

Mapping the Mahomet Aquifer

by
**Helicopter-borne Transient
Electro-Magnetic Survey**

“HTEM”

Steven E. Brown, Chief Scientist
September 9, 2021

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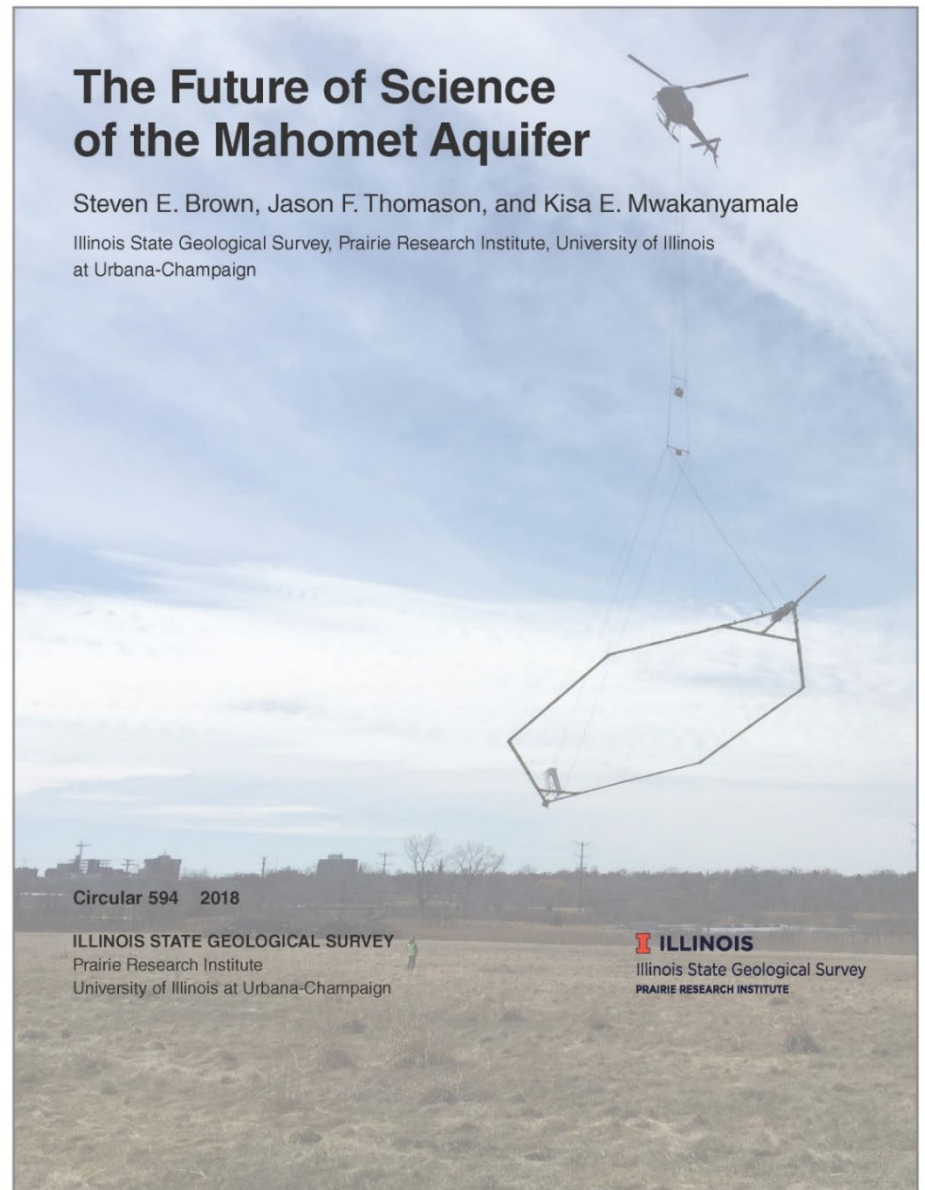
Illinois State Geological Survey

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The Future of Science of the Mahomet Aquifer

