



United States
Department of Agriculture



Natural
Resources
Conservation
Service

Keys to Soil Taxonomy

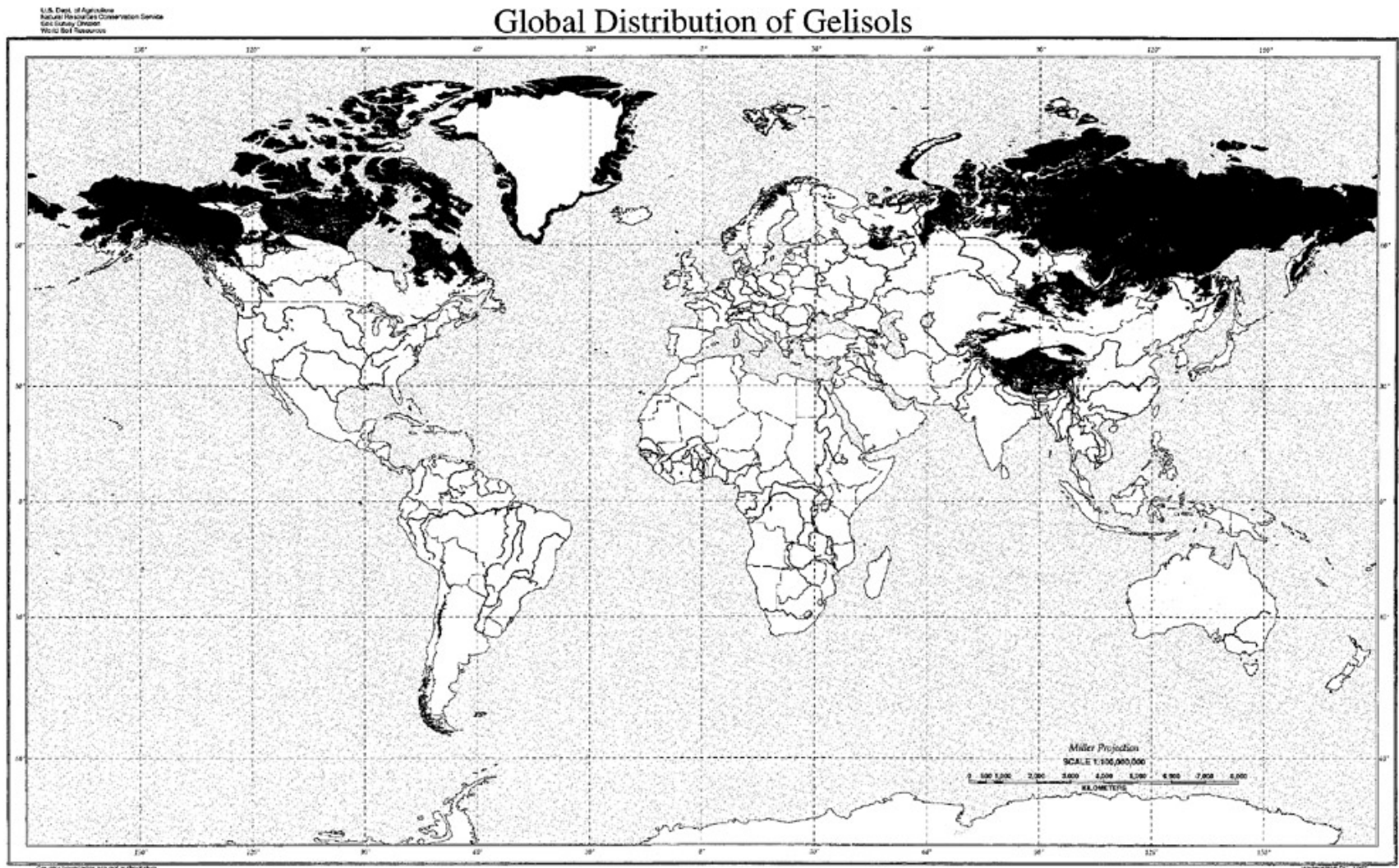
Ninth Edition, 2003



GELISOLS

Young Soils with little profile development

Form in the presence of Permafrost and frost churning



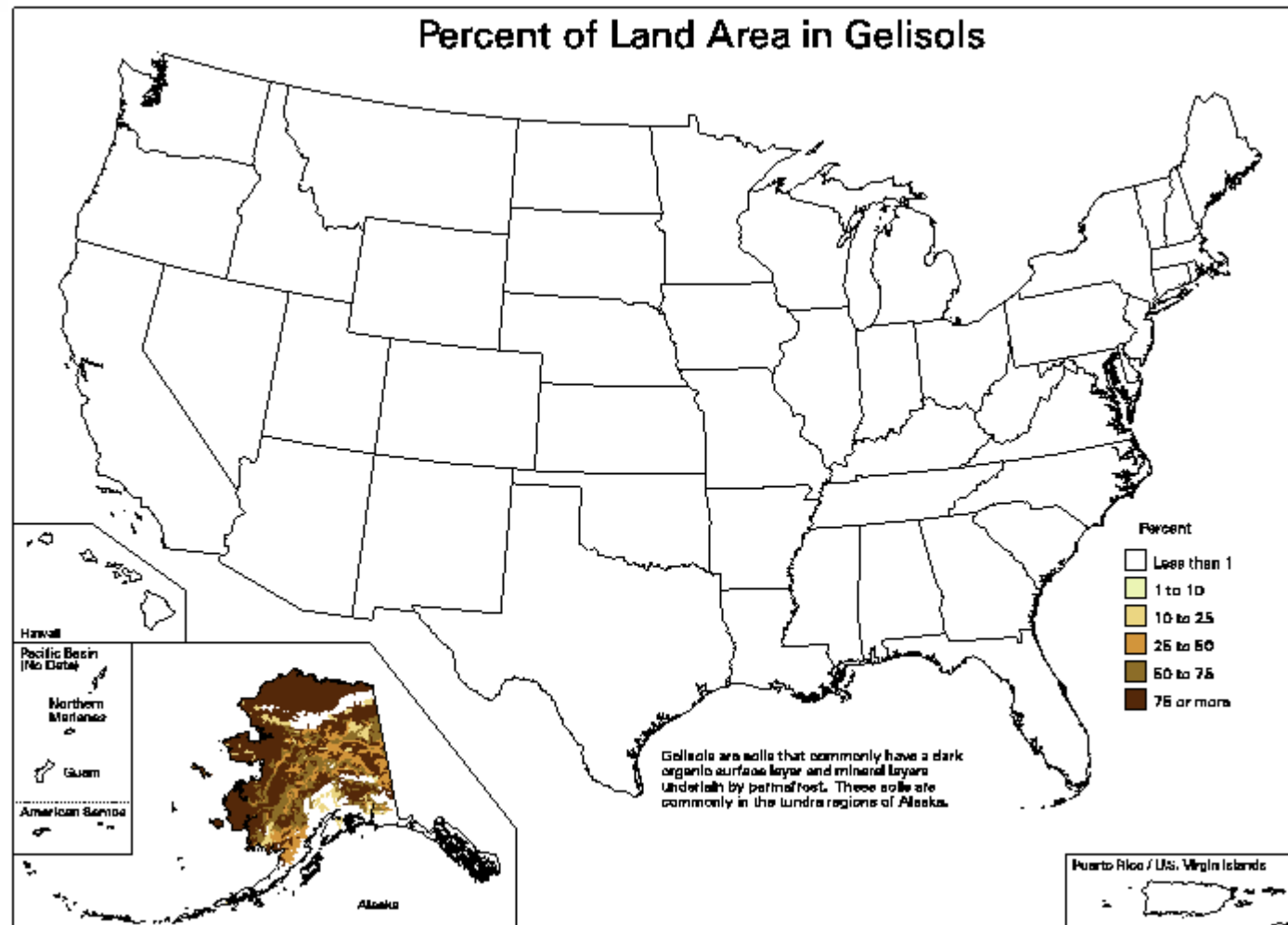
Key to Soil Orders

A. Soils that have:

1. Permafrost within 100 cm of the soil surface; or
2. Gelic materials within 100 cm of the soil surface and permafrost within 200 cm of the soil surface.

