Supplementary Material

# Supplementary Data

Supporting calculations for Table 5

Emissivity formula: $E=ϵσT^{4}$

Where,

E = energy flux (also called the radiant emittance),
ε = emissivity,
$σ$ = Stefan–Boltzmann constant (5.67x10-8 W m^-2 K^-4) and
T = Temperature (in kelvin).

or equivalently: $T=\left(\frac{E}{ϵσ}\right)^{\frac{1}{4}}.$

Error propagation formula: $δf=\left[\sum\_{i}^{}\left(\frac{∂f}{∂x\_{i}}δx\_{i}\right)^{2}\right]^{\frac{1}{2}},$

 applied to the temperature-emissivity equation:

$$δT= \sqrt{\left(\frac{∂T}{∂ϵ} δϵ\right)^{2}+\left(\frac{∂T}{∂E} δE\right)^{2},}$$

 where:

$$\frac{∂T}{∂ϵ}= -\frac{ϵ^{-\frac{5}{4}}}{4}×\left(\frac{E}{σ}\right)^{\frac{1}{4}}, and \frac{∂T}{∂E}=\frac{E^{-\frac{3}{4}} }{4ϵσ} .$$

Assuming $δE=0$, i.e. ignoring the uncertaintity in the measured emission, we have:

$$δT= -\frac{ϵ^{-\frac{5}{4}}}{4}×\left(\frac{E}{σ}\right)^{\frac{1}{4}}.$$

For a given temperature, 308.15K (35oC), and considering the Stefan Boltzman constant $σ=5.67 10^{-8}W/m^{2}K^{4}$, we can obtain the error in temperature for different choices of $ϵ$. See Table 5.