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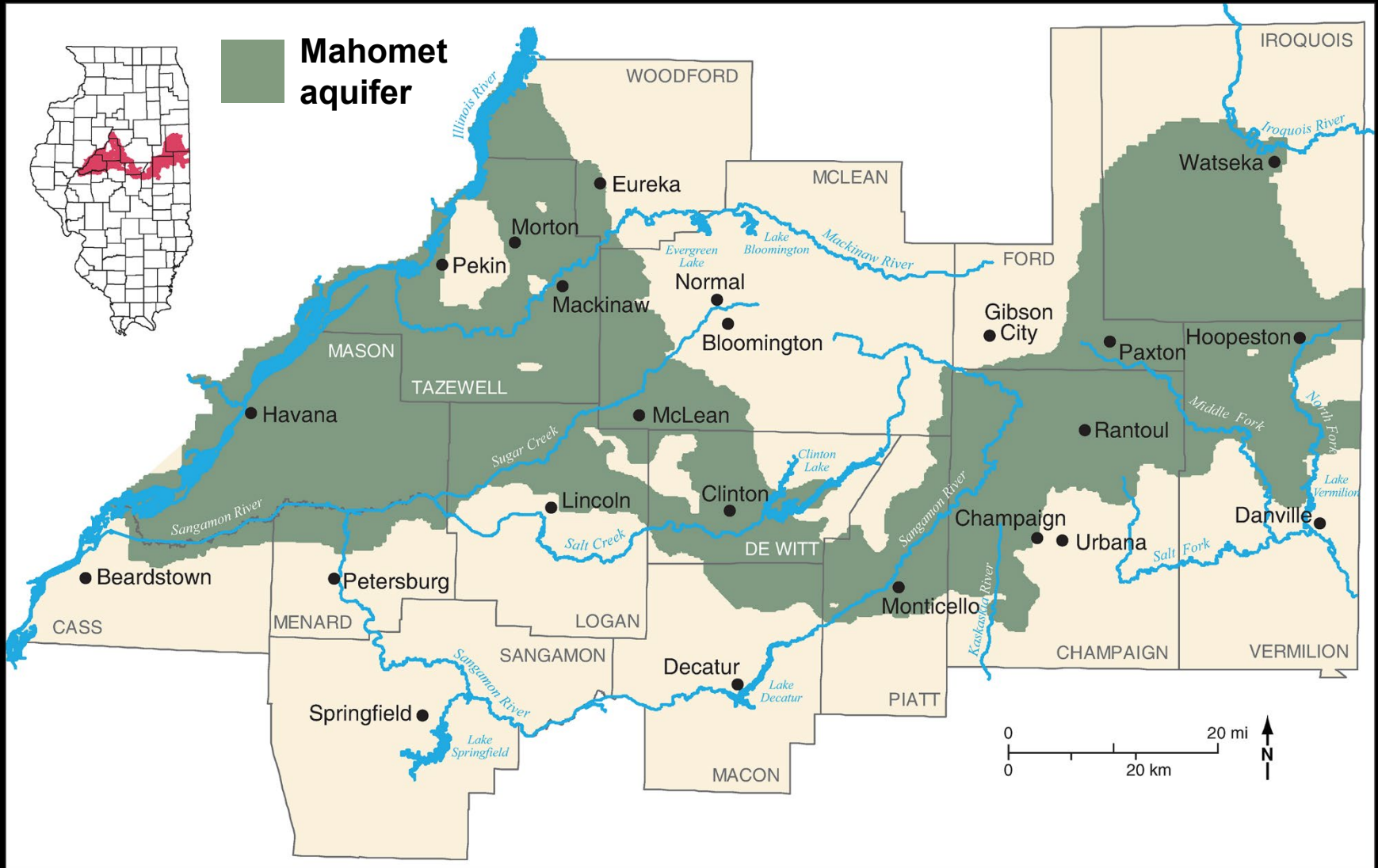


