Precambrian Surface (Great Unconformity) in Eastern Midwest*

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Abstract

This morning I want to discuss with you what is known of the basal Paleozoic unconformity in the eastern Midwestern states of Illinois, Indiana, Ohio, Michigan, and Kentucky plus bridges of Minnesota and Iowa and mention some possibilities for future research. I am here, not because I have much experience with this unconformity, but because I have had some modest experience with its possible analogs in Africa and Brazil and in southern Ontario. And, because I have always found it of great interest.

My talk will:

1. Illustrate some of the topography of the Precambrian surface in Africa and Brazil.
2. Provide a glimpse of well density in the eastern Midwest and Ontario.
3. Suggest all the states and provinces to work together on a unified data base.
4. Propose a few things that we might do now that would be telling yet not too extensive.

This basal unconformity was first recognized by the great Canadian geologist, Andrew Lawson, who called it, “the Great Unconformity”, a name that perhaps we should reintroduce today.

Selected References

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Swinford, E.M., and E.R. Slucher, 1995, Map 8: Regional Bedrock Geology of the Bellefontaine, Ohio, 30 x 60 Minute Quadrangle: Division Geological Survey, Columbus, OH.

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20-23 September 2015

McMicken College of Arts & Sciences

University of Cincinnati

Why Study Paleotopography of Base of Mt. Simon

- The “Great Unconformity” is a major event in the Midwest and the world that deserves more attention in the Midwest
- Locate networks of paleochannels
- Help determine limits of watersheds and divides that are likely to have residual topographic highs
- Possible areas of secondary mineralization
- Identify paleoslopes

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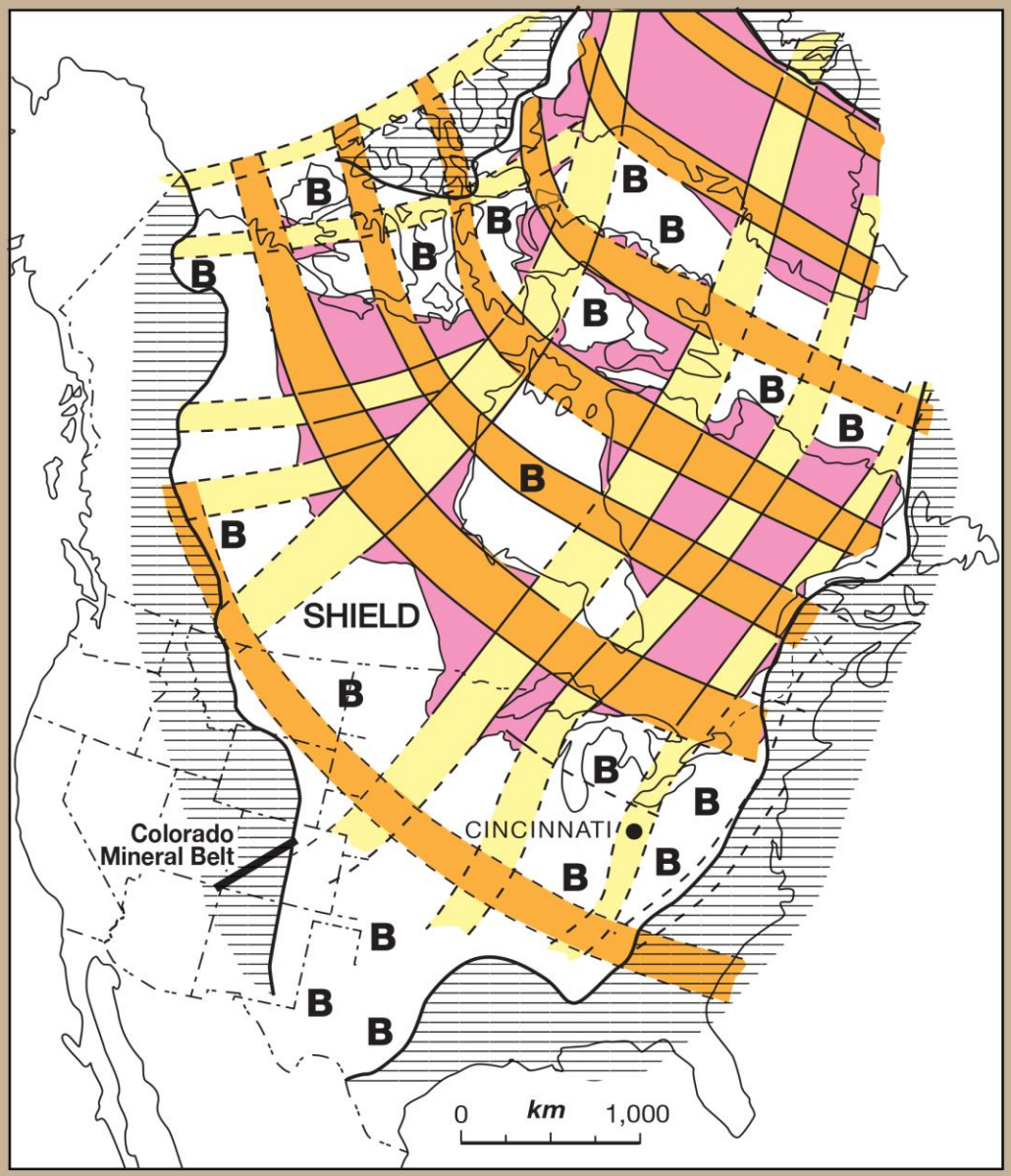
VOL. 1, PP. 163-174 MARCH 12, 1890

NOTE ON THE PRE-PALEOZOIC SURFACE OF THE ARCHEAN TERRANES OF CANADA.

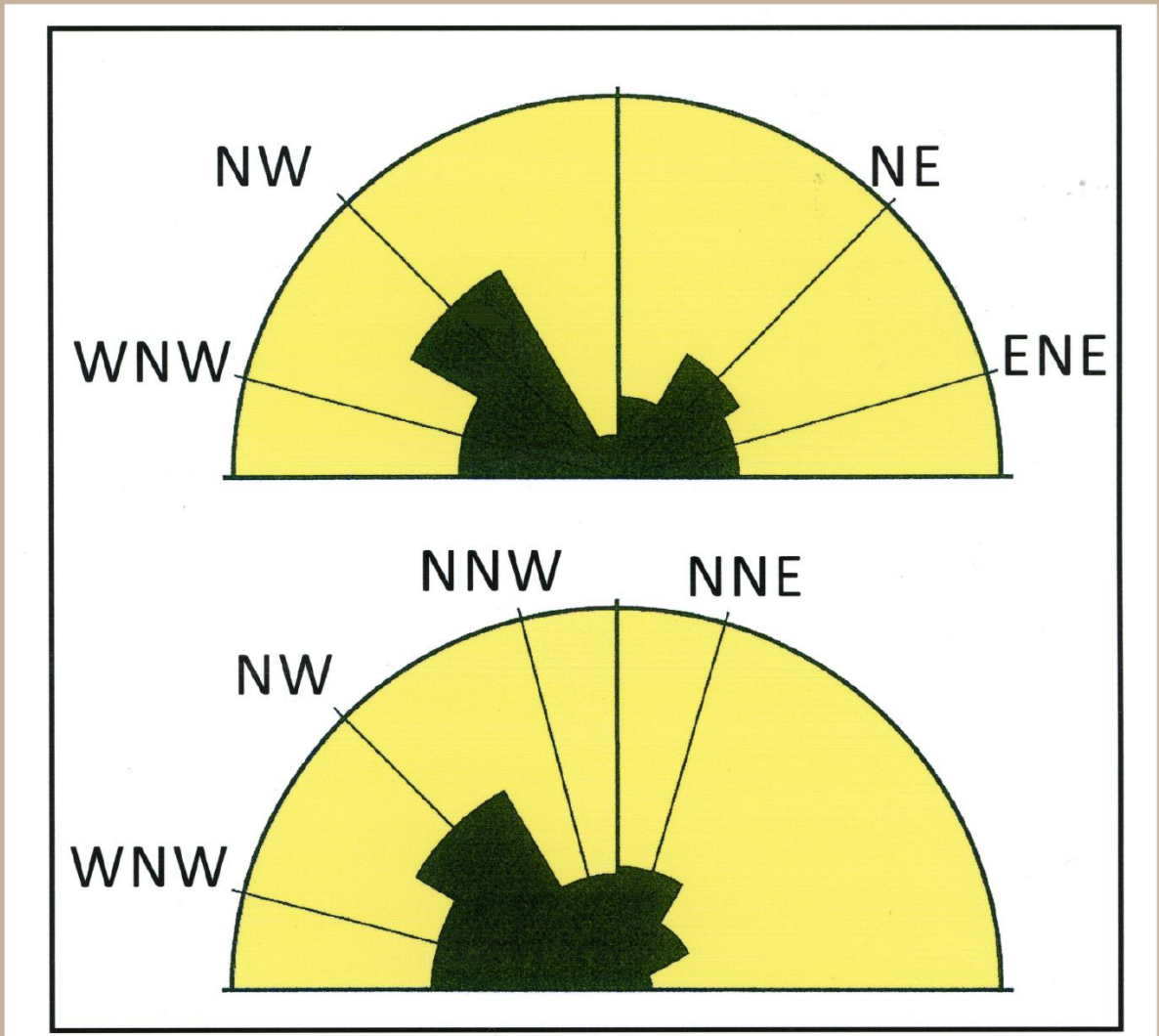
BY ANDREW C. LAWSON, PH. D.

