

## ISOSTACY

The term isostasy was proposed by Dutton (1889). The term was derived from a German word '*isostasios*' meaning *in equilibrium*. Isostasy is the corresponding state of balance between extensive blocks of earth's crust, which rise to different levels and appear at the surface as mountain ranges, plateaus, plains or ocean floors. The idea implies that there is a certain minimum depth below sea level where the pressure due to the weight of the overlying material in each unit column is everywhere the same.

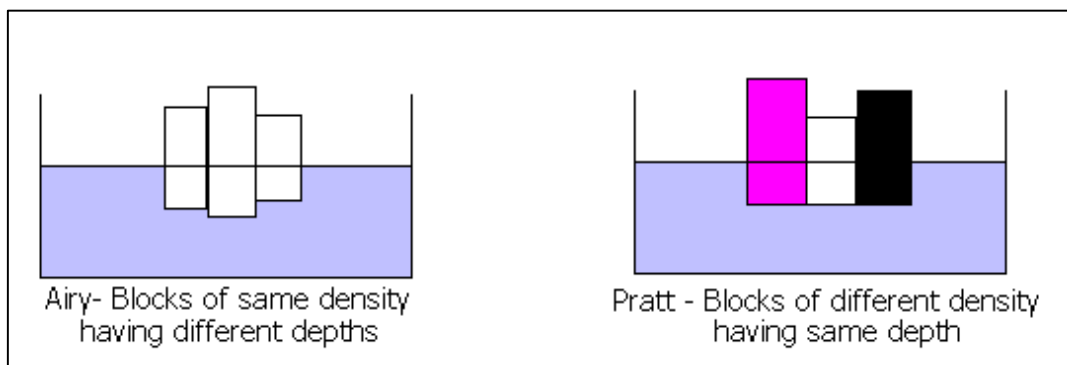
Segments of crust that stand high, such as mountain ranges, also project lower, resulting in mountain roots. Segments that ride low and do not stand high relief, such as the oceanic basaltic crust, do not project to great depths and hence do not have roots. There is a condition of theoretical balance for all large portions of the earth's crust. As a result of erosion or deposition, this balance is put out of equilibrium and has to be compensated for by movements of the earth's crust. The uplifting of a segment of the earth's crust in response to the removal of overlying material is known as **isostatic rebound**.

The idea of isostasy evolved due to the work of geodesists. They observed that a pendulum bob suspended at a mountain station deflects from the true vertical due to attraction of the upstanding mass.

In 1855 two systems of density distribution came into existence by Airy and Pratt.

**Airy's theory** – George Airy in 1855 postulated that there is a change in density of rocks material floats on the more dense part, which behaves like a fluid i.e. continents are resting/floating in denser mass. The depth of change varies from place to place. Excess of matter above the substratum is balanced by deep projections (or roots) of lighter material into the substratum.

Thus under mountains the depth is greater than under that occurs in that of plains. In other words mountains have roots of lighter materials which extend down into lower dense mantle rocks. The lower density of rocks causes the lowering in gravity observed than the predicted theoretically.



**Pratt's theory** – Pratt assumed that the boundary between the upper lighter material and lower dense rocks is at a uniform depth, called the depth of compensation. There are variations within the density of the longer layer, which are related to elevations of surface. Lighter material lies under the mountains and heavier under oceans. The weight of the columns of rocks extending from the surface to the depth of compensation in different parts of the earth is same.