Circular 594 2018

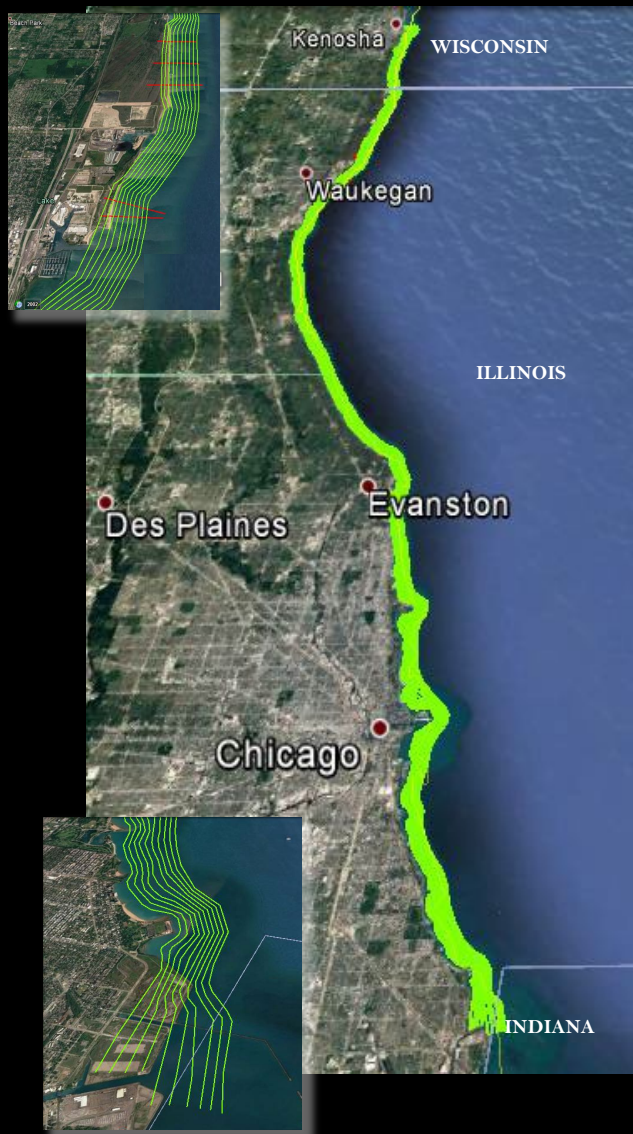
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Area of the Mahomet aquifer



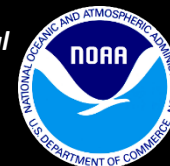
Use of HTEM: Example 1 — Lake Michigan coast



