THRUSTING, ACTIVE BACK THRUSTING AND TECTONIC WEDGING: AN EXAMPLE FROM SURGHAR RANGE, NORTH PAKISTAN

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The Surghar Range is the easternmost of the Trans Indus Ranges of Northern Pakistan that appears as an arcuate mountain belt. The range follows in general the basinal east west structural trend while bordering Southern Kohat Plateau and switches to north south trend along the eastern flank of Bannu Depression. Being an active range front it preserves variety of structural styles in the outcropping rocks. The east west trending segment of the range owes its evolution to frontal ramping from decollement thrusting within the Paleozoic-Mesozoic rocks and emerges as an low angle frontal thrust named as the Surghar Fault. The hanging wall of Surghar Fault is moderately to tightly folded with Surghar Anticline being the most prominent fault bend structure. The structural geometries along the frontal thrust fault suggests that it is weakly emergent in the west and changes its character to strongly emergent to tip-stick thrust front progressively towards east. This part of the range is dominantly a south vergent structural system impinging upon the Punjab Foreland in the south.

In contrast the north south trending segment of the Surghar Range has evolved as an easterly tapering tectonic wedge of Paleozoic-Paleocene rocks inserted underneath Eocene-Pliocene rocks. The tectonic wedge comprises north south trending Makarwal Anticline that has developed above a ramp from basal decollement within Paleozoic-Mesozoic rocks and forms the base of the wedge. The ramp beneath the Makarwal Anticline instead of emerging out at erosional surface get flattened at an approximate depth of 800 meters to form a shallow level flat. The eastern flank of the Makarwal Anticline is steeply east dipping along the range front and is thrust over by a west verging active back thrust namely Makarwal Active Back Thrust that fonns the top of the tectonic wedge. The Makarwal Active Back Thrust is linked with the east verging basal fault in the subsurface at the hanging wall cut off of the Jurassic rocks locateu at the tip line of the basal fault. The Makarwal Active Back Thrust along with an other east vergent active back thrust splays from the forelimb of a buried anticline underneath the Makarwal Anticline forming the top of a second tectonic wedge. The tenn active back thrust is applied to the west verging faults because their hanging as well as foot wall strata is actively defonning in response to wedge insertion.