

much greater than at present; for no important disturbance can occur in the climate of a particular region without its immediately affecting all other latitudes, however remote. The heat and cold which surround the globe are in a state of constant and universal flux and reflux. The heated and rarefied air is always rising and flowing from the equator towards the poles in the higher regions of the atmosphere; while in the lower, the colder air is flowing back to restore the equilibrium. That this circulation is constantly going on in the aerial currents is not disputed; it is often proved by the opposite course of the clouds at different heights, and the fact has been farther illustrated in a striking manner by two recent events. The trade wind continually blows with great force from the island of Barbadoes to that of St. Vincent; notwithstanding which, during the eruption of the volcano in the island of St. Vincent, in 1812, ashes fell in profusion from a great height in the atmosphere upon Barbadoes.\* In like manner, during the great eruption of Sumbawa, in 1815, ashes were carried to the islands of Amboyna and Banda, which last is about 800 miles east from the site of the volcano. Yet the south-east monsoon was then at its height.† This apparent transposition of matter against the wind, confirmed the opinion of the existence of a counter-current in the higher regions, which had previously rested on theoretical conclusions only.

That a corresponding interchange takes place in the seas, is demonstrated, according to Humboldt, by the cold which is found to exist at great depths within the tropics; and, among other proofs, may be mentioned the mass of warmer water which the gulf stream is constantly bearing northwards, while a cooler current flows *from* the north along the coast of Greenland and Labrador, and helps to restore the equilibrium.‡

Currents of colder and therefore specifically heavier water pass from the poles towards the equator, which cool the inferior parts of the ocean§; so that the heat of the torrid zone and the cold of the polar circle balance each other. The refrigeration, therefore, of the polar regions, resulting from the supposed alteration in the distribution of land and sea, would be immediately communicated to the tropics, and from them its influence would extend to the antarctic circle, where the atmosphere and the ocean would be cooled, so that ice and snow would augment. Although the mean temperature of higher latitudes in the southern hemisphere is, as before stated, for the most part, lower than that of the same parallels in the northern, yet, for a considerable space on each side of the line, the mean annual heat of the

\* Daniell's Meteorological Essays, p. 103.

† Observed by J. Crawford, Esq.

‡ In speaking of the circulation of air and water in this chapter, no allusion is made to the trade winds, or to irregularities in the direction of currents, caused by the rotatory motion of the earth.

These causes prevent the movements from being direct from north to south, or from south to north, but they do not affect the theory of a constant circulation.

§ See note, p. 97., on the increasing density of sea water in proportion to the degree of cold.