



The building committee meets. The conservator starts by specifying the environment, relying on the wisdom of the standard committee.

## 7.3 Recommended storage temperatures and relative humidity

### 7.3.1 *Storage temperature for frequently-handled material*

The temperature for the storage of frequently-handled paper and parchment should be as constant as possible. In order to avoid the need for acclimatization (see 7.3.4) when documents move from storage to reading room and back, the temperature should be at a fixed point between 16 °C and 19 °C with a tolerance of 1 °C on either side, but ranging neither below the minimum nor above the maximum. Documents in transit should be protected against the effects of any unsuitable environment between the repository and the reading room, and the distance between the two should be minimized.

### 7.3.2 *Storage temperature for infrequently-handled material*

Little-used material will benefit from being stored at cooler, constant temperatures. The temperature should be at a fixed point within the range of 13 °C to 16 °C with a tolerance of 1 °C on either side. The material should be allowed to acclimatize before use in a transitional environment such as that recommended in 7.3.1.

Extract from  
BS5454:2000

Interpretation by the  
National Preservation  
Office:

between 16°C and 18°C,  
or 17°C and 19°C

No evidence given for  
the need for constancy  
to  $\pm 1$  degree, nor for  
the lower limit

### **7.3.3 Relative humidity**

Relative humidity should be at a fixed point between 45 % and 60 % with a tolerance of 5 % on either side, but ranging neither below the minimum nor above the maximum. Rapid changes should be avoided. Little-used paper not in bound volumes may be stored at a relative humidity of 40 %, but should then be acclimatized before use (see 7.3.4)

...

### **7.4 Ventilation**

NOTE See also 5.2.2 for reducing air infiltration.

#### **7.4.1 General**

The air within the repository should not be stagnant. There should be sufficient air movement to avoid pockets of stagnant air.

NOTE Air movement removes off-gassing of organic materials and prevents a build-up of pockets of high relative humidity.

If a mechanical ventilation system is provided, it should be designed to reduce pollutant concentration by introducing a proportion of fresh air (see 7.5.3) and by providing air distribution that will avoid areas of stagnation. Care should be taken over the location of air diffusers since loaded shelves create barriers to air circulation.

Confused explanation  
for ventilation  
requirement



Enforcement of the British Archive Standard demands supplementary non-standard instrumentation.

The unconsidered consensus, enshrined in standards:

Constant temperature

Constant relative humidity

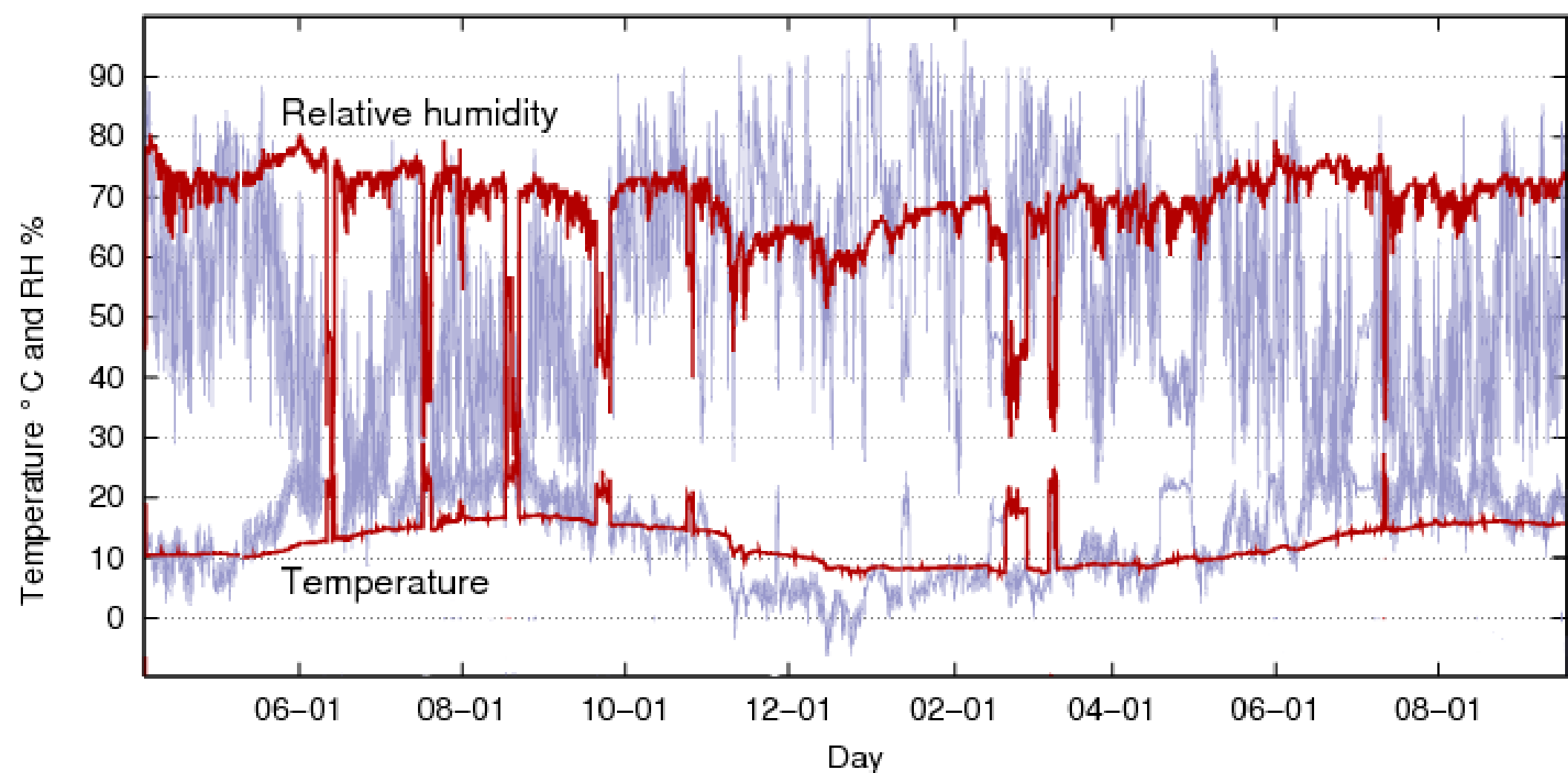
Air movement

Are these mantras justifiable?

Science still cannot measure very slow deterioration,  
so let's start by looking at historical evidence.



The Alcazar of Segovia, Spain. The military archive is behind the lowest range of small windows.



