

FaithLink

Connecting Faith and Life

Recent earthquakes in Oklahoma have raised concerns about the process known as fracking. What is fracking, and how is it connected to seismic activity? How are institutions and communities responding? How does Christian faith inform our responses to fracking?

Oklahoma Earthquakes

In recent years, the Sooner State has become “the small earthquake capital of the U.S.,” according to Dr. Jeremy Boak, director of the Oklahoma Geological Survey. Quakes of magnitude 3.0 and higher—a strength most people can feel—struck 109 times in 2013, 585 times in 2014, and 907 times in 2015.

In 2016, Oklahoma had seen fewer earthquakes (580) as of mid-November—but the quakes were stronger. Three measured magnitude 5.0 or greater, including a 5.8 quake near Pawnee in early September, the year’s strongest quake in the contiguous United States. The quake was also the biggest in Oklahoma’s history, surpassing the 2011 5.7 quake near Prague, Oklahoma, that injured two people, destroyed more than a dozen homes, and was felt in 17 states.

Oklahoma residents can buy earthquake insurance, but the traditional classification of earthquakes as “acts of God” in insurance policies no longer necessarily applies. Compelling scientific evidence suggests that increased quakes in Oklahoma and elsewhere—Ohio, Arkansas, Colorado, New Mexico, Texas, and West Virginia—are, in Boak’s words, a feature of “induced seismicity”: earthquakes caused by human activity.

Fracking, Injection Wells, and Quakes

Understanding Oklahoma’s recent quakes requires some understanding of the drilling technique known as hydraulic fracturing, or fracking. In this process, high-pressure fluid called “slickwater”—mostly water, with some chemical additives for engineering reasons—is pumped into wells drilled hundreds to thousands of feet below the surface. Unlike traditional wells, fracking wells are angled horizontally after initial vertical drilling, allowing them to reach more fuel deposits.

The slickwater fractures the rock around the well. Gas and oil flow through the breaks. The toxic wastewater that returns to the surface—“flowback,” which contains not only the injected chemicals but also naturally occurring radioactive materials and

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Core Bible Passages

Psalm 8 is a key text for Christians' understanding of who human beings are and how we relate to both the Creator and the creation. The psalm marvels at God's creative work, from the beasts of the earth to the farthest flung stars of heaven, and boldly claims that God made humans "only slightly less than divine" (**verse 5**), endowed with authority over all God's "handiwork" (**verse 6**). The idea would be breathtakingly arrogant were it not framed by unreserved praise of God's ultimate sovereignty (**verses 1, 9**). The psalm affirms humanity's right to use the natural world's resources without elevating human beings to divine status and without sacrificing the value and dignity the rest of creation possesses simply by virtue of being God's work.

In **Leviticus 25:1-7, 19-22**, God commands Israel to let its land lie fallow every seventh year. The land's "special sabbath rest" (**verse 4**) both ensures its long-term ability to sustain life and offers Israel another opportunity to live in reliance on God to provide.

In **Exodus 23:10-11**, the Law further ties the land's sabbath rest to Israel's responsibility to provide for people who are hungry and poor. More than sound agricultural practice, the land's sabbath is a limit on humanity's use of natural resources that benefits both the land and those who live on it.

other toxins—is treated, recycled, or buried deep below ground in injection wells. The *PBS NewsHour* observes, "At some oil and gas wells, for every barrel of oil that's produced, 20 barrels of salty wastewater bubble up as well."

Fracking is not, in and of itself, responsible for Oklahoma's surge in earthquakes. But as *Scientific American* reports, "Geologists have known since the 1960s that pushing fluids into the ground can set off quakes."

Oklahoma is full of geological fault lines hundreds of millions of years old. These faults stabilized long ago, making earthquakes rare. But fluid injection endangers that equilibrium, and earthquakes often result. Data from the Virginia Tech Seismological Observatory show a "clear correlation . . . in the proximity of earthquakes to wells that are allowed to inject high volumes of water into the ground." In fact, despite its lack of *major* geologic faults, central Oklahoma is now more seismically active than San Francisco.

Economic Rewards

Oklahoma's energy industry, especially fossil fuel production, is large and important to both the state and the country. Oklahoma ranks among the top five petroleum-producing states, accounting for 3–4 percent of the country's annual production, and it supplies ten percent of the nation's marketed natural gas.

