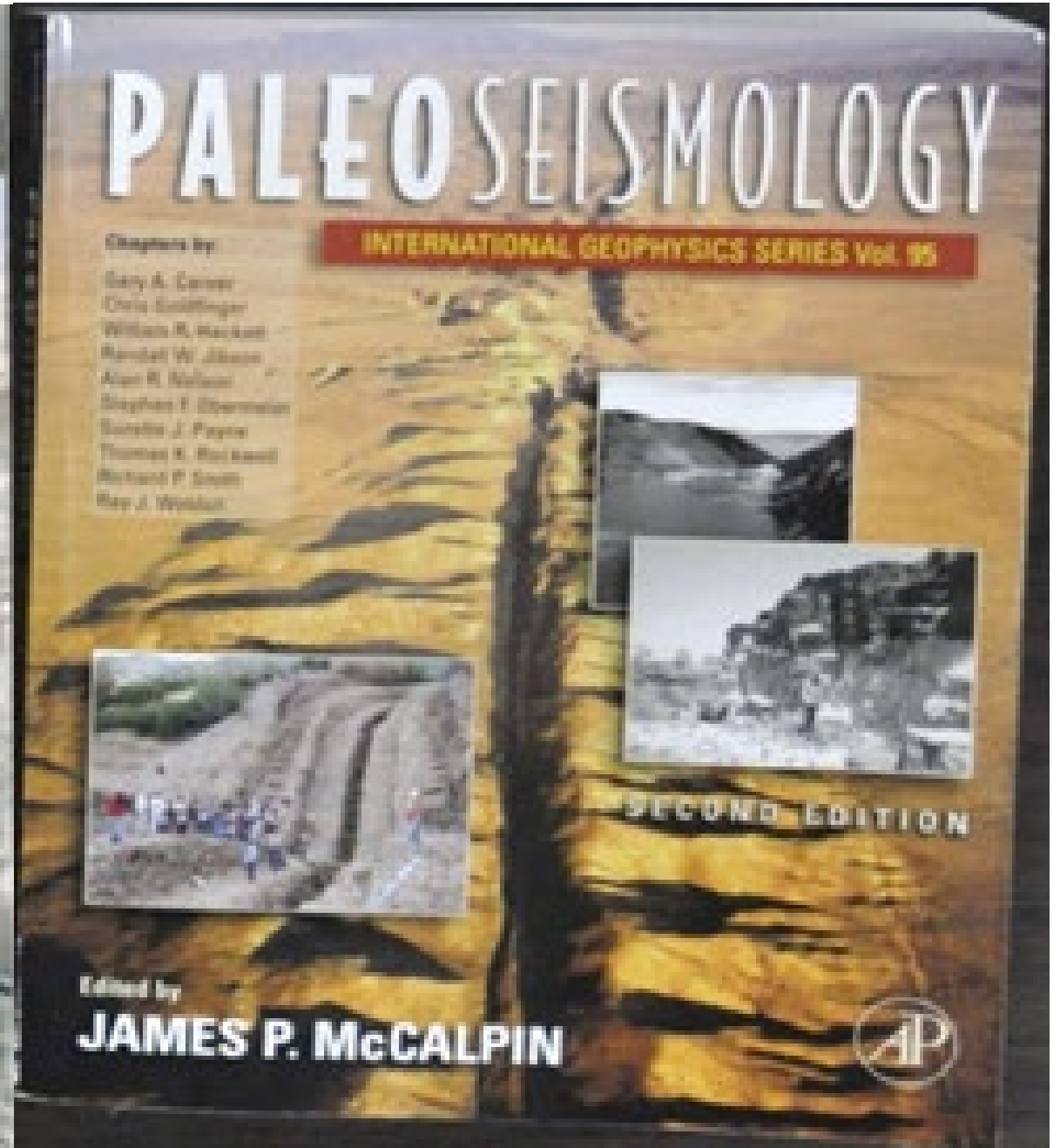
