

8.1.3 Regional Compensation According to Vening Meinesz

Both systems just discussed are highly idealized in that they assume the compensation to be strictly *local*; that is, they assume that compensation takes place along vertical columns. This presupposes free vertical mobility of the masses to a degree that is obviously unrealistic in this strict form.

For this reason, Vening Meinesz (1931, 1940, 1941) modified the Airy floating theory, introducing regional instead of local compensation. The principal difference between these two kinds of compensation is illustrated in Fig. 8.3. In Vening Meinesz'

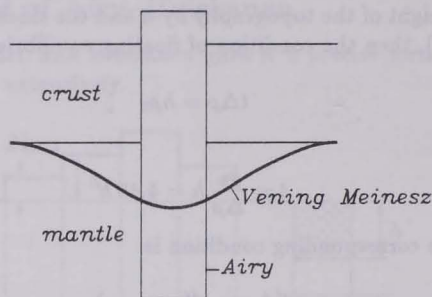


FIGURE 8.3: Local and regional compensation

theory, the topography is regarded as a load on an unbroken but yielding elastic crust.

To understand the situation, consider a point load P on an infinite plane elastic plate (representing the crust) which floats on a viscous underlayer of higher density (representing the mantle, see above); see Fig. 8.4. Since the topography is counted

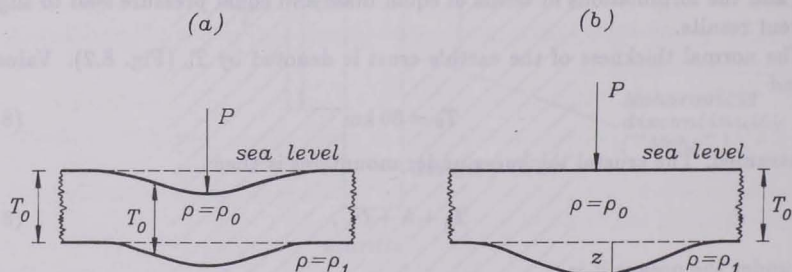


FIGURE 8.4: Bending (direct effect, (a)) and thickening (indirect effect, (b)) of an elastic plate

above sea level, we must fill the upper hollow in Fig. 8.4, (a), by crustal material of density ρ_0 which causes, as an additional load, a further bending (indirect effect)