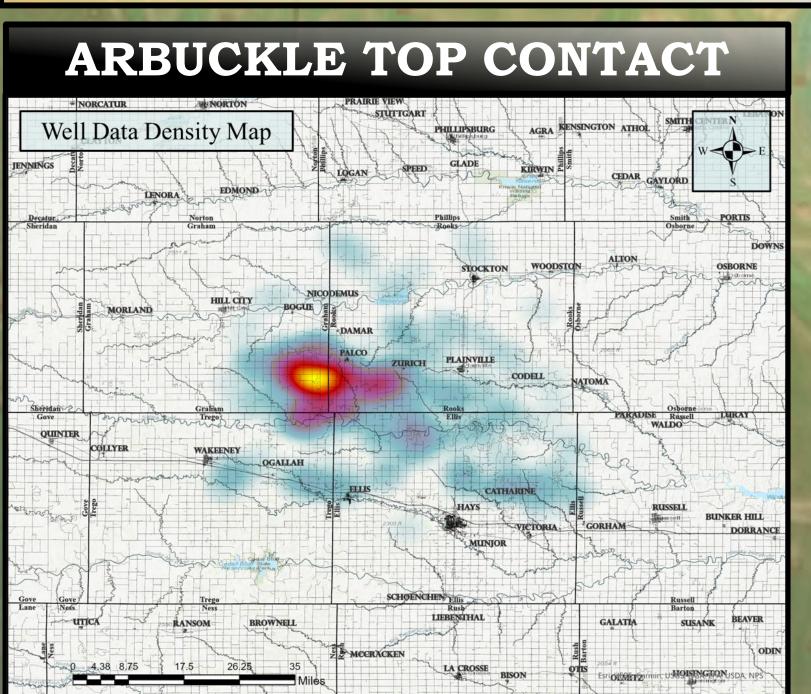
SUBSURFACE MAPPING OF INTRA-ARBUCKLE SHALE IN NORTH-WEST KANSAS USING WELL LOG DATA

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.