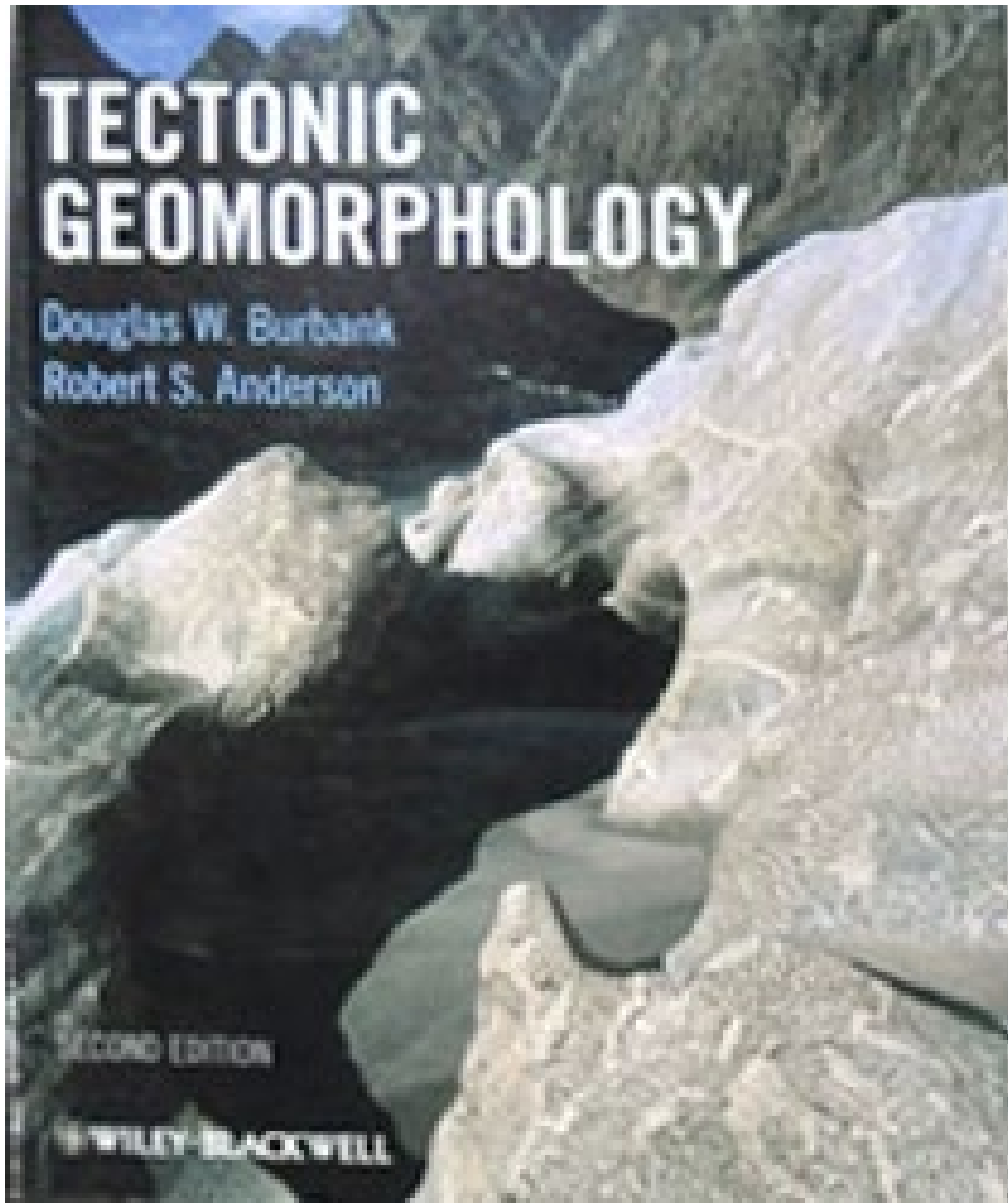


