Spatial resolution

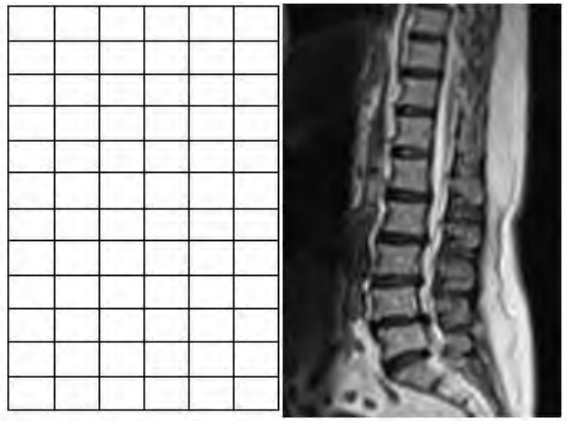
Comparison between 1m and 10m spatial resolution

In the case of a temperature event 0.5m (hot spot, damaged cable etc)

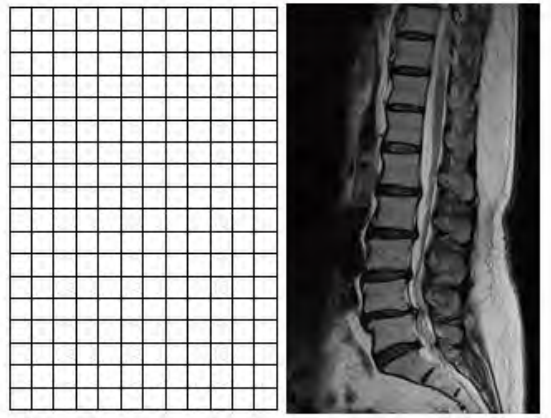
Spatial resolution

- Definition: spatial resolution is the “size” of the smallest event that can be fully distinguished

You can imagine the spatial resolution as the size of a pixel in an image. The smaller the pixel, the better you can reproduce the image



