

miles from the Icelandic volcanoes on the one side, and 1100 miles from those of Italy and Sicily on the other.

(3.) *Borings, Wells and Mines.*—The influence of the seasonal changes of temperature extends downward from the surface to a depth which varies with latitude, with the thermal conductivity of soils and rocks, and perhaps with other causes. The cold of winter and the heat of summer may be regarded as following each other in successive waves downward, until they disappear along a limit at which the temperature remains constant. This zone of invariable temperature is commonly believed to lie at a depth of somewhere between 60 and 80 feet in temperate regions. At Yakutsk in Eastern Siberia (lat. 62° N.), however, as shown in a well-sinking, the soil is permanently frozen to a depth of about 700 feet.³⁴ In Java, on the other hand, a constant temperature is said to be met with at a depth of only 2 or 3 feet.³⁵

It is a remarkable fact, now verified by observation all over the world, that below the limit of the influence of ordinary seasonal changes the temperature, so far as we yet know, is nowhere found to diminish downward. It always rises; and its rate of increment never falls much below the average. The only exceptional cases occur under circumstances not difficult of explanation. On the one hand, the neighborhood of hot-springs, of large masses of lava, or of other manifestations of volcanic activity, may raise the subterranean temperature much above its normal condition; and this augmentation may not disappear for many thousand years after the volcanic activity has wholly ceased, since the cooling down of a subterranean mass of

³⁴ Helmersen, Brit. Assoc. Rep. 1871, p. 22. See vol. for 1886, p. 271.

³⁵ Junghuhn's "Java," ii. p. 771.