The Ventura Avenue anticline hosts one of the fastest-uplifting structures in southern California. However, assessing its seismic potential has been a long-standing challenge due to first-order disagreements over the subsurface structure of the system. In particular, it requires estimating long-term deformation rates and the relative contribution of seismic and aseismic processes in the Ventura basin.

**Motivation**

The Ventura Avenue anticline yields a shortening rate of 2.1 mm/yr across the Ventura Avenue anticline. However, assessing its seismic potential has been a long-standing challenge due to first-order disagreements over the subsurface structure of the system. In particular, it requires estimating long-term deformation rates and the relative contribution of seismic and aseismic processes in the Ventura basin.

**Models**

Two proposed models for the Ventura Avenue anticline: fault-propagation fold model that Ventura fault extend to seismogenic depth beneath the anticline (Hubbard et al., 2013); and detachment fold model that the Ventura fault is a shallow fault that extends only about 300 m in depth (Yeats et al., 1988).

**Conclusions**

1) The fluvial terraces yield a shortening rate of 2.1 mm/yr across the Ventura Avenue anticline.
2) GPS data measures shortening rates of 8-10 mm/yr across the Ventura basin.
3) A kinematic model of the Ventura Avenue anticline will be developed on the basis of structure cross-sections.

**Fluvial terraces**

Ventura fluvial terraces and river profiles projected on a N10E trend. The terrace altitudes are extracted from 10 m DEM data. The excess area can be estimated for respective terrace.

**GPS data**

Horizontal GPS data (blue circles) with a rough dislocation model (red curve) projected on a N10E trend. The GPS velocities are from Marshall et al. (2013).