

Wondering at Creation

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PRE-LESSON INFORMATION:

SESSION DESCRIPTION

Given the scientifically-oriented culture within which we live and engage in God's mission, we have an obligation to help our young people understand that what science teaches us about the universe is not only comprehensible within the context of faith, but can also nurture a healthy and faithful wonder at what it means to be part of, and stewards of, God's creation. Wonder at creation, and specifically at the universe, can help us integrate our faith with the world in which we live.

ELCA FAITH PRACTICES

Study

LEARNING OUTCOMES

Participants will . . .

- experience a deeper sense of wonder at the scale and beauty of the universe
- recognize that scientific understanding of the universe and faith in God as the creator of all can be held together in a helpful conversation
- consider what it means to be called as stewards of creation
- develop tools for helping youth explore the intersection of faith and science

BIBLICAL FOCUS

Psalms 8:3-5

Genesis 1:20-26, 2:7

Ephesians 1:9-10

MATERIALS NEEDED

- Participants will not need any materials.
- Presenter will need a 23' ball of string or yarn, if the first activity suggested below is part of the plan.

LESSON PLAN:

The bulk of this session will be a presentation, highlighting the ways in which our understanding of the universe has radically changed over the past century, and ways in which this new perspective might be brought into conversation with our

faith. A sense of wonder at the universe is an essential part of this integration, and so a key element of the presentation is a collection of astronomical photos taken by the author which will be shown throughout the presentation. This sense of wonder at creation as part of the human vocation will be connected to Psalm 8. The deep connection between humans and the rest of the universe, also vital for a proper understanding of stewardship, will be explored both in terms of current cosmology and in terms of the Genesis creation accounts. Finally, this sense of cosmic connection will be discussed in the light of the promise expressed in Ephesians that God will bring all things together for reconciliation and healing in Christ. Such a wide view is important for shaping our sense of hope, of wonder, and (again) of stewardship.

Suggestion: print out the script for the slides and divide them up so you have different voices reading the presentation.

APPENDIX

Suggested group activity:

Part of the wonder of the universe is the deep sense of time that it can give us. Have a ball of string or yarn that is 23 feet long. Place a small mark on the string every 12 inches. Have one member of the group hold the end, and unravel the ball as it is passed from one person to the next, until the entire length is being held out by the group. If this is the timeline of the universe from the big bang until now (13.8 billion years), ask the group where on the string they think the earth formed (it would be at about 15 1/3 feet from the beginning). Then ask them when the first single-celled organisms appeared on earth (that would be at about 17 feet from the beginning). Next, when did dinosaurs like the T. Rex show up on the timeline? (about 1 1/2 inches from the end). Finally, where would humans show up? That would leave only 1/250" at the end of the string for human history. (The scale here is 1 inch for every 50 million years of history; scientists identify the earliest members of *homo sapiens* from about 200,000 years ago; 1/250" is about the thickness of two sheets of paper). Prompt some conversation with these questions:

What does this imply about the things that God cares about in the universe?

How does this make you feel about the role of humans in God's creation?

What do you think Ephesians 1:9-10 means when it talks about God bringing all things together in Christ?

(Note: thanks to Pastor Randal Palm for suggesting this timeline analogy)

Questions for Discussion:

1) What part of creation most fills you with wonder? Is that the same as a sense of God's presence?

2) Which would describe the way in which scientific discoveries have intersected with your faith:

A) Scientific awareness of the world has increased my sense of wonder at creation, and so deepened my sense of faith and worship.

B) The claims of science have challenged my faith, and caused me to rethink some theological issues.

C) The claims of science contradict my faith, and so I reject them.

D) The claims of science never seem to affect my faith or understanding of God at all.

3) Some have suggested that part of the reason that the churches in our context are declining in membership is because the message of the church is not even in conversation with the scientific understanding of reality that shapes people's everyday lives, and so it seems like an anachronism, belonging to a different time. Do you think that is true?

4) What traditional theological concepts or teachings might need reformulation to make sense in a Big Bang universe? Is that exciting to you, or scary?

Activities to do with youth (or anyone else, including just yourself):

1) Look at this "zoom-able" scale universe.

