

Rock Magnetism

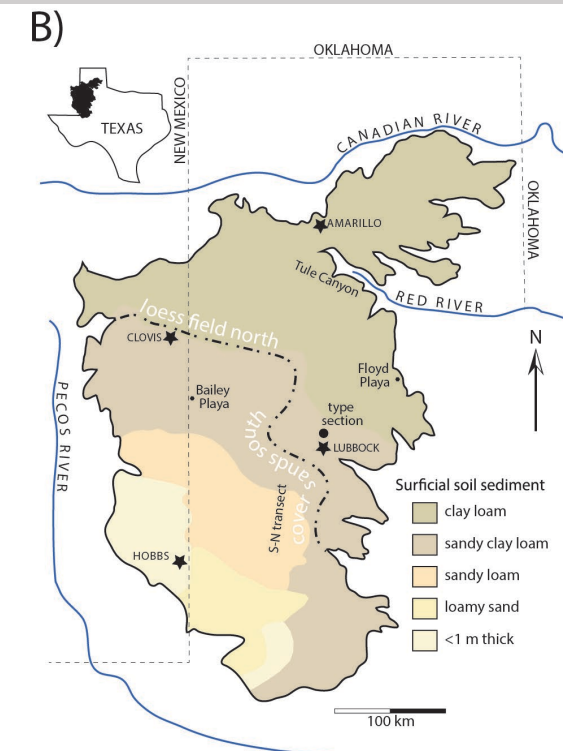
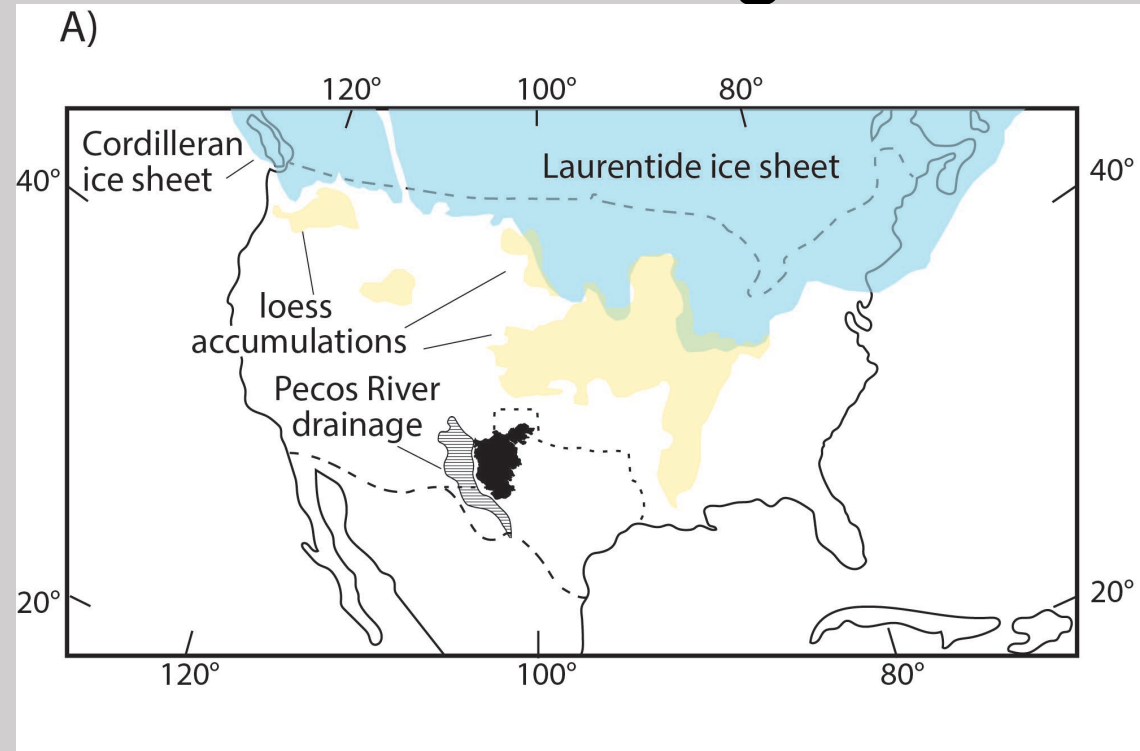
Paleoenvironmental Reconstruction of the Southern High Plains during the Late Pleistocene using Rock-Magnetic Data

