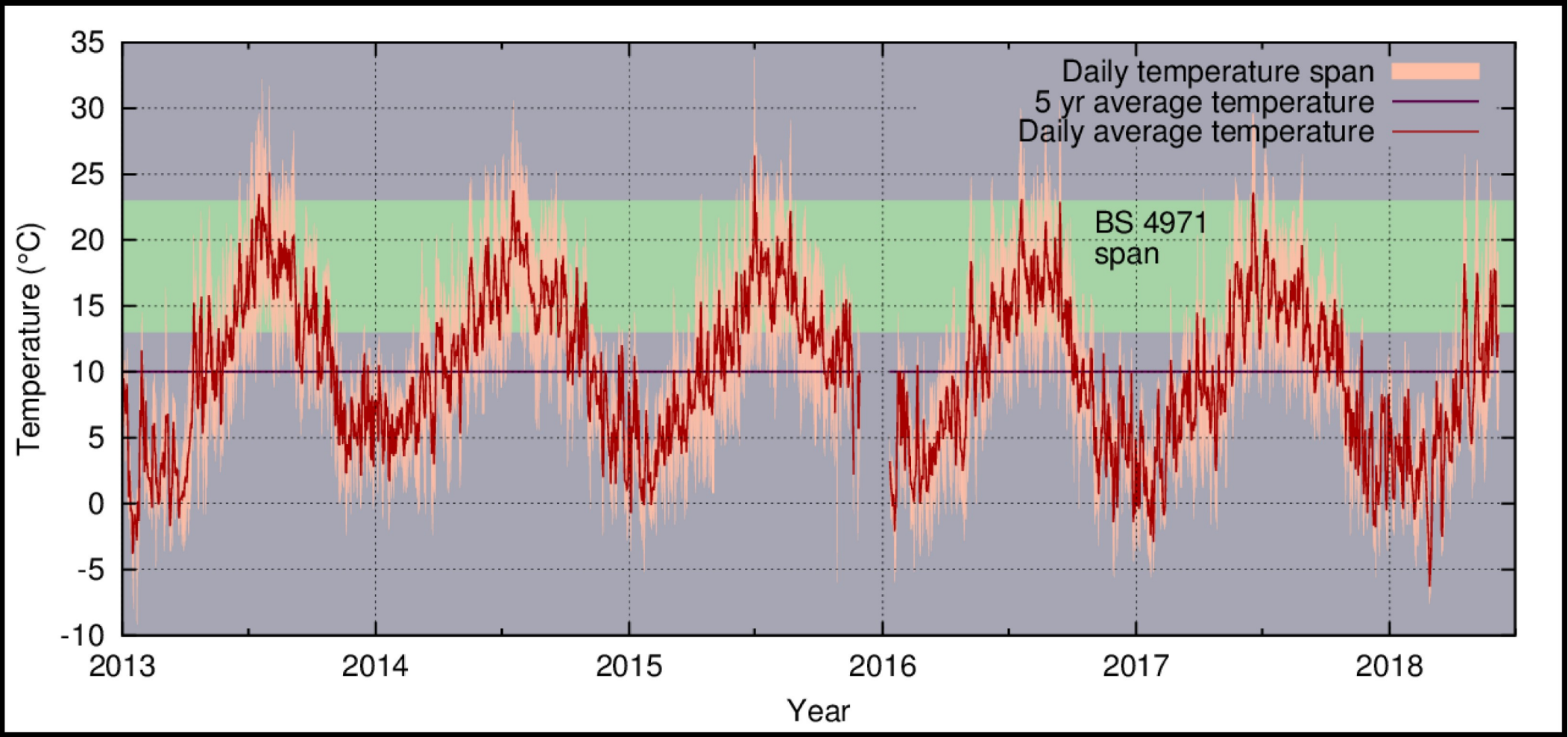
Durability of the institution keeping the artefact



Durability of the building

- Durability of air conditioning: 20 years
- Validity of environmental standards: 10 years
- Period between software security updates: 1 month

