

The original attitude of many strata is horizontal, also called flat-lying, planar, or parallel. This horizontal arrangement of beds or laminae results from the tendency of gravity to arrange particles, whether silt, sand or gravel-sized, parallel to the horizon (Figure 2). Horizontal strata tend to be grouped into packages or sets of common lateral extent and thickness of individual layers; the lower boundaries of such sets are planar as are the upper boundaries, if preserved (Figure 3). Other sets are arranged at various angles to the boundaries of sets of horizontal boundaries -- these inclined sets are called cross-sets (Figure 3).

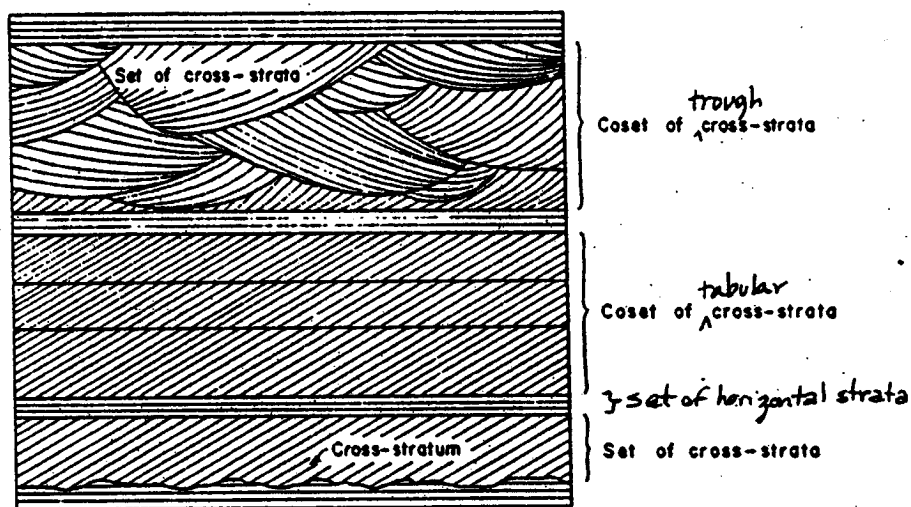


Figure 3. Illustration of sets, co-sets, horizontal stratification, and cross-stratification, and some examples of their relations.

Individual beds or laminae within the sets are called cross-beds and cross-laminae, and the general term for this condition of non-parallel, inclined bedding is called cross-stratification. Figure 3 illustrates several kinds of cross-stratified sets, distinguished by the shape of their lower boundaries (trough cross-sets, tabular cross-sets), and also notes how sets can be grouped in turn into larger co-sets of horizontally or cross-stratified strata.

Like sets of horizontal strata, cross-strata develop on a variety of scales. Sets may be only a few mm or as much as a few m thick. Geologists differentiate small-scale cross-stratification in which sets have a maximum thickness of 5 cm, from large-scale cross-stratification where sets are 5 cm up to 1 or 2 m. The angle of inclination of cross-laminae or cross-beds within sets also varies, from very low angles of less than  $12^\circ$  from horizontal, to high angles nearing the maximum angle of repose of sand ( $24$  to  $34^\circ$ ).

Cross-strata are classified into different types depending on the geometry of the sets and the arrangement of cross-strata within sets. Each records different conditions of fluid flow.