<http://scaleofuniverse.com>

How much of the possible range can you move, either in or out, before you begin to feel overwhelmed by the scale and complexity of the world? Are far can you go before you start to see things that make you wonder, "What is that?"

2) Look at Neil DeGrasse Tyson's video here:

<http://www.huffingtonpost.com/2012/03/12/most-astounding-fact-universe-neil->

degrasse-tyson_n_1339031.html

Does the story of the universe, and our connection to it, make you feel “big” or “small” (that is, do you share Tyson’s perspective or not)?

3) Look through some of the “Astronomy Picture of the Day” images:

<http://apod.nasa.gov/apod/astropix.html>

Find one to share with the group (or email to a friend); how does that picture make you feel?

4) Visit local astronomy club / planetarium / observatory. Most communities have a local astronomy club (look online) that regularly do outreach events with schools and church groups; they will probably be more than happy to arrange an observing session for your youth group, supplying several telescopes and experts to operate them. Get out under the stars. Do you share the wonder expressed in Psalm 8?

5) Together build a scale model of the solar system:

http://www.exploratorium.edu/ronh/solar_system

How does seeing our neighborhood in this way change your perspective on human life or on our stewardship of planet earth?

SUPPLEMENTAL INFORMATION

One benefit of the internet and the era astronomical research in which we live is that videos, images, and other resources are readily available online; if you can't get out under a dark sky (or even as a preparation for, or supplement to that experience), these can also be a window into wondering at creation.

SUGGESTED RESOURCES

Web resources

Big History Project website: <https://school.bighistoryproject.com/bhplive>

Center for Theology and the Natural Sciences website: <http://www.ctns.org>

Lutheran Alliance for Faith, Science, and Technology website:
<http://luthscitech.org>

A couple of good books

Guy Consolmagno & Paul Mueller, *Would You Baptize an Extraterrestrial?* (Random House, 2014).

Brown, William P. *The Seven Pillars of Creation. The Bible, Science, and the Ecology of Wonder* (Oxford University, 2010).

Curriculum resource

Painting the Stars: Science, Religion and an Evolving Faith:
<http://www.livingthequestions.com/xcart/home.php?cat=485>

AUTHOR BIOGRAPHY

Brian Peterson has served as an ELCA pastor in congregations in Minnesota and Virginia, and since 1998 has taught New Testament courses at Lutheran Theological Southern Seminary in Columbia, SC. In his spare time, he pursues astrophotography as a hobby, and some of his pictures can be found at:
<http://www.pbase.com/bkpeterson>

(Note to the readers: One purpose of this session is not simply to talk about wonder at creation, but to instill a bit of it. That will make more sense, I think, if you also refer to the images in the Power Point that I intend to use. These will also be uploaded as a PDF to the coach site. The slide numbers indicated throughout this presentation correspond to the numbered pages of that PDF).

[Slide #1 – IC 443]

Luther once said that “God writes the gospel not in the Bible alone, but on trees and flowers and clouds and stars.” For centuries, theology and science were good colleagues; they both pursued the truth about the world. A few hundred years ago, with the Enlightenment, the two became more separated, a trend that has probably grown deeper over the past century. I think that this separation has stunted the church’s ability to engage the world in many of the important questions that we face. I think it also makes it more difficult for the youth of our congregations to connect their faith with the world in which they live. We need to be more deliberate, and creative, and explicit, in declaring that scientific knowledge about the universe and the church’s confession about God the creator are not opposed to one another. So, this session is going to explore how wondering at creation, and especially wondering at the big universe, can be an important part of faith. This image, by the way, is what is left after the explosive death of a star long ago.

[Slide #2 – NGC 6820] And this is a picture of a stellar nursery, where new stars are being formed.

Our view of the universe has radically changed in the last century. We have an obligation, I think, to help the people in our congregations, including but not only the youth, to think and to speak and to live out faith in ways that don’t ignore what we have learned about the world around us. I think that is important if we are going to be able to engage in God’s mission in and to the world in ways that are wise and faithful. I think it is important also for helping

youth see that they don't have to choose between faith on the one hand, and an informed intellect on the other.