Gelic = frost churning (cryoturbation)

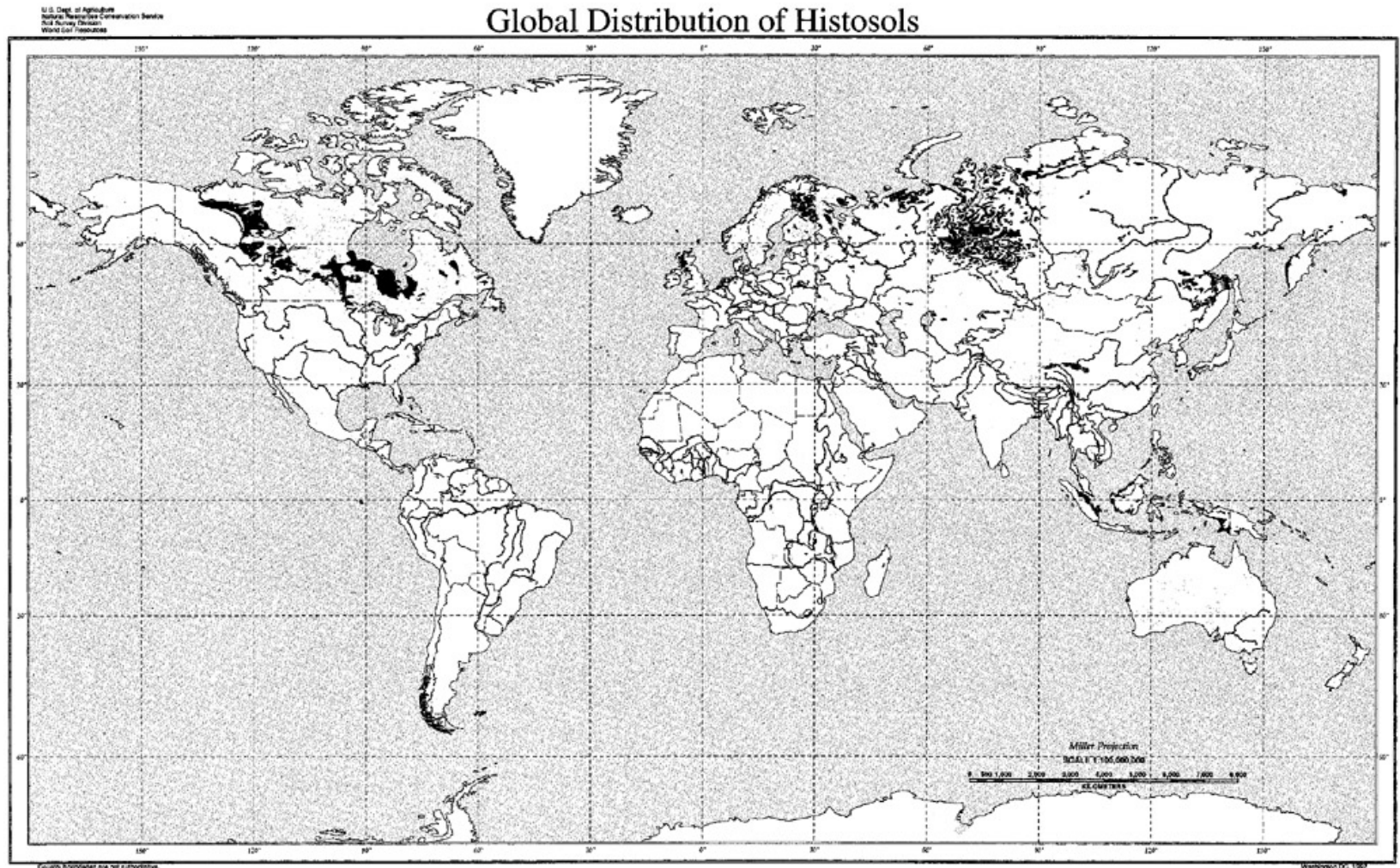
Gelisols, p. 445

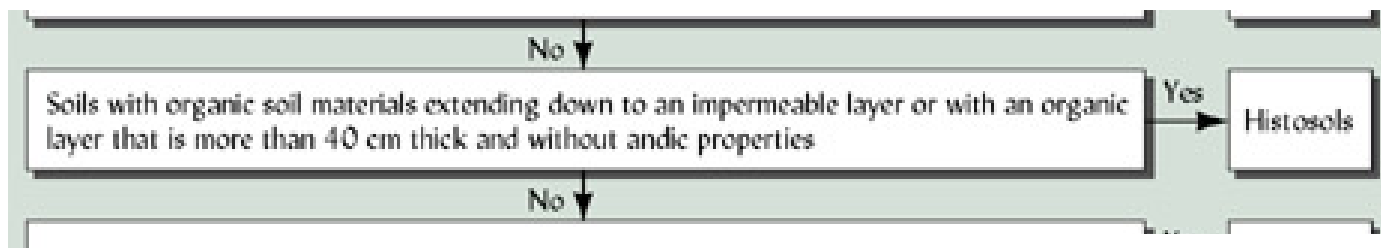




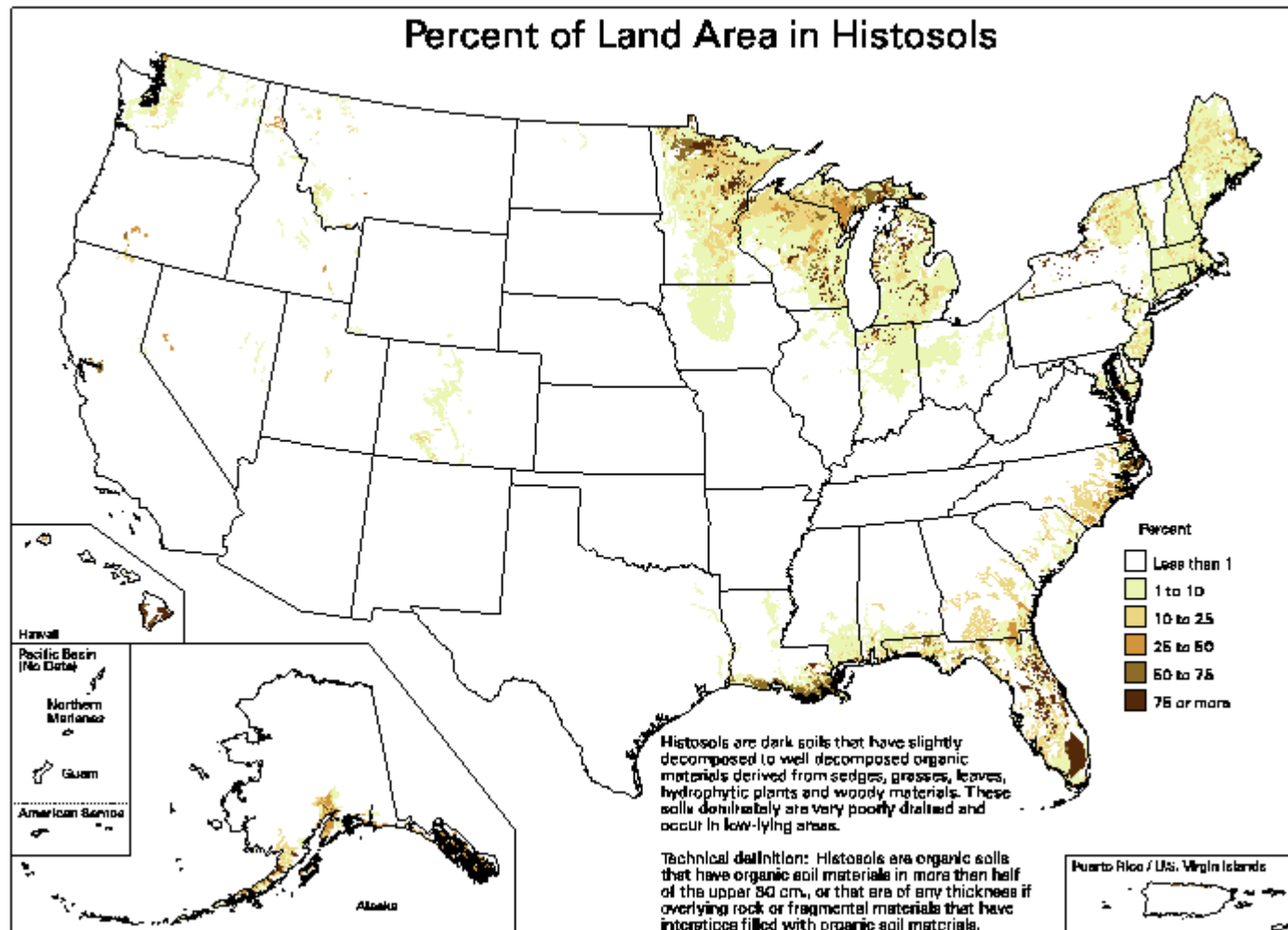
HISTOSOLS

**All organic soils (peats, mucks, etc.)
At least 20-30% organic matter**





