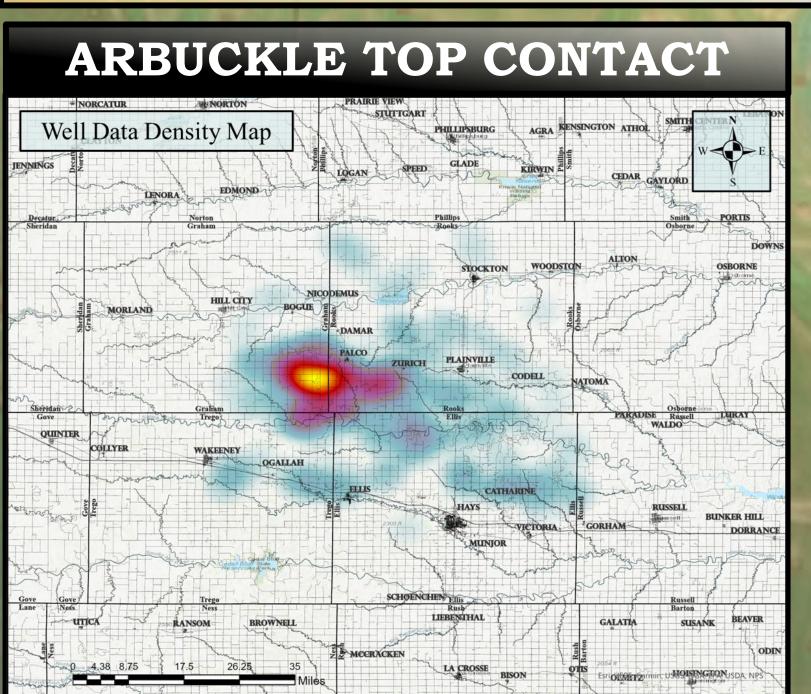
# SUBSURFACE MAPPING OF INTRA-ARBUCKLE SHALE IN NORTH-WEST KANSAS USING WELL LOG DATA

**COLE DENNY** +

FORT HAYS STATE UNIVERSITY **GEOSCIENCES APRIL 2024** 



- makes many KS well logs available for public viewing.
- **Micro-Resistivity** logs are used to specific zones.
- Gamma Ray logs measure the formations.



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### **ARBUCKLE FORMATION**

- Discovered in the early 1900's and located throughout the central US. Cambrian and Ordovician in age (541-480 million years ago), and mostly made up of **Dolomite and Limestone** at 500 ft to 6000 ft
- Arguably the most important formation to the Kansas oil industry having produced 35-40 % of all KS oil. Lacks up to date Maps and Well Log
- Studies.

## **INTRA-ARBUCKLE SHALE (IAS)**

- **Shale:** sedimentary rock made up of very small grains, mud, and clay.
- Deposited within the Arbuckle Formation
- □ Impermeable and non-porous.
- □ Act as **barriers** to hydrocarbon flow throughout KS.
- **Compartmentalizes** Arbuckle reservoirs, potentially storing economically substantial quantities of hydrocarbons beneath them.

# **MAPPING IAS**

- KGS Interactive Oil and Gas Map was used to locate and collect well log data. □ **Microsoft Excel** was used to gather and organize well data.
  - □ KB, Arbuckle depth, Arbuckle sea-level, IAS depth, IAS sea-level, IAS GAPI, Lat/Long, API#, # of barriers
- ArcGIS Pro 2.7.0 was used to map well log data.
- **Inverse Distance Weighted (IDW) spatial analyst** was the technique used to map IAS and Arbuckle top contact.