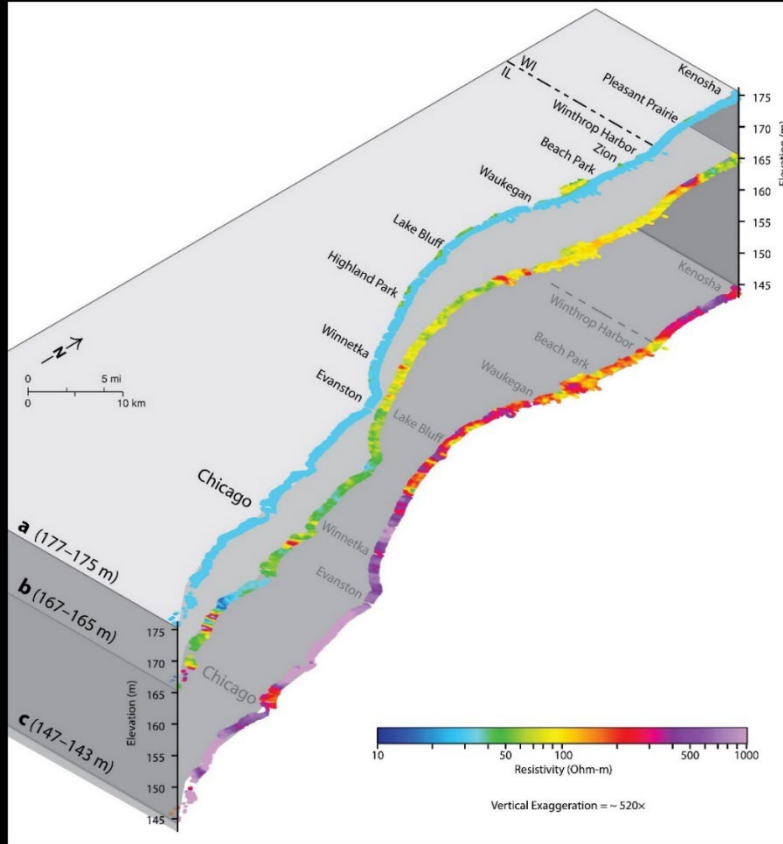
NOAA
Office for Coastal Management

Projects of Special
Merit

2016 Award

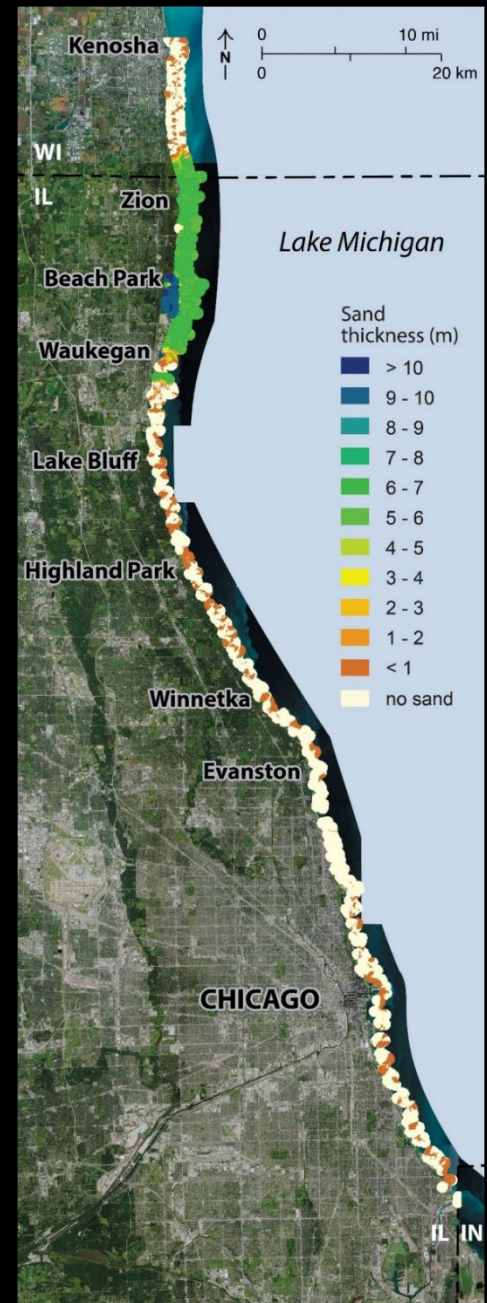


Use of HTEM: Example 1 — Lake Michigan coast

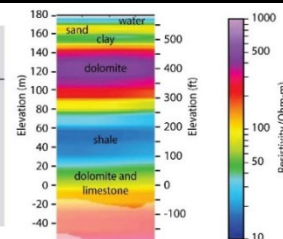


Geology at depth

Sand distribution and thickness on lake bottom

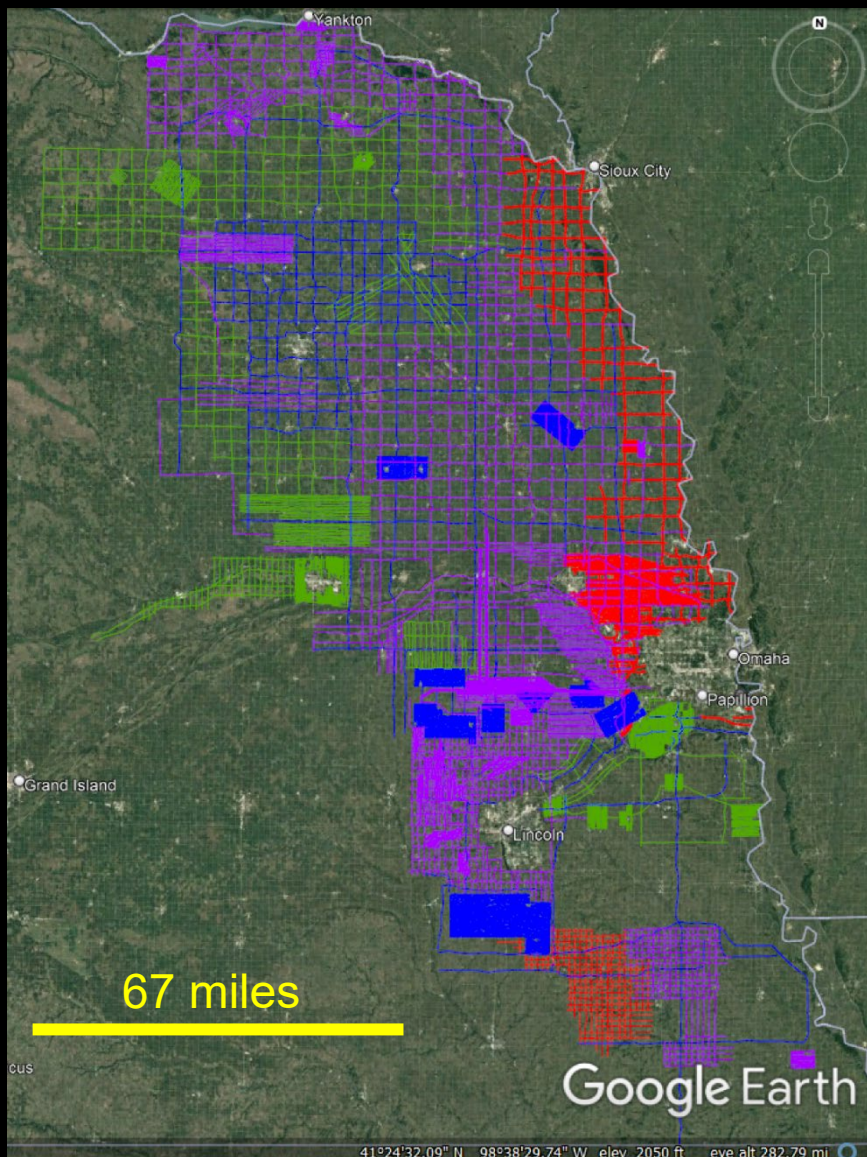


Earth Material	Resistivity Ranges (Ohm-m)		