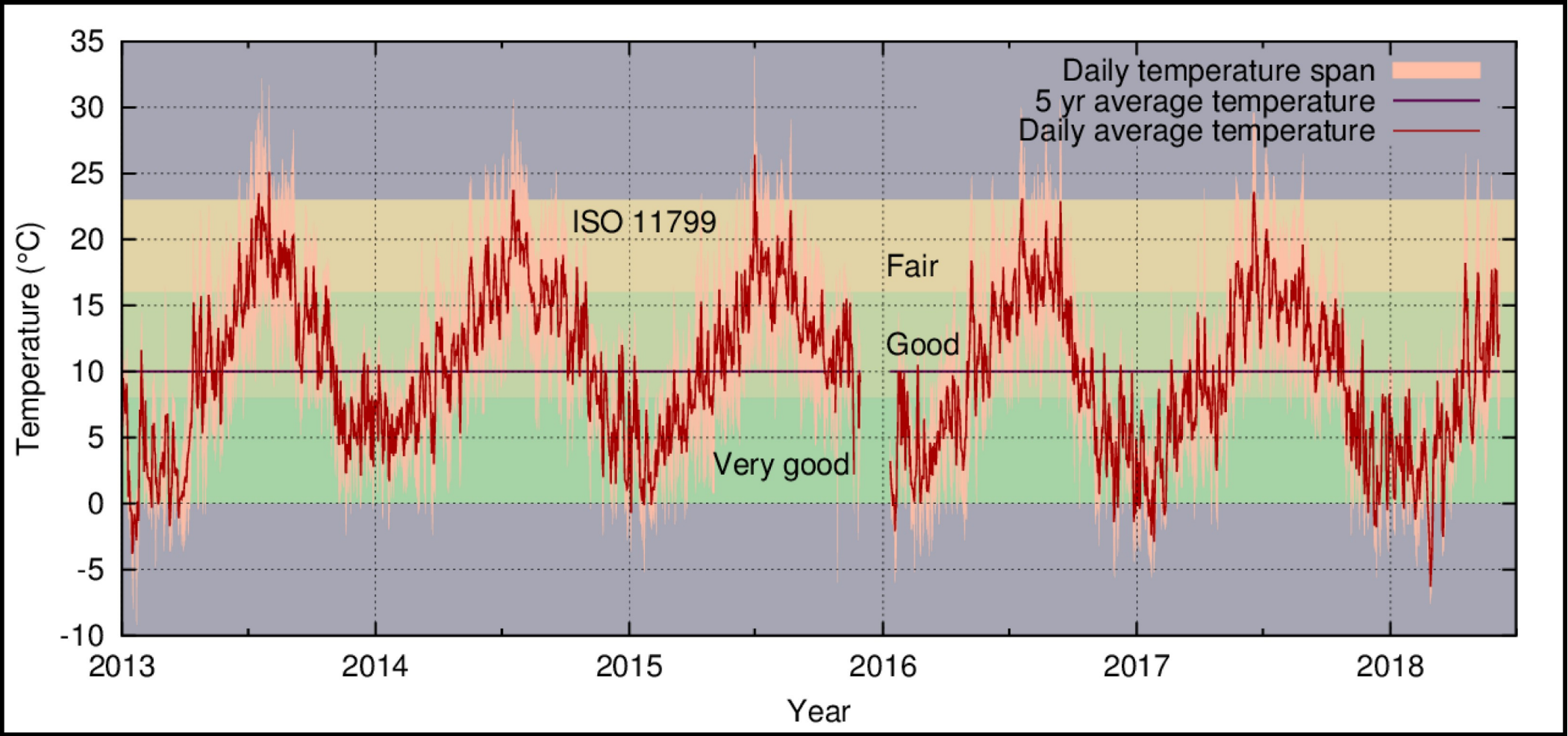
The natural climate and the standard climate