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Project One

*View of Southern High Plains
Looking in any direction*

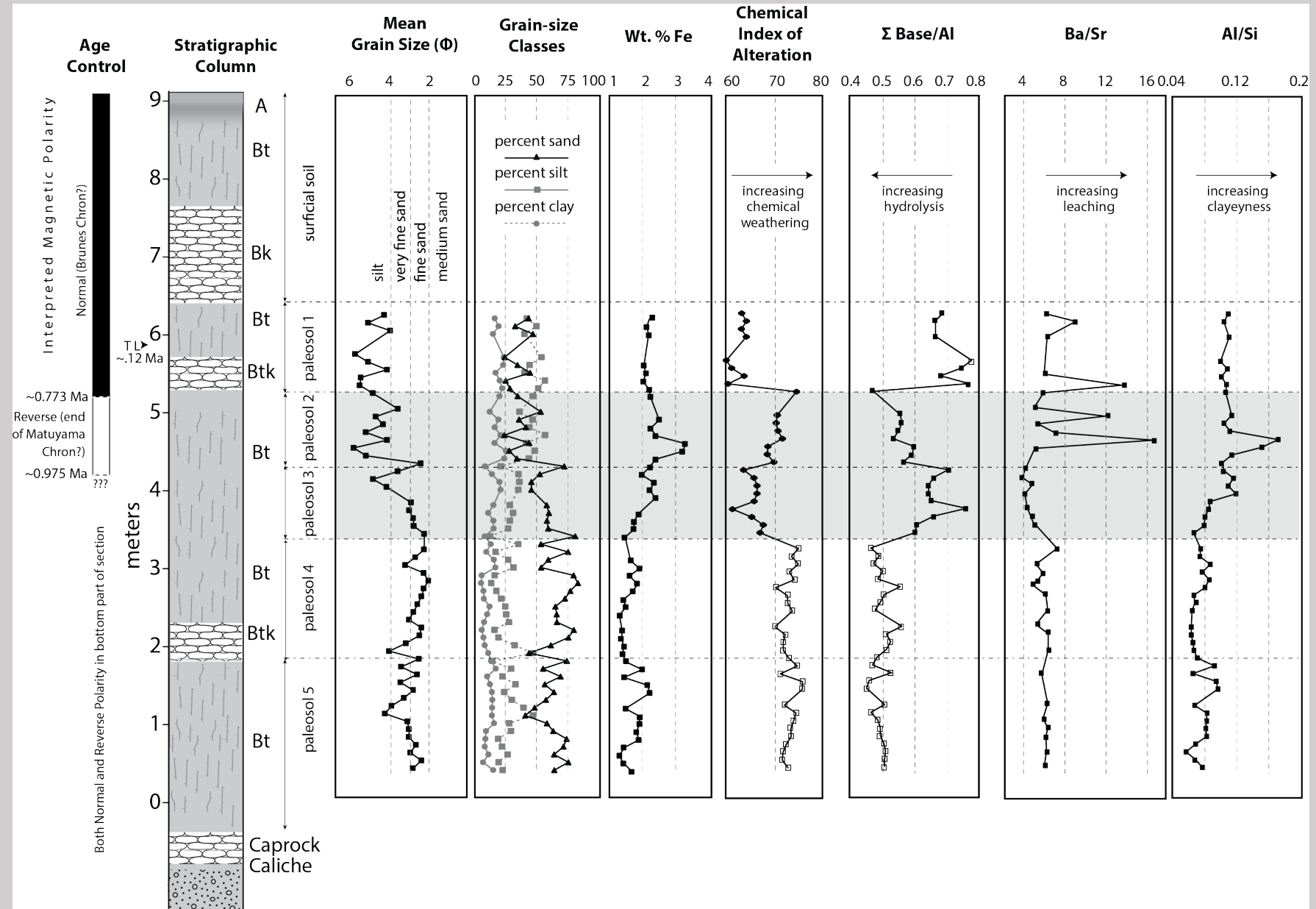
Texan Southern High Plains

- Southern High Plains region of Texas → Texas panhandle
- Primary surficial soil is the Blackwater Draw Formation (~1.4 Ma – Present)
- Two primary sources
 - Southern Pecos River
 - Northern Loess



