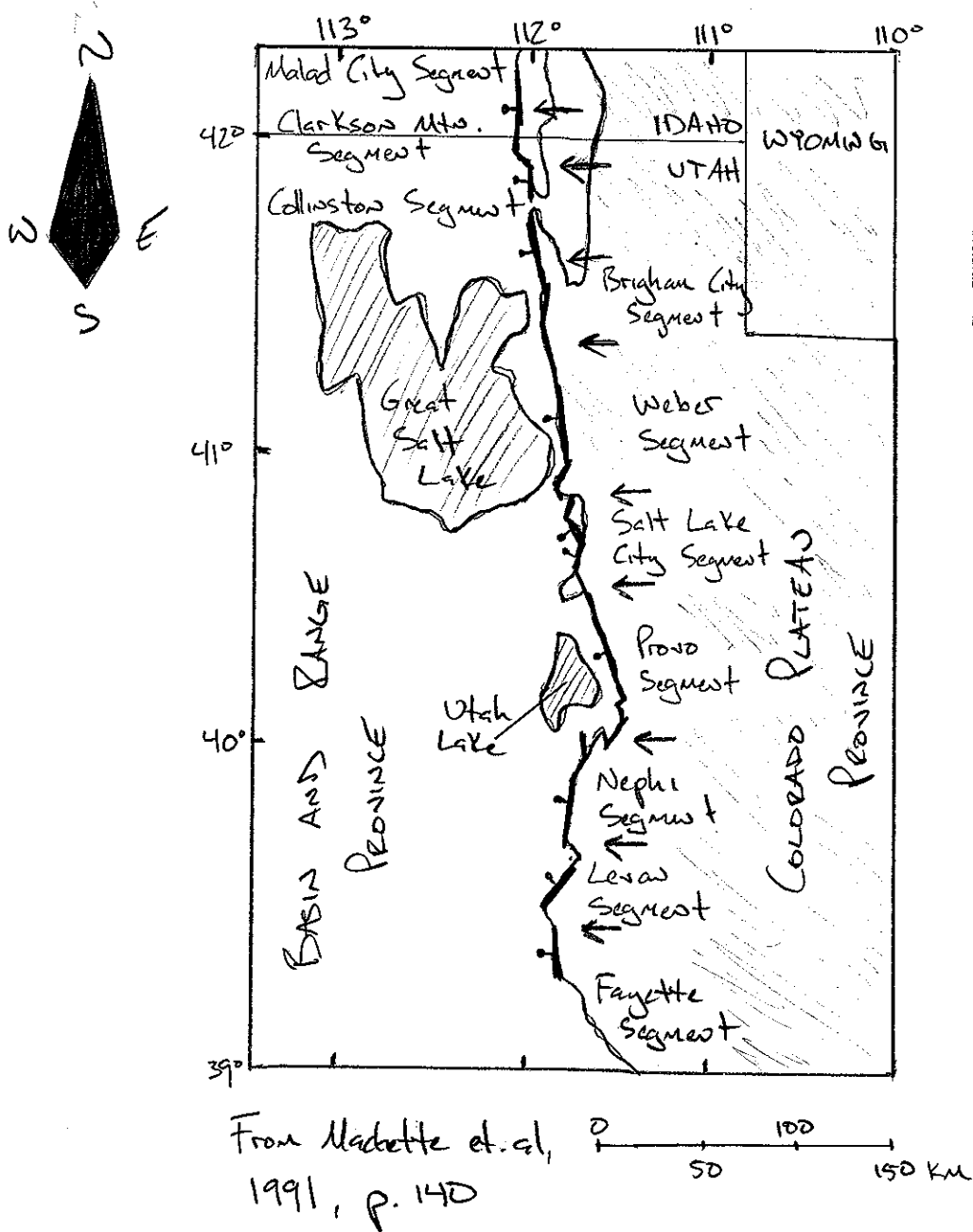


STRUCTURE - TECTONIC MAP

WASATCH FAULT, UTAH, U.S.