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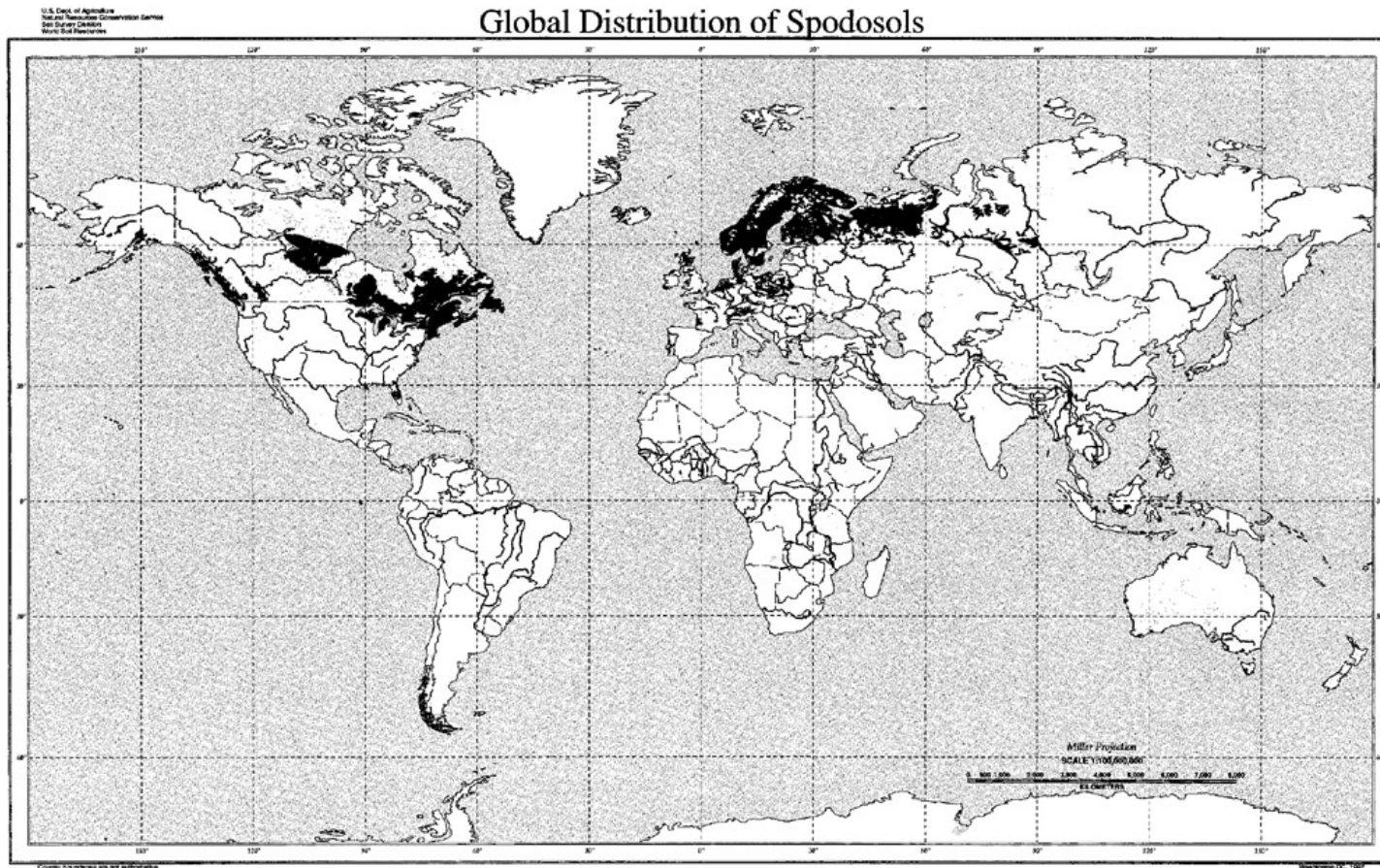


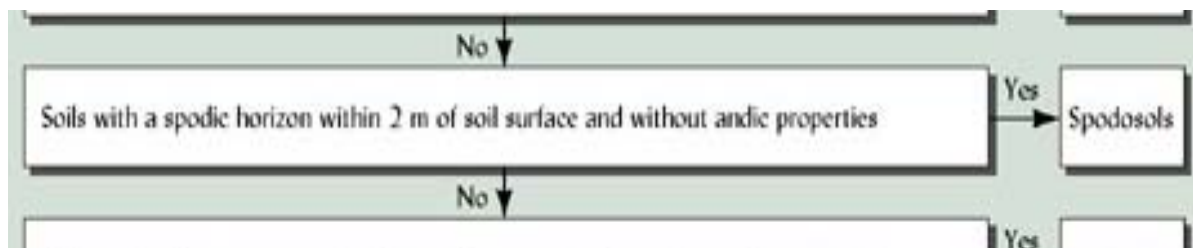


SPODOSOLS

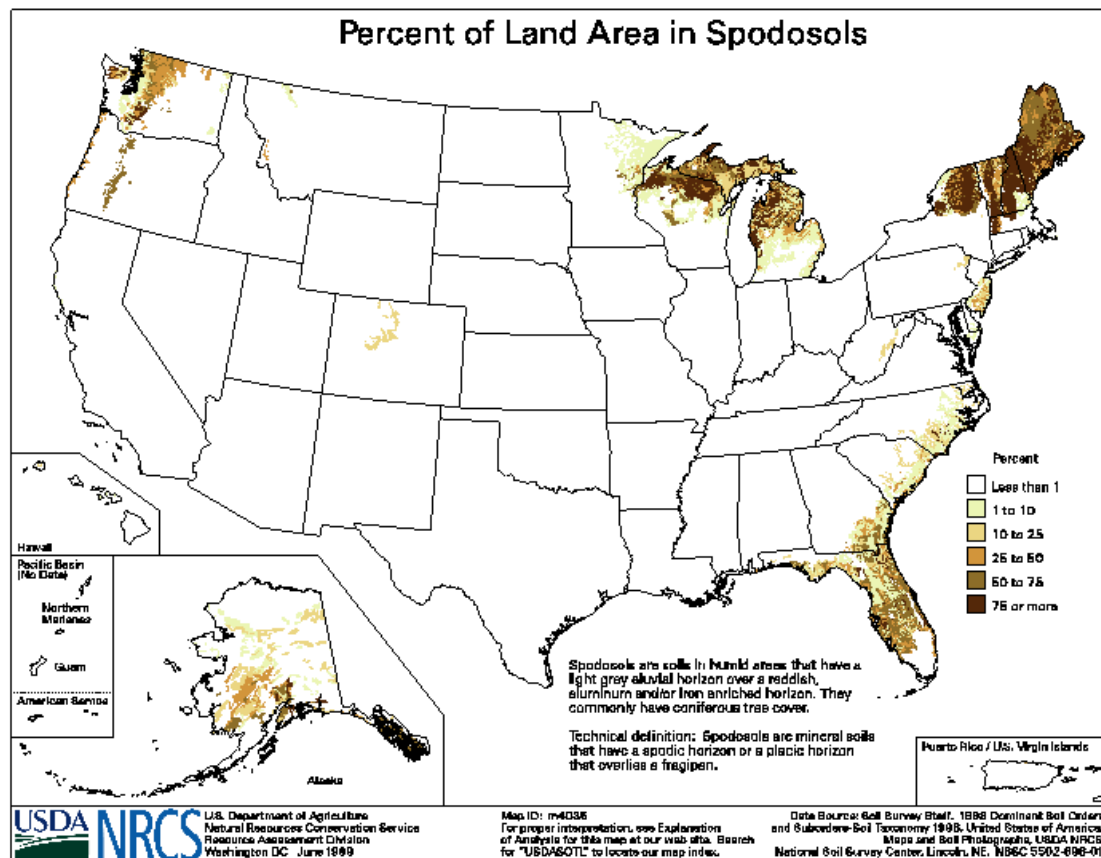
**Spodic horizon of illuviated humus, Fe & Al
oxides**