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

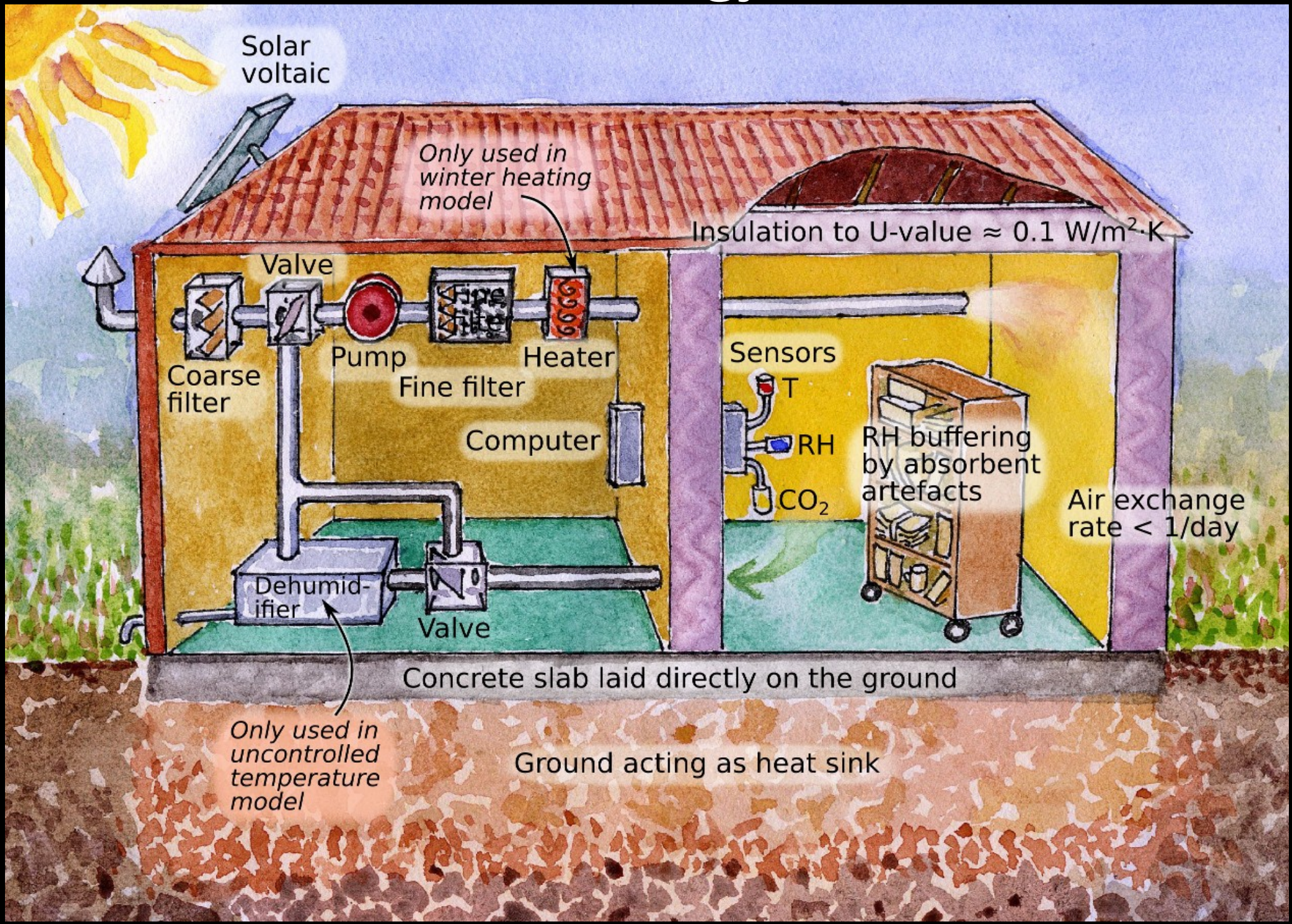
The natural climate and the standard climate



The temperature in Cambridge, UK, superimposed on the range permitted by ISO 11799:2015