Fracking benefits the oil and gas industry by making more fossil fuels available. It can also benefit the local communities in which it takes place. A 2015 study found that "each million dollars of new oil and gas production is associated with a \$66,000 increase in wage income and 0.78 new jobs within the county" where fracking occurs.

The entire nation has experienced the economic impact of fracking. Households that use natural gas saved \$200 annually in 2007–2013 thanks to increased fracking, and fracking for oil boosted US stock values by \$2.5 trillion in 2012–2014.

"All told," Arjun Sreekumar wrote for *The Motley Fool* in 2014, "the U.S. energy boom has been—and should continue to be—a major blessing to the nation's economy, creating both direct and indirect jobs, giving the manufacturing sector a much-needed boost, and reducing the nation's reliance on foreign oil."

Environmental Risks

For all its economic benefits, fracking remains controversial because of its associated environmental risks. The earthquakes triggered by wastewater disposal wells aren't felt everywhere fracking happens, likely due to local geologic differences (in North Dakota, for instance, porous sandstone helps contain the wastewater), as well as the fact that not all fracking wells pump as much flowback as do Oklahoma's (the smaller the volume of wastewater, the fewer the earthquakes).

But fracking poses other challenges. The chemicals used can contaminate groundwater, for instance, as happened near Pavilion, Wyoming. State tests there detected 19 different fracking-related chemicals in people's wells. Almost half those chemicals

Regulatory Response

In April 2015, after what *The New York Times* calls “years of official skepticism,” Oklahoma’s government acknowledged the link between fracking and frequent earthquakes. An official website (www.earthquakes.ok.gov) states that “natural causes” alone cannot account for “the recent rise in earthquakes” and that most of them are “very likely triggered” by injecting wastewater into disposal wells.

The Oklahoma Corporation Commission (OCC), the regulatory agency with oversight of the state’s oil and gas industry, has, as of early November 2016, ordered 700 disposal wells to cut back the volume of wastewater they handle or to cease using the wells altogether, cutting disposal rates by some 800,000 barrels daily. Consequently, Oklahoma is averaging half as many earthquakes per day (from four or more to two). Dr. Jeremy Boak calls the reduction “the closest thing we have to a smoking gun” in establishing the injection well/earthquake link.

For some business owners, unfortunately, the regulations that are reducing the quakes are also threatening their livelihood. In 2010, for example, Jeff Andrews and business partners invested \$3.2 million to start a wastewater disposal business. But the recent regulations, coupled with low oil prices, mean trouble for him: “I’m probably going to have to shut my doors,” Andrews told Bloomberg News.

are unstudied, with safe exposure levels unknown, according to the Environmental Protection Agency. “Communities have never argued that every [fracking] well goes bad,” says environmental scientist Hugh MacMillan, but that “when you drill and [are] fracking thousands, too many go bad. For those living on groundwater, it becomes a matter of luck, and that’s not right, because over years, more and more people’s luck runs out.”

While natural gas burns “cleaner” than other fossil fuels—releasing half as much carbon dioxide (CO₂) as coal—it’s mostly methane, which traps atmospheric heat 30 percent more than CO₂ does. *Scientific American* reports that “fracked wells leak 40 to 60 percent more methane than conventional natural gas wells.” Because methane dissipates more quickly than CO₂—within 10–12 years, as opposed to decades or centuries—methane’s effect on global warming isn’t as severe as that of CO₂. But as climate scientist Raymond Pierrehumbert wrote to *The New York Times*, “The real argument against over-reliance on fracking as a solution to the climate problem is that [the value of natural gas] as a bridge fuel has been oversold. . . . If you’re not careful, natural gas becomes a bridge from a coal-powered past to a coal-powered future.”

Faith Questions About Fracking

In Scripture, earthquakes often manifest God’s power, as at the giving of Torah (**Exodus 19:18**) or Jesus’ resurrection (**Matthew 28:2**). Quakes also announce God’s judgment (**Numbers 16:31-34; Isaiah 24:19-20; Revelation 8:5**). While accepting human responsibility for induced seismicity, can Christians see increased earthquakes as calls to examine our society in light of God’s will?

We believe the earth belongs to God (**Psalms 24:1**). Even its “depths are in his hands” (**Psalms 95:4**). We also believe God gives this planet’s resources to human beings for their use and benefit (**Genesis 1:28; Psalm 8:6**). But God calls humans to responsible dominion, not relentless domination. God placed us in God’s earthly garden “to take care of it” (**Genesis 2:15**). When human use of the garden’s resources shakes and breaks it—let alone endangers the people living in it—how should people of faith respond? Has God given us license to extract and exploit every possible resource we can? Can harnessing other resources in other ways—for example, wind power, in which Oklahoma is also a national leader—also fulfill God’s design for human dominion?