Miles

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

Mississippi char

Chattanooga Shale Aisener Sandston

Hunton Group Maquoketa Shak Viola Limestone

Simpson Grou

Arbuckle Grou

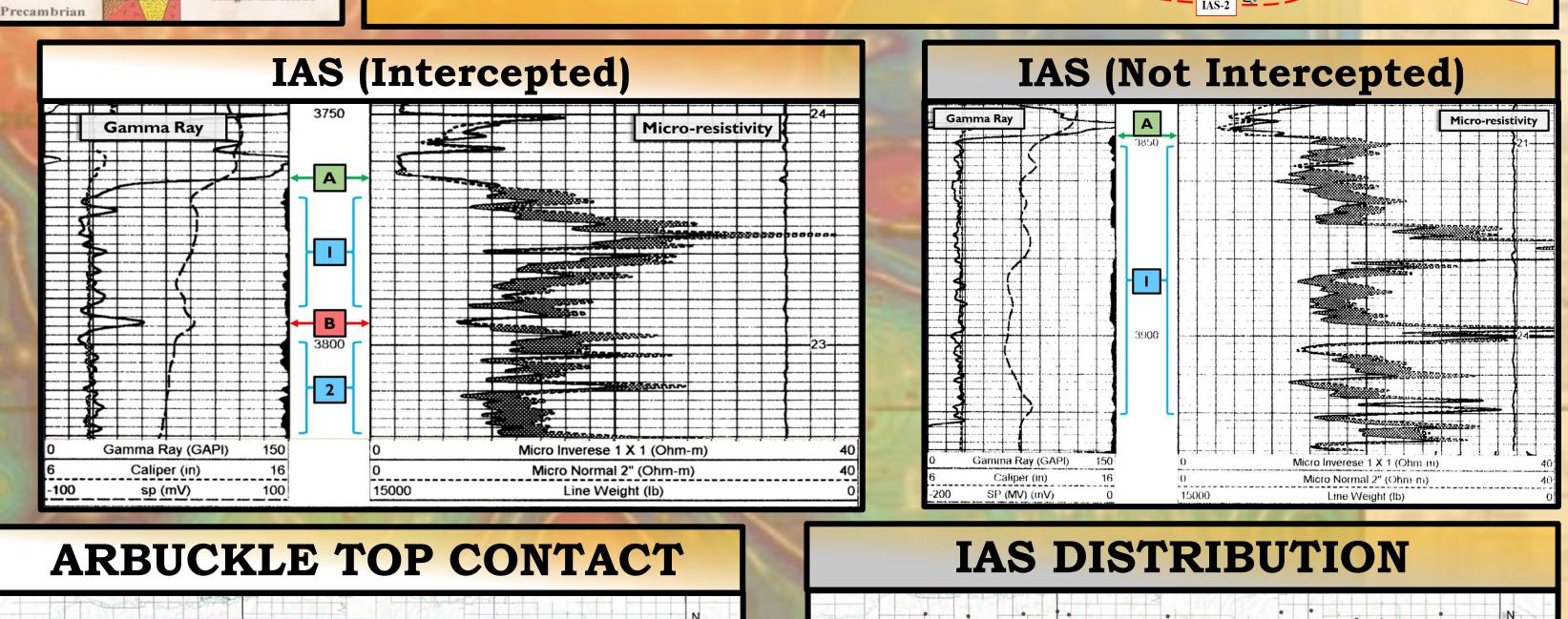
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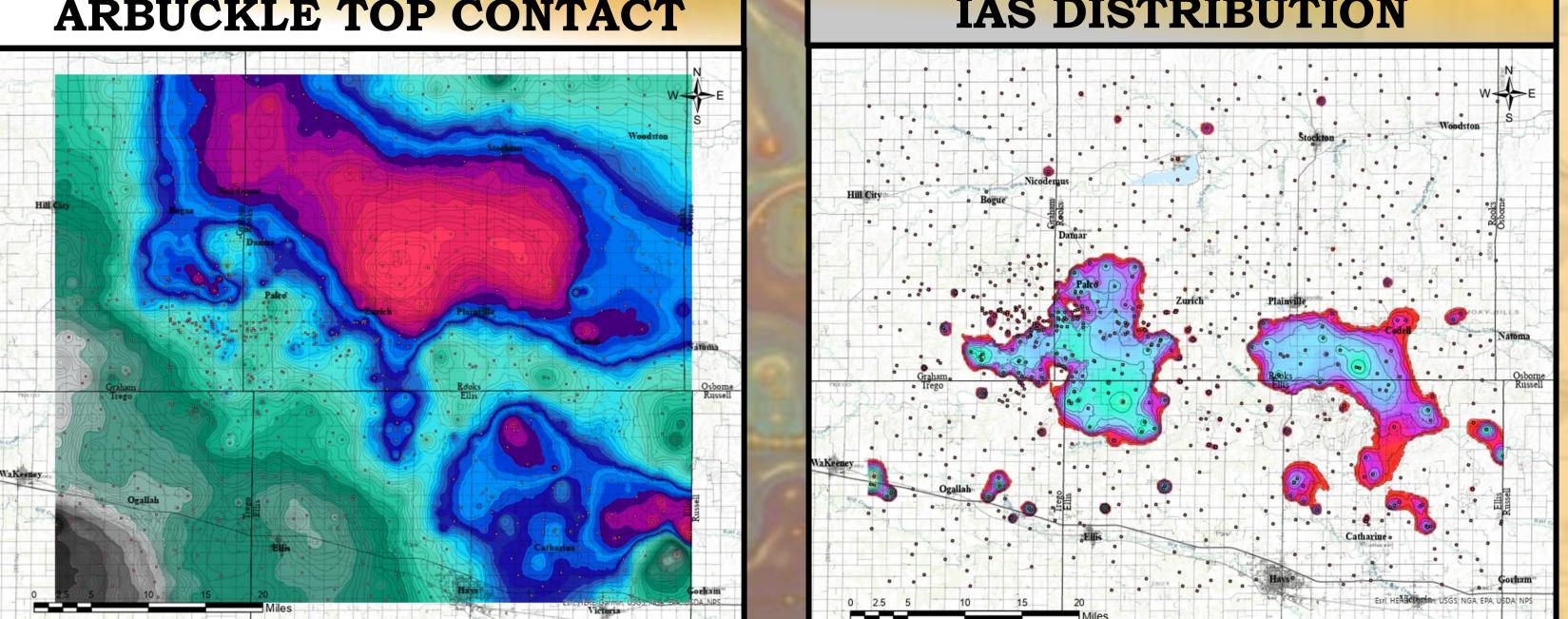
measure fluid resistance in a formation and give us insight into the permeability of

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

Decelur

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
Tringo	EXIs	Russell	Uncole	Обана		Goary	Websunsse	Sherrad	rt	- Free
	Rush		Elloworth	Salina	Dickingon	Biorris		Ouage	Franklin	Jolunson
Nose		Barton	Rice	McPherson	Marion	Chase	Lycia	Culley	Anderson	Unn
lodgemaa	Pawnee Edwards	Stafford	Reno	Harv			Greenwood	Woodson	Allen	Bourtaon
Ford	Kkowa	Prait	Kiegman	Sedgw	BarDer		Elk	Wilson	Nooitio	Crawford
clut	Comanche	Baiber	Harper	Sume		wiey	Cheeledgue	Montgomery	Cabilia	Cherokee