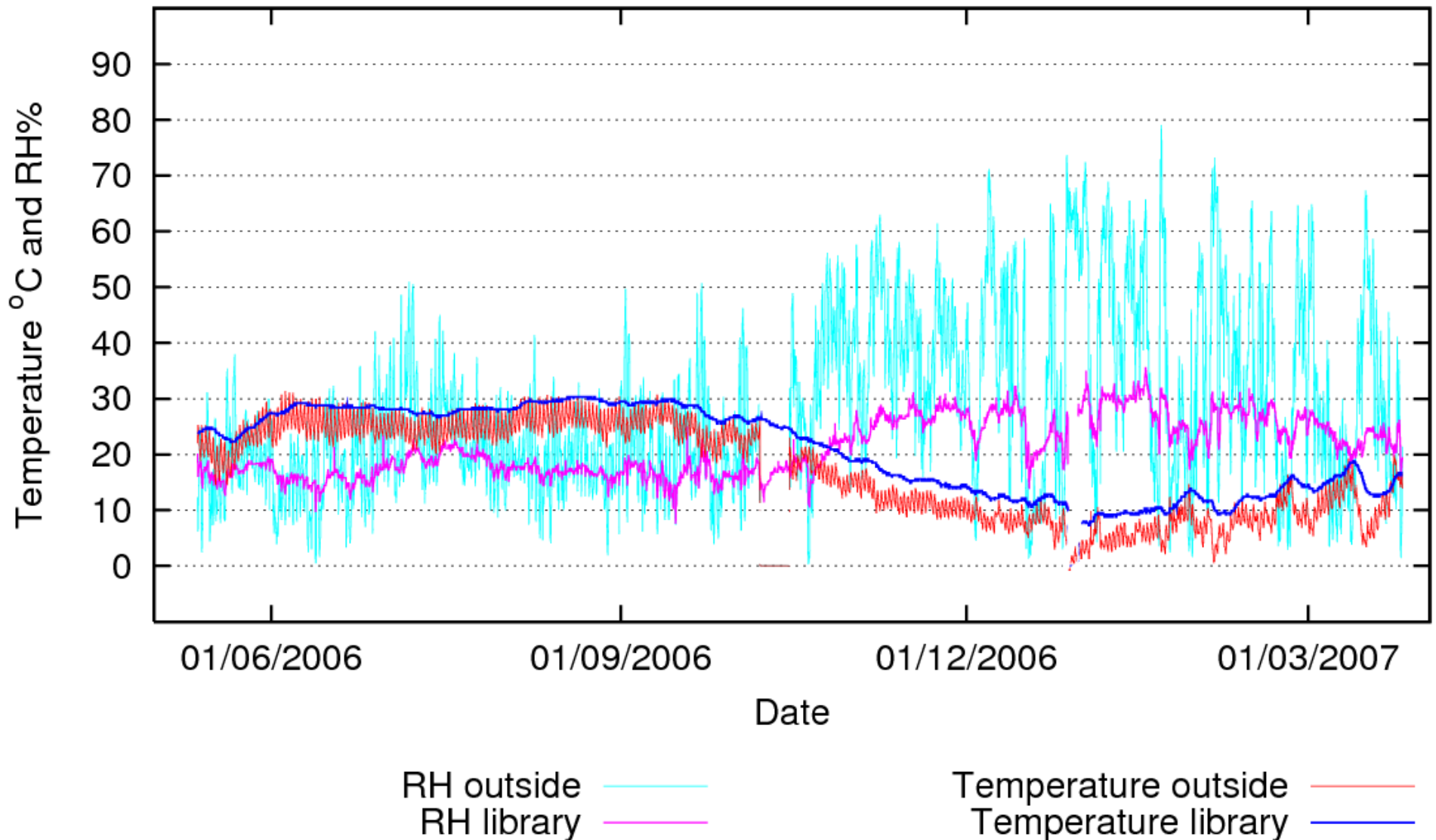
Alcazar archive climate over a year and a half.

Naturally buffered, no heating – RH perilously high but no visible biological growth.