Introduction to Fault Zone Geomorphology

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Textbooks to draw from (plus many papers)

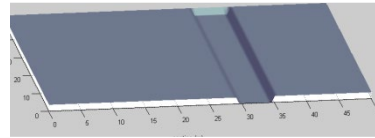


Outline

- Some basic ideas and definitions to keep in mind
 - Balance between surface and tectonic processes
 - Climate fluctuation driving marker formation

Landscape development in areas of active deformation

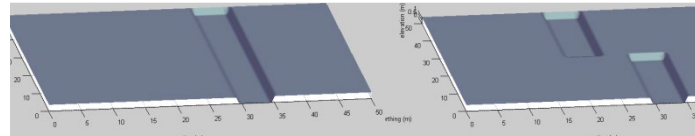
Original
elevation



$$H_0(x, y)$$

Landscape development in areas of active deformation

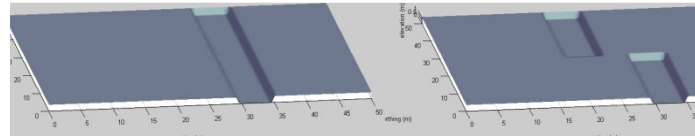
Original
elevation + Tectonic
displacement



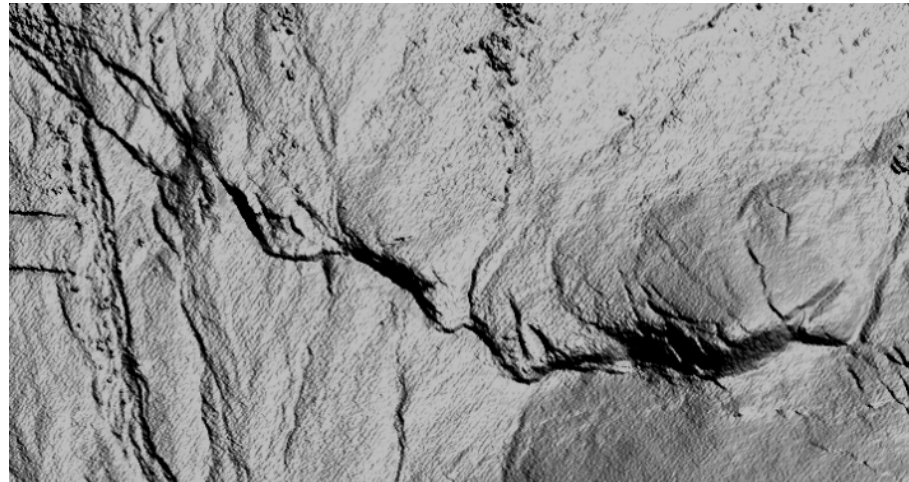
$$H_0(x, y) + U(x, y, t, H)$$

Landscape development in areas of active deformation

Original
elevation + Tectonic
displacement



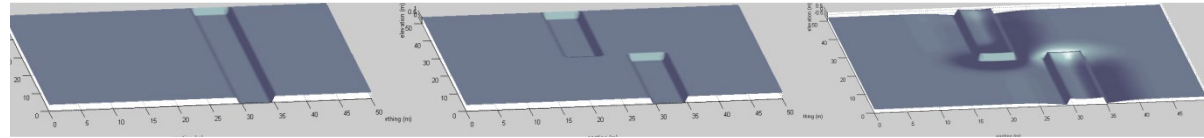
$$H_0(x, y) + U(x, y, t, H)$$



Denali 2002 earthquake rupture
(EarthScope)

Landscape development in areas of active deformation

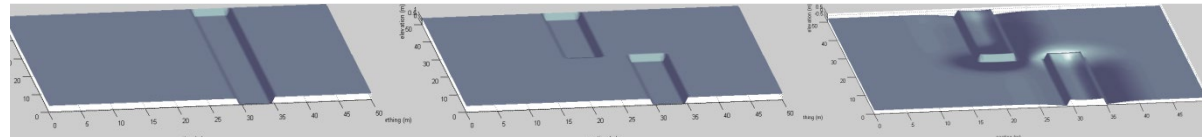
Original elevation + Tectonic displacement + Geomorphic displacement