**Common in cool, humid regions on coarse-
textured parent materials**





Spodic horizon of illuviated humus, Fe & Al oxides
Common in cool, humid regions on coarse-textured parent materials



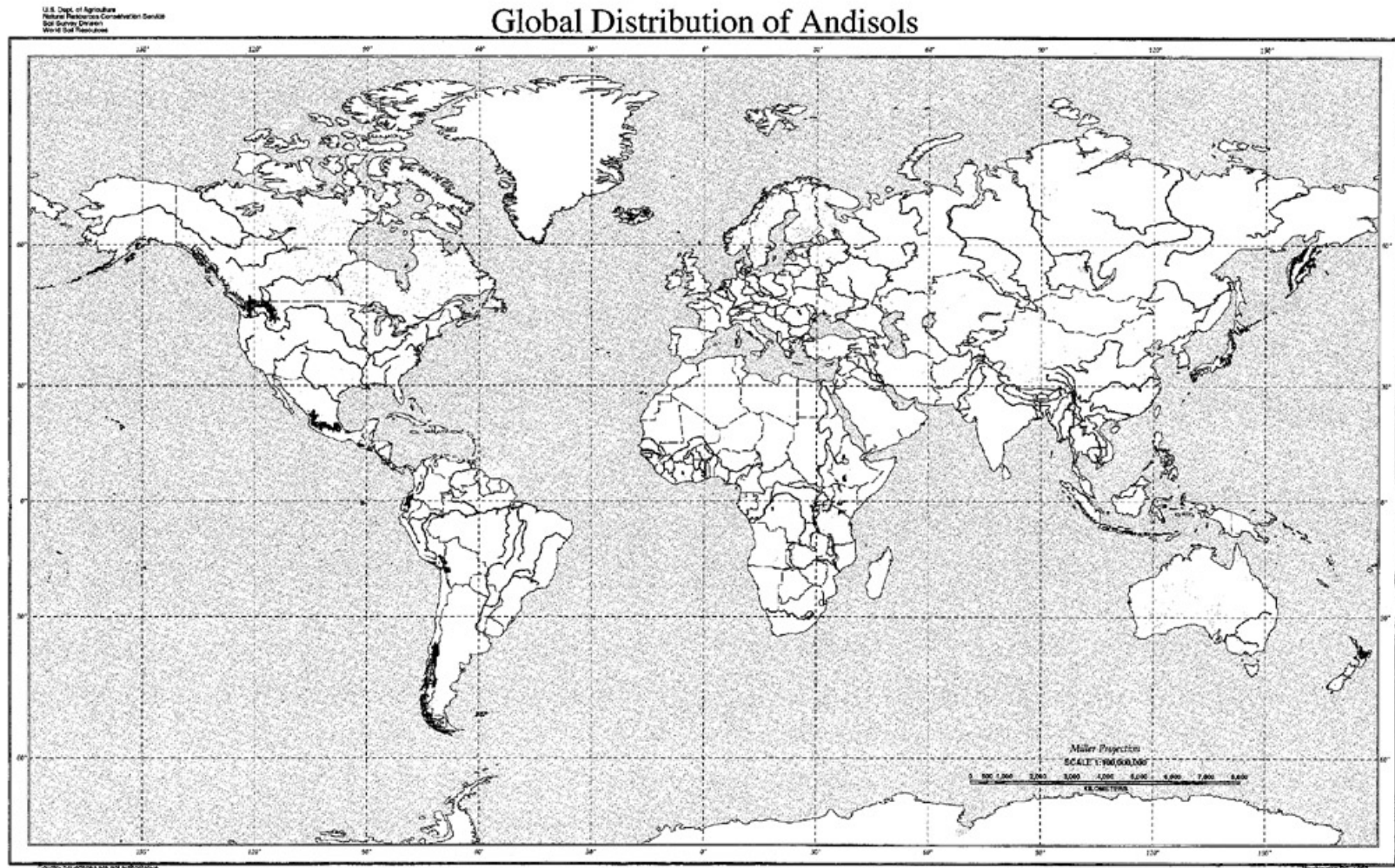






ANDISOL

**Volcanic ash parent materials
Mineralogy contains high amount of
amorphous materials**



No ↓

Soils with andic properties (low density, glass, pumice, short-range order minerals)

Yes →

Andisols

No ↓

D. Other soils that have andic soil properties in 60 percent or more of the thickness *either*:

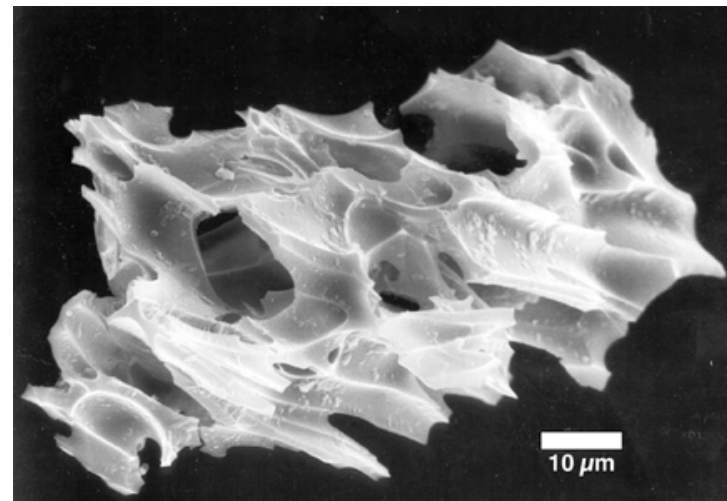
1. Within 60 cm either of the mineral soil surface or of the top of an organic layer with andic soil properties, whichever is shallower, if there is no densic, lithic, or paralithic contact, duripan, or petrocalcic horizon within that depth;
or