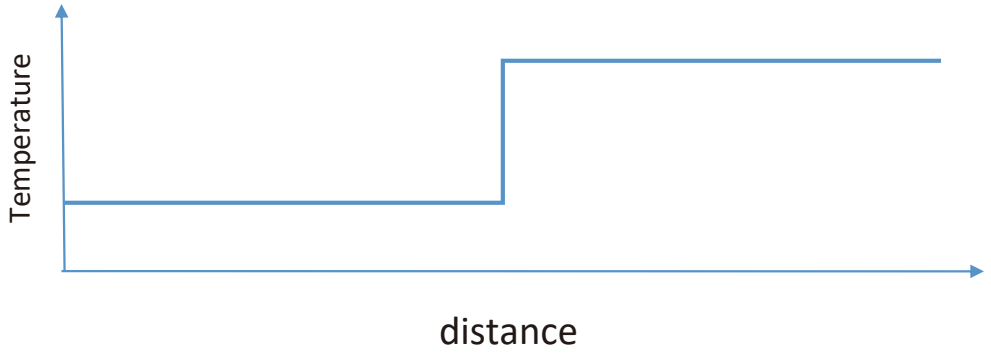
Large pixel size low resolution image



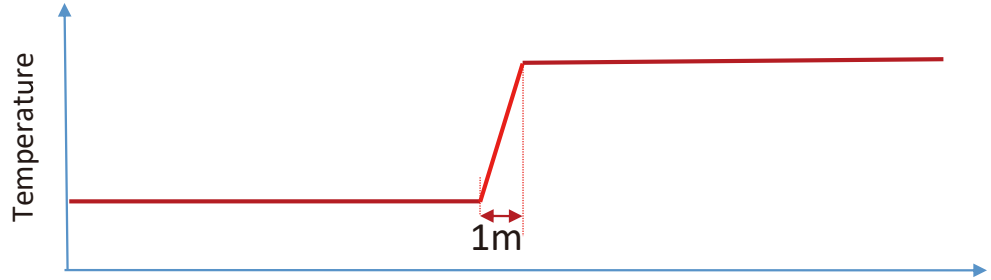
Small pixel size high resolution image

Spatial resolution: step event

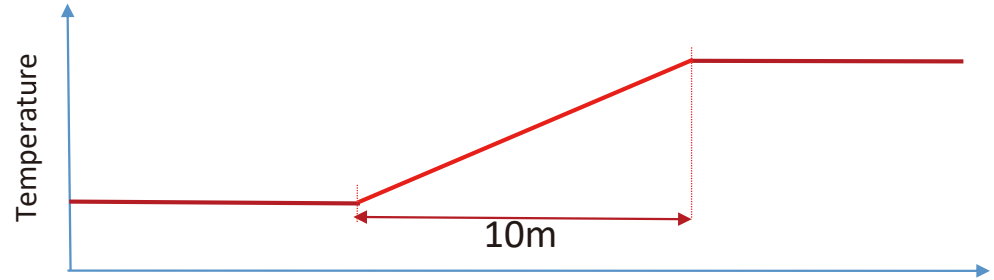
Let's consider an ideal step temperature profile



This is how you would see your signal with resolution 1m



And this is what you would see with spatial resolution 10m



You may think:

"I don't mind if my measurements are a bit foggy, if I can still see the temperature difference!"

But what if you have a "hot spot"?

Damages on the cable are localised events, they start as a small raise in temperature over a small area.

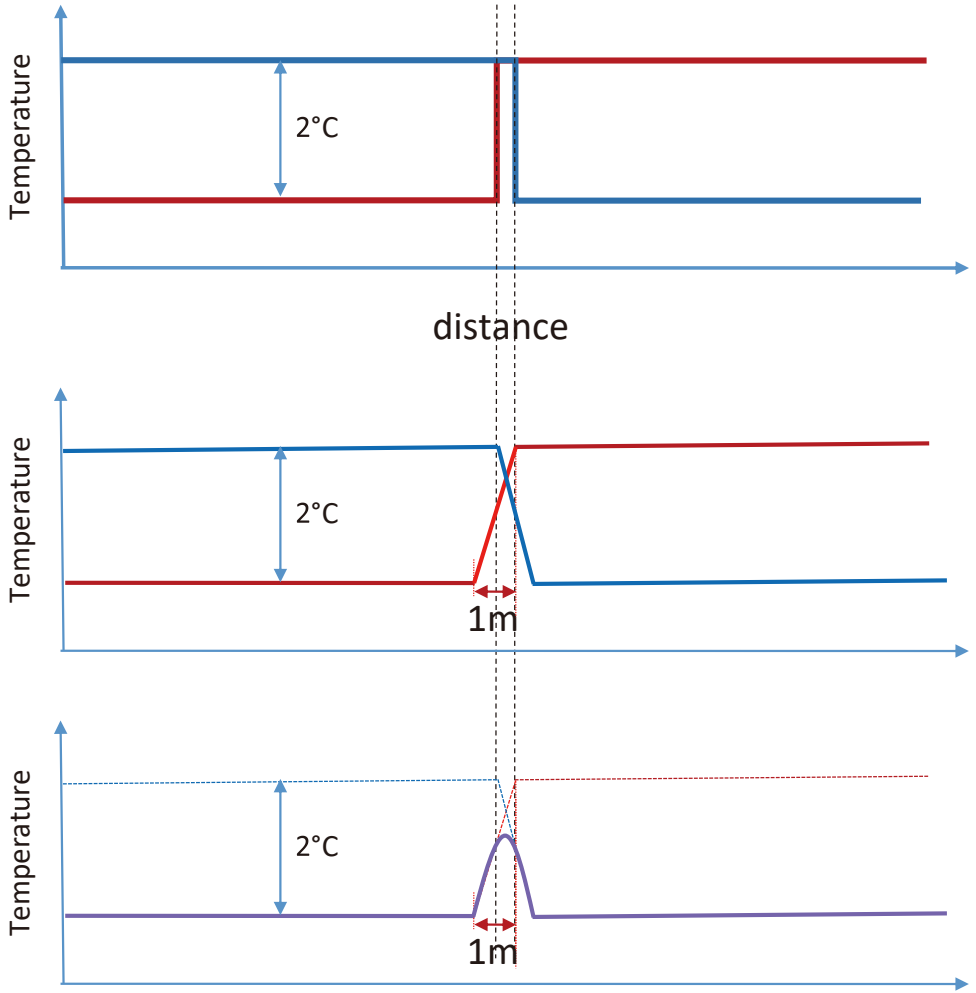
So let's consider a hot spot event: a raise of 2degC over 0.5m in the case of 1m and 10m resolution.