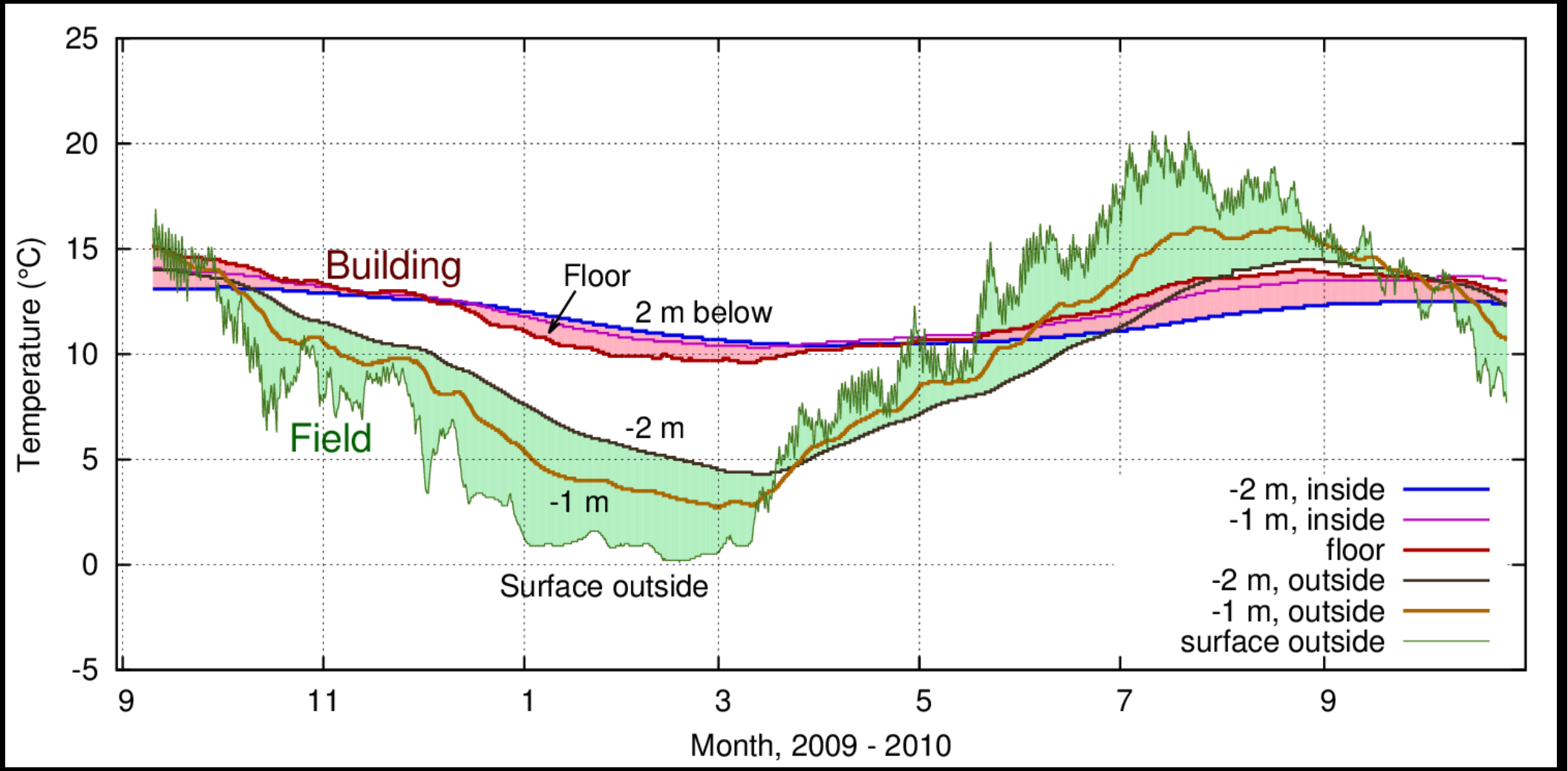
Attainable by summer dehumidification without active temperature control