St. Catherine's Monastery, Sinai, Egypt



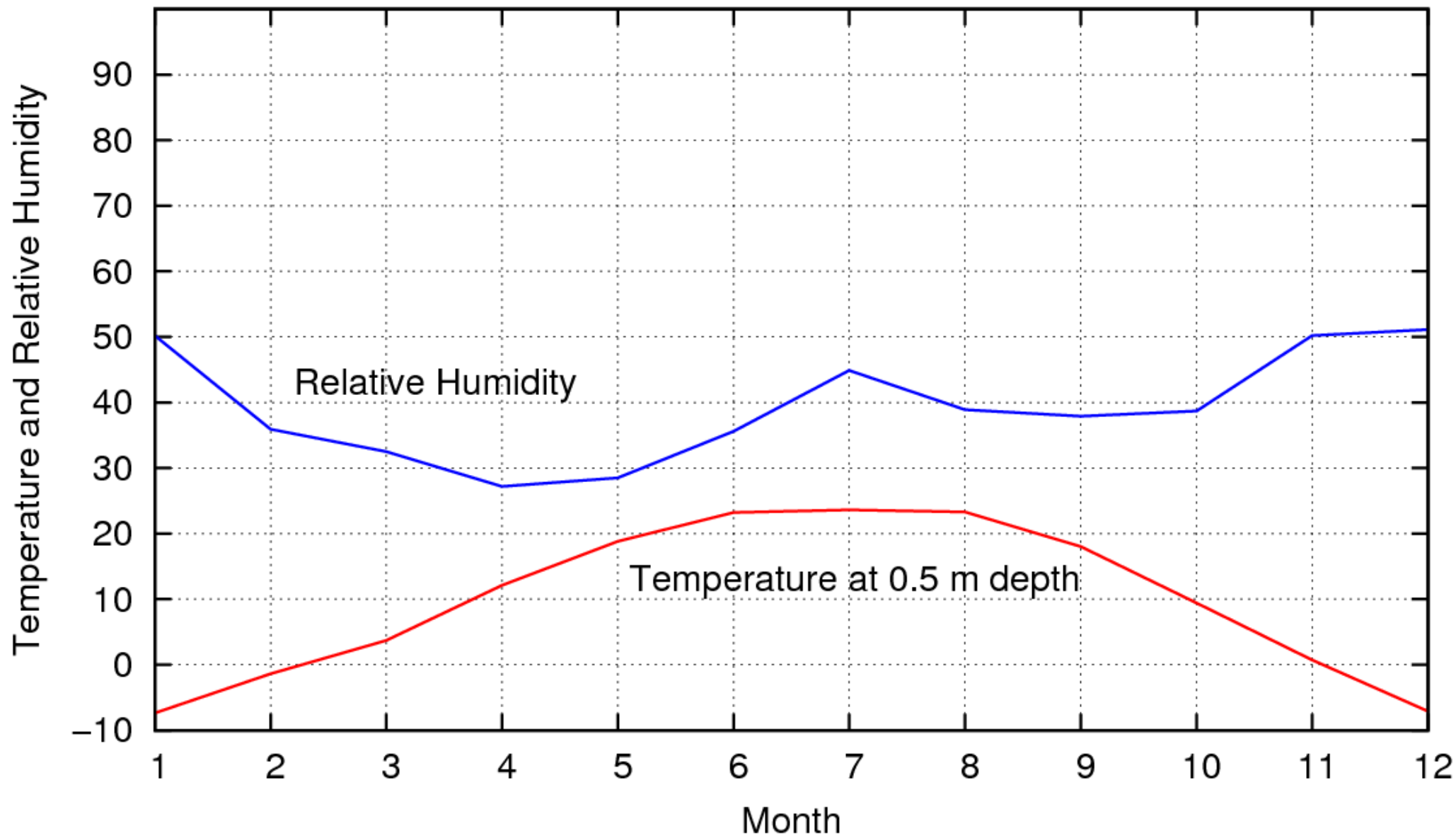


## Climate in the library of St. Catherine's Monastery, Sinai, Egypt

Some natural buffering, no heating, low RH,  
Damage through high summer temperature is compensated  
by low RH



Archive without a roof: In 1901, Swedish explorer Sven Hedin discovered paper from the third century, perfectly preserved under half a metre of blown sand in a ruined building near Lop Nur in the Taklimakan desert of Eastern Turkestan