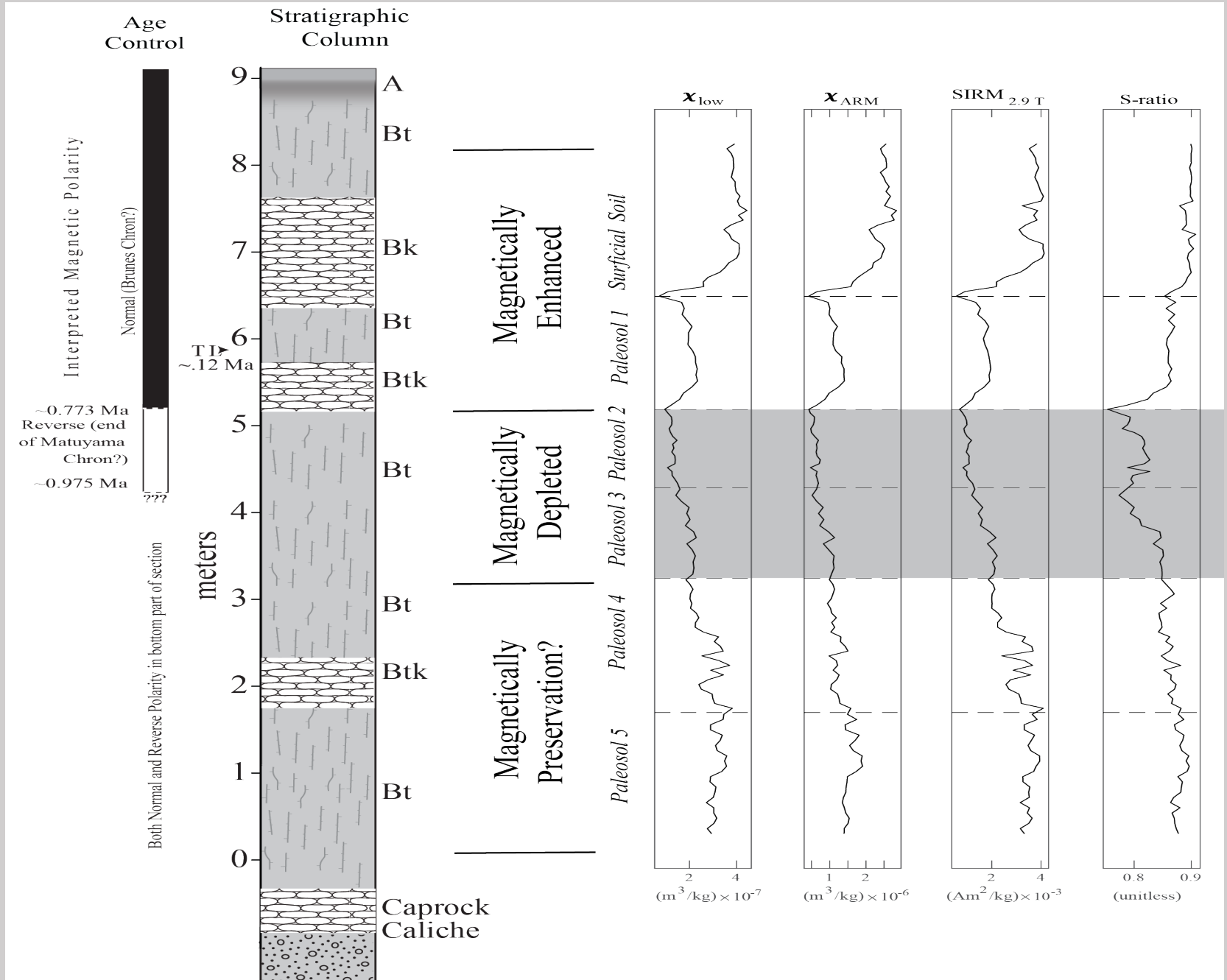
Geochemical Data as a Function of Depth

- Paleosols 5-4
 - Least chemically weathered
 - Fine-sandy material
 - Pecos
- Paleosols 3-2
 - Most chemically weathered
 - Mixture of fine-sand and silt
 - Mix of Pecos and Loess
- Paleosol 1
 - Moderately chemically weathered (less than 3-2 but more than 5-4)
 - Mixture of fine-sand and Sil
 - Mix of Pecos and Loess



