

CHAPTER XX.

DESTROYING AND TRANSPORTING EFFECTS OF TIDES AND CURRENTS.

Differences in the rise of the tides — Rennell's Account of the Lagullas and Gulf currents — Velocity of currents — Causes of currents — Action of the sea on the British coast — Shetland Islands — Large blocks removed — Effects of lightning — Isles reduced to clusters of rocks — Orkney isles — Waste of East coast of Scotland — and East coast of England — Waste of the cliffs of Holderness, Norfolk, and Suffolk — Sand-dunes how far chronometers — Silting up of estuaries — Origin of submarine forests — Yarmouth estuary — Suffolk coast — Dunwich — Essex coast — Estuary of the Thames — Goodwin Sands — Coast of Kent — Formation of Straits of Dover — South coast of England — Sussex — Hants — Dorset — Portland — Origin of the Chesil Bank — Cornwall — Coast of Brittany.

ALTHOUGH the movements of great bodies of water, termed tides and currents, are in general due to very distinct causes, their effects cannot be studied separately; for they produce, by their joint action, those changes which are objects of geological interest. These forces may be viewed in the same manner as we before considered rivers, first, as employed in destroying portions of the solid crust of the earth, and removing them to other places; secondly, as reproductive of new strata.

Tides. — It would be superfluous at the present day to offer any remarks on the cause of the tides. They are not perceptible in lakes, or in most inland seas; in the Mediterranean even, deep and extensive as is that sea, they are scarcely sensible to ordinary observation, their effects being quite subordinate to those of the winds and currents. In some places, however, as in the Straits of Messina, there is an ebb and flow to the amount of two feet and upwards; at Naples and at the Euripus, of twelve or thirteen inches; and at Venice, according to Rennell, of five feet.* In the Syrtes, also, of the ancients, two wide shallow gulfs, which penetrate very far within the northern coast of Africa, between Carthage and Cyrene, the rise is said to exceed five feet.†

In islands remote from any continent, the ebb and flow of the ocean is very slight, as at St. Helena, for example, where it is rarely above three feet.‡ In any given line of coast, the tides are greatest in narrow channels, bays, and estuaries, and least in the intervening tracts where the land is prominent. Thus, at the entrance of the estuary of the Thames and Medway, the rise of the spring tides is eighteen feet; but when we follow our eastern coast from thence northward, towards Lowestoff and Yarmouth, we find a gradual diminution, until, at the places last mentioned, the highest rise is only seven or eight feet. From this point there begins again to be

* Geog. of Herod. vol. ii. p. 331.

† Ibid. p. 328.

‡ Romme, Vents et Courans, vol. ii.

p. 2. Rev. F. Fallows, Quart. Journ. of Science, March, 1829.