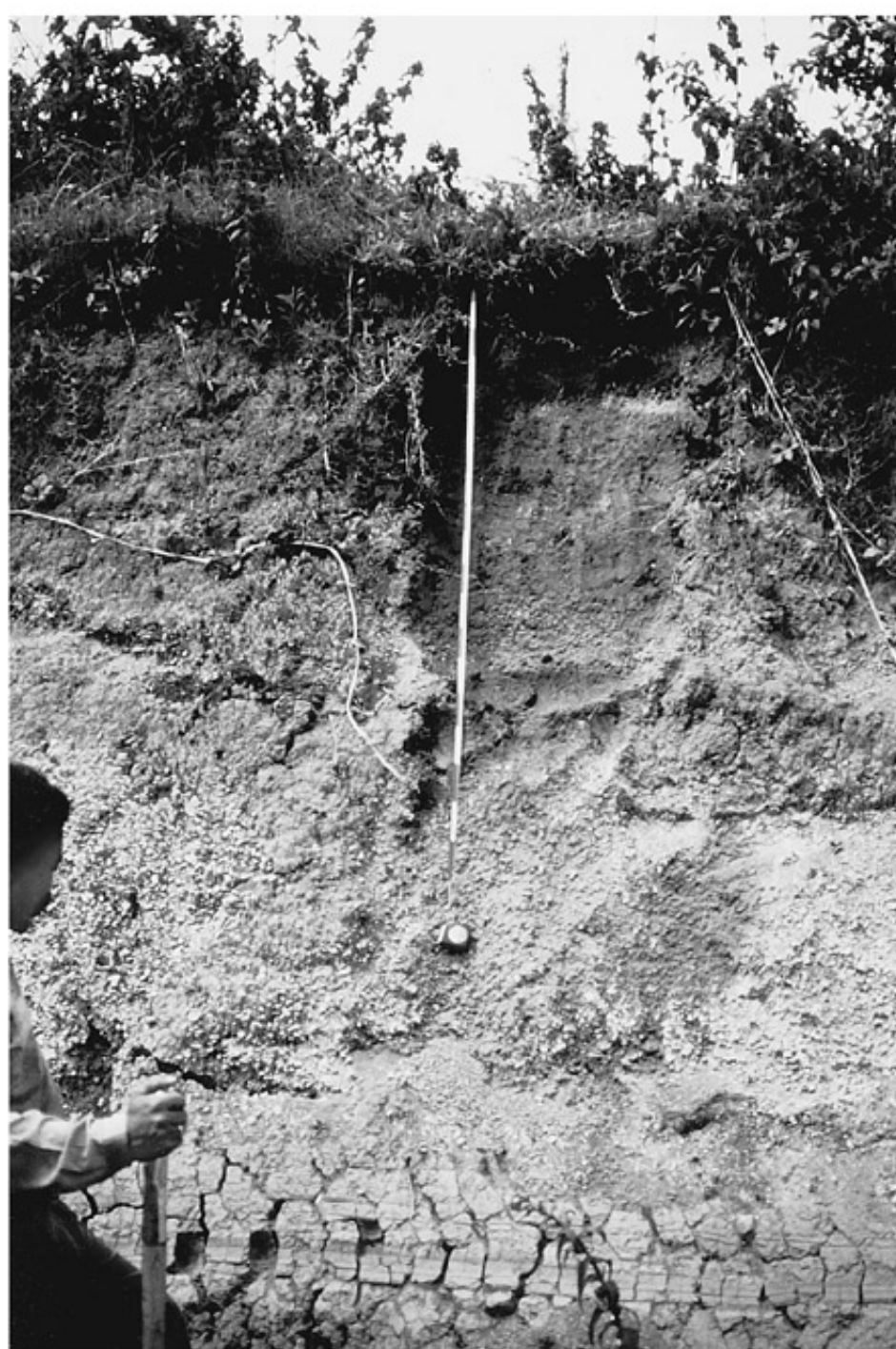
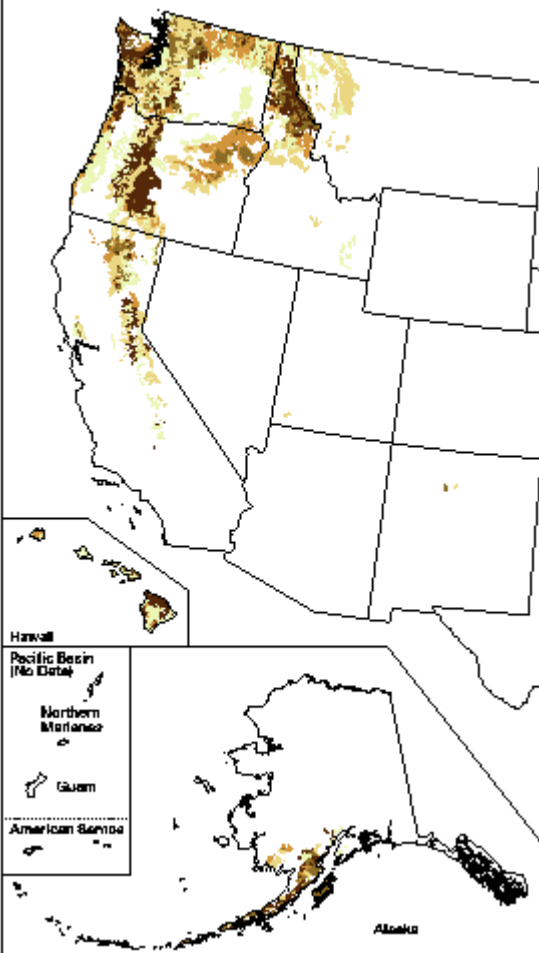
2. Between either the mineral soil surface or the top of an organic layer with andic soil properties, whichever is shallower, and a densic, lithic, or paralithic contact, a duripan, or a petrocalcic horizon.