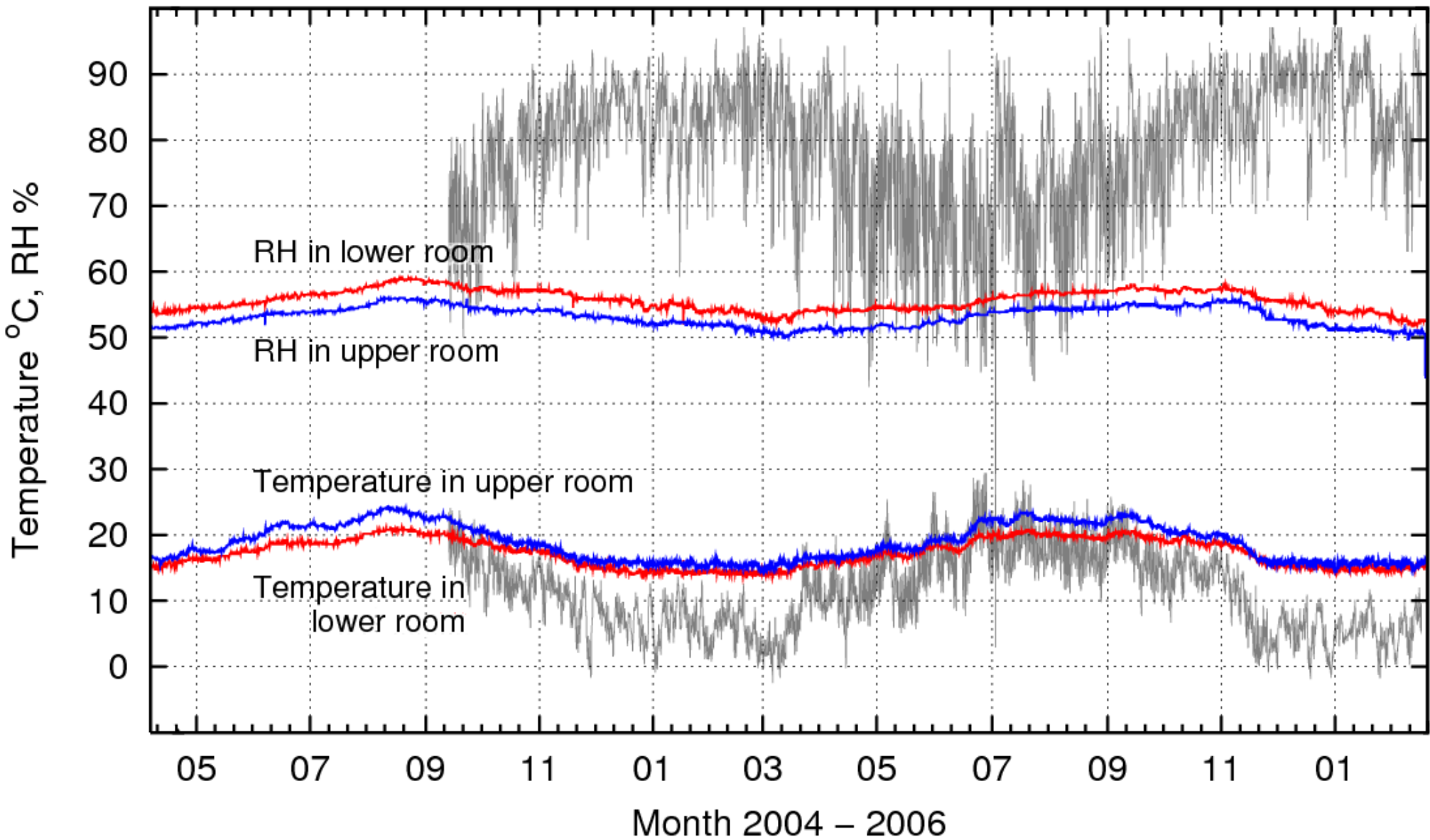


There is no climate data in the expedition records. Here is the climate predicted at 0.5 m depth from Dunhuang, China, in the same desert environment.