	Telford et al. 1976	Culley et al. 1975	TEM, this study
Sand and Gravel	100-180	100-8000	80-150
Clays	1-100	1-100	30-75
Dolomite	350-5000	—	200-1000
Shale	20-2000	—	10-35
Limestone	50-10 ⁷	—	100-300



measures electrical properties (conductivity/resistivity) of sediment and rock

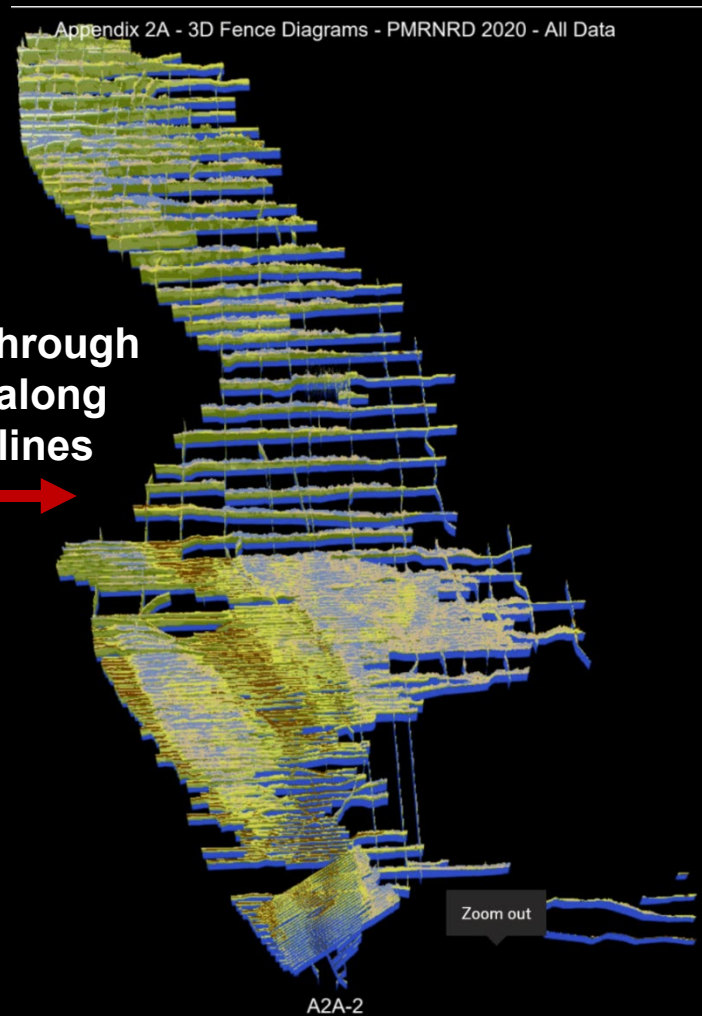
Use of HTEM: Example 2 — eastern Nebraska