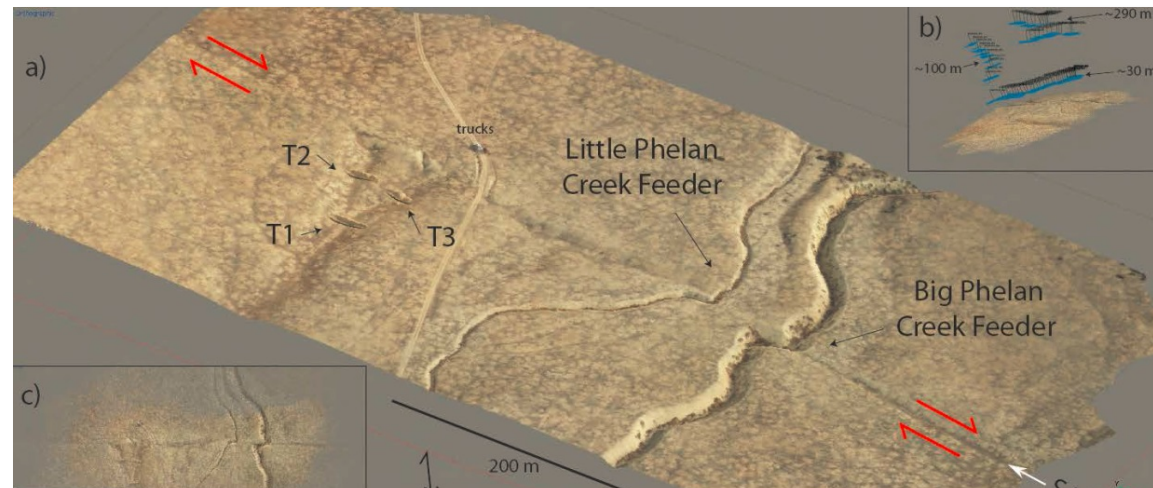
$$H_0(x, y) + U(x, y, t, H) + V(x, y, t, H)$$

Landscape development in areas of active deformation

Original elevation + Tectonic displacement + Geomorphic displacement

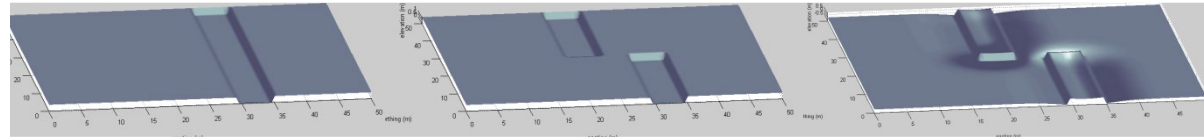


$$H_0(x, y) + U(x, y, t, H) + V(x, y, t, H)$$



Landscape development in areas of active deformation

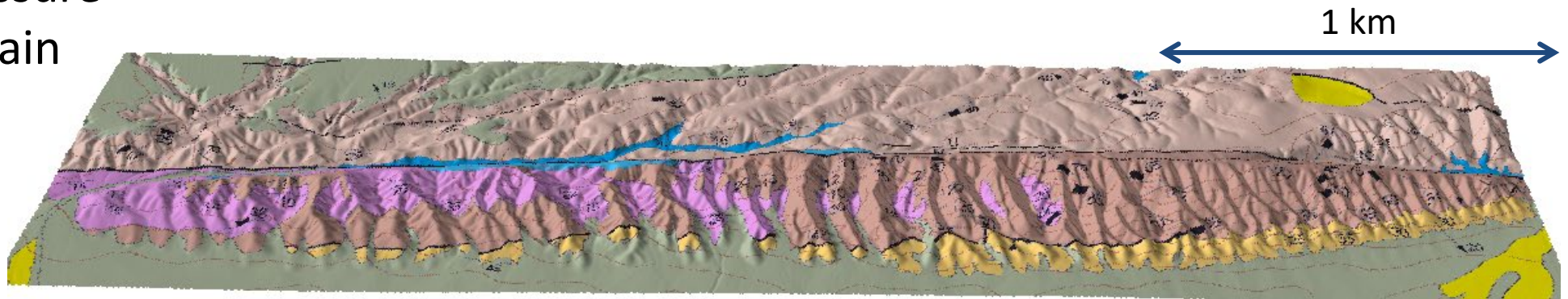
Original elevation + Tectonic displacement + Geomorphic displacement



$$H_0(x, y) + U(x, y, t, H) + V(x, y, t, H)$$

Dragon's Back Pressure
Ridge, Carrizo Plain
California

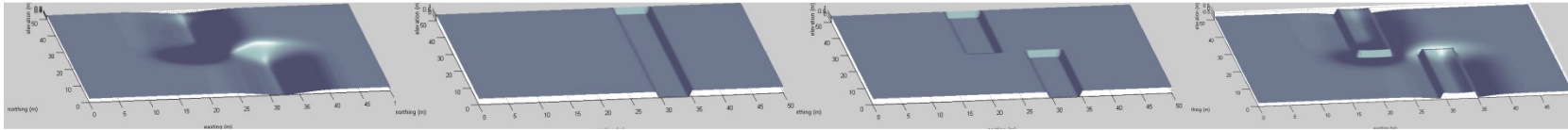
*Arrowsmith, 1995;
Hilley, 2001; Hilley and
Arrowsmith, 2008*