The Suffolk Record Office, Ipswich, UK  
Architect Henk Pieksma, built 1990

Designed to be heated in winter, with inertial humidity control



## Climate in the Suffolk Record Office

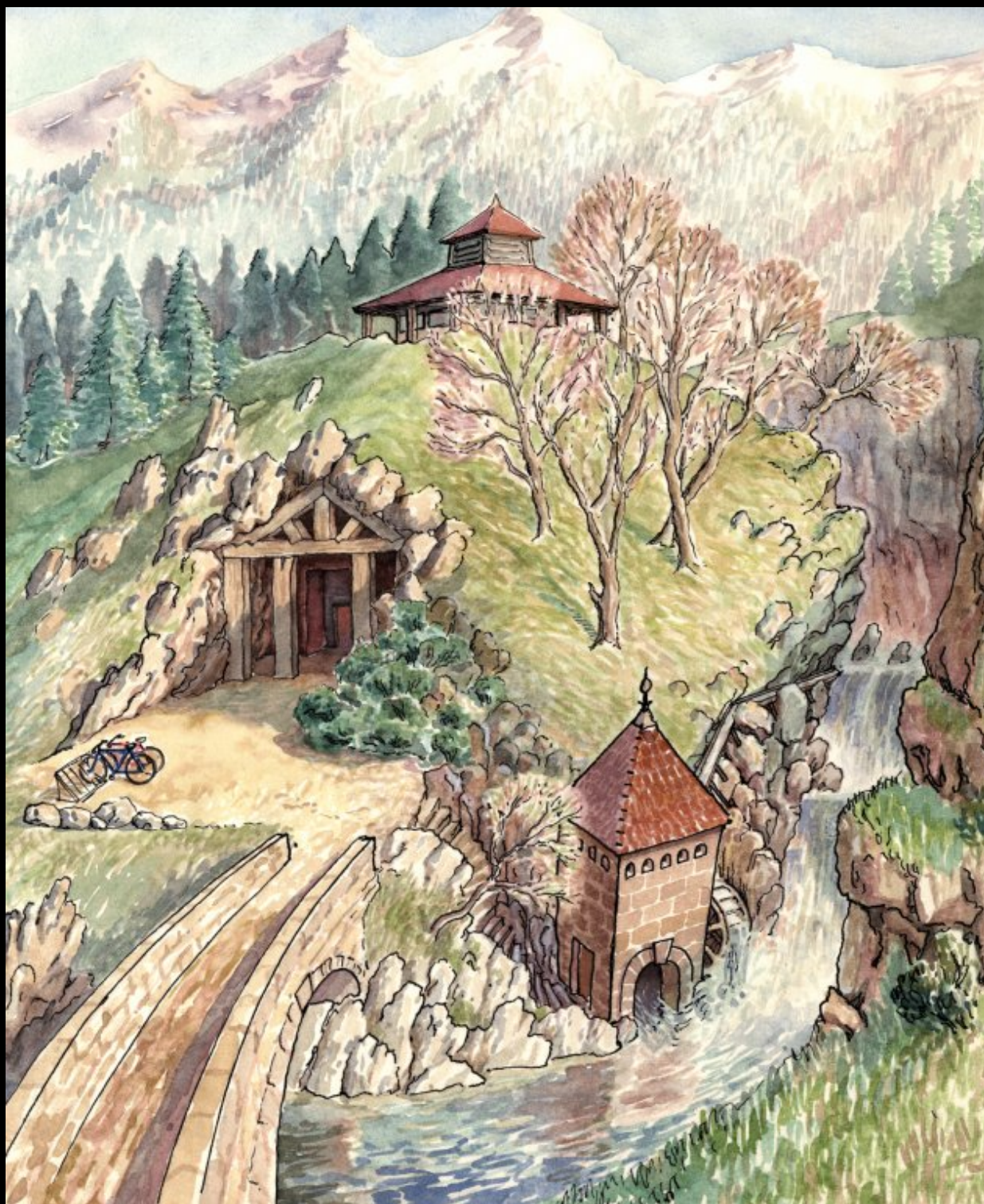
The temperature variation was judged to be in conflict with BS5454:2000, so air conditioning has now been installed



Section through the wall of the Suffolk Record Office



The Royal Library, Copenhagen. 1999. Architects Schmidt, Hammer and Lassen. The facade is black granite from Zimbabwe. An outward tilted wall cannot safely have high thermal capacity.



# The Ideal Archive

Semi underground:  
good thermal buffering,  
sloping site allows  
convective ventilation

High altitude:  
Low oxygen reduces  
degradation rate and  
fire risk. Low temperature  
enhances durability

Deciduous trees on  
south side protect from  
summer sun

Water power

Low air pollution:  
bicycle transport only,  
for curators and scholars



More information about simple climate control:

[www.padfield.org/tim/cfys/](http://www.padfield.org/tim/cfys/)

Then you may wish to learn more:

Course in the design of museum and archive storage,

Copenhagen, School of Conservation

26 – 30 October 2009.

Info:

[www.padfield.org/tim/wiki/index.php/Storage/Announcement](http://www.padfield.org/tim/wiki/index.php/Storage/Announcement)

Tim Padfield

[tim@padfield.dk](mailto:tim@padfield.dk)