(*Read before the Society December* 27, 1889.)



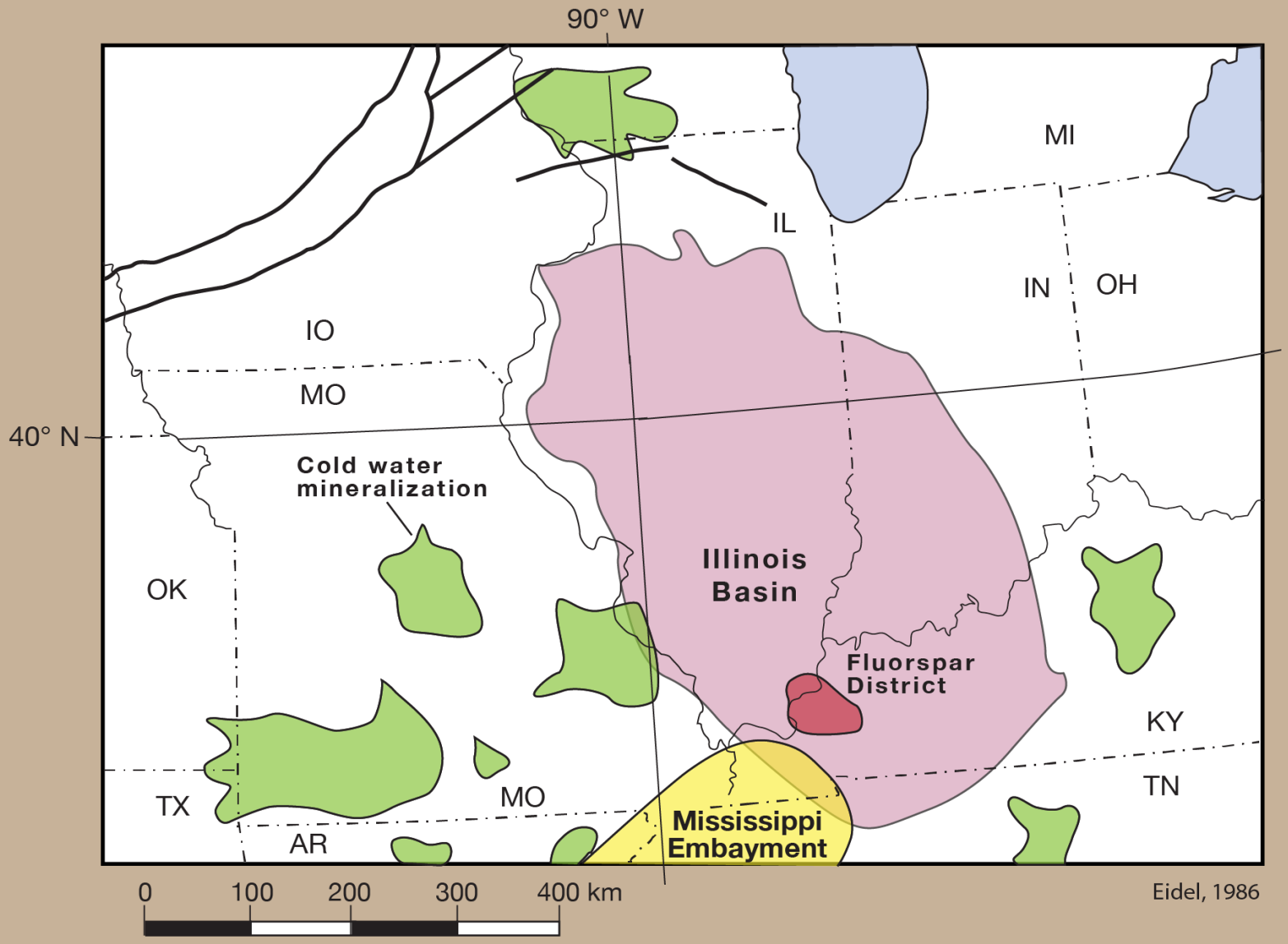
Sandford, et al. (1987, Fig. 3)

Orientation of Basement Structures of the Great Unconformity, Central U.S. Craton

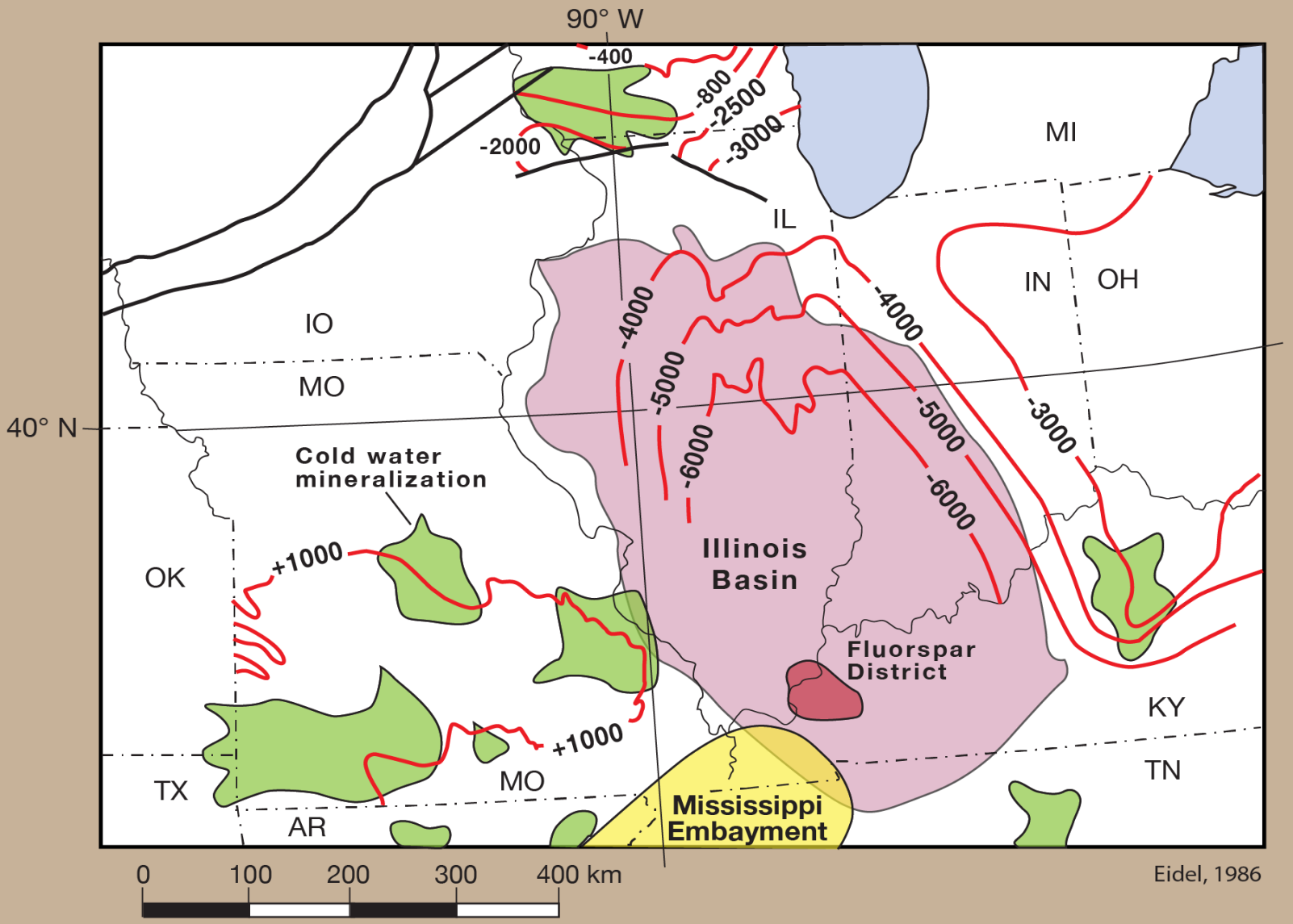


Domrois (2015, Figs. 3.4 and 3.6)