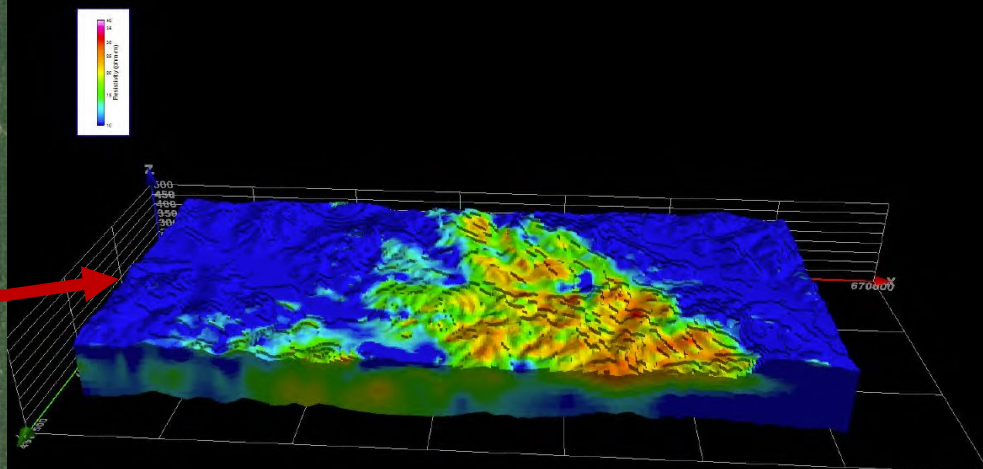
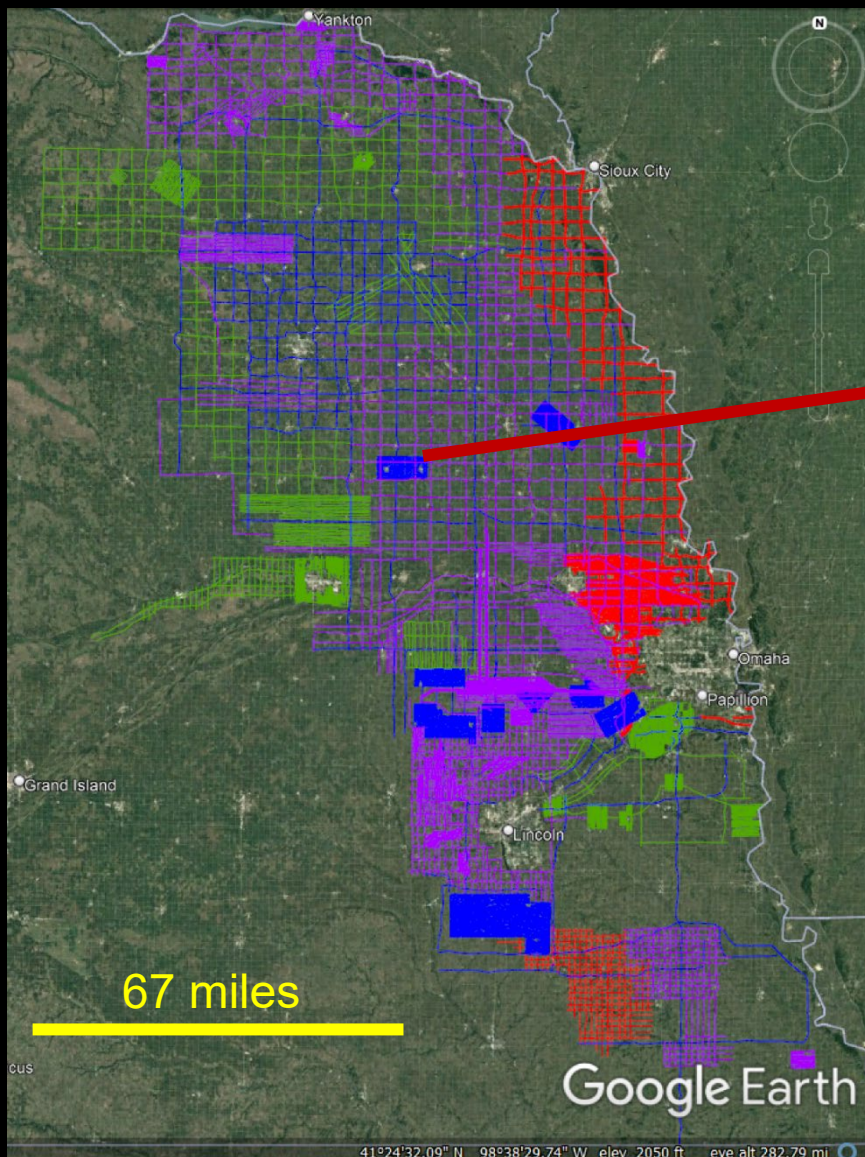
Helicopter
flight lines



