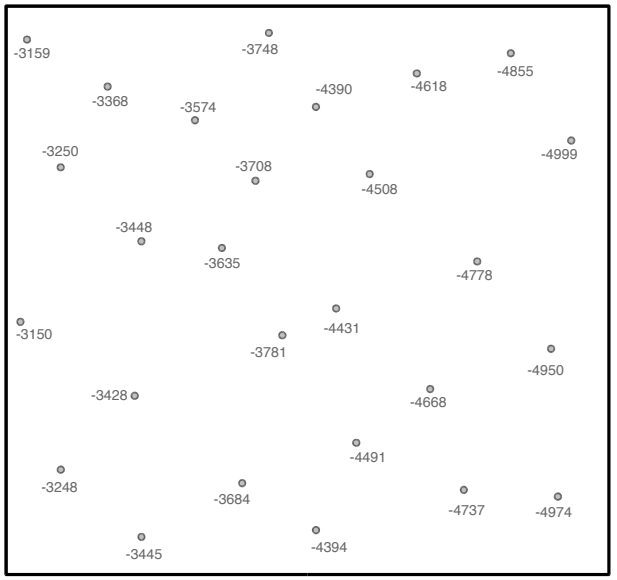
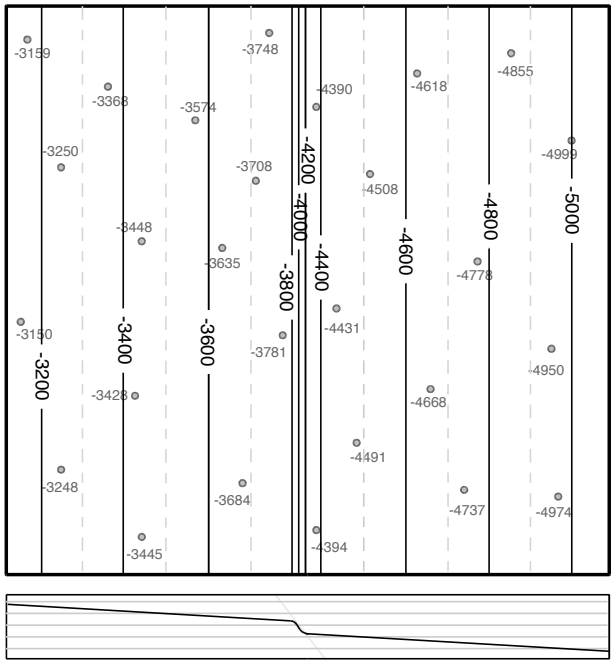
Structural maps, Part II: normal faults

Geologists commonly make structure contour maps, which are maps interpreting the elevation/depth of stratigraphic horizons (or of other surfaces of interest). For petroleum geologists, these maps represent the surfaces of sedimentary rock bodies, commonly sandstones and limestones, that bend broadly to give gentle folds but that break rather than fold sharply.

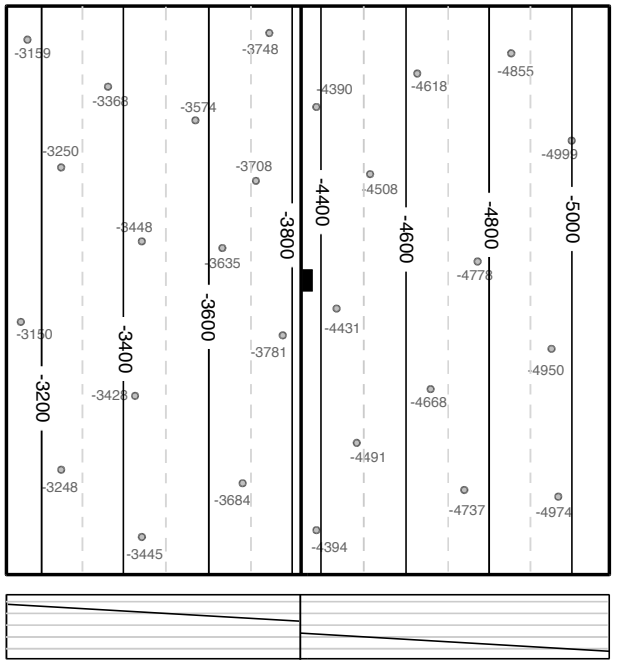
Mapping in areas of normal faults commonly requires attention to these concerns. The uncontoured map at right provides an example that students can contour as desired. Someone envisioning a continuous surface will likely contour the data as shown on the map at lower left. However, the continuous surface is improbable, because it requires that the stratum of relatively brittle rock be twice folded very sharply. A brittle stratum subjected to the stresses required to produce this configuration would be more more like to break to give a fault, presumably a normal fault.

The middle map below is contoured and marked with a dip-slip fault in its central zone of offset. Taken literally, it implies that the contoured horizon exists everywhere in the map area, which would require a vertical fault. The map at lower right more nearly meets most geologists' expectations by showing a normal fault. To do so accurately, the map must include an area above the fault in which the horizon no longer exists (the horizon would be "missing section" in a well drilled in this narrow area).

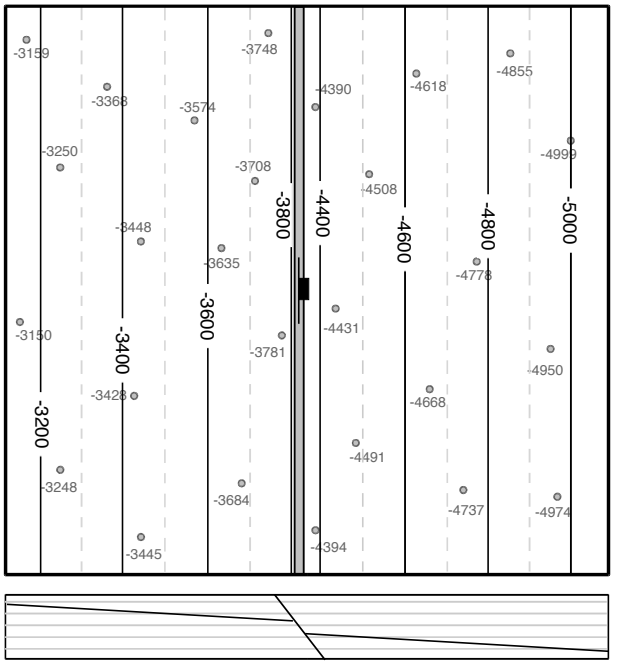




Monocline with improbably sharp curvature of folding



Vertical dip-slip fault



Normal fault