A sense of wonder is an important part of integrating faith with an understanding of the universe around us. When we stop to consider what the universe is actually like, or even stop to look up into a clear dark sky and see the Milky Way [Slide #3 – Milky Way], wonder isn't hard to come by. The writer of Psalm 8 knew this, and apparently knew that such wonder is a significant part of a healthy faith:

Psalm 8:3-4: “When I look at your heavens, the work of your fingers, the moon and the stars that you have established; ⁴ what are human beings that you are mindful of them, mortals that you care for them?”

Psalm 8 is an invitation to wonder at God's world, and to wonder at what it means to be human. I think that a bit of astronomy can inform our sense of wonder. For me, that wonder is nurtured by a hobby of taking pictures of objects deep in space, and the pictures I'm showing, which I hope will help your sense of wonder today, are all pictures that I took. As I said, Psalm 8 invites us to wonder, and I think that part of that wonder comes from considering the sheer extent of space. [Slide #4 – double cluster] It quickly becomes mind-boggling, and to even get a start on this realization of what the universe is like, we have to shrink it down to a scale model. So...

If the Sun, instead of being 865,000 miles in diameter, is shrunk down to the size of a grapefruit,

then the Earth is a single grain of sand -- how far away, do you think? 35 feet away.

Pluto (I know it isn't a planet, but it is still pretty cool) would be an even smaller grain of sand ¼ of a mile away.

What about the nearest star? Where would the next grapefruit, the closest one to our sun? It would be 1600 miles away. If the sun were a grapefruit in my home in South Carolina, the next star would be a grapefruit in Colorado!

In this tiny scale model, the diameter of our Milky Way Galaxy would be 40

million miles across.

And that's just our galaxy. Just 100 years ago, astronomers weren't sure there were any other galaxies beyond our own. Now we know that there are a staggering number of them – at least 100 billion galaxies that we can see. The context for our faith has changed.

[Slide #5 – M 31]

Here is the nearest big neighbor to our galaxy, the Andromeda Galaxy – like the Milky Way, it is collection of hundreds of billions of stars. Even for our little scale model, this galaxy would be about a billion miles away (I really can't imagine what a billion miles are like; that's already gone past the numbers that seem real to me). The actual distance, of course, is even more mind-boggling. It takes 2.5 million years for light to make the trip from that galaxy to my telescope and camera that caught the light and made this picture: light travelling at 186,000 miles every second for 2.5 million years; that's 7 with 18 zeros after it miles (7 million-trillion miles). It sounds like a made-up number. You see why astronomers use "light year" as a distance. And that's the closest big galaxy. There are hundreds of billions of other galaxies, at far greater distance:

[Slide # 6 – M 81] Here is a galaxy a bit further away, at 12 million light years distance. And that's actually still next door to us in the universe.

[SLIDE #7 – NGC 2903] – This one is 20 million light years away.

[SLIDE #8 - Sombrero Galaxy] – Here's one that is 29 million light years away.

[SLIDE #9 -3628] – Here's one 35 million light years away. (If you've ever seen the Milky Way under a really dark sky, you know there are dark lanes running through it; that is the left-over dust and ash from stars that have burned out; the galaxy recycles that by collecting it in the arms of the galaxy. What you see as dark lanes in this picture is the same thing you see from the inside when you see the dark lanes running through the Milky Way).

[Slide # 10 – NGC 4725] Here's another galaxy that is 40 million light years away.

[SLIDE #11 - Stephen's Quintet] Here are 5 galaxies clustered together, 270 million light years away. Now we need to stop and consider what that means.

The size of universe means that when we see stars and galaxies, we're looking back in time. When the light in this picture left those galaxies, 270 million years ago, all the continents we know on earth today were joined together in one big land mass. The first fish with bones had just started to evolve. While this light traveled on its way to us, the dinosaurs evolved, and then went extinct.

Of course we have trouble grasping this kind of scale. Maybe that's the point. With telescopes and cameras and space probes, we're seeing things that all the earlier generations never even knew existed. [SLIDE #12– M 109] Rather than ignoring such new perspectives or feeling that our faith is somehow challenged by these scientific discoveries, we need to bring them into conversation with our faith. Astronomy can remind us of the overflowing scale, and abundance and variety, in God's creative activity. [Slide #13– NGC 5033] In ways that were not possible to previous generations, we can see the excess of God's glory flung out in billions of galaxies by an unrestrained creator. We are called to enjoy that creation, to wonder at its depth and mystery, and to care for our little corner of it. And maybe we need that staggering scale to begin to think about what we mean by the everlasting faithfulness of God.