# LOCATING IAS

□ Well Logs are electronically generated measurements taken by lowering a special instrument down into a bore hole. **The KGS (Kansas Geological Survey)** 

Tertiary

Cretaceous

Jurassic Triassic

Permian

/irgilian

Missourian

Atokan Morrowan

evonian

Cambrian

Ogallala Formatio

Niobrara chalk

Dakota Formation

Cedar Hills Sand

Hutchinson salt

Chase Groun

Kansas Cit

Cherokee Group

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Chattanooga Shale Aisener Sandston

Hunton Group Maquoketa Shak Viola Limestone

Simpson Grou

Arbuckle Grou

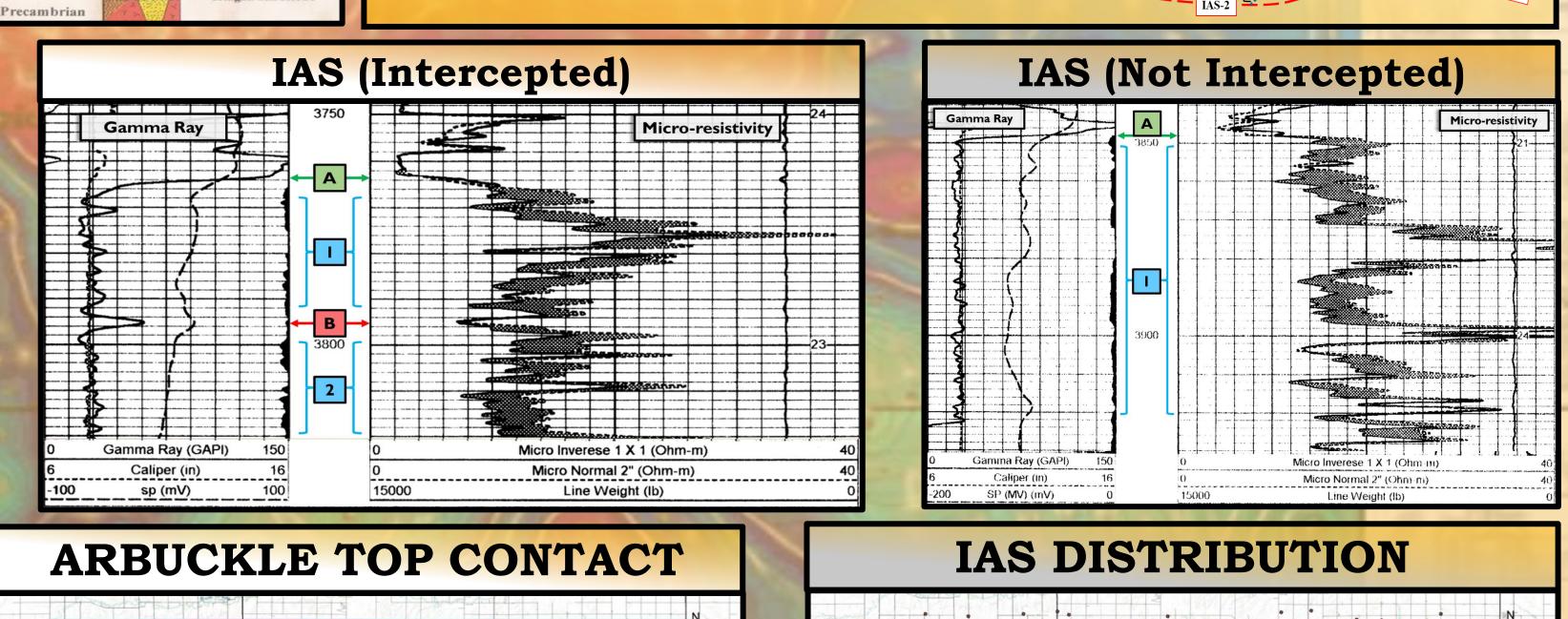
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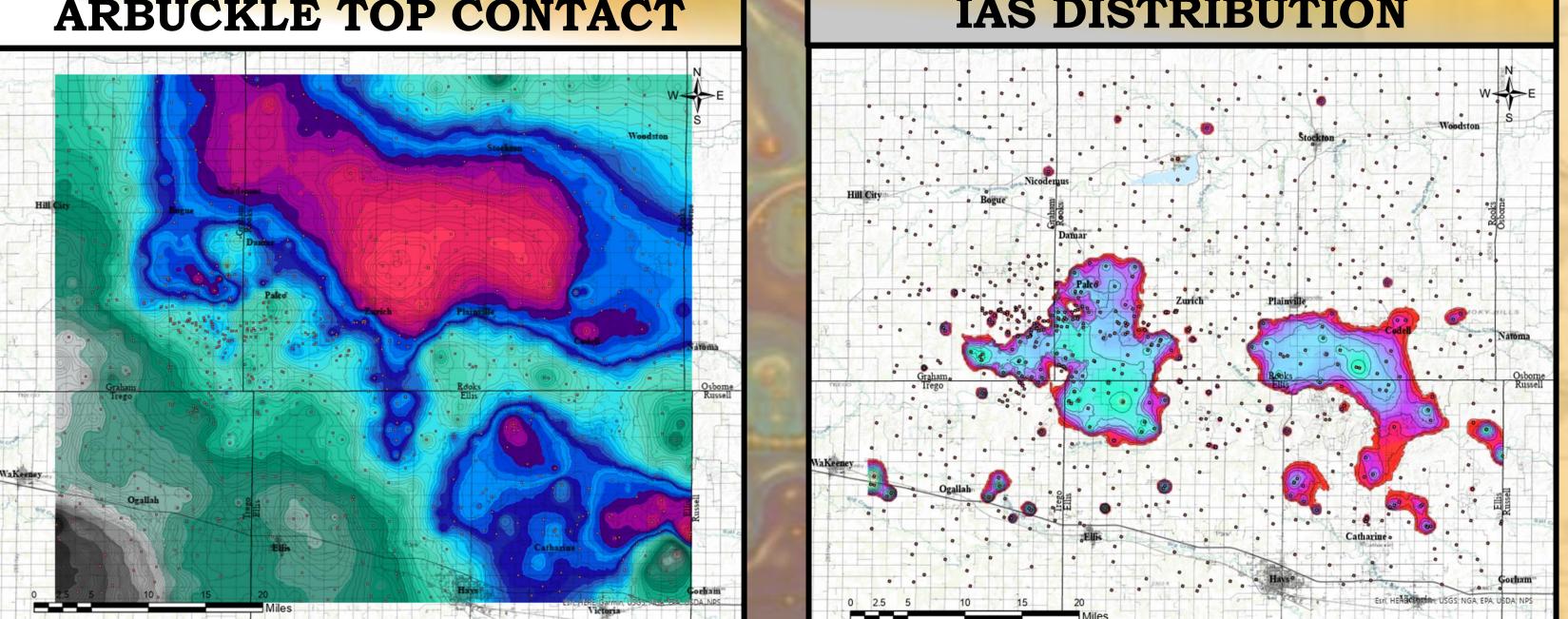
measure fluid resistance in a formation and give us insight into the permeability of