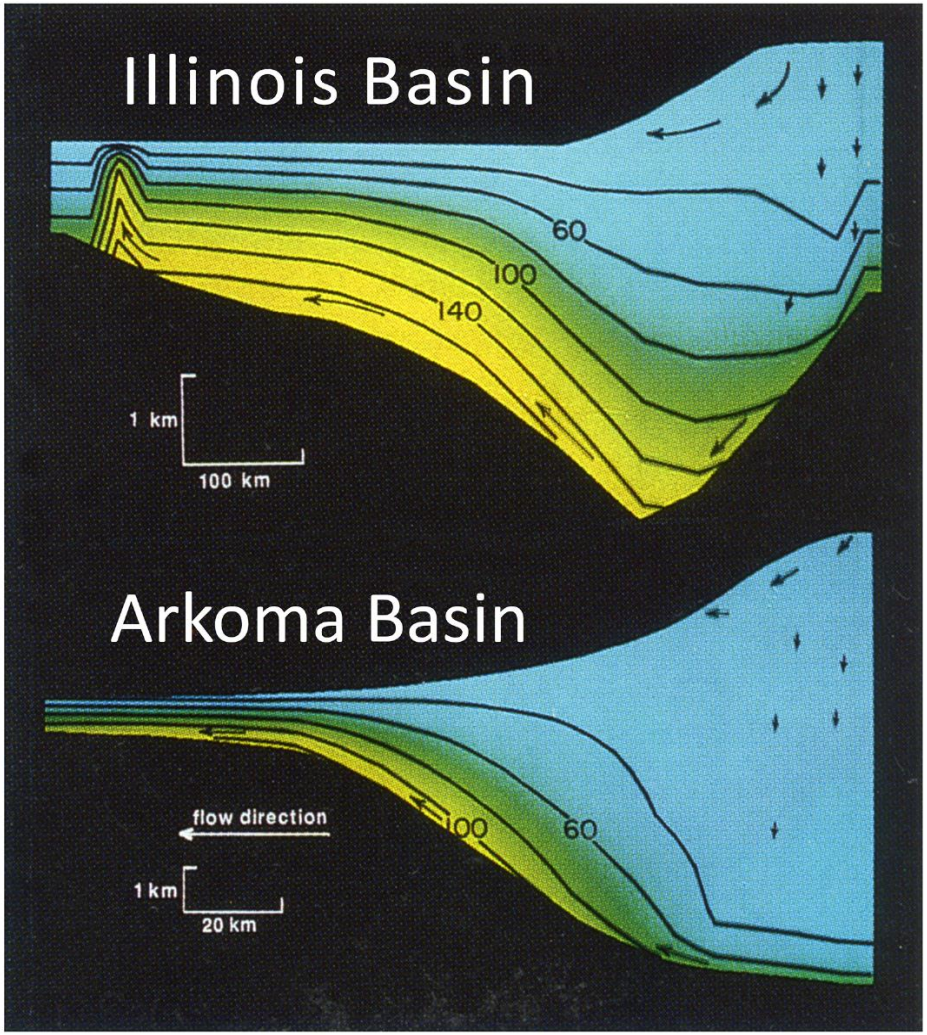
Upper Mississippi Valley Mineralization



Upper Mississippi Valley Mineralization

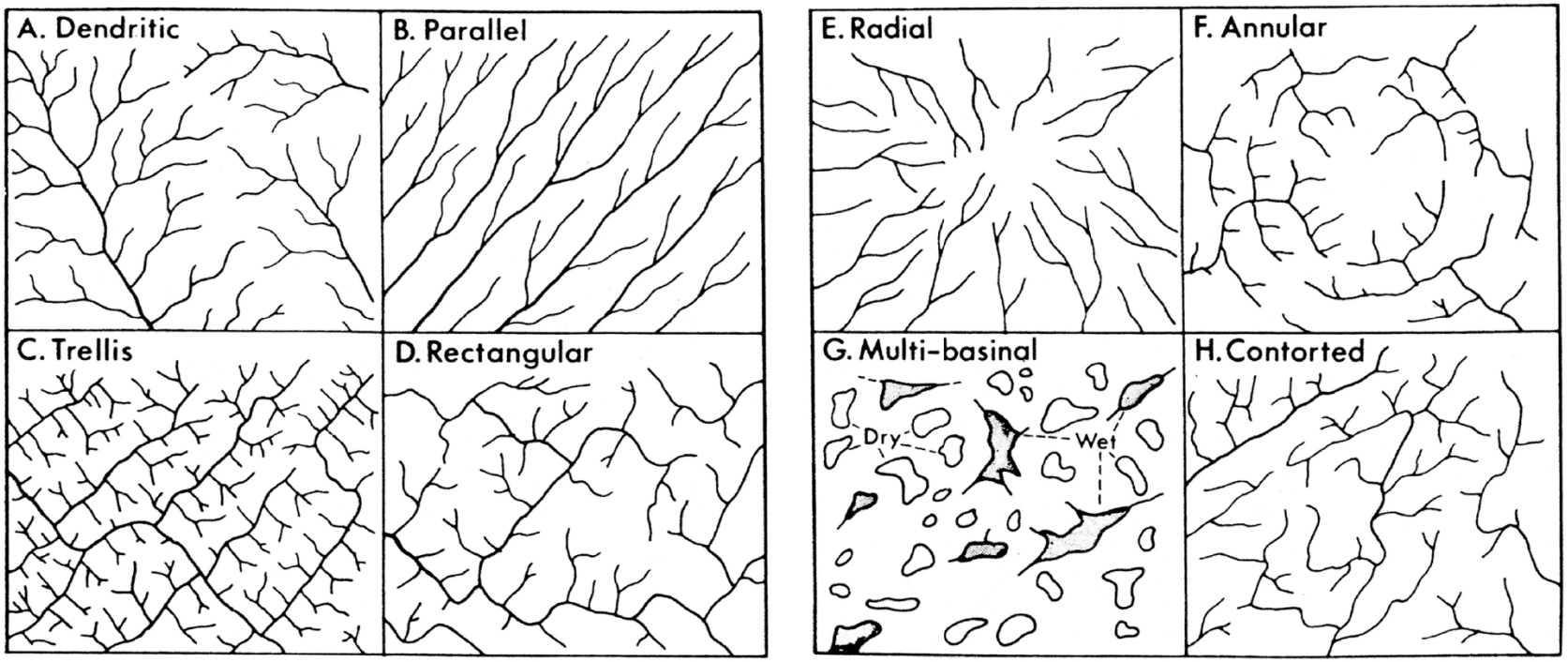


Models of Regional Orogenic Groundwater Flow



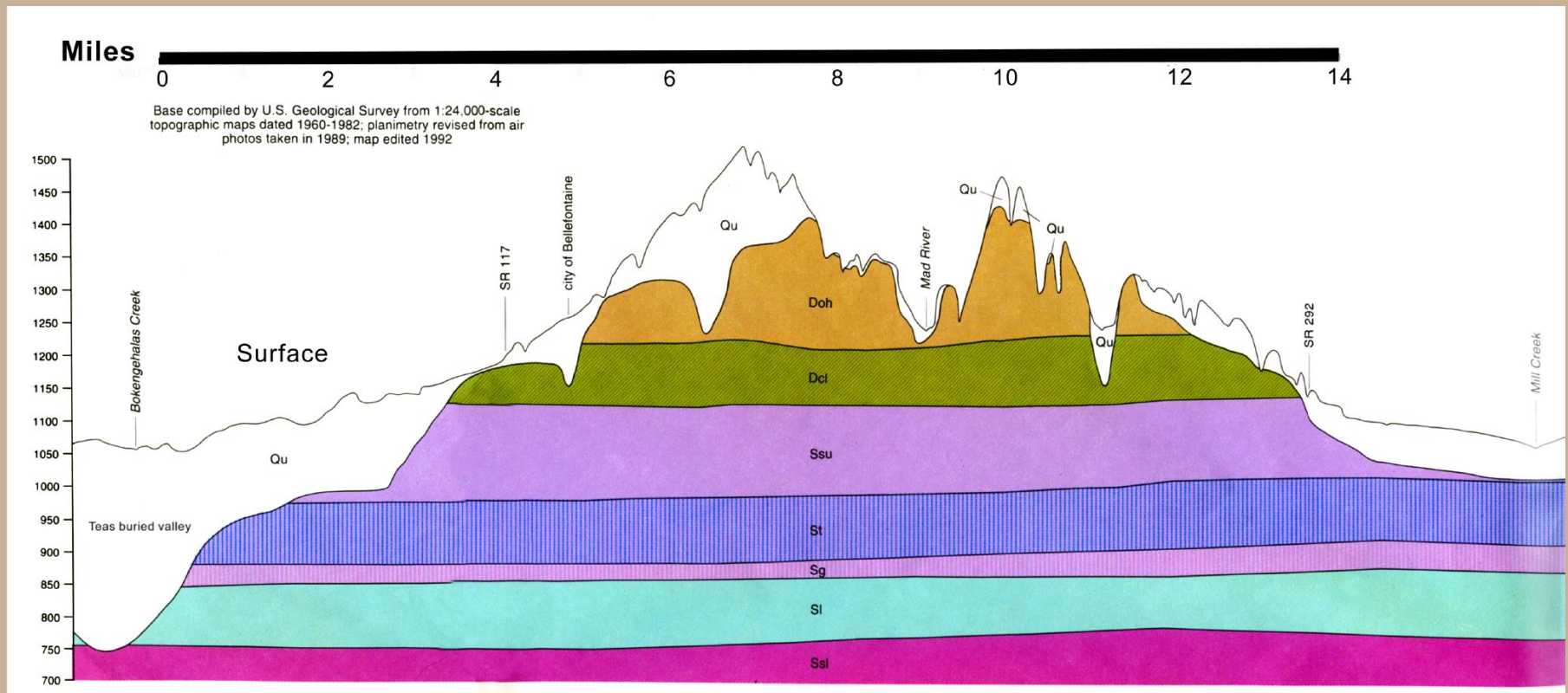
Bethke et al, (1998, Figs. 4 & 6

Types of Drainage Patterns