Still, it might be easy to feel lost in a universe like this.

[SLIDE #14 - HELIX Nebula]

And yet, faced with the deep night sky, Psalm 8 celebrates that God cares about us: "You have made them a little lower than God, and crowned them with glory and honor. You have given them dominion over the works of your hands." There is wonder expressed here in Psalm 8, wonder at what it means to be human and wonder at the vocation that God has given to humanity. There is also, here in Psalm 8, wonder that God's love is so great, so vast, that God does not lose us in all the wide universe. (This object, by the way, is the sort of thing that forms when a star the size of our sun comes to the end of its life, as our sun will do in about 4 billion years; our sun isn't big enough to blow up in a spectacular supernova – instead, it more gently exhales what it's cooked up out

into the galaxy again). Psalm 8 declares that even in that immense cosmic story, God remains faithful and does not lose us.

[Slide #15– Pleiades] One thing that recent astronomy can teach us is that the universe does have a story. The idea that the universe is eternal and unchanging wasn't seriously questioned until the 18th century. But now we know that individual stars are dying and being born all the time. [Slide #16 – M 78] In places like this one, and this one [Slide #17 – M 42] new stars are condensing out of massive clouds of hydrogen and dust until they finally light up. [Slide #18– flaming Star Nebula] And beyond the life cycle of individual stars, one thing that the discovery of the Big Bang makes clear is that the universe itself is changing and expanding. The difficult part to grasp is that the universe isn't expanding into some larger but empty space, but that space itself is expanding. And that means that new space is coming into existence all the time; there is more outer space today than there was yesterday. The creation of the cosmos continues. [Slide #19 – IC 405] The universe has a story – it is not static, but is a dynamic, changing place. One theologian suggested that we live in the middle of God's unfinished sentence, "let there be ... a universe,"¹ and the unfinished story of creation is still being told.

[Slide #20 - NGC 7762] So, think about what we mean when we say, in the creed, that we believe in God, the creator of all that exists. If we imagine creation happening only at one instant a long time ago, then we haven't grasped what it means to confess God as the creator of all that exists.

[Slide #21– M 78 Wide] The creation of new things –new stars, new planets, new species -- is going on all the time, and that simply wasn't known just 200 years ago. That new realization might help us notice that Genesis 1 reports God saying "Let the waters bring forth swarms of living creatures," and "let the earth bring forth living creatures." [SLIDE #22– M 51] The Genesis account sounds as though God gives to the world the freedom and the ability to produce new

¹ See Ted Peters, ed., *Cosmos as Creation* (Nashville: Abingdon, 1989), 97.

things, to be in a sense God's partner in creating. We see that working its way out both in terms of the evolution of life on this planet, and in a larger cosmic sense in how the universe is still producing new things— not by God stepping in to suspend physics and miraculously manipulate things, but just by the universe doing what it does so well (This picture is two galaxies in the process of merging together and, over the course of several million years, developing into something new – a larger, more mature galaxy).

[Slide #23 –lagoon widefield] Perhaps the wonder that we feel at the universe around us and its story of change and development can help us realize that the journey God takes with the world is longer than we usually imagine. I think we can get a better sense of it when we look at the stars, and listen to astronomers. Science can tell us the story of the universe's birth and its long development; and we, in faith and in wonder, can in turn tell it as the story of a loving creator.

Of course, it is our story too [SLIDE #24– Crab nebula] After the big bang -- this is not a picture of the Big Bang, but of a supernova that people in China noticed as a suddenly bright star nearly 1000 years ago – after the Big Bang, when things finally cooled down enough for atoms to form, for hundreds of millions of years the whole universe was made up of hydrogen and helium and a little bit of lithium, the three lightest elements, and that's all that managed to condense before the pieces had spread apart too far for heavier things to form. Everything else in the universe was formed inside the nuclear furnaces that we call stars. Whether stars were huge and met their end in a gigantic supernova explosions [Slide # 25 –Veil Nebula] or in the more gentle puffing out that a star the size of our sun will go through [Slide # 26 – M 27], the dying stars spread out the old bits of stuff that they had cooked up, and that scattered star material condensed and formed the next generation of stars and solar systems that have things like oxygen and iron and carbon. [Slide #27– skull] The elements that make up our bodies, then, were all created inside stars. [Slide # 28 – Spaghetti Nebula] We're all made of recycled stardust.