radioactivity of rocks in a bore hole to help geologists identify the lithology of

### **CORRELATING IAS**

**Correlation:** describes a relationship between stratigraphy and/or lithology **Deterministic Shale:** Shale that can be correlated from one well to another. **Stochastic Shale:** Shale that cannot be correlated from one well to another. **IAS was correlated using gamma ray logs** and corresponding geologist reports.





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Sherklan Thomas Shornan Wallaca Gove Logan Scott Greeky Wichita Hamilton Flarey Kearny Gury Grana Stanion Haskel Moston Staren Seward

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### **IAS STRUCTURE HYPOTHESIS:**

- Deposited as horizons. Structurally
- deformed and affected by Paleo-karst.

| Norton   | Phillips          | Sinith   | lowal     | Republic  | Washington | -       | Aug Hory    | iha Brow   | m Donipi | 3           |
|----------|-------------------|----------|-----------|-----------|------------|---------|-------------|------------|----------|-------------|
| Grafsam  | Rooke             | Osborne  | Mitchell  | Cloud     | Clay F     | -       | Iterwatomie | Jackson /  | Aickison | Lenvioworth |
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|          | Rush              |          | Elloworth | Salina    | Dickingon  | Biorris |             | Ouage      | Franklin | Jolunson    |
| Nose     |                   | Barton   | Rice      | McPherson | Marion     | Chase   | Lycia       | Culley     | Anderson | Unn         |
| lodgemaa | Pawnee<br>Edwards | Stafford | Reno      | Harv      |            |         | Greenwood   | Woodson    | Allen    | Bourtaon    |
| Ford     | Kkowa             | Prait    | Kiegman   | Sedgw     | BarDer     |         | Elk         | Wilson     | Nooitio  | Crawford    |
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