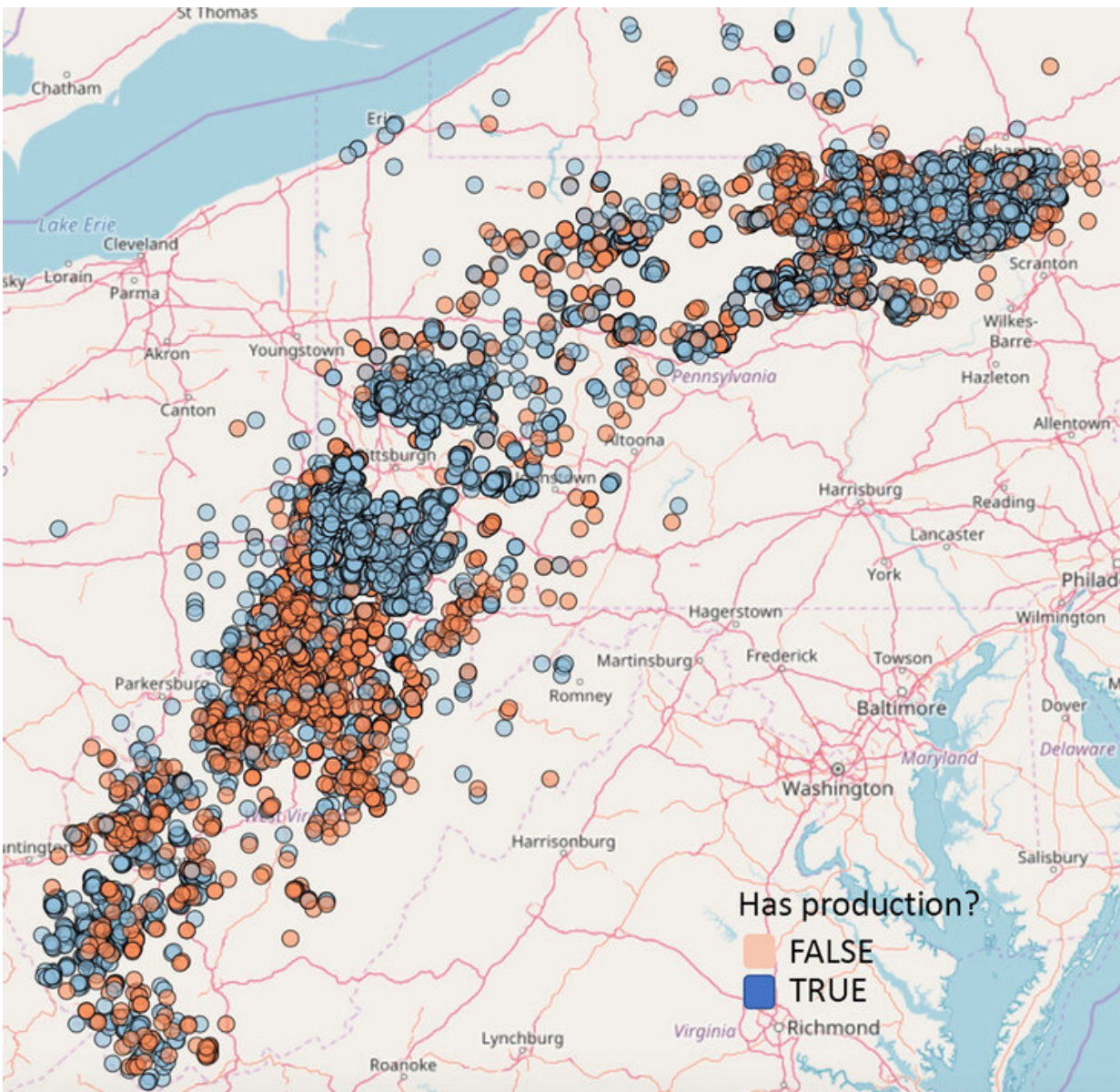


Researchers unearth cost-effective method for finding shale gas

September 4 2019, by David Kubarek



Penn State researchers detail a method for approximating available gas in untapped areas using well production data taken from more than 5,600 existing wells in the Marcellus Shale region. That could lead to more economical location of natural gas with less disturbance on the region's geology. Credit: Penn State

A new method for exploring natural gas in the Marcellus Shale, developed by Penn State researchers, shows potential high yield areas can be found more easily and with lower costs.

Traditionally, natural gas hot spots are determined using a combination of current well production data and various geological tests. The researchers, in work published in *SPE Reservoir Evaluation & Engineering*, detailed a method for approximating available gas in untapped areas using well production data taken from more than 5,600 existing wells.

Researchers used only wells with more than two years of production logs and assigned a decline curve analysis—the amount of production loss over time—for each well. They then applied these decline curves over the entire region of the Marcellus Shale. That allowed researchers to forecast the amount of gas that would be generated over time if a new well were created. Researchers then validated their findings using [geological maps](#), which were created from core samples.

"Rather than looking at these geological proxies for production we're just looking at production itself," said Eugene Morgan, Penn State. "By looking at just production and mapping we see that it agrees really well with these geological variables related to production, which validates our approach. By looking at production alone you're directly targeting the information you're after."

Morgan said the method held strong during validation, showing that it was almost as effective at forecasting natural gas resources as methods that include costly geological data sampling. Morgan said errors were within 20 percent when compared to decline curve analysis alone.

"Since our method mostly takes production data, it's very economical," said Zhenke Xi, a [graduate student](#) in energy and mineral engineering and co-author on the research paper. "Other data, such as porosity and permeability, is expensive to collect. Our method has proven to be very effective using only production data. Getting this data is much easier and more economical than gathering geological data."

This new method could allow industry experts to make better decisions about which areas to explore.

"This method indicates areas that are more favorable for drilling exploratory wells," Morgan said. The drillers can then collect more detailed data and decide if they want to invest more money into completing the well. This is a first order pass that gives a better indication about where natural gas companies would have greater success."

Researchers used the data to create a comprehensive heat map of available [natural gas](#) within the Marcellus Shale.

The team also created an [interactive website](#) that shows historical production data from all wells in the Marcellus Shale region. The website could prove useful for industry experts and property owners alike.

Morgan said the website, which breaks down the region into chunks of about 3 square miles, is a very practical tool for estimating well productivity.

Researchers said the next step will be to fine-tune cluster sampling used in the initial research to improve accuracy.

More information: Zhenke Xi et al. Combining Decline-Curve Analysis and Geostatistics To Forecast Gas Production in the Marcellus Shale, *SPE Reservoir Evaluation & Engineering* (2019). [DOI: 10.2118/197055-PA](https://doi.org/10.2118/197055-PA)

Provided by Pennsylvania State University

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