✓
ARTHUR WICKHAM
GEOSS 304 - DAVIS
MAR 1, 2012
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- BASIN AND RANGE
- ▨ COLORADO PLATEAU
- ▩ BODY OF WATER
- ← FAULT SEGMENT

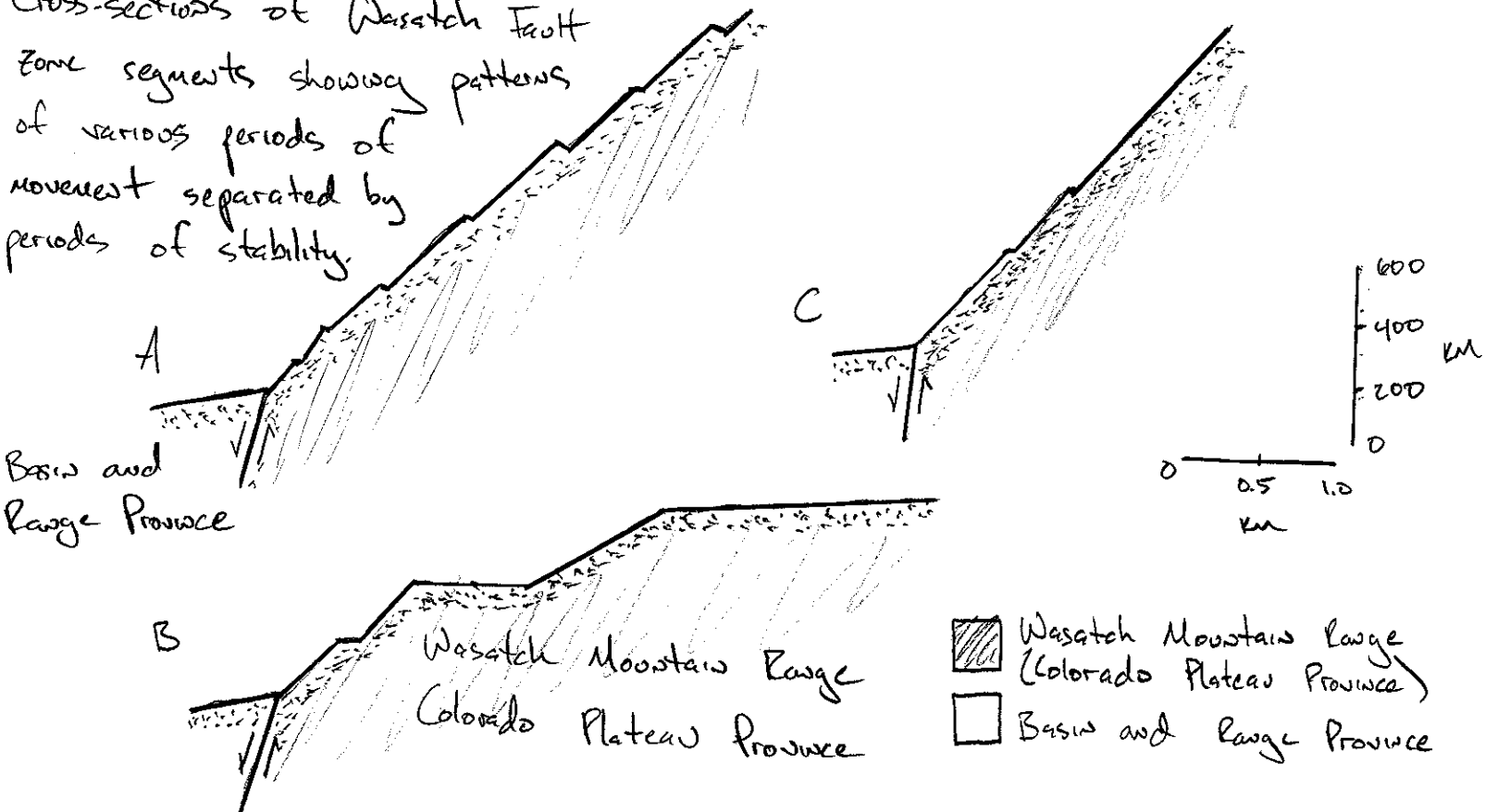
6/6

STRUCTURE SECTION

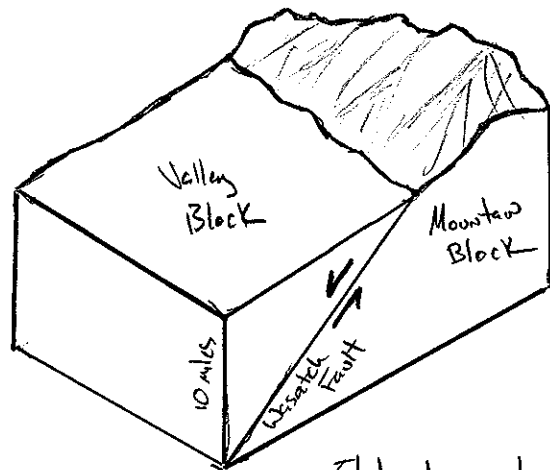
WASATCH FAULT, UTAH, U.S.

6/6

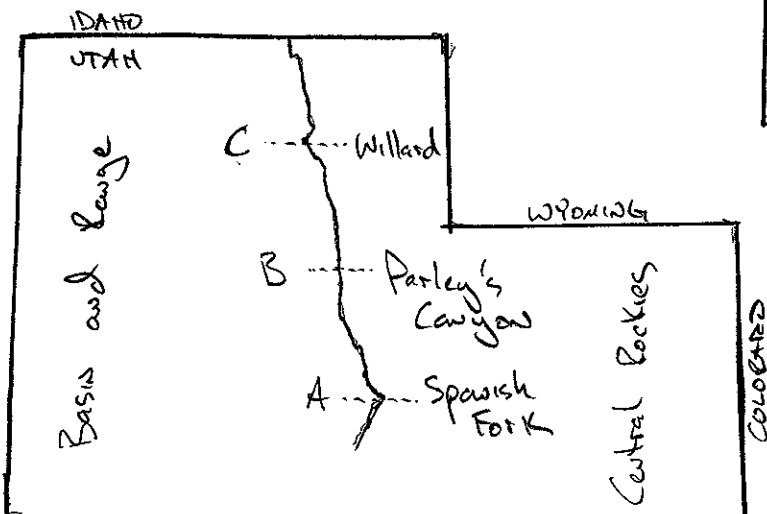
Cross-sections of Wasatch Fault zone segments showing patterns of various periods of movement separated by periods of stability.



Hamblin, 1976, p. 622



Eldredge et al, 1997, p. 1



Hamblin, 1976, p. 619

DESCRIPTION

WASATCH FAULT, UTAH, U.S.

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- Forms eastern boundary of Basin and Range Province with Colorado Plateau Province and Middle Rocky Mountain Province. ✓
- Longest continuous, active normal fault (343 km) in United States. ✓
- Divided into 10 discrete segments. 5 are active, medial segments with Holocene slip rates of $1-2 \text{ mm a}^{-1}$, recurrence intervals of 2000-4000 years, and average lengths of 50 km. ✓
- 5 are less active, distal segments with pre-Holocene surface ruptures, late Quaternary slip rates of $< 0.5 \text{ mm a}^{-1}$, recurrence intervals of $> 10,000$ years and average lengths of 20 km. ✓
- Approximate composite strike: $N10^{\circ}W - N20^{\circ}E$ ✓
- Approximate composite dip: $50-70^{\circ}WSW$ ✓
- Surface faulting events on each of the medial segments of WFF formed 2-4 m high scarps repeatedly during the Holocene. ✓
- Seismically active: During the past 6000 years, a major surface-rupturing earthquake has occurred every 395 ± 60 years.
- Wasatch Mountains being uplifted and tilted to the east at an average rate of approximately 1 mm per year.

