

permanent state, be uniform in the same vertical line, as soon as we get beyond the influence of the superficial oscillations of which we have spoken ;—and that, before the distribution of temperature reaches this limit, it will decrease, not increase, in descending. It appeared also, by the calculation, that this remaining existence of the primitive heat in the interior of the earth's mass, was quite consistent with the absence of all perceptible traces of it at the surface ; and that the same state of things which produces an increase of one degree of heat in descending forty yards, does not make the surface a quarter of a degree hotter than it would otherwise be. Fourier was led also to some conclusions, though necessarily very vague ones, respecting the time which the earth must have taken to cool from a supposed original state of incandescence to its present condition, which time it appeared must have been very great ; and respecting the extent of the future cooling of the surface, which it was shown must be insensible. Everything tended to prove that, within the period which the history of the human race embraces, no discoverable change of temperature had taken place from the progress of this central cooling. Laplace further calculated the effect<sup>16</sup> which any contraction of the globe of the earth by cooling would produce on the length of the day. He had already shown, by astronomical reasoning, that the day had not become shorter by 1-200th of a second, since the time of Hipparchus ; and thus his inferences agreed with those of Fourier. As far as regards the smallness of the perceptible effect due to the past changes of the earth's temperature, there can be no doubt that all the curious conclusions just stated are deduced in a manner quite satisfactory, from the fact of a general increase of heat in descending below the surface of the earth ; and thus our principles of speculative science have a bearing upon the history of the past changes of the universe, and give us information concerning the state of things in portions of time otherwise quite out of our reach.

4. *Heat of the Planetary Spaces.*—In the same manner, this portion of science is appealed to for information concerning parts of space which are utterly inaccessible to observation. The doctrine of heat leads to conclusions concerning the temperatures of the spaces which surround the earth, and in which the planets of the solar system revolve. In his Memoir, published in 1827,<sup>17</sup> Fourier states that he conceives it to follow from his principles, that these planetary spaces

<sup>16</sup> *Conn. des Tems*, 1823.

<sup>17</sup> *Mém. Inst.* tom. vii. p. 580