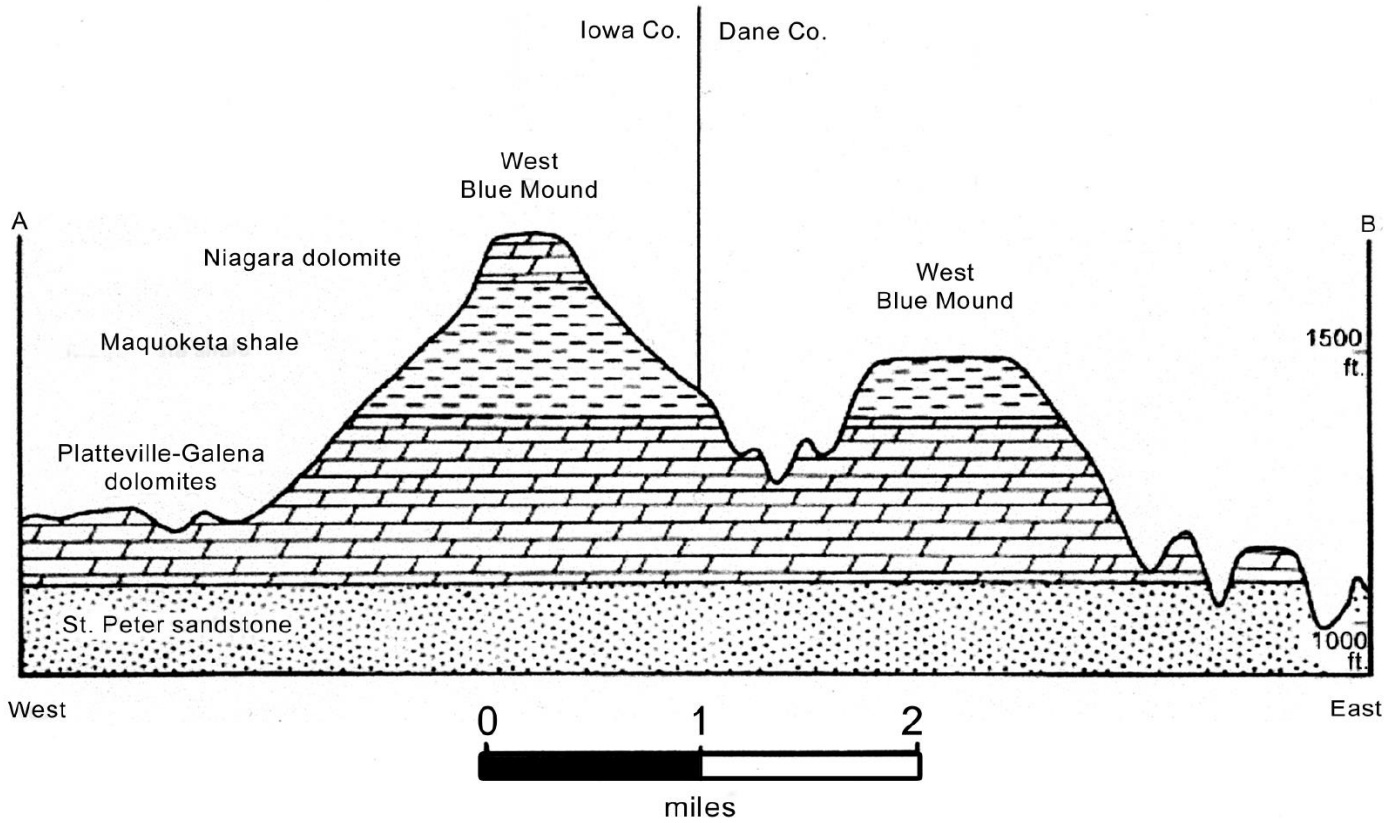
Redrawn after Howard, 1967

Bellefontaine Outlier, Ohio



Mac Swinford and Slucher, Ohio Geological Survey,1995

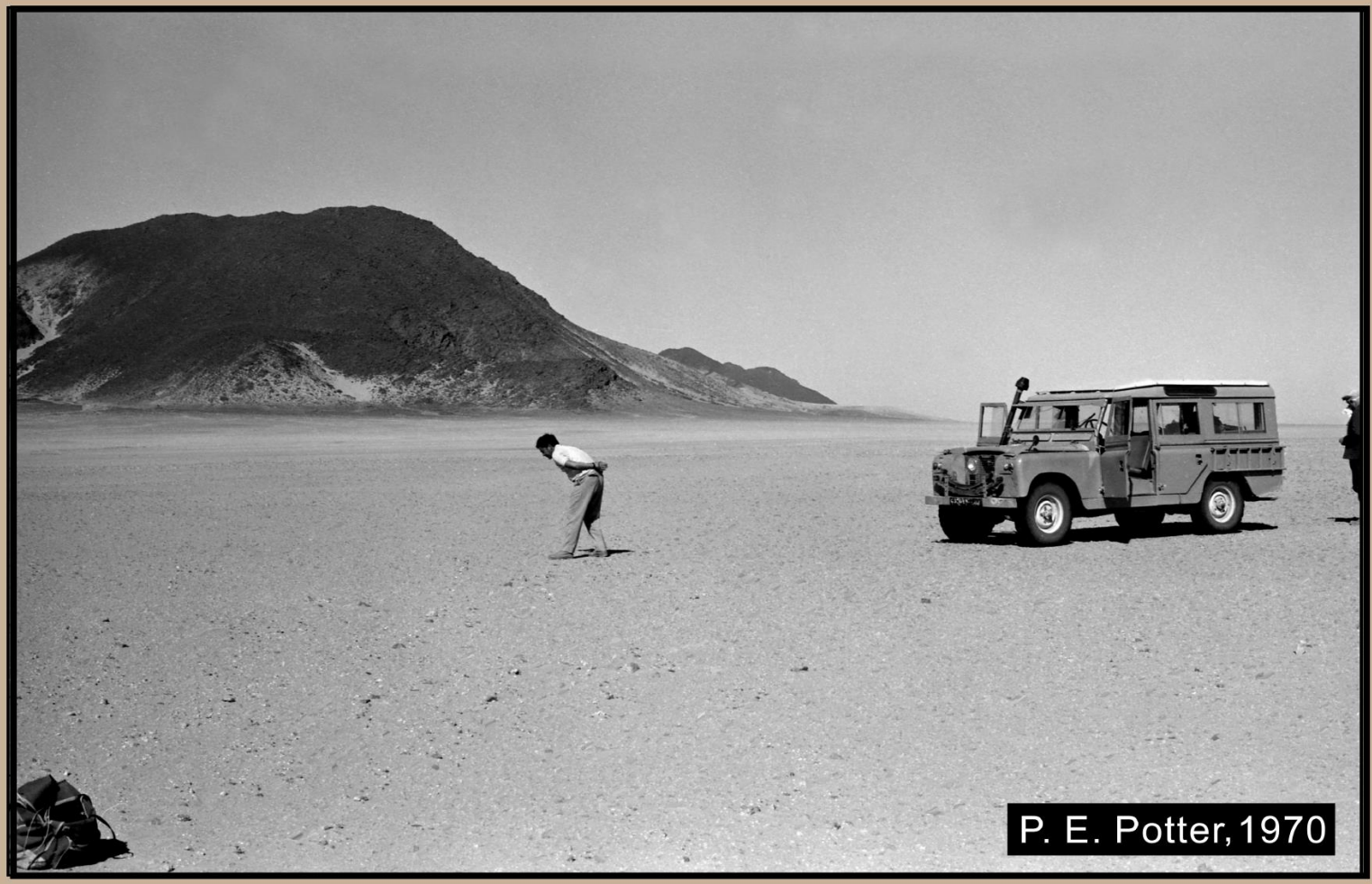
East-West Cross Section Through Blue Mounds, Iowa Co., Wisconsin



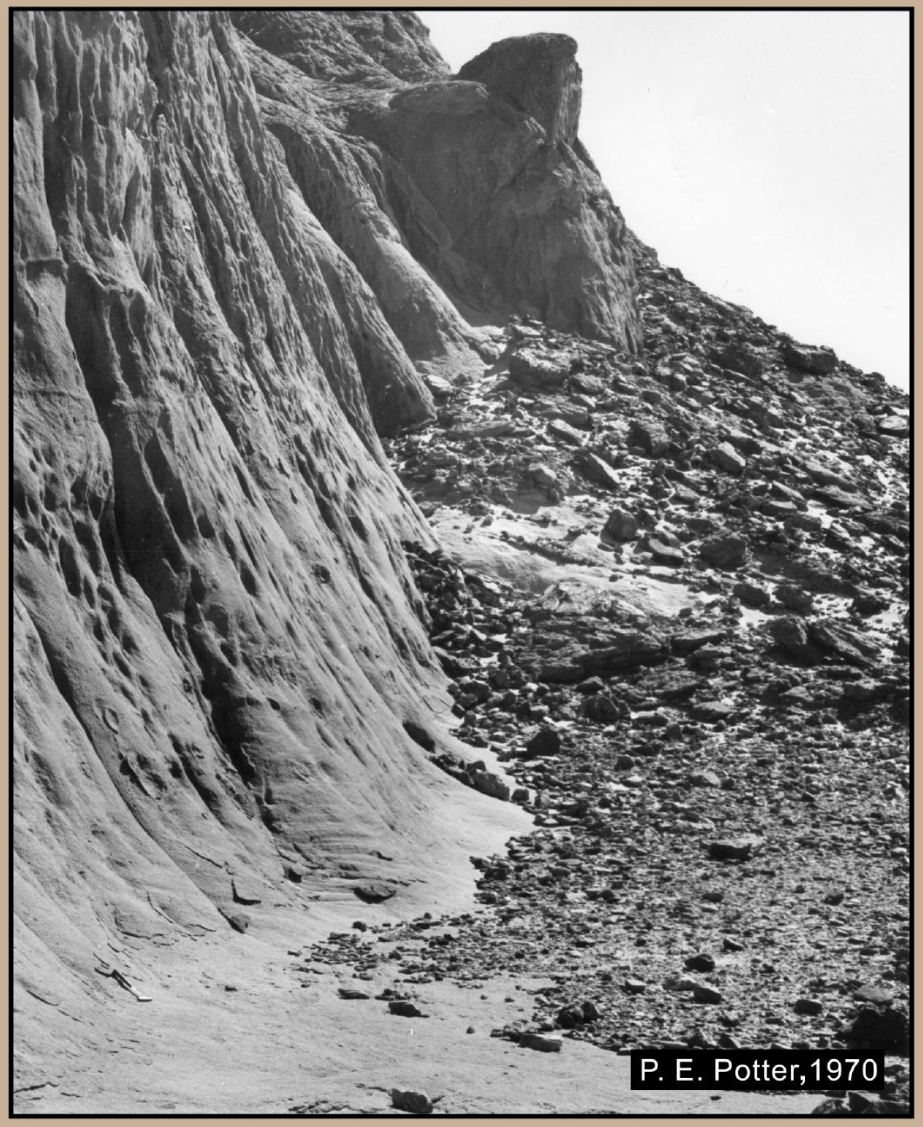
Martin (1932, Fig. 22)