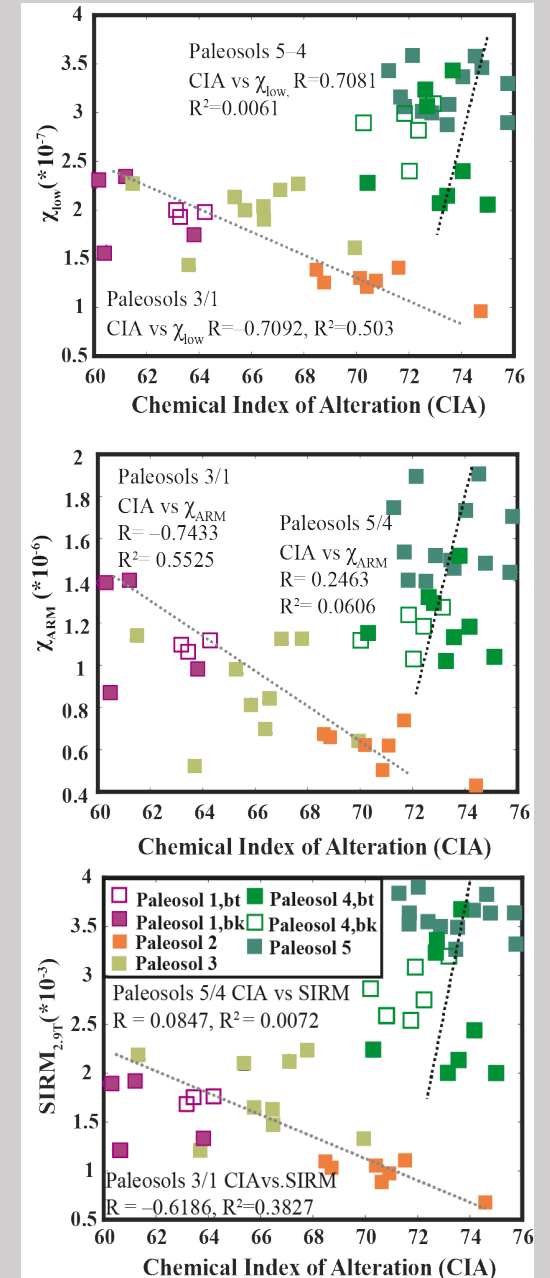
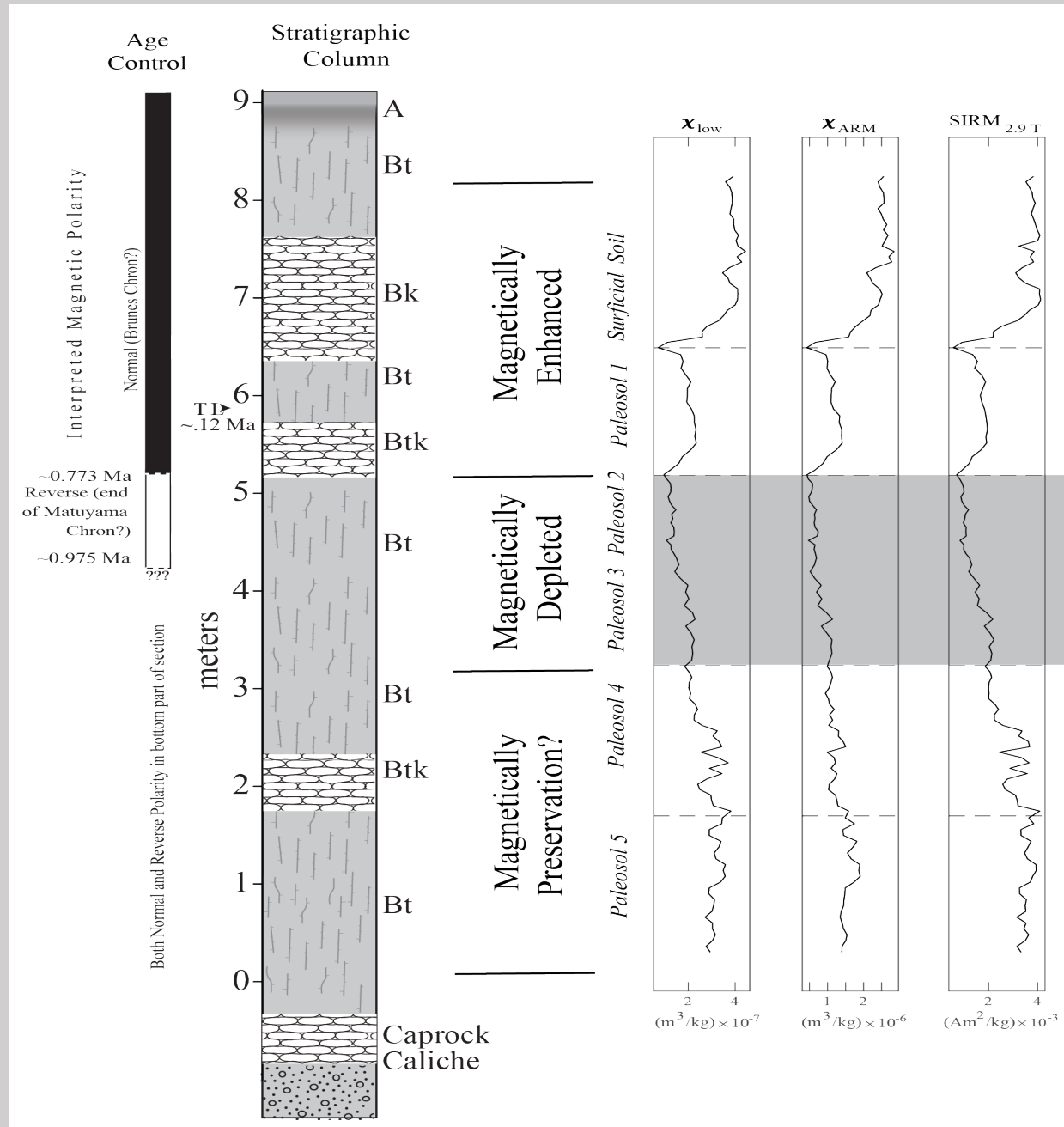
Rock-Magnetic Data as a Function of Depth