Spatial resolution: 1m

Hot spot event (0.5m) : it can be seen as overlap of two different temperature steps.

The resulting measurements can be built from the convolution of two different step response with resolution=1m

The resulting signal for spatial resolution=1m is a temperature event smaller than the “real one”.

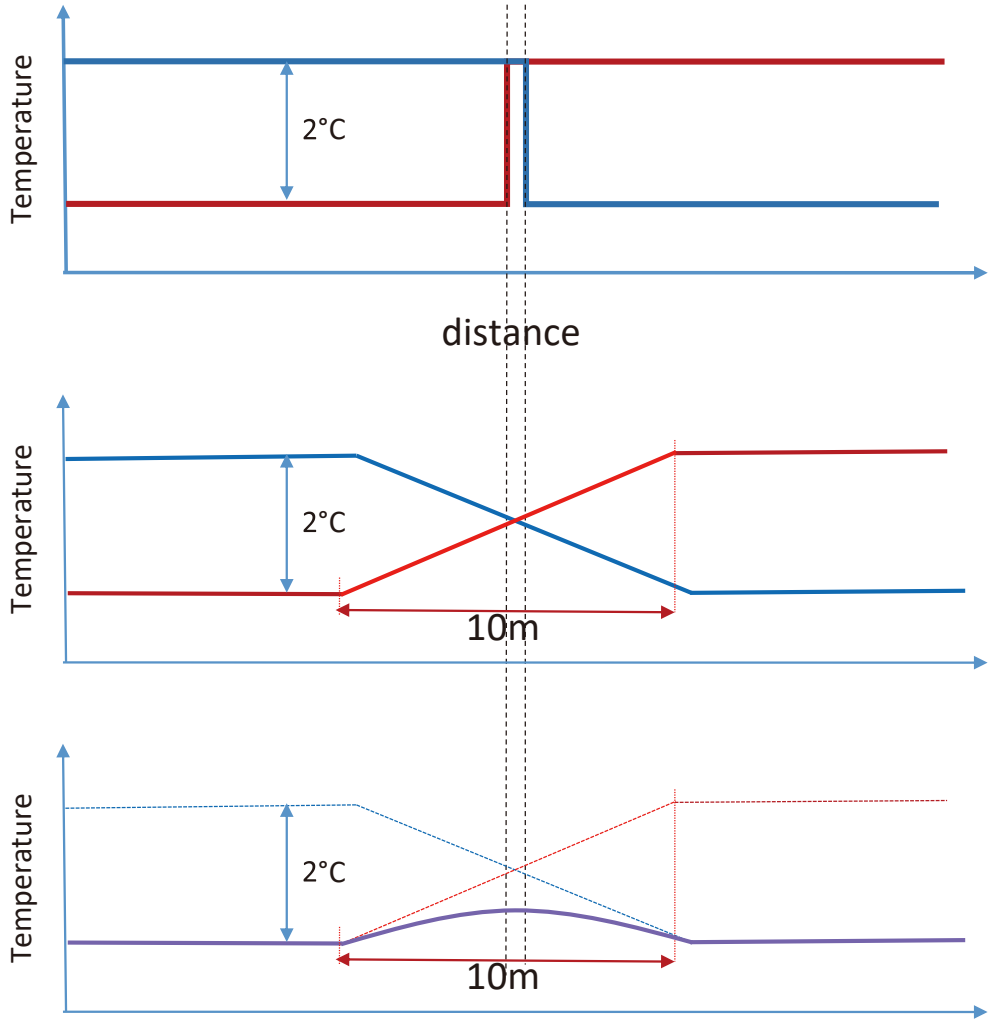


Spatial resolution: 10m

Hot spot event (0.5m) : it can be seen as overlap of two different temperature steps.

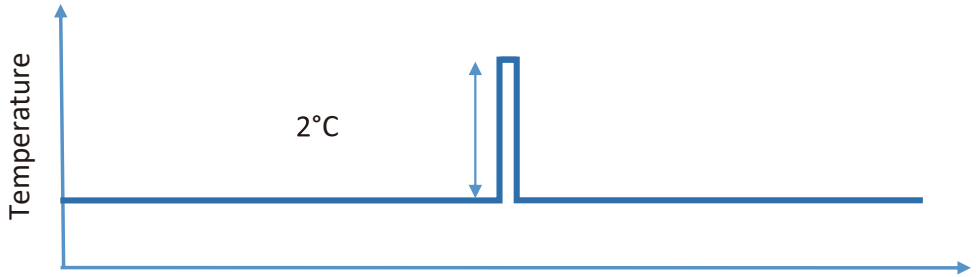
The resulting measurements can be built from the convolution of two different response for resolution=10m