Landscape development in areas of active deformation

Surface processes act to change elevation through erosion and deposition while tectonic processes depress or elevate the surface directly.

$$\text{Current elevation} = \text{Original elevation} + \text{Tectonic displacement} + \text{Geomorphic displacement}$$



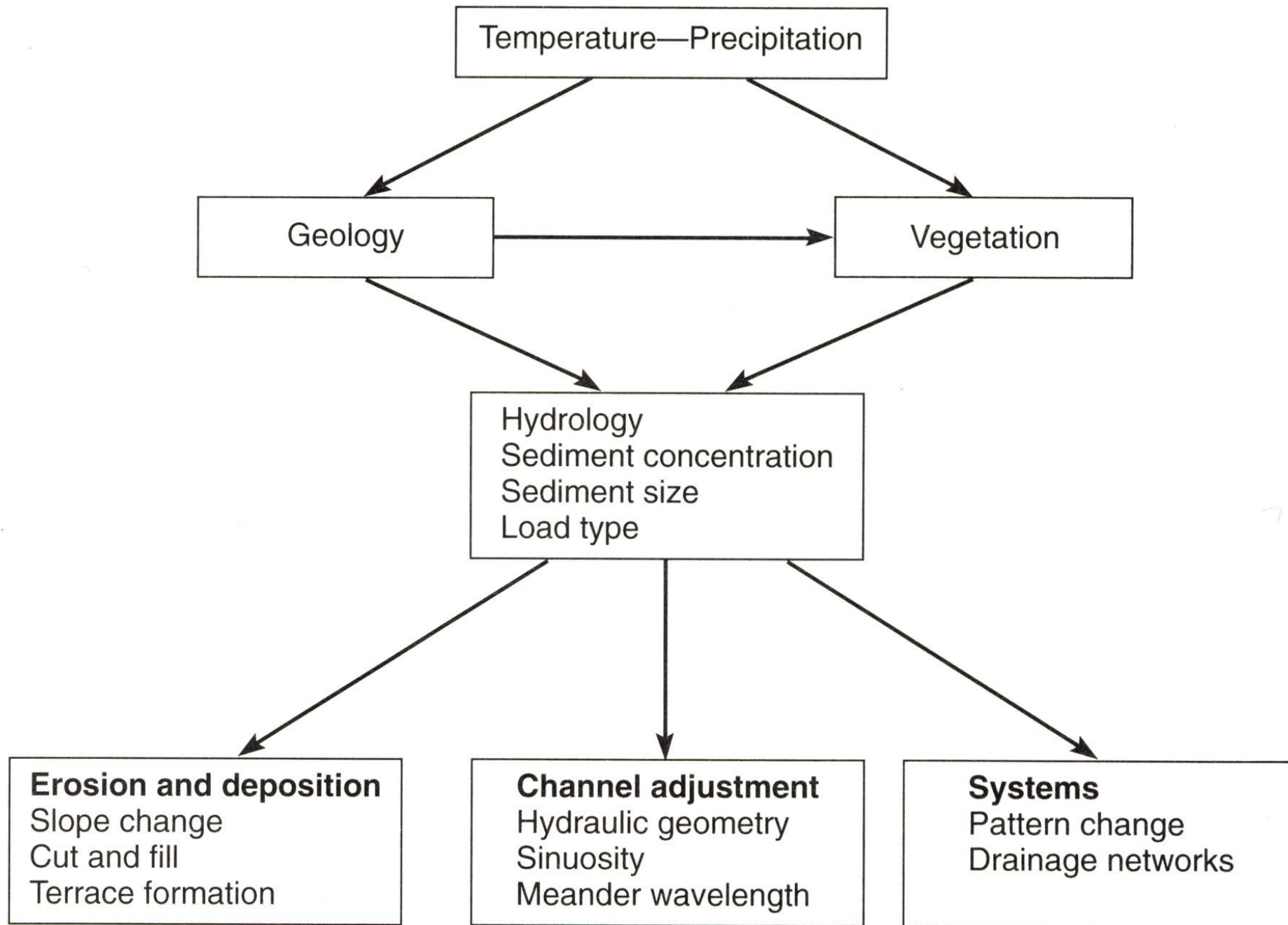
$$H(x, y, t) = H_0(x, y) + U(x, y, t, H) + V(x, y, t, H)$$