- χ , χ_{ARM} , and SIRM are very similar implying that they are all controlled by same phase \rightarrow likely magnetite
- High S-ratio values indicate that the type site is dominated by magnetite
 - Relatively lower values indicate that Paleosol 3-2 have a higher concentration of hematite and goethite (wetter conditions)

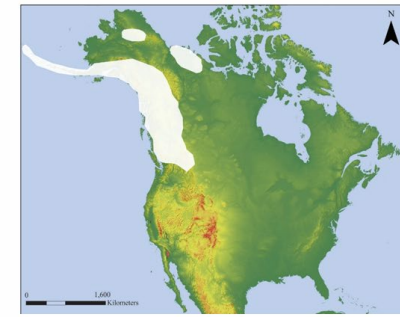
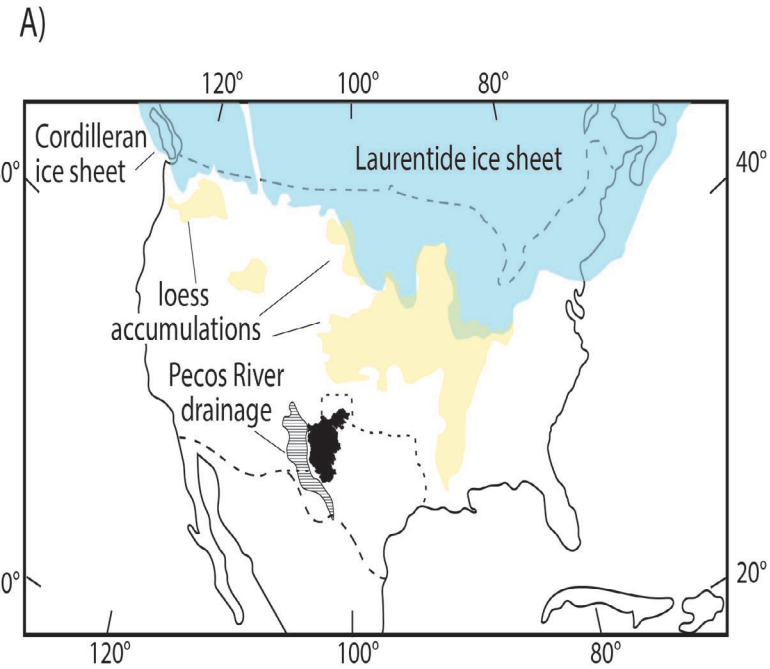
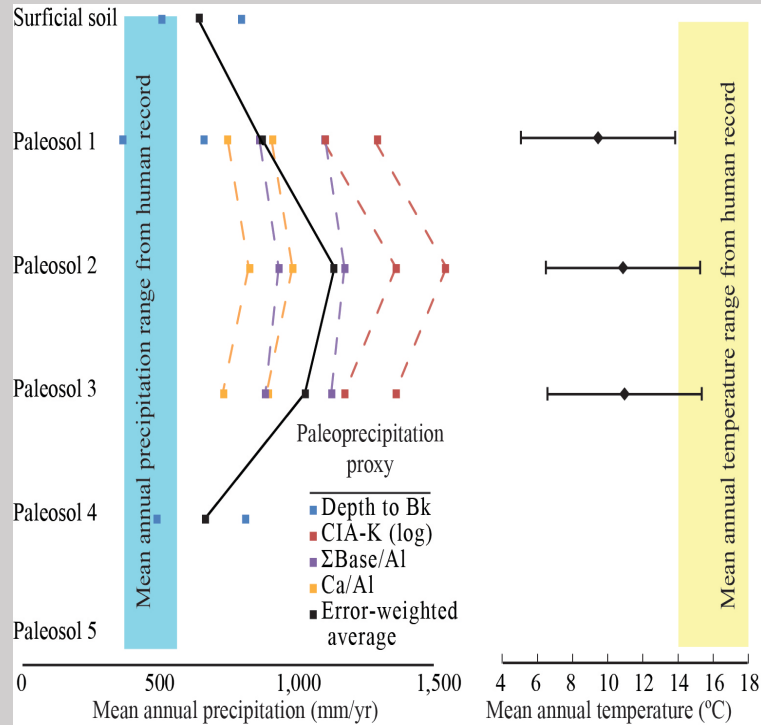


