The seabed: an active landscape

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The ocean "double conveyor belt"

- The ocean floor is not inert. It is the seat of movement and exchange of matter between the inner Earth and its surface, driven mainly by internal geodynamics and plate tectonics (1) (2). The plates diverge, overlap or slide in relation to each other, depending on the nature of their boundaries, which can be divergent, convergent or transforming (faulting).

- The ocean crust*, that forms at a divergent boundary (mid-oceanic ridge), spreads out along both sides of the rift valley. It is drawn onto the upper mantle which acts like a conveyor belt at a velocity of a few cm/year until it reaches a convergence boundary (subduction zone) where it dives under another plate and sinks into the asthenosphere.

- The seabed is, therefore, both a place of expansion and of closure for oceanic spaces, the position and extent of which have often evolved throughout the history of our planet (3).

Sedimentary landscapes and environments

- The seabed forms unique landscapes, with very contrasting topographies and gradients, ranging from 4000m elevation (seamounts) to -11034m depth (oceanic trenches).

- This physiography is essentially the result of plate tectonics (kinematics, volcanic eruptions, hydrothermal sources, hot spots) and sea level variations (4). It also stems from the action of marine currents (erosion/deposition), bio-constructive and bio-erosive processes, physico-chemical and biochemical precipitation, as well as from mud volcanoes.

* Ocean crust makes up the seabed, it comes from the cooling of basic (basalts, gabbro) and ultrabasic (peridotite) lavas, emitted at mid-ocean ridges. On average, it is 5 to 8 km thick and has a density of 2.7.

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- The ocean consists of two distinct marine domains: the oceanic margins and the abyssal zone (5).
  - Ocean margins come in two types: passive margins arising from the opening of an ocean and active margins arising from subduction or collision. Passive margins, also called continental margins, border continents in relatively stable regions of the globe and their substratum is continental crust**. They are made up of two broad sedimentary environments, the continental shelf and the continental slope.
  - The abyssal zone comprises several environments that differ in morphology and topography, namely: oceanic trenches, oceanic ridges, large smokers, ripples and seamounts, brine basins and mud volcanoes (6), and manganese nodule fields (7).

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** Continental crust is primarily made up of acidic magmatic rocks (granitoids) and metamorphic rocks. It has a density of 2.9 and a thickness that can reach 35 km

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