Geomorphic markers are landscape elements for whose geomorphic displacements (erosion and sedimentation are small enough or understandable that the tectonic displacement can be interpreted)

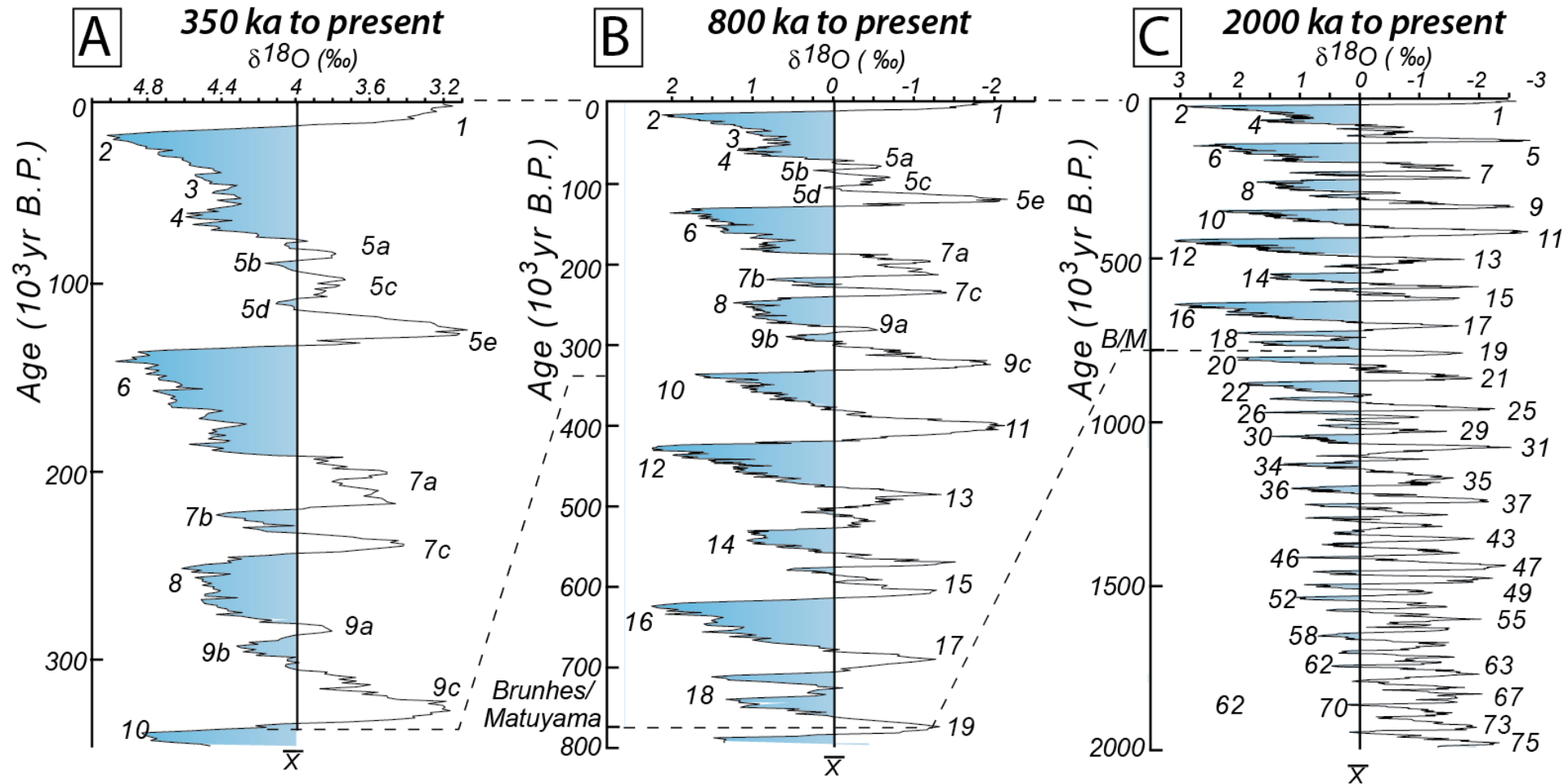
Climate and Climate Change over the Quaternary