Andisols, p. 271



**Volcanic ash parent materials
Mineralogy contains high amount of
amorphous materials**





Melanic
Epipedon

Pumice layer

Weathered
layers of
volcanic
ash and
pumice

Buried
A horizon

Oldest
layers of
volcanic
pumice

Underlying
layer of
expanding
clay

A & Bw
0-250 cm

C
250+



A
0-8 cm
Bw1
8-18

Bw2
18-40

2BC
40-65

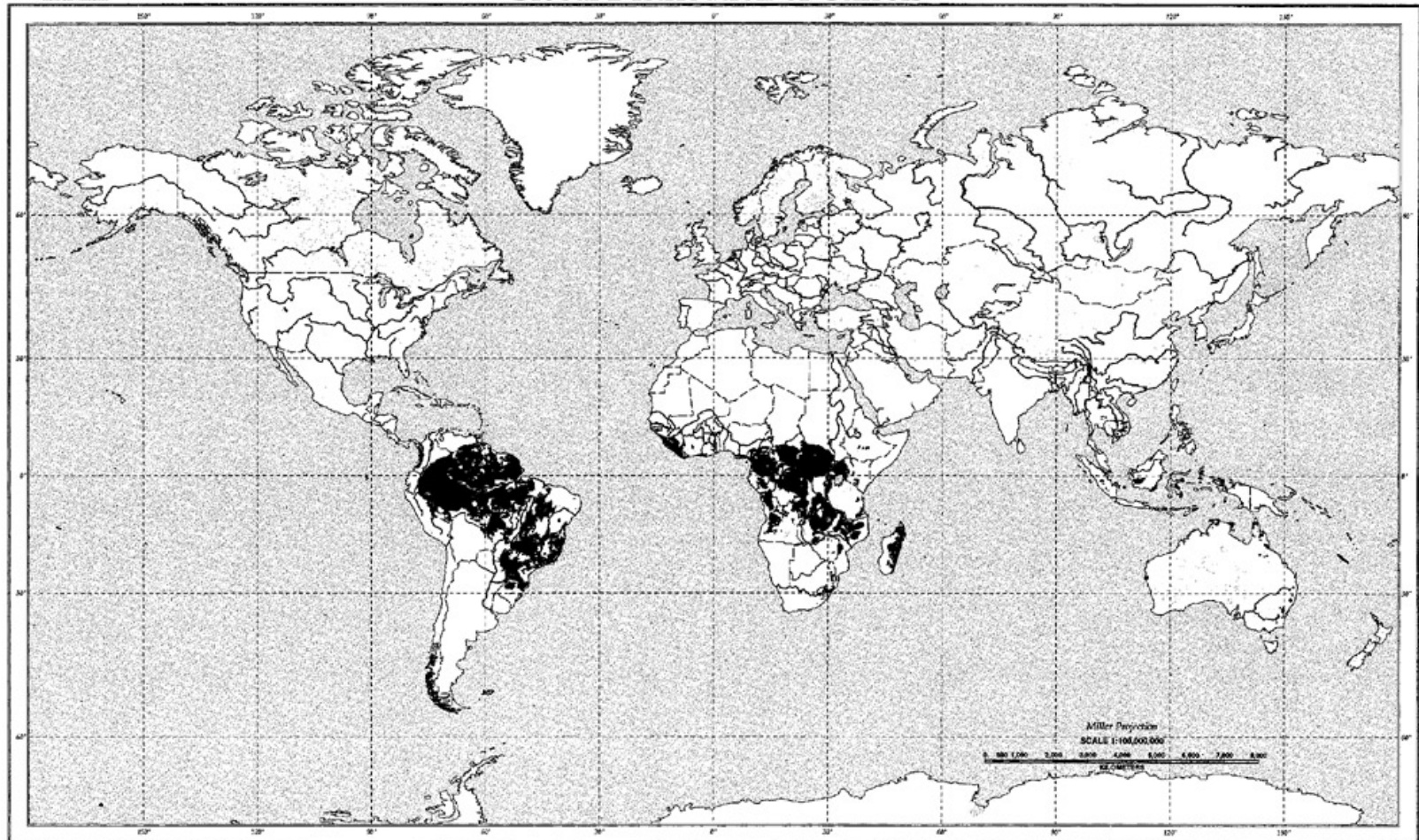
2C
65+



OXISOLS

**Common in hot, humid climates with intense
weathering and leaching
Dominant minerals: quartz, Fe & Al oxides,
kaolinite
Commonly infertile**

Global Distribution of Oxisols



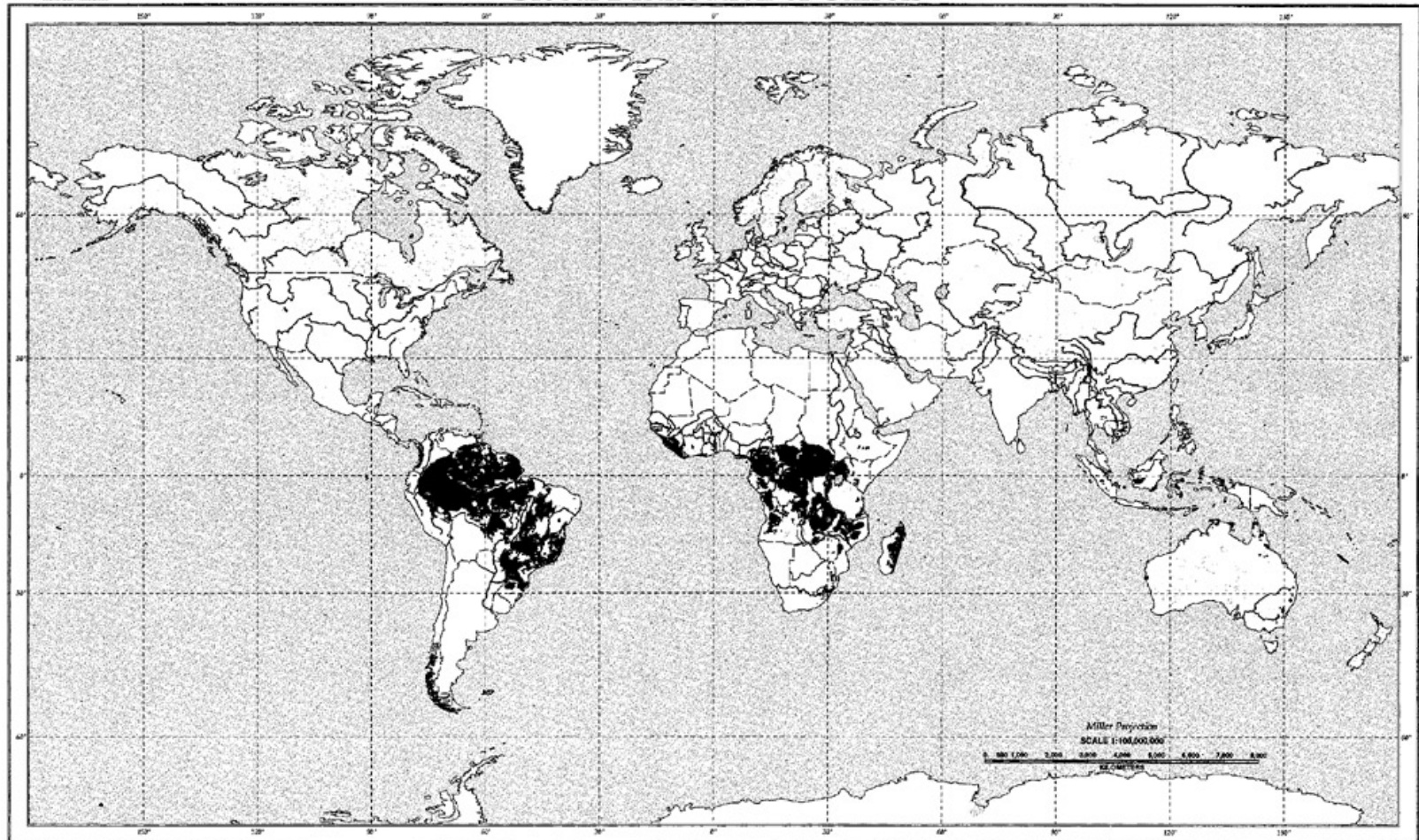
The region inside the black oval was
the continental interior of Pangaea 200
million years ago

