

parts, and constantly flows towards the polar regions, by which it is emitted into the planetary spaces.

Climate is affected by many thermotic influences, besides the conduction and radiation of the solid mass of the earth. The atmosphere, for example, produces upon terrestrial temperatures effects which it is easy to see are very great; but these it is not yet in the power of calculation to appreciate;<sup>14</sup> and it is clear that they depend upon other properties of air besides its power to transmit heat. We must therefore dismiss them, at least for the present.

3. *Temperature of the Interior of the Earth.*—The question of the temperature of the interior of the earth has excited great interest, in consequence of its bearing on other branches of knowledge. The various facts which have been supposed to indicate the fluidity of the central parts of the terrestrial globe, belong, in general, to geological science; but so far as they require the light of thermotical calculations in order to be rightly reasoned upon, they properly come under our notice here.

The principal problem of this kind which has been treated of is this:—If in the globe of the earth there be a certain original heat, resulting from its earlier condition, and independent of the action of the sun, to what results will this give rise? and how far do the observed temperatures of points below the surface lead us to such a supposition? It has, for instance, been asserted, that in many parts of the world the temperature, as observed in mines and other excavations, increases in descending, at the rate of one degree (centesimal) in about forty yards. What inference does this justify?

The answer to this question was given by Fourier and by Laplace. The former mathematician had already considered the problem of the cooling of a large sphere, in his *Memoirs* of 1807, 1809, and 1811. These, however, lay unpublished in the archives of the Institute for many years. But in 1820, when the accumulation of observations which indicated an increase of the temperature of the earth as we descend, had drawn observation to the subject, Fourier gave, in the *Bulletin of the Philomathic Society*,<sup>15</sup> a summary of his results, as far as they bore on this point. His conclusion was, that such an increase of temperature in proceeding towards the centre of the earth, can arise from nothing but the remains of a primitive heat;—that the heat which the sun's action would communicate, would, in its final and

<sup>14</sup> *Mém. Inst.* tom. vii. p. 584.

<sup>15</sup> *Bullet. des Sc.* 1820, p. 58.