Green River Knob, 1789 ft., on the divide between the Cumberland and Green Rivers, Kentucky

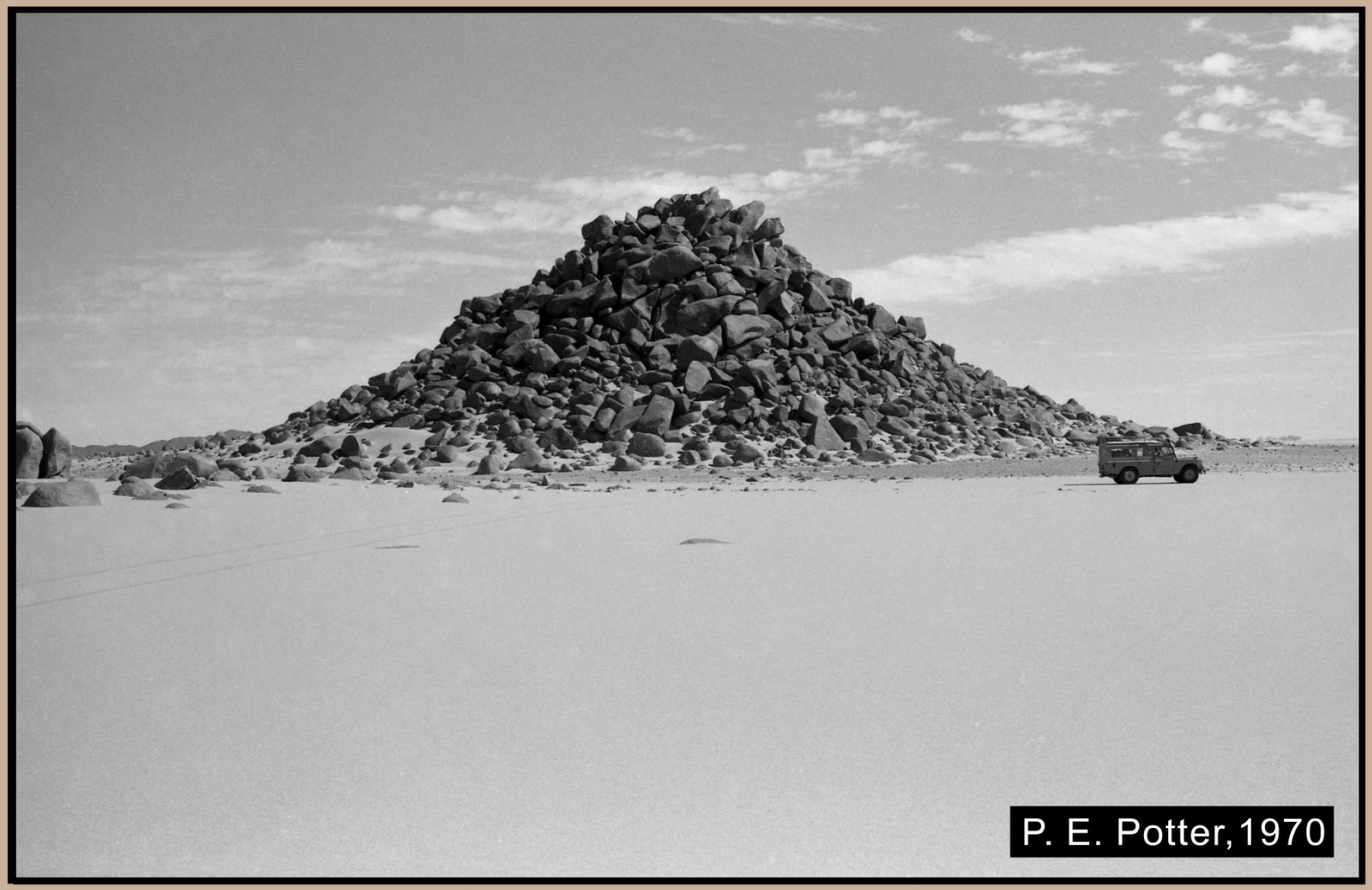
Sahara Desert, Southern Algeria



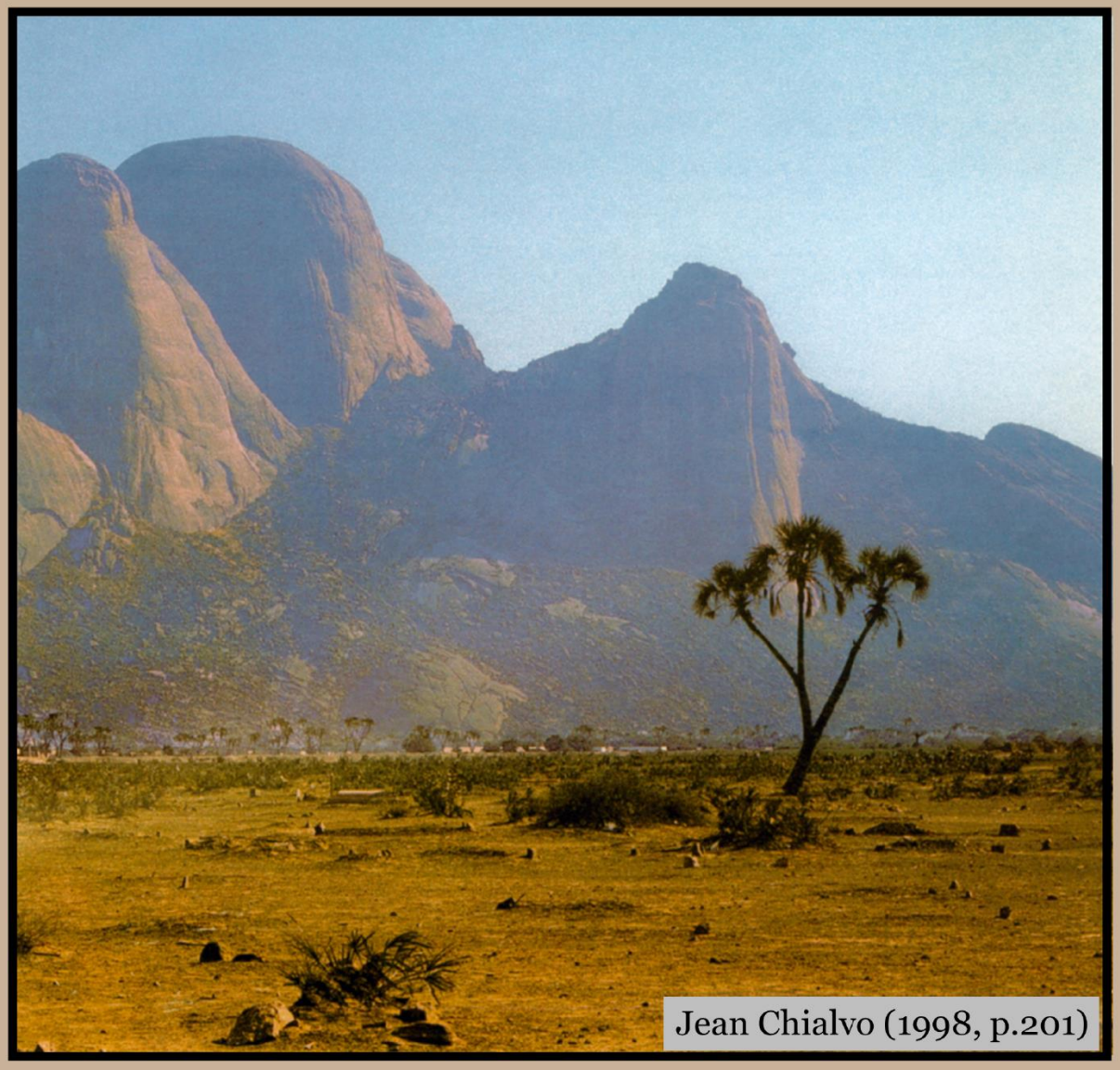
Sahara Desert, Southern Algeria