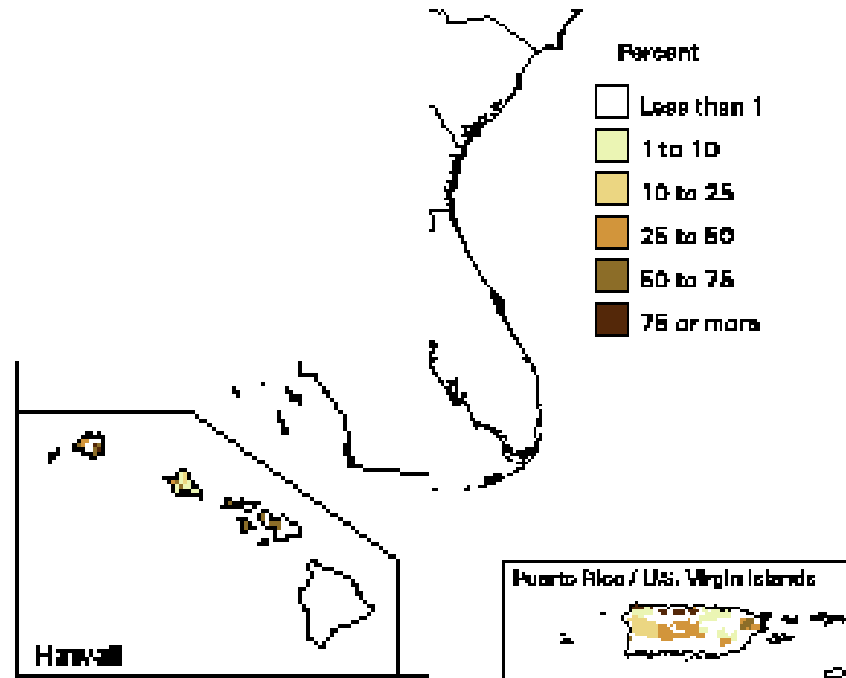


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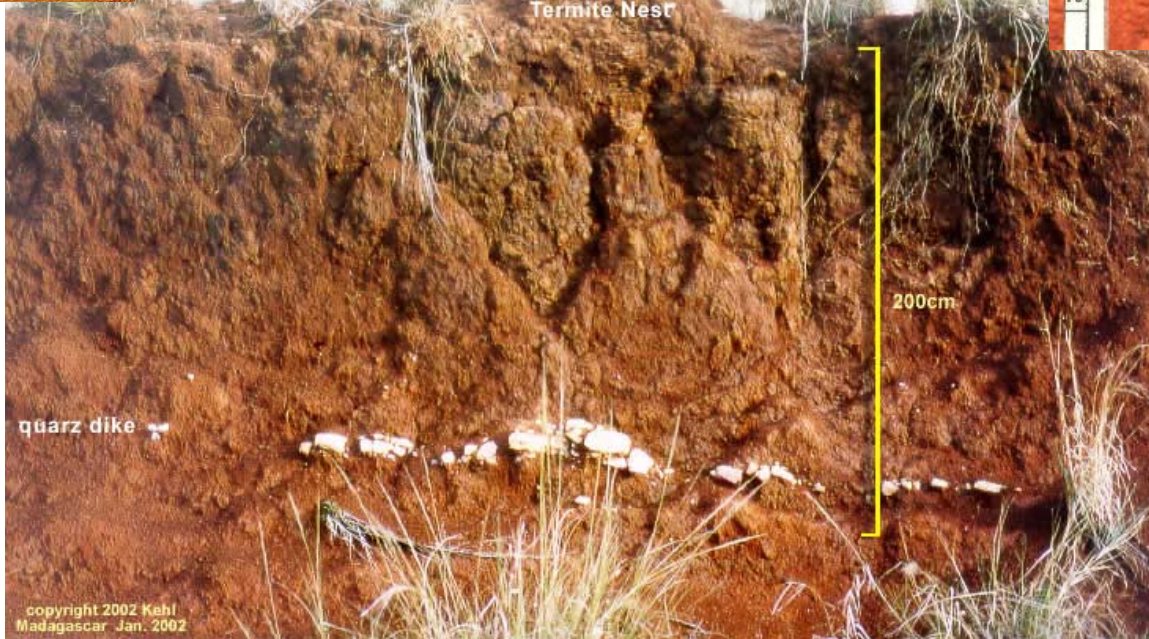
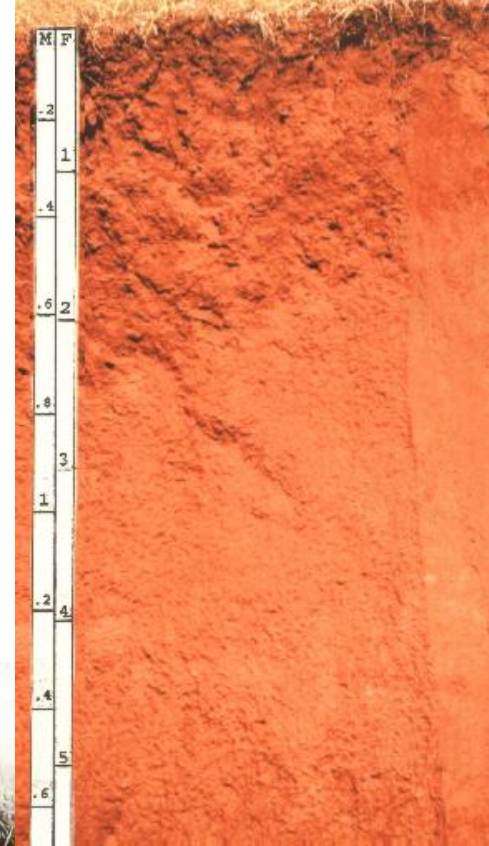
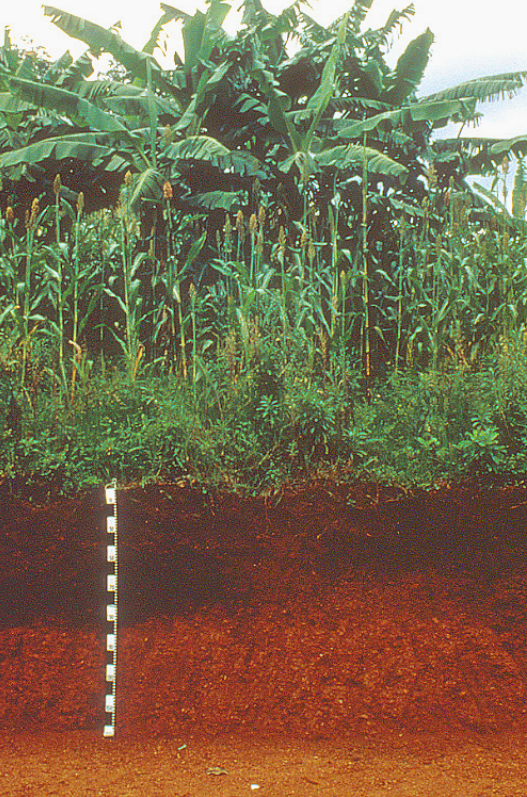




Common in hot, humid climates with intense weathering and leaching
Dominant minerals: quartz, Fe & Al oxides, kaolinite
Commonly infertile







