2- THE PHENOMENON OF INCANDESCENCE - THE COLOUR OF EMBERS

I arrive in the Faroe Islands on 21 June 2021, the longest day of the year. On the occasion of the solstition, a bonfire is organised on the beach, in which the whole community participates: there is a choir of men singing songs to the sun, the speech of what I think are the municipalities, and the scout section preparing popcorn. The whole community gathers here, to celebrate around the fire, the element that marks union. I look carefully above the pile of wood and notice that the air produces a strange movement, almost like waves. Also, if you try to look through, the image appears blurred. I ask Thierry for an explanation and he tells me that this effect is produced because of the different density of the air. My gaze is then caught by something just below, the incandescent pieces of wood that seem to glow in their own light. The colour, in this case, seems to me to take on a new concept: it is not static as I am usually used to seeing it, but dynamic. The wood is initially mahogany-coloured and then, after being heated, at a certain point it lights up: here is the embers. I wonder how this is possible and why it happens.

Lava takes on this flamboyant colour because of the physical phenomenon of incandescence: when an object is heated to a high temperature, it emits light. The word derives from the Latin candescere, "to become white",

referring to materials that emit white light at high temperatures. An object is only considered incandescent when the emission of light due to its heating reaches its maximum: the temperature at which this phenomenon occurs and the colour of the light emitted are variable elements depending on the physical properties of the object in question. However, we know that all solid or liquid substances begin to emit visible light at about 525°C, becoming reddish, as does the lava of a volcano. This temperature limit is called the Draper point and is defined as the temperature above which almost all solid materials glow visibly due to blackbody radiation. The glow does not fade below this temperature, but it is too weak in the visible spectrum to be perceived. At higher temperatures, the substance becomes brighter and its colour changes from red to white and finally to blue. The value of the Draper point can be calculated using Wien's law: the peak frequency (in hertz) emitt

d by a black body is related to temperature as follows:

$$\nu_{peak} = 2.821 \frac{kT}{h}$$

k is Boltzmann's constant, h is Planck's constant, T is the temperature (K). Substituting the Draper point into this equation gives a frequency of 83 THz, or a wavelength of 3.6 um, which is well into the infrared and completely invisible to the human eye. However, the leading edge of the blackbody radiation curve extends, at a small fraction of the maximum intensity, into the near infrared and far red (approximately in the range 0.7-1 m), which are faintly visible as a dark red colour.