Additionally, we believe God desires us to use our reason and ingenuity in ways that nurture life and cause life to flourish since God’s will, for us and for all creation, is life in abundance (**John 10:10; Romans 8:19-22**). Fracking produces short-term gains but is not sustainable. Production from fracking wells in shale formations, for example, declines 60–70 percent in the first year alone. What should Christians say about a practice that doesn’t yield long-term, sustainable benefits to people—including communities whose present livelihood and well-being depend upon it?

While the questions, faith-related and otherwise, about fracking continue, so do the Oklahoma earthquakes, although now at a slower pace. Tighter regulations on wastewater disposal may

Fracking on the Ballot

As fracking continues to spread across the country, more communities seek a say in whether the drilling technique may take place near them. The year 2016 saw several local ballot initiatives regarding fracking, according to the nonpartisan, nonprofit website Ballotpedia.

In June, voters in Butte County, California, approved Measure E, which imposes a ban on fracking and all related activity, including the disposal of by-products, within the county's borders. In November, Monterey County voters approved a similar measure, Measure Z, which not only bans fracking in the county but also bans new oil and gas operations and phases out operational wells.

In contrast, a petition to ban new oil and gas extraction in Columbus, Ohio, failed, for the second year in a row, to earn enough valid signatures to be placed before voters in November. Similarly, two antifracking initiatives in Colorado failed to make the ballot. A measure that was voted on, however, and passed was Amendment 71, which raises the bar for citizen-initiated amendments to be placed on future ballots and imposes a 55 percent supermajority for the adoption of such amendments.

According to Ballotpedia, the top donor toward the passage of Amendment 71 was "Protecting Colorado's Environment, Economy, and Energy Independence, a committee promoting oil and gas development, which provided \$2.99 million."

already be responsible for reducing the number of earthquakes from their 2015 peak. "We're slowing down," Todd Halihan, professor of geology at Oklahoma State University, told PBS, "but nobody is breathing super easy yet."

United Methodist Perspective

"All creation is the Lord's," affirm the United Methodist Social Principles, "and we are responsible for the ways in which we use and abuse it." The Principles express awareness "that the current utilization of energy resources threatens this creation at its very foundation" and commit the church "to approaching creation, energy production, and especially creation's resources in a responsible, careful and economic way." The Principles also recognize the link between limited deposits of carbon, oil, and gas and the acceleration in global warming caused by their use.

At The United Methodist Church's 2016 General Conference, delegates voted against adding a fossil fuels "investment screen" for the United Methodist Board of Pension and Health Benefits. Barbara Boigegrain, the board's CEO, said, "The denomination would have more influence by working on the inside to change corporations' behavior" than by divesting.

But according to Fossil Free UMC, a group of United Methodists calling for the denomination to add fossil fuels to the *Book of Discipline* and *Book of Resolutions*' lists of socially responsible investment screens, the board "is invested in 80 of the top 100 oil and gas companies (as of 9/30/15)" while engaged in social advocacy with only seven.

Helpful Links

- www.earthquakes.ok.gov — an official Oklahoma state government website bringing together information about the earthquakes and the state government's response
- www.magma.geos.vt.edu/vtso/induced_quakes.html — data and analysis of induced seismic activity in Oklahoma and elsewhere from the Virginia Tech Seismological Observatory
- www.youtube.com/watch?v=A1u3b0WhMgs — a three-minute animated video summarizing the science of fracking and induced seismicity

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Fracking

How does Christian faith inform our responses to fracking?

CREATE Your Teaching Plan

Keeping in mind your group members and your group time, choose from among the OPEN, EXPLORE, and CLOSE activities or from "Teaching Alternatives" to plan the session.

OPEN the Session

Pray Together

Creator God, you fashioned this world with wisdom and called us, made in your image, to use and to care for it. May our time of reading, discussing, and thinking today make us more mindful of the great responsibility you have given us; and, by your Spirit, may it help us grow as not only better stewards of your world but also more faithful disciples of Jesus Christ, your Son, our Savior. Amen.