VERTISOLS

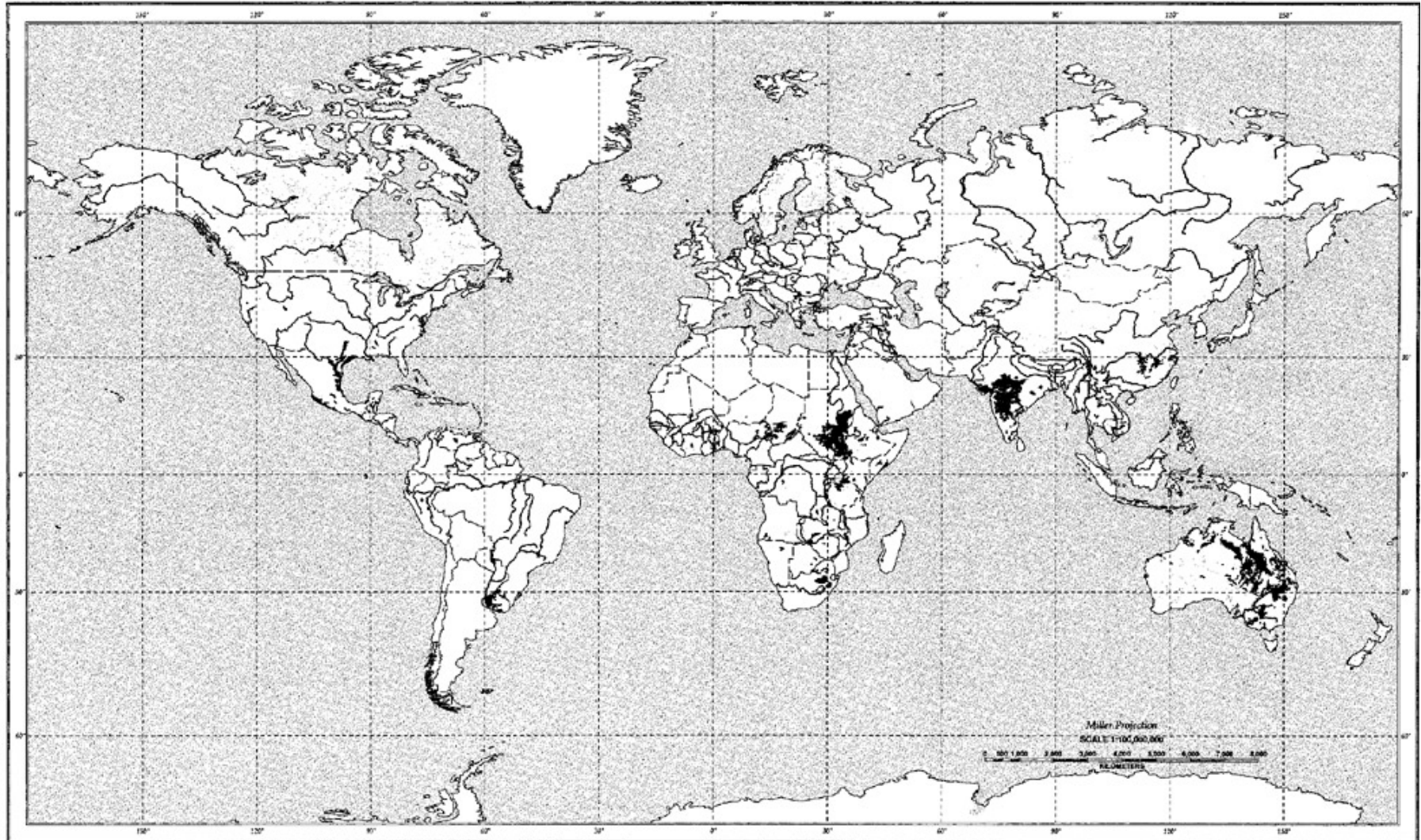
Form in clayey parent material

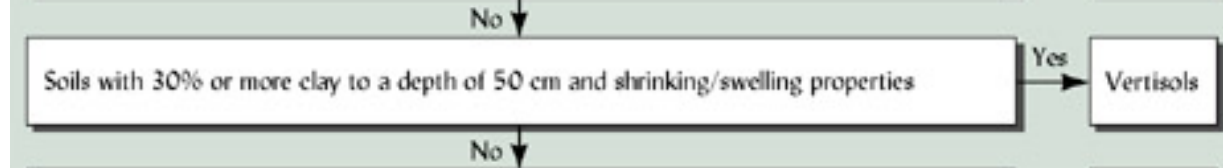
Shrink-swell behavior

Found in climates dry enough to form wide cracks

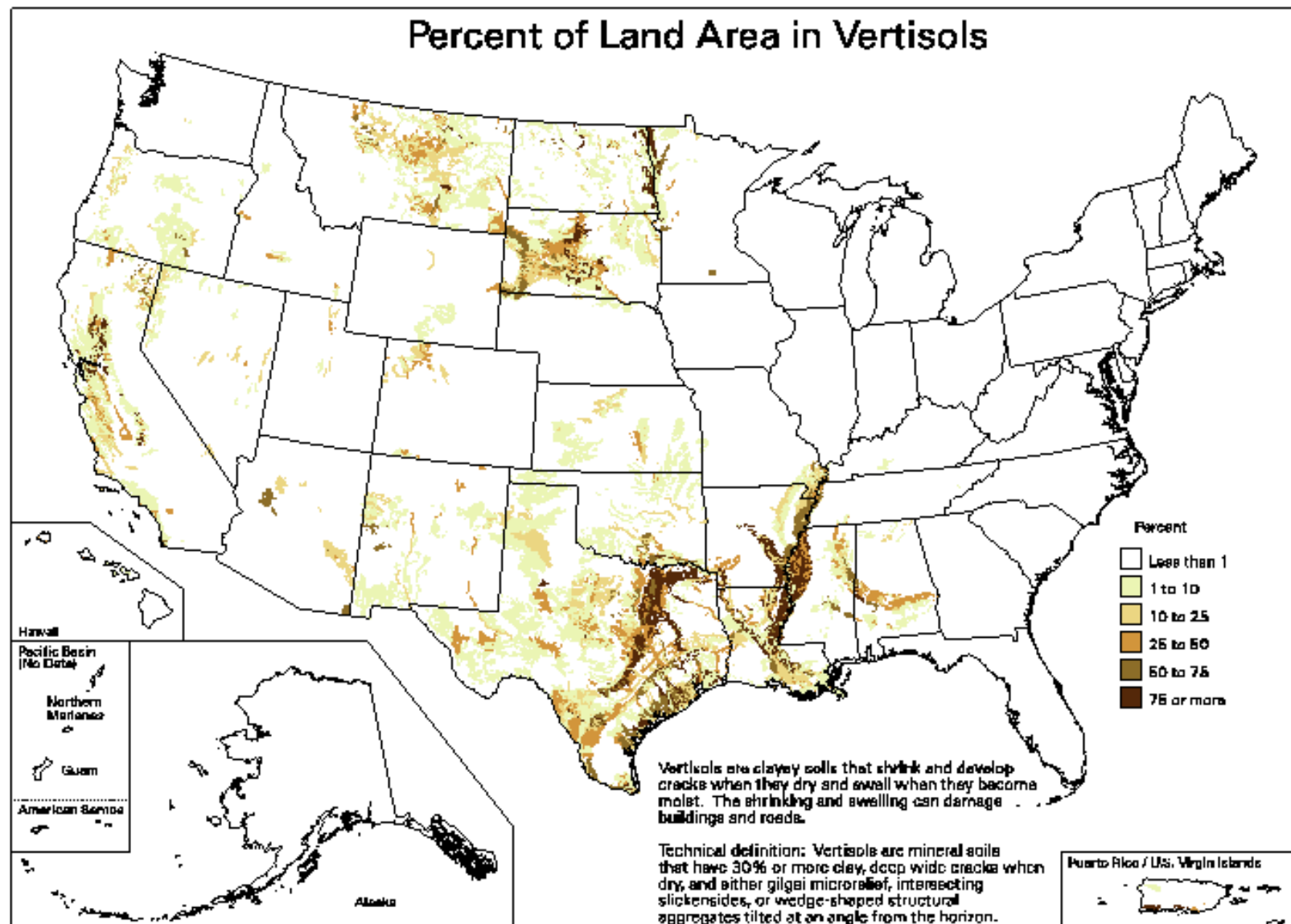
U.S. Dept. of Agriculture
Natural Resources Conservation Service
Soil Survey Division
World Soil Resources

Global Distribution of Vertisols

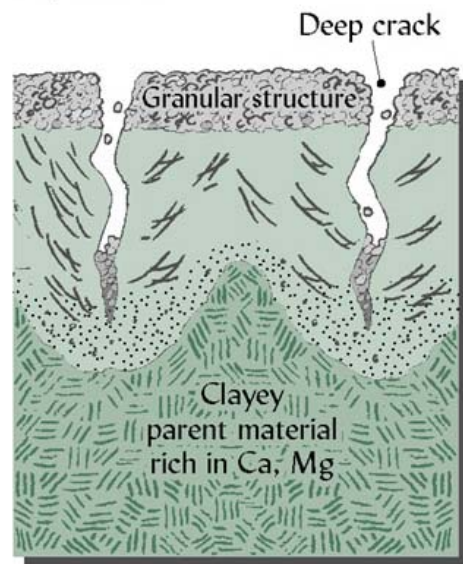




Percent of Land Area in Vertisols

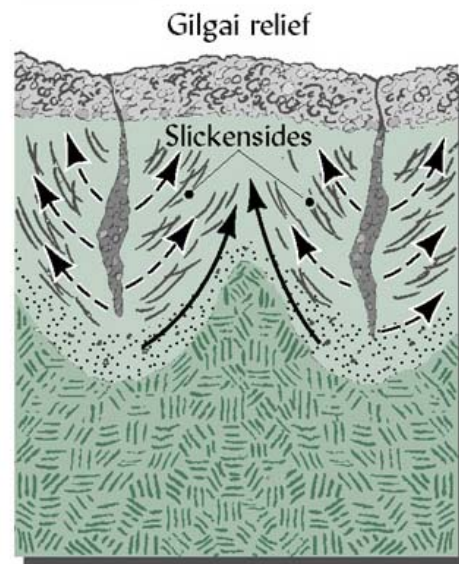


Dry season



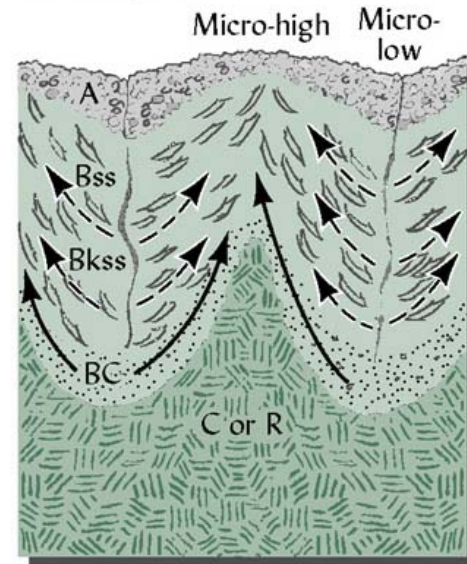
(a)

Wet season



(b)

Vertisol profile



(c)

