Paper 2-1-B: Verhey

Subsurface seismic reflection in the Van Duzen/Eel River Valley

Mark Verhey

ABSTRACT

The relative development of several soil properties on Eel River terraces, located on the southern limb of the Eel River syncline, records three distinct soil age groups. The highest well-preserved terrace is named the Rohnerville. The relative elevations of similar age terraces/soil age groups records Quaternary growth, and the approximate location of, thrust faults and folds.

The Grizzly Bluff anticline is an asymmetric fold, with a relatively long and planar northern limb, expressed by the northward tilt of the Rohnerville terrace between Hydesville and Fortuna. A 200-foot down to the south displacement of the Rohnerville terrace across Price Creek expresses the southern limb of the GBA. Additionally, an intermediate terrace, the Weymouth terrace is visibly tilted south, which can be viewed from the highway.

Principal reflection packages across industry seismic reflection lines reveal the GBa is a thin-skinned structure. North dipping thrust faults exposed in Price Creek and Weymouth Bluff Road do not extend to seismogenic depth. Rather, they are rooted in a south dipping detachment surface. The vergence direction is northerly, with some of the slip returning to the surface in a series of backthrusts or antithetic faults. The south dipping detachment surface does not reach the surface. I have provided one of the seismic lines for your review.

Paper 2-3-D: Thompson and others

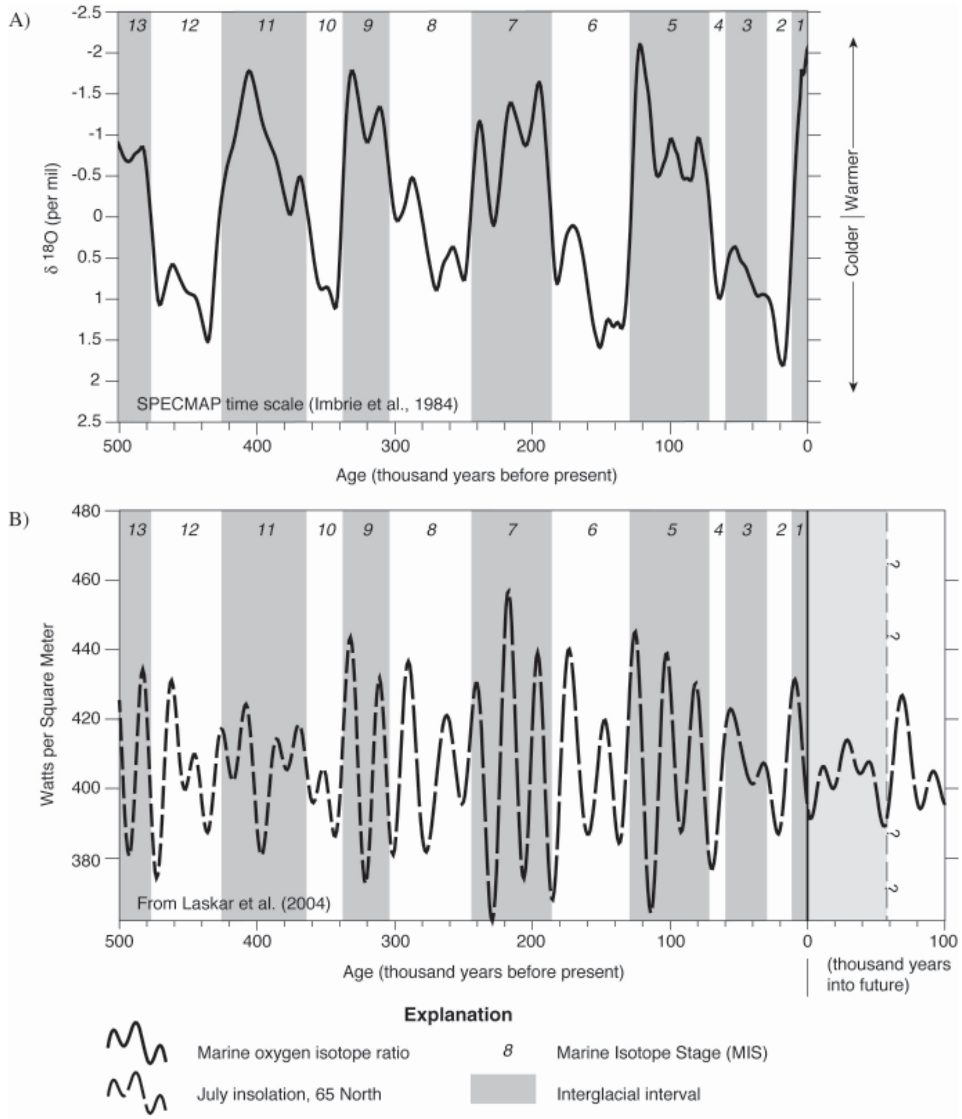

Figure 4. Glacial-interglacial cycles of the past 500,000 years. A) Marine oxygen isotope record of deep-sea sediments (from Imbrie et al., 1984). B) Solar insolation curve for 65 degrees North latitude in July. Insolation curve for the next 100,000 years also shown. A possible interglacial - glacial transition in about 50,000 years is indicated by the dashed and queried line. From Laskar et al. (2004).

Paper 4-1-A: Simpson and Roberts

SUMMARY, INTERPRETATION, AND SPECULATION

Trench studies along the Mad River fault near School Road result in the following observations and interpretations, in no particular order:

- Fault location can be refined based on these studies, especially south of School Road, where geomorphic expression of the fault is absent. The studies document the termination of the northern Mad River fault strand, just south of School Road.