Modulates the development of landforms

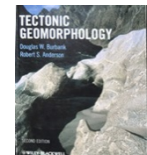
- Climate: Long term atmospheric and surface conditions that characterize a particular region
- Weather: daily fluctuations in temperature wind speed, and precipitation at a location

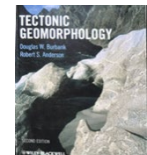
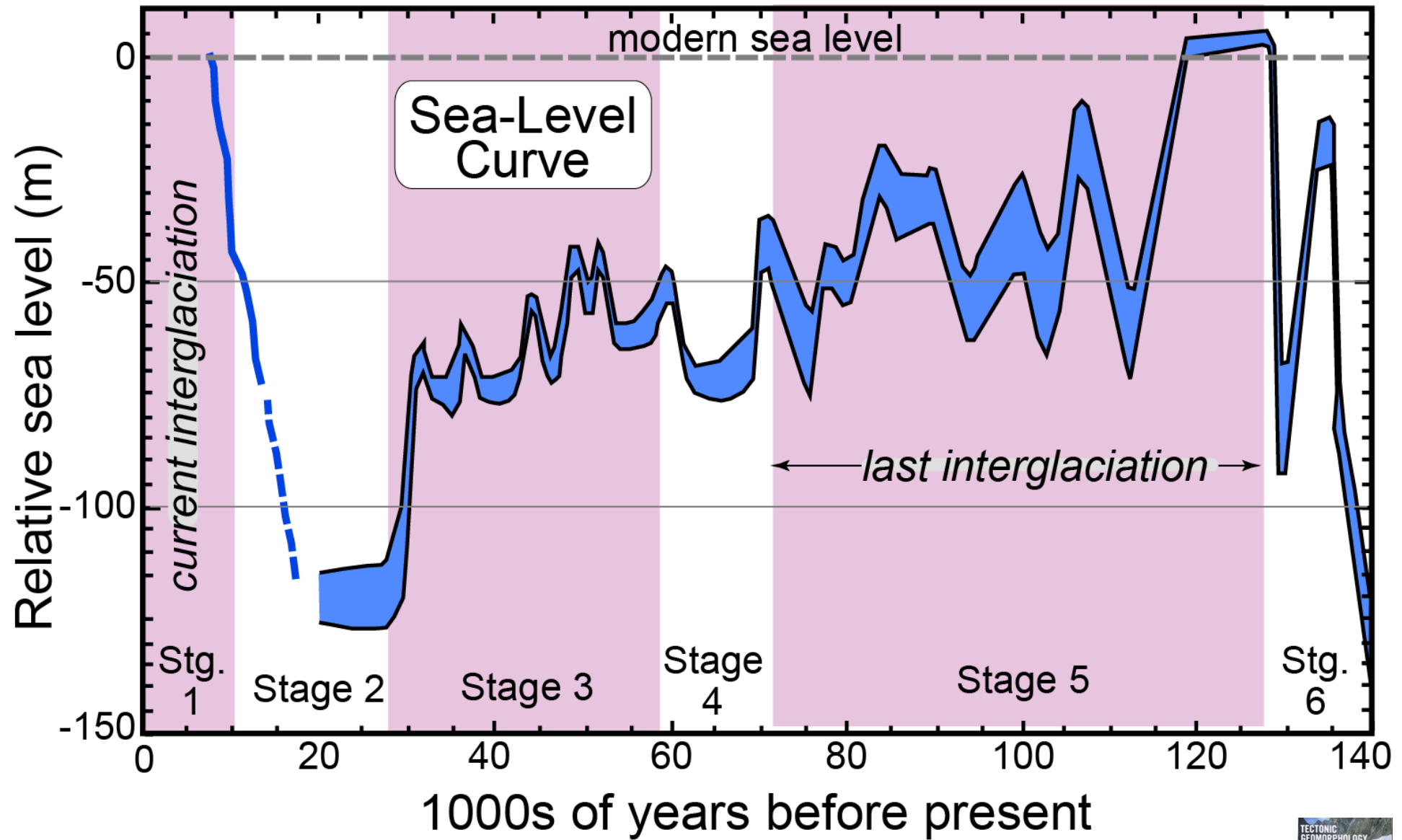


Marine Record of Isotopic Change



Isotope stages numbered backward with interglacials odd (current is 1) and the glacials numbered evenly (last is 2). They are subdivided further by letters.





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