The resulting signal for spatial resolution=10m is a temperature event much smaller than the “real one”.

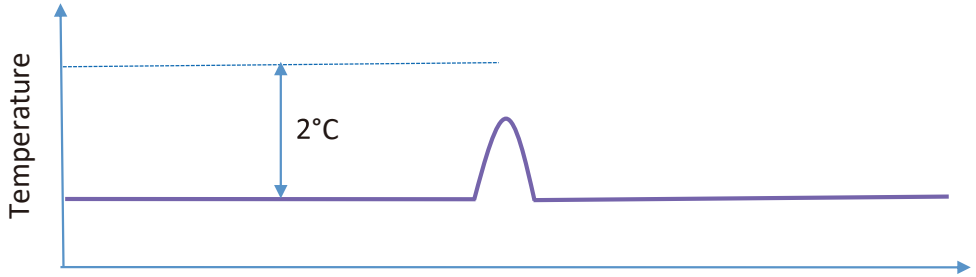


Comparison

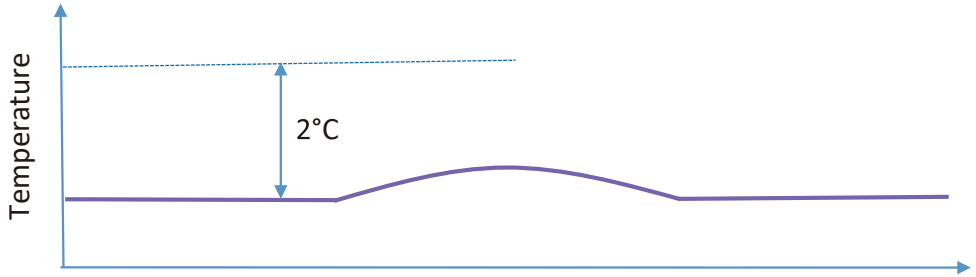
Hot spot event 0.5m



Signal with spatial resolution=1m



Signal with spatial resolution=10m



A **better spatial resolution** such as 1m is able to detect more **localised events**. This is particularly desirable on the joints, where defects are more likely to occur.

Even considering that the heat will diffuse over larger areas over time, an instrument with better spatial resolution will detect the raise in temperature **earlier**, allowing to intervene in a timely manner.