Unusual Residual Hill, Sahara Desert, Southern Algeria

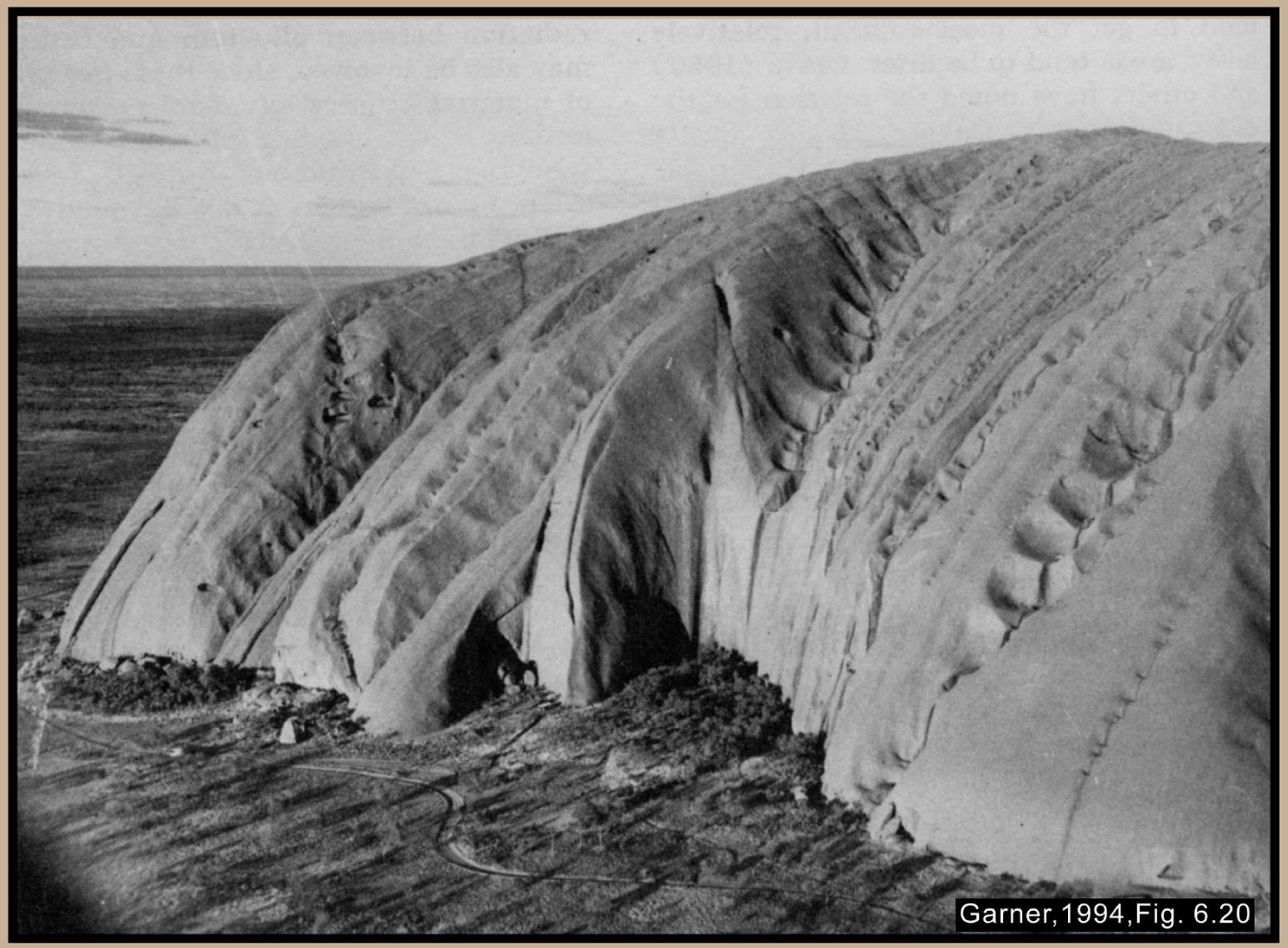


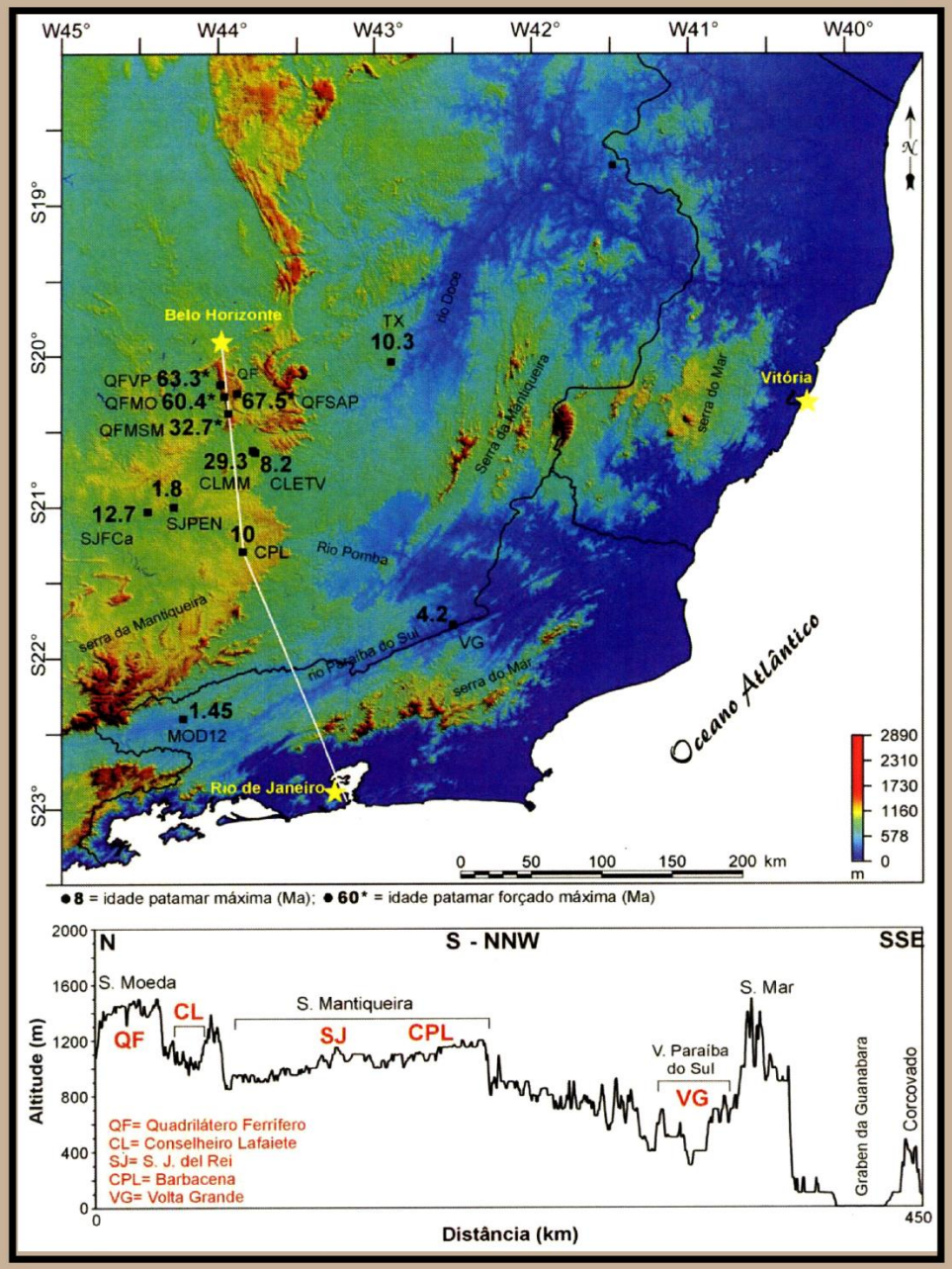
Inselbergs Overlook, Sudanese Plateau



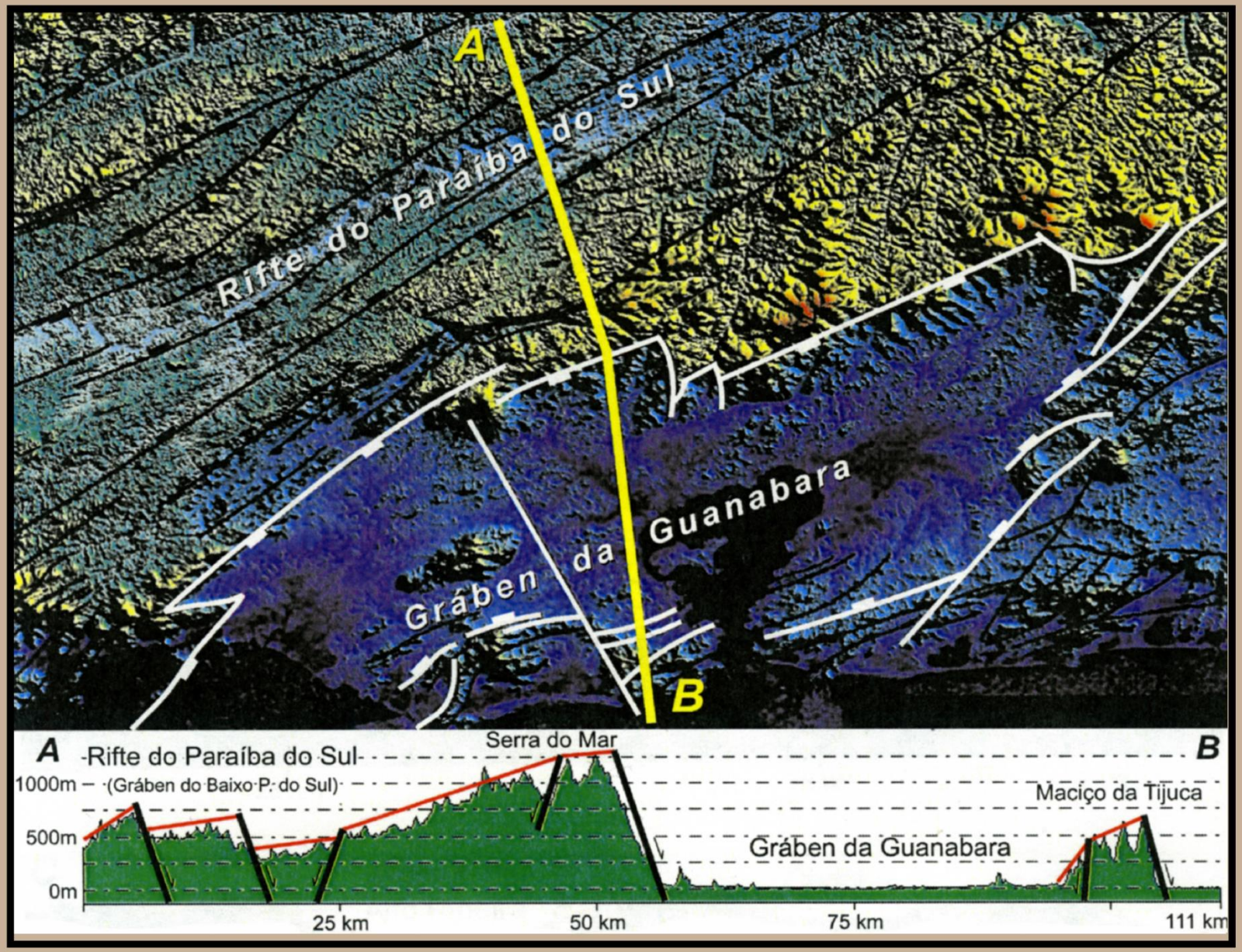
Jean Chialvo (1998, p.201)