Brainstorm Uses of Oil and Gas

Form two teams of participants and ask each team to appoint a secretary. Give each team one minute to list as many ways participants can think of that they directly or indirectly use oil (the first team) or natural gas (the second team). Serve as timekeeper. After one minute, call time and ask each team's secretary to read aloud that team's list. Invite participants to add any additional uses they can think of. Ask: What do you know about where the oil and natural gas we use comes from and how it gets to us?

EXPLORE the Topic

Discuss "Oklahoma Earthquakes"

Read or review "Oklahoma Earthquakes." Ask participants to share what they know or have heard about earthquake activity in Oklahoma in recent years. If any participants have ever felt earthquakes firsthand, allow them to talk briefly about those experiences. Ask: How do you respond to the assertion that the increased number of earthquakes in Oklahoma and elsewhere is due to human activity?

Reflect on "Fracking, Injection Wells, and Quakes"

Read or review "Fracking, Injection Wells, and Quakes." Have participants define *fracking*, *slickwater*, *flowback*, and *injection wells*. Ask: Why is it not accurate to say that fracking has caused Oklahoma's recent earthquake activity? What indirect connection exists between fracking and the earthquakes?

Consider "Economic Rewards"

Read or review "Economic Rewards." Invite participants to identify a statistic that most interested or surprised them. Ask: Of the three areas of fracking benefits named by Arjun Sreekumar—jobs, manufacturing, and energy independence—which seems most important to you, and why?

Talk About "Environmental Risks"

Read or review "Environmental Risks." Ask: What makes fracking risky for communities that depend on groundwater? To what extent is fracking a risk factor in climate change (global warming)? Having now heard about both some of the economic rewards and environmental risks of fracking, how comfortable are you or would you be with fracking that takes place in your community? Why?

Discuss Regulatory and Political Responses

Read or review “Regulatory Response” and “Fracking on the Ballot.” Ask: Do you agree with the OCC’s decision to regulate disposal wells in this way? Why or why not? What responsibilities, if any, does the government have toward people like Jeff Andrews? How do you respond to the efforts of citizens to place fracking on the ballots?

Reflect on Psalm 8

Invite one or two participants to read Psalm 8 aloud as others follow along silently. Ask: What phrase or image from the psalm most attracts your attention? What kind of relationship between humanity and God does this psalm portray? What kind of relationship between humanity and the rest of the natural world does this psalm portray? How do we tell whether we are ruling over God’s handiwork (verse 6) in ways that are acceptable to God? What insights, if any, do you think this psalm offers us as we think about fracking? *Optional Extension:* Encourage participants to illustrate Psalm 8 using pictures torn from magazine issues you supply or with their own original artwork.

Consider a Sabbath for the Land

Read aloud Leviticus 25:1-7, 19-22 and Exodus 23:10-11. Ask: How does the sabbath rest God commands Israel to give the land benefit both the land and the people? How might the land’s sabbath be connected to God’s commandment to keep and honor the weekly Sabbath day? What insights, if any, does the principle of a sabbath for the land offer us as we think about fracking?

Consider “United Methodist Perspective”

Read or review this section. Ask: In The United Methodist Church’s discussions about whether to divest from fossil fuel companies, do you tend to agree more with Barbara Boigegrain’s position or with Fossil Free UMC’s position—or neither, or both? Why? What would you advise the church to do?

Plan a Letter to the Editor

Ask participants to jot down a few key points they would want to make if they were writing a letter to a local editor about fracking in their community. Encourage participants to include a specifically Christian perspective in their argument. Remind participants, if needed, that not all Christians will agree about whether fracking makes sense for the community. Invite volunteers to talk about what they would write.

CLOSE the Session

Pray Together

God of all life, as our communities continue to struggle with how best to use the resources you have given us, may we, your church, remain a constant witness to your care for those who are vulnerable and to your passion for all people to know the fullness of life, both in this world and in your presence eternally, through Jesus Christ. Amen.

Teaching Alternatives

- Introduce the session using the video in the third “Helpful Link” on page 4.
- Use participants’ mobile devices or a computer with Internet access to find out, if you don’t already know, whether fracking takes place in your state, how much or little it is regulated, and whether any ballot measures about it have been placed before voters.

Next Week in
FaithLink
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Spiritual Formation

In Christian circles, we often talk about the importance of spiritual formation as an aspect of discipleship. How is *spiritual formation* defined? What spiritual practices and disciplines can support our desire to mature in Christ?