Upwelling, the upward movement of deep water, occurs when surface water moves away or apart to create a space into which deeper water can move. This happens consistently and at large volume at two places in the oceans. One is in the Trade Winds belt on the east side of ocean basins. There, both the consistent action of the northeasterlies and the net transport of water as represented by the Ekman spiral move water westward away from the coast. This allows deep water to move up. The effect is not significant on the west sides of ocean basins because the mass of water in the dynamic topographic high precludes upward movement of the underlying deep water.

The second region in which upwelling occurs is along the equator, where divergence of water in the motion represented by the Ekman spiral allows deep water to move up. This is most noticeable in the eastern, rather than western, equatorial regions, probably again because of the effect of the dynamic topographic high in the west. Upwelling is significant because the deep water is cold and rich in nutrients, which are critical for photosynthesis by phytoplankton and thus support the flourishing ecosystems in these regions.