“Slices” through
the earth along
red flight lines



Use of HTEM: Example 2 — eastern Nebraska

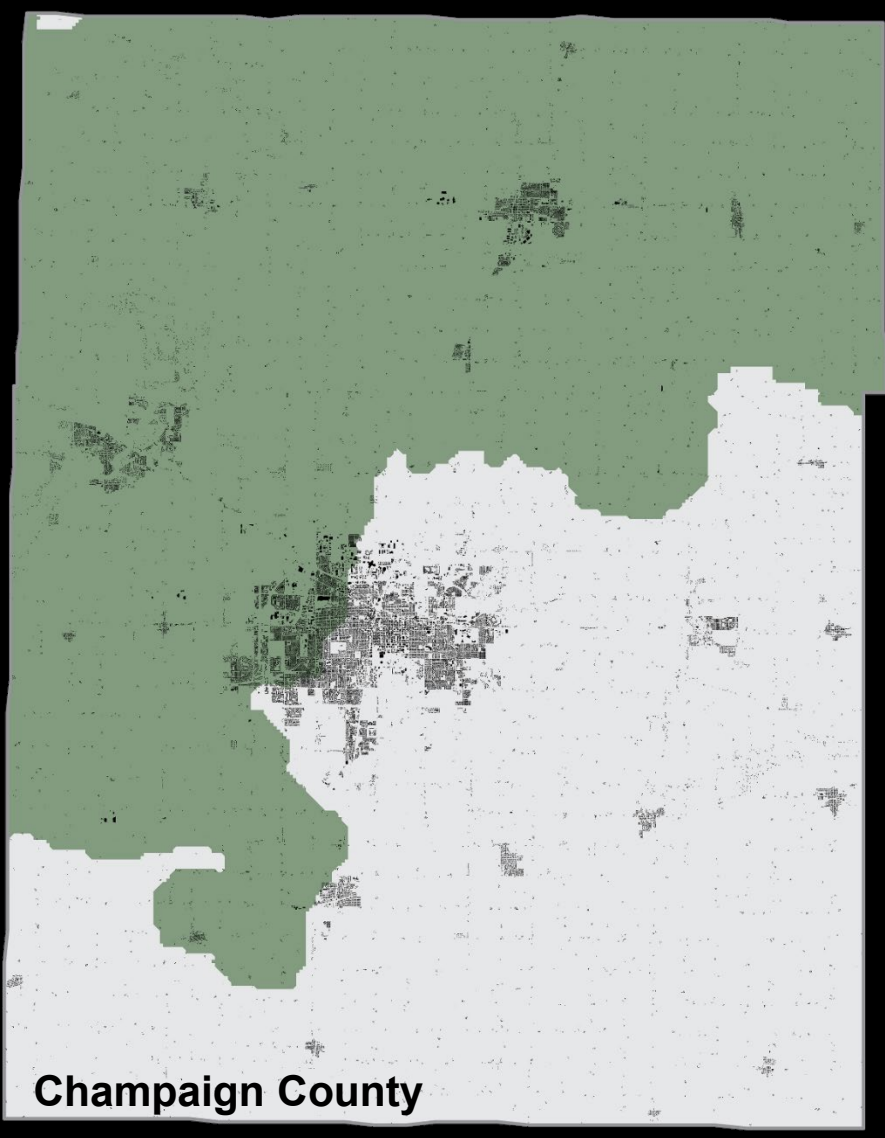


Water volume in aquifer

Resistivity Threshold (ohm-m)	Aquifer Volume (m ³)	Specific Yield	Extractable Water Volume (millions m ³)
15-20	7.3 x 10 ⁸	0.1	73.4
20-25	3.4 x 10 ⁸	0.12	40.3
25 and above	12 x 10 ⁸	0.15	17.8
TOTAL	1.2 x 10⁹		131.5

Abraham, 2014

Cost for Mapping the Mahomet aquifer in Champaign County



\$1.7 million

550 to 600 square miles

~4500 to 5000 flight miles

 **Mahomet aquifer**



Contacts and Sources of Information

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