KINEMATICS

WASATCH FAULT, UTAH, U.S. 5/6

- Normal fault(s) - region of extension ✓
- 200-300 m of total vertical displacement ✓
- During late Cenozoic, Wasatch fault experienced recurrent displacement ✓

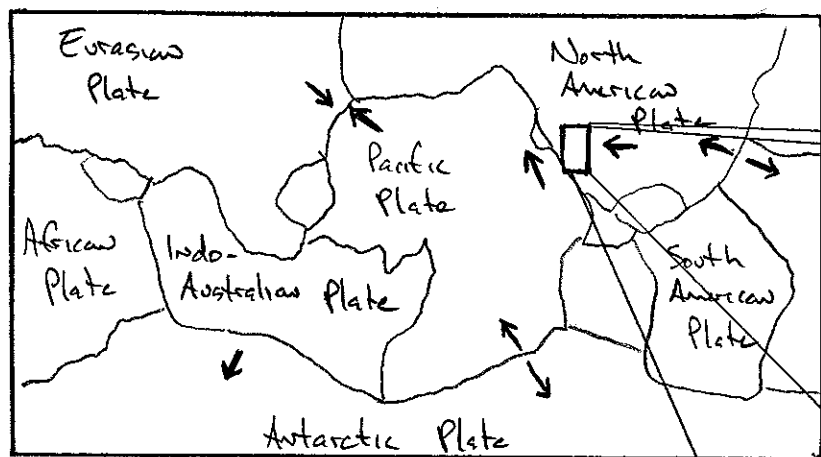
DYNAMICS AND MECHANICS 6/6

- For pure, average normal faulting along Wasatch fault, σ_3 (or greatest principal stretch, S_1) is horizontal, approximately oriented WSW/ENE. ✓
- σ_1 (or least principal stretch, S_3) in a pure normal fault is oriented vertical. ✓

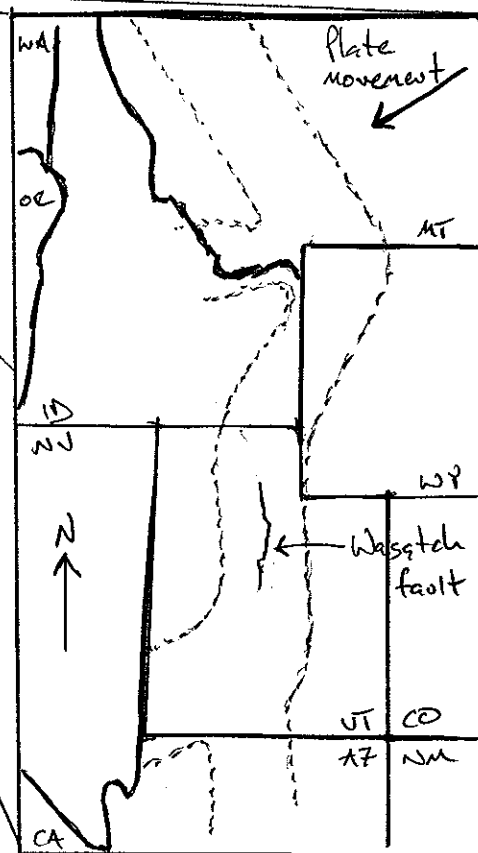
TECTONICS

WASATCH FAULT, UTAH, U.S.

6/6



• Movement of North American plate and Pacific plate creates zone of extension between Basin and Range Province and Colorado Plateau Province



Intermountain seismic belt

Eldredge, S. et al, 1996, p. 3

• East-west extension concentrates seismicity in a zone (Intermountain seismic belt) coincident with a belt of young faulting (< 15 ka) that forms a right-stepping or echelon pattern from the northern part of the WFF to the Yellowstone area.

(Madhett, M., 1991, p. 138)

REFERENCES

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Eldredge, S., Clarke, V., 1996, The Wasatch Fault, Utah Geological Survey: Public Information Series 40, p. 1-7.

Hambill, W.K., Patterns of displacement along the Wasatch fault, Brigham Young University, 1976, *Geology*, V.4, p. 619-622

Machette, M., Personos, S., Nelson, A., Schwartz, D., Lord, W., 1991, The Wasatch fault zone, Utah - segmentation and history of Holocene earthquakes, *Journal of Structural Geology*, V.13, No. 2, p. 137-149.