Ayres Rock, (Uluru) Nearly Vertical Precambrian Residual

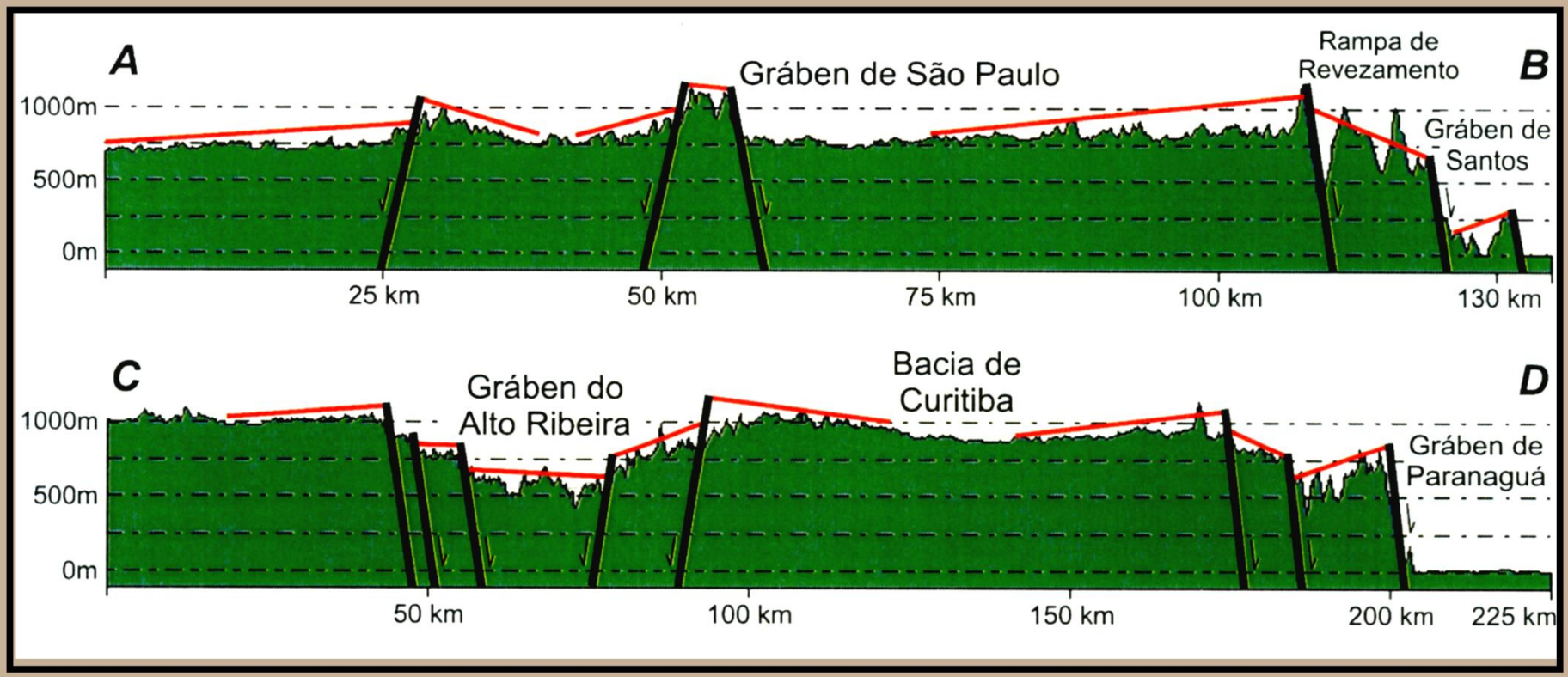



W45°
W44°
W43°
W42°
W41°
W40°
S19°
S20°
S21°
S22°
S23°
Belo Horizonte
Vitória
Rio de Janeiro
TX
10.3
QFVP 63.3*
QF
QFMO 60.4*
67.5*
QFSAP
QFMSM 32.7*
29.3
8.2
CLMM
CLETV
1.8
12.7
SJPEN
SJFCa
10
CPL
Rio Pomba
4.2
VG
1.45
MOD12
rio Doce
Serra da Mantiqueira
serra do Mar
serra da Mantiqueira
rio Paraíba do Sul
Oceano Atlântico
0 50 100 150 200 km
2890
2310
1730
1160
578
0
m
● 8 = idade patamar máxima (Ma); ● 60* = idade patamar forçado máxima (Ma)
N
S - NNW
SSE
S. Moeda
QF
CL
S. Mantiqueira
SJ
CPL
V. Paraíba do Sul
VG
S. Mar
Graben da Guanabara
Corcovado
Altitude (m)
2000
1600
1200
800
400
0
QF= Quadrilátero Ferrífero
CL= Conselheiro Lafaiete
SJ= S. J. del Rei
CPL= Barbacena
VG= Volta Grande
0
450
Distância (km)