The low energy store

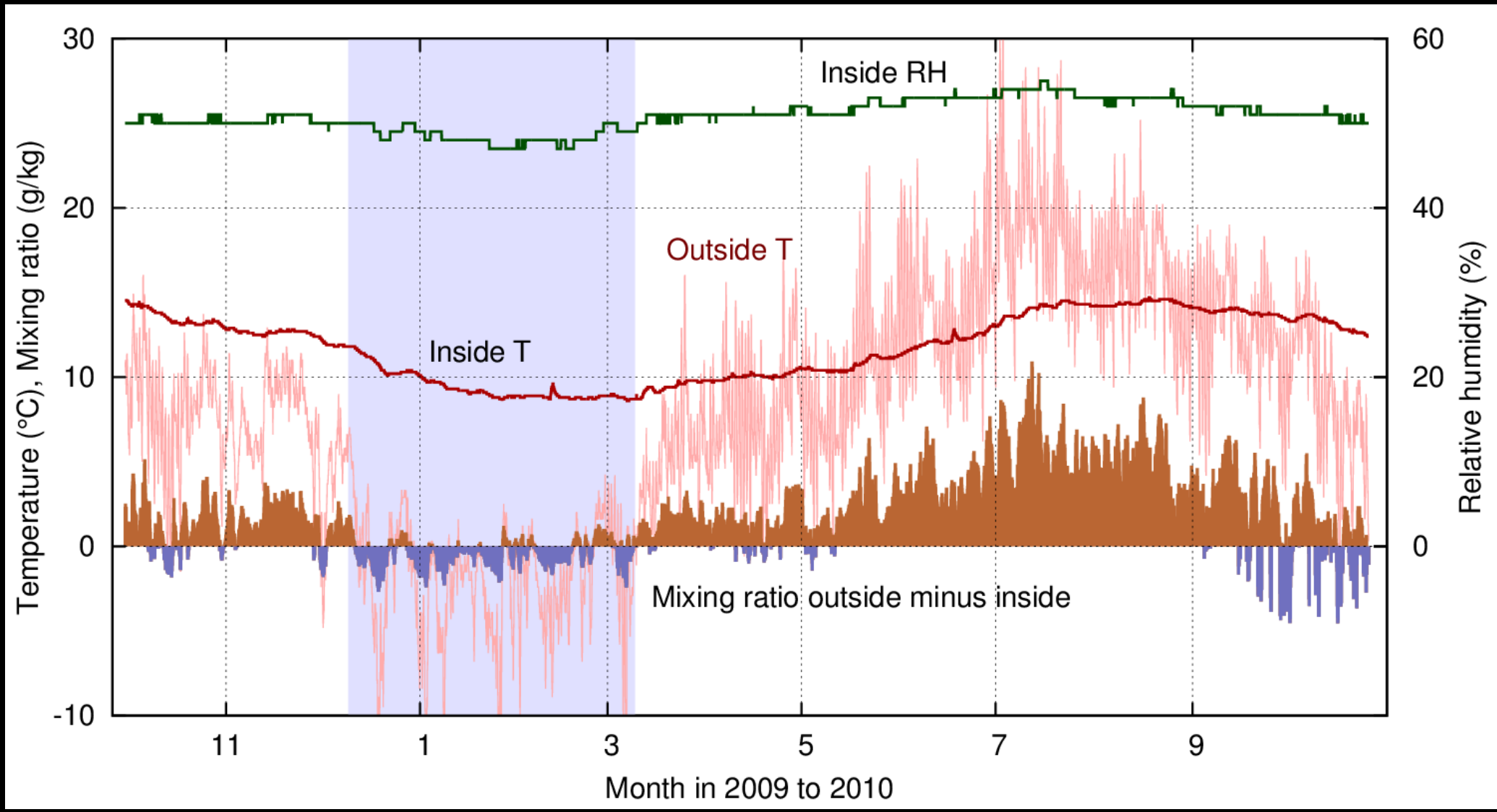


The ground as a heat store

Museum store in