Effects of Weathering

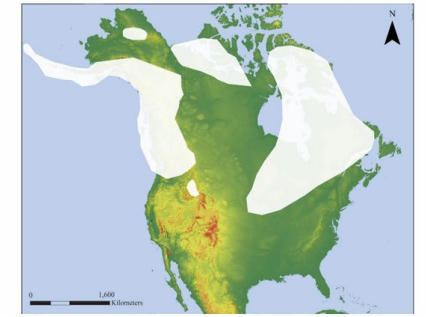
- Moderate weathering, in conjunction with finer magnetic material implies that Paleosol 1 and Modern soil are “Magnetically Enhanced
- Enhanced weathering and increased hematite implies that Paleosols 3-2 are “Magnetically-Depleted”
- Minimal weathering implies that Paleosols 5-4 are “Magnetically Preserved”



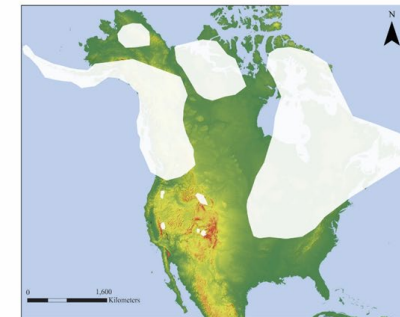
Paleo-environmental Models



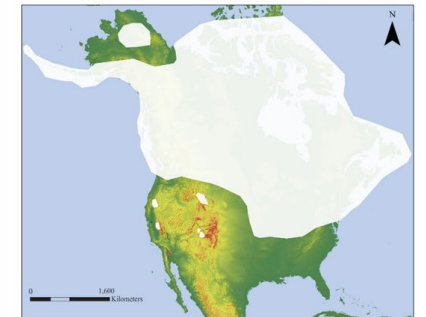
Late Gauss: ~2.58 Ma



Lower Matuyama: 2.58-1.95 Ma



Upper Matuyama: 1.83-0.78 Ma



Brunhes: 0.78 Ma - Modern

• Three Phases

- Phase 1 (Paleosols 5-4)
 - Arid Time period where sediment was primarily derived from Pecos River

- Phase 2 (Paleosols 3-2)
 - Semi-Humid time period where sediment was derived from both Pecos and Northern Loess

- Phase 3 (Paleosols 1-Modern)
 - Semi-Arid to Semi-Humid time period where sediment was derived from both Pecos and Northern Loess

Thank you for your time

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Looking in any direction*