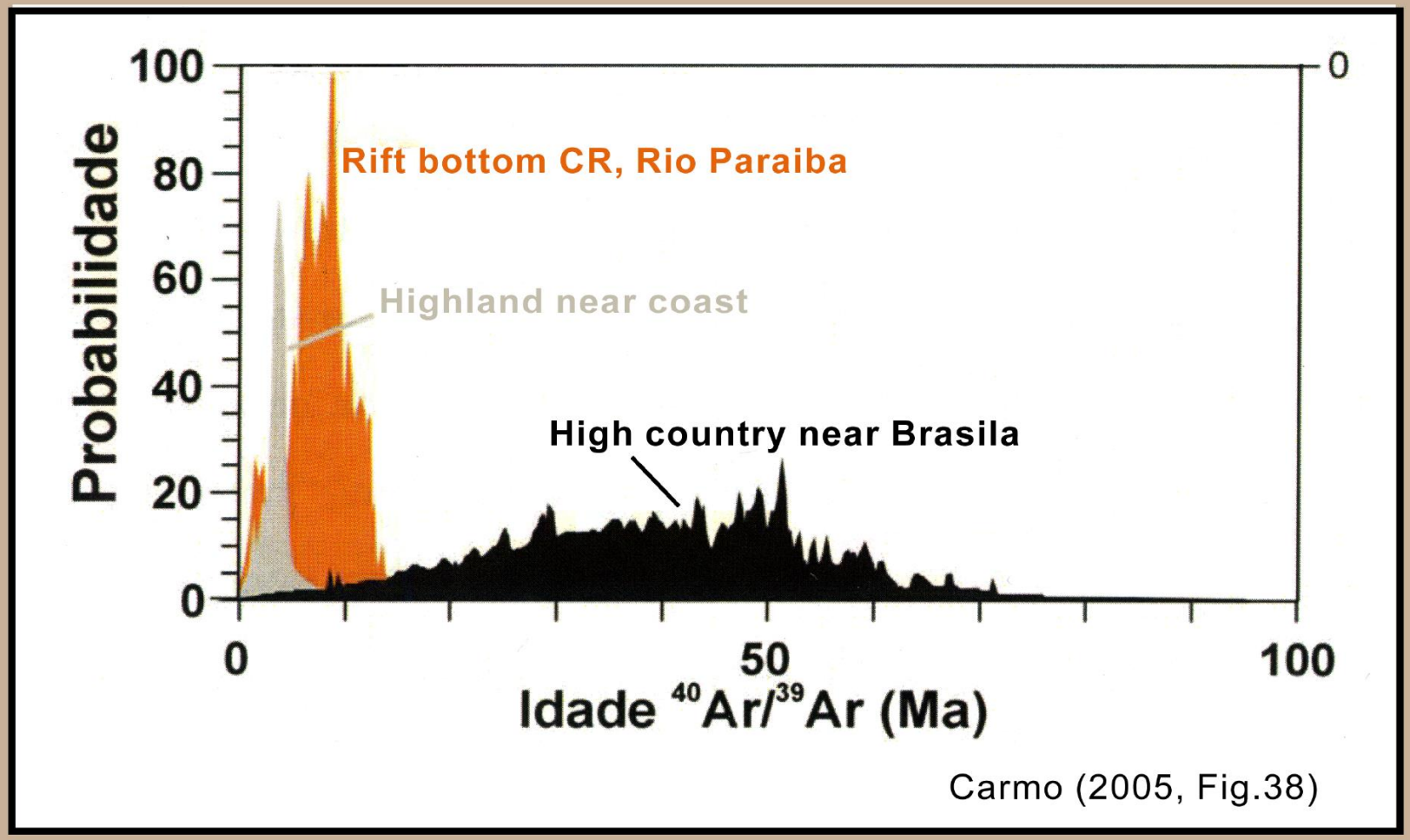
Geology in Rio Area



Cross Sections through Sao Paulo and Curitiba, Brasil



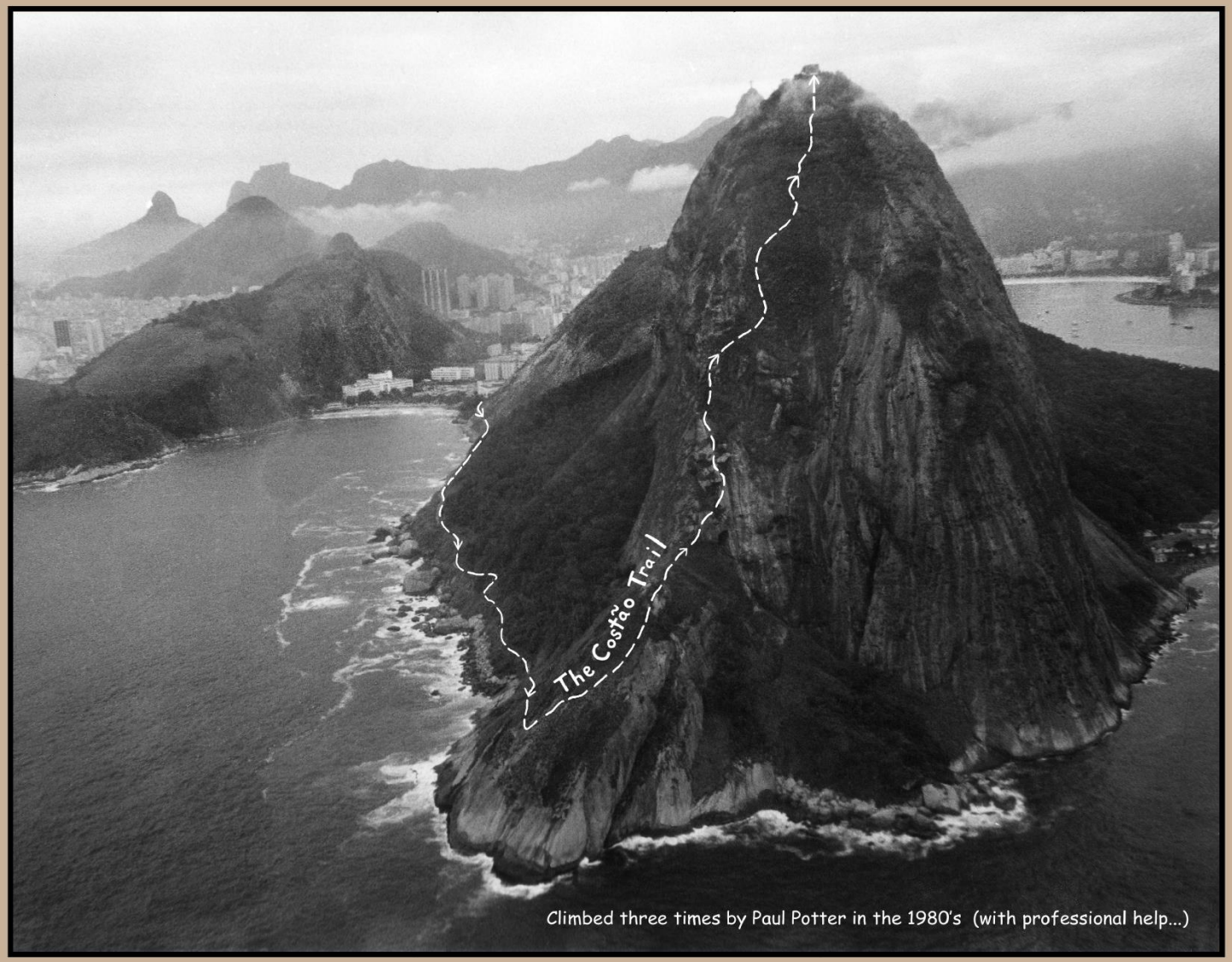
Isotopic Argon Age Distributions, Brasilia to the South Atlantic



Carmo (2005, Fig.38)


Slide & Scarp
P. E. Potter, 2012

Trail to Top of Sugarloaf

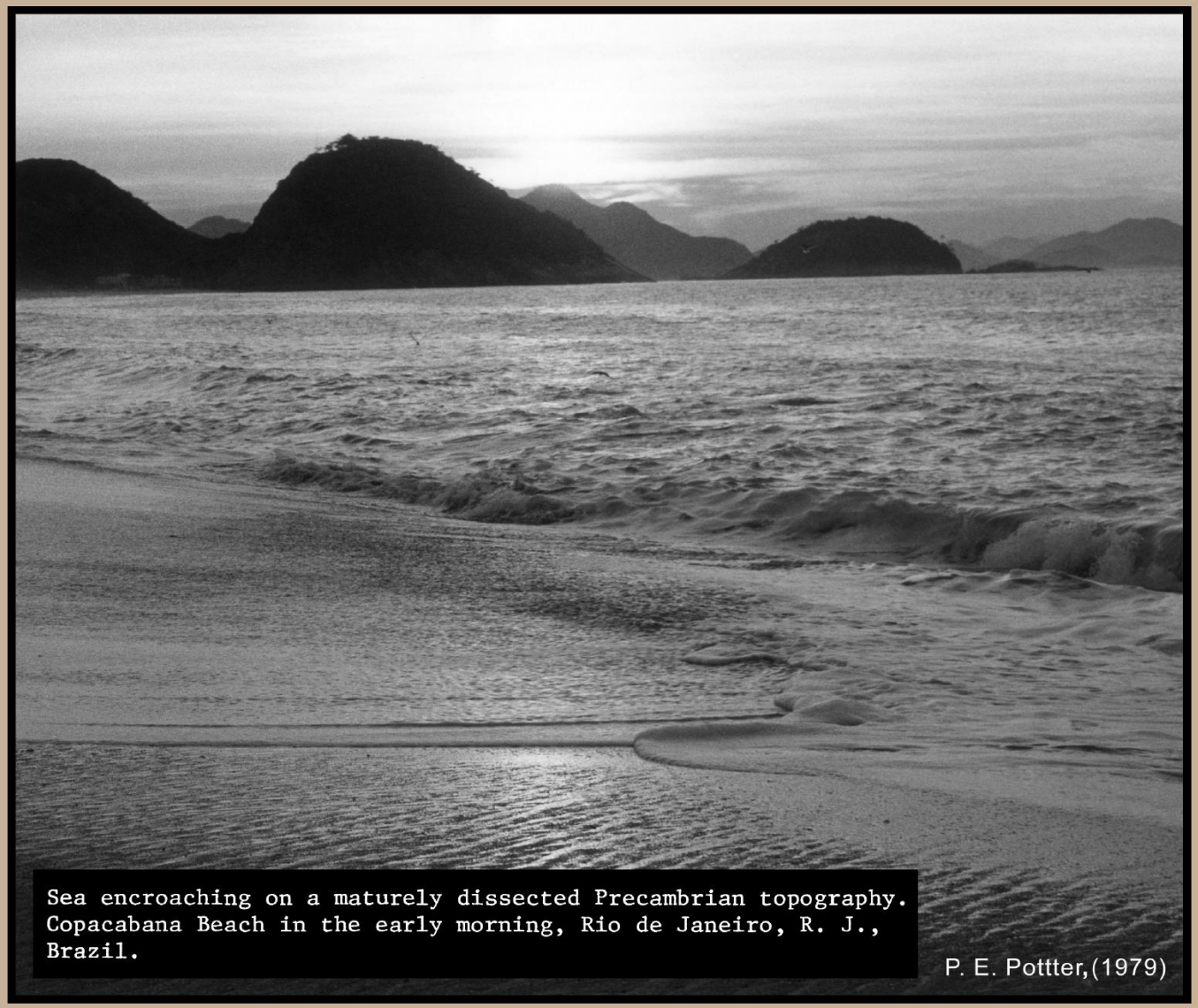


Near Petropolis, Rio de Janiero

P. E. Potter, 1983

Pedra Lisa, Rio de Janeiro State, Brasil

Morning in Rio



Sea encroaching on a maturely dissected Precambrian topography. Copacabana Beach in the early morning, Rio de Janeiro, R. J., Brazil.

P. E. Pottter,(1979)

Possibilities for the Future

- Unified Midwestern data set
- AAPG grant to collect and save the basin data set
- Geophysical and seismic review of the unconformity
- Modern analog models of the unconformity
- Field trips to outcrops in Missouri and Ontario
- Try to identify the physiograhic unit of the unconformity (equivalents of the Crawford Uplannd, Scotts burg Lowland, etc. of Indiana)

The basement and the Mt. Simon have been studied -- now its time to examine it's paleotopography

- Focus of fluid flow
- May harbor deep channels for fresh or salty water, CO_2, toxic waste, and petroleum?
- Help determine limits of paleowatersheds below Mt. Simon
- Sites of secondary mineralization
- Cause compactional "bumps" far above

See Krumbein (1942) and Shanmugam (1988) for more reasons. . . . . .