Ribe, Denmark



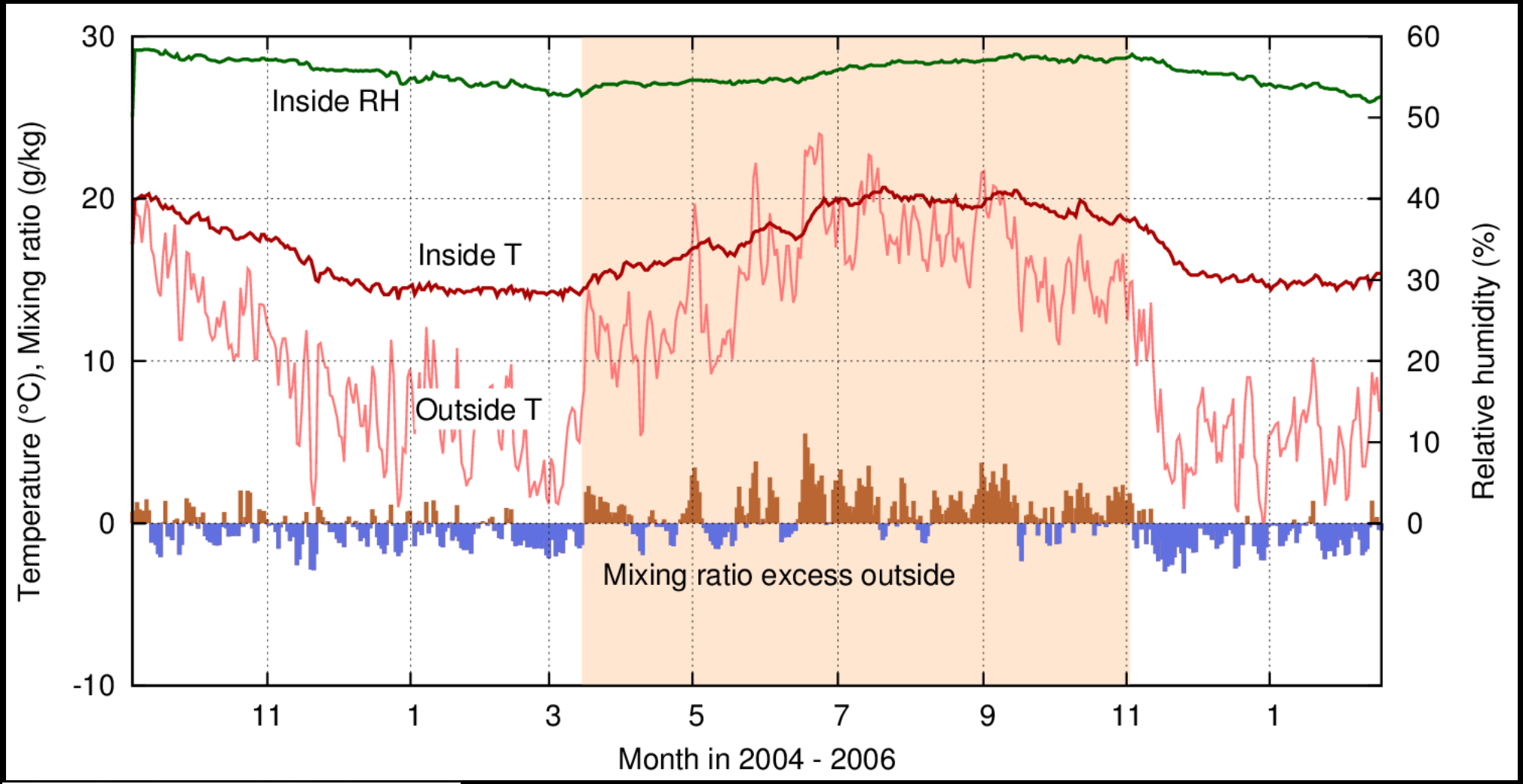
No temperature control, summer de-humidification