- Scarp morphology in the area appears to be heavily influenced by the presence of a broad bedrock block that is being thrust over terrace sediments. The anomalously steep scarp in this area is directly coincident with the segment of the fault containing the rock block. Where the block is absent to the southeast, the scarp becomes more subdued and eventually terminates. It is conceivable that the bedrock block forms an asperity along the fault that may have played a role in the initiation of the broad fault step to the southwest.

- The internal character of the bedrock block appears to influence scarp morphology as well. The significant bend in the scarp directly north of School Road is coincident with the location of distinctly blocky, strongly jointed rock. Elsewhere in the vicinity the rock is massive and generally deeply weathered and pervasively sheared.

- As at other sites in the Mad River fault zone, the fault tends to daylight relatively low in the scarp face.

- The fault is expressed in the trenches as a relatively narrow zone, typically less than 2 to 3 meters wide. Locally, distributed shearing is observed in the upper (hanging wall) plate as high angle, fault-parallel shears and joints.

- Although well-constrained data on event timing is lacking, the available information (radiocarbon dates and the distribution of colluvial deposits) is consistent with the interpretation of recurrence intervals on the order of thousands of years.

Paper 3-1-A: Stallman and Kelsey

Table 1. Radiocarbon of North Fork Elk River terrace deposits. All dates determined by accelerator mass spectrometry by Beta Analytic Inc. 2. Errors for laboratory ages represent 1 standard deviation. 3 2σ calibrated age ranges. Samples 151432 and 153846 use calibration of Stuiver et al. (1998). Sample 157389 uses calibration of Bard et al. (1998) (Reimer pers. comm. 2001).

Lab number[1]	Longitudinal distance, km	Terrace surface	Laboratory age,[2] yr	Calibrated age,[3] yr	Stratigraphic description
151432	4.37	T3	15,900 ±90	18,500–19,500	platy wood fragment channel facies 0.55 m above strath
153846	5.97	T4 (?)	16,300 ±50	19,000–19,800	leaf detritus overbank facies 2.5 m above strath
157389	2.78	T5	34,400 ±390	39,000–40,200	detrital charcoal channel facies 0.49 m above strath

Notes:
[1] All dates determined by accelerator mass spectrometry by Beta Analytic Inc.
[2] Errors for laboratory ages represent 1 standard deviation.
[3] 2σ calibrated age ranges. Samples 151432 and 153846 use calibration of Stuiver et al. (1998). Sample 157389 uses calibration of Bard et al. (1998) (Reimer pers. comm. 2001).