

to mark out not only a considerable area, previously little known, in which tertiary formations occur; but also a still wider expanse, over which the northern drift, and erratic blocks with occasional marine shells, are traceable. The southern limits of these glacial deposits in Russia and Germany indicate the boundary, so far as we can now determine it, of the northern ocean, at a period immediately antecedent to that of the human race.

I was anxious, even in the title of this map, to guard the reader against the supposition that it was intended to represent the state of the physical geography of part of Europe at any *one point of time*. The difficulty, or rather the impossibility, of restoring the geography of the globe as it may have existed at any former period, especially a remote one, consists in this, that we can only point out where part of the sea has been turned into land, and are almost always unable to determine what land may have become sea. All maps, therefore, pretending to represent the geography of remote geological epochs must be ideal. The map under consideration is not a restoration of a former state of things, at any particular moment of time, but a synoptical view of a certain amount of one kind of change (the conversion of sea into land) known to have been brought about within a given period.

It may be proper to remark that the vertical movements to which the land is subject in certain regions, occasion alternately the subsidence and the upraising of the surface; and that, by such oscillations at successive periods, a great area may have been entirely covered with marine deposits, although the whole may never have been beneath the waters at one time; nay, even though the relative proportion of land and sea may have continued unaltered throughout the whole period. I believe, however, that since the commencement of the tertiary period, the dry land in the northern hemisphere has been continually on the increase, both because it is now greatly in excess beyond the average proportion which land generally bears to water on the globe, and because a comparison of the secondary and tertiary strata affords indications, as I have already shown, of a passage from the condition of an ocean interspersed with islands to that of a large continent.

But supposing it were possible to represent all the vicissitudes in the distribution of land and sea that have occurred during the tertiary period, and to exhibit not only the actual existence of land where there was once sea, but also the extent of surface now submerged which may once have been land, the map would still fail to express all the important revolutions in physical geography which have taken place within the epoch under consideration. For the oscillations of level, as was before stated, have not merely been such as to lift up the land from below the waters, but in some cases to occasion a rise of many thousand feet above the sea. Thus the Alps have acquired an additional altitude of 4000, and even in some places 10,000 feet; and the Apennines owe a considerable part of their present height