Museum store in Ribe

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

Winter heating to a fixed temperature - no RH control



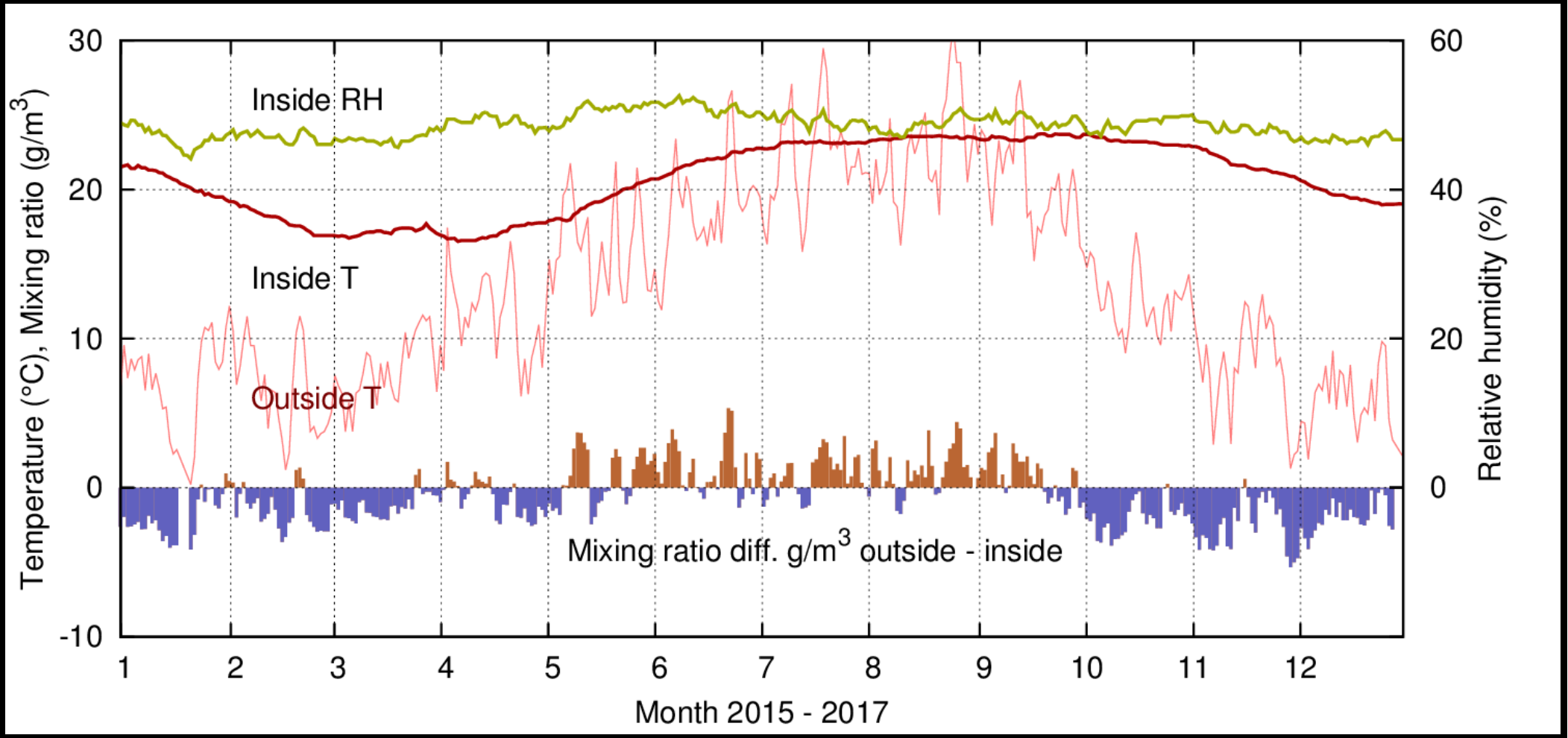
Suffolk Record Office, Ipswich, UK

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

Full air conditioning - instant response

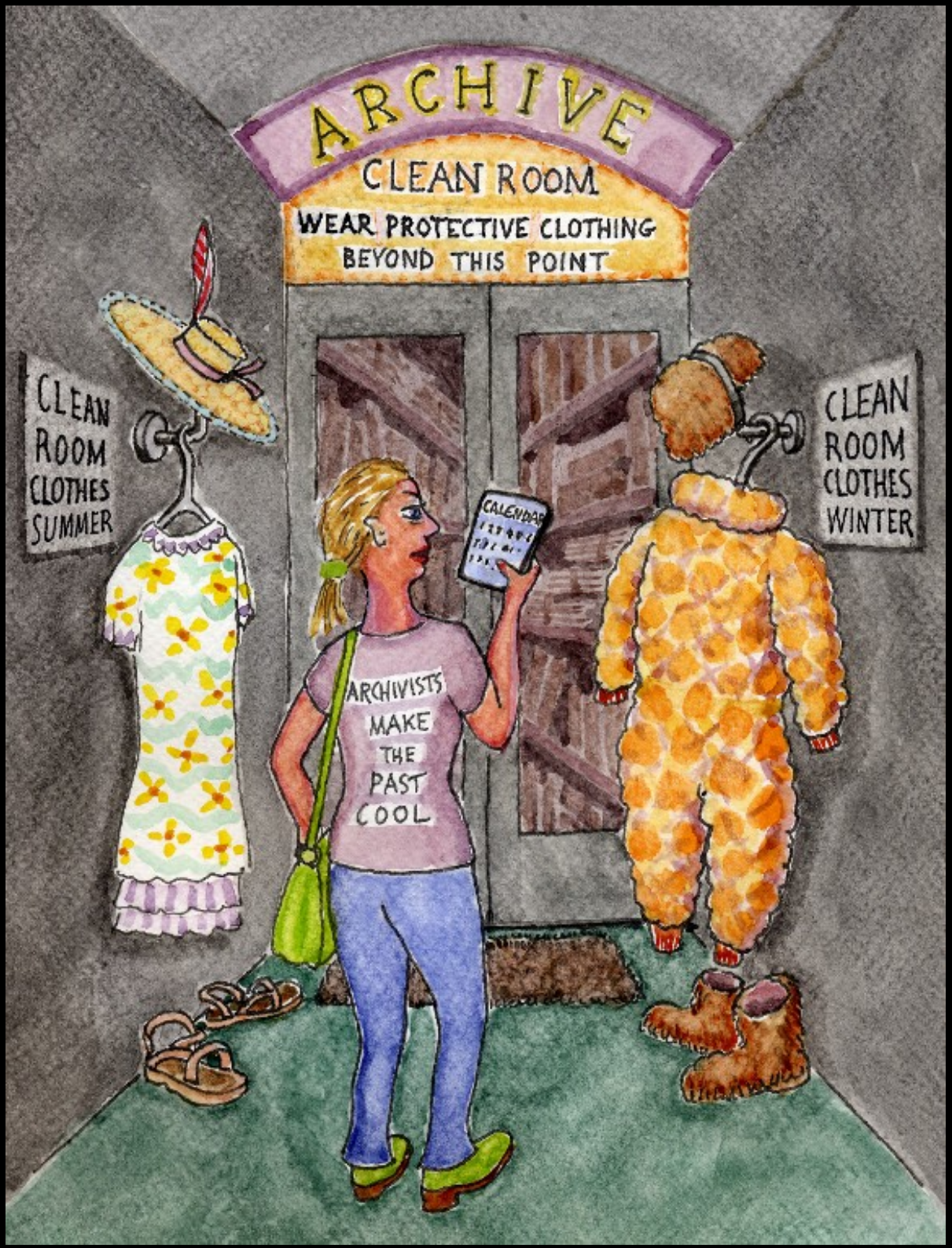


The National Archive of France at Pierrefitte, Paris

The water vapour deficit in winter (blue area) is not compensated in summer, so humidification is needed.

Looking ahead...

The project for new low energy storage for the National Museum of Denmark and the Royal Library



Acknowledgements

The Danish Ministry of Culture
The National Museum of Denmark
Dominic Wall, Suffolk Record Office
Bruno Bonandrini, Pierrefitte Archive

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

The authors:
Tim Padfield,
Morten Ryhl-Svendsen,
Poul Klenz Larsen,
Lars Aasbjerg Jensen