The Genesis creation stories insist on our connection to the rest of creation. For example, in Genesis 1 humans are created on the 6th day along with all the other animals. And in Genesis 2, humans – in Hebrew, the word is “adam” – humans are made from the dirt, which in Hebrew is “adamah.” So, adam is made from the adamah; the point there is that humans come from the stuff of the earth, and we belong together. [slide #29– M 57] Modern astronomy also insists on the interconnectedness of all things, the deep connection between stars and galaxies and the atoms that make up our bodies. We belong with the rest of the universe.

[Slide # 30– eta Carina]

We should not be surprised by the fact that the universe is so interconnected. It's just what we should expect in a universe in which God comes to join us through the incarnation. Perhaps such an interconnected universe, where the old stuff of long-gone stars now makes up our bodies, is just what we should expect from a God who intends to bring together and reconcile all things in Christ, as it says in Ephesians 1:10, where we hear that God's promise and plan is “to gather up all things in Christ, things in heaven and things on earth.” The present calling of the church, of course, is to witness to this promise by consistent and bold action toward justice and healing for all creation, at least for the part of the universe that we can affect.

[Slide #31– Deerlick group] The large galaxy here is about 50 million light years away- so, the light left there after the dinosaurs had gone extinct, and mammals had just started to become more prevalent on earth. The smaller galaxies in the picture are 500 million light years away; the light left them before even the first land animals had evolved on earth, and that light traveled 186,000 miles every second since that time to reach us. The scale of the universe does bring us some humility, but it can also help us realize the wonderful gift of being creatures that are able to reflect upon God. In recent years, astronomy has given us a rich story of the universe, a 14-billion year story about formation and

growing complexity. [Slide #32– cocoon] Our faith means that we will tell THAT story, and we will help our youth understand and tell that story, within the framework of the gracious God revealed in Christ. As the church, we can declare that in the galaxies and stars, in the collapsing clouds of new-born stars and in the cosmic self-giving of supernova, we hear a story heading toward the healing and unity of all things that God promises in Christ. [Slide #33 – Sh-170] We are called to appreciate the beauty of creation and even to engage in creating more beauty in the world, and we are called to lessen creation's groaning when we can. We are called to be instruments of God's own care for a creation to which we profoundly belong, and to do so in the assurance that God loves it all, and will bring it all to God's full redemption.

In the 16th century there was an Italian monk named Giordano Bruno (1548-1600). More than a decade before Galileo first looked at the sky through a telescope and revolutionized our understanding of the universe (1610), Bruno seemed to realize intuitively some remarkable things. [Slide # 34 – California Nebula] For example, he said that since God is infinite, God's creation must be infinite too – there is no end to the universe. He also said that since the universe is infinite, it has no center – and so the center of the universe is not the earth, as the church was still teaching; and it wasn't the sun, as Copernicus had by then suggested. Bruno said, rightly as it turns out, that there is no center at all. And he said that means that God is equally present everywhere. Bruno said that there must be other worlds, other planets orbiting the stars too (that's something that we have confirmed in just the past couple of decades). And when his ideas were critiqued as unbelievable, Bruno's response was to say "your idea of God is too small."

[SLIDE # 35 – Rosette nebula] Now, Bruno's story doesn't end well. He taught for a while at the Lutheran university at Wittenberg, but the Lutherans eventually excommunicated him, not so much for his cosmology as for some other very unorthodox ideas about the Trinity and about salvation, and in the end he was burned as a heretic in Rome. [Slide # 36 – Horsehead] My point in

retelling Bruno's story is not that contemplating the universe may turn us into heretics, but that contemplating the universe may help us think bigger thoughts about God. Without stopping to wonder at the universe, the chances are pretty good that our ideas of God WILL be too small. Of course, our ideas of God are always too small, but an awareness of the big universe can help, and that sense of wonder at it all can be a place where we nurture a healthy integration of our faith with the amazing world in which we live.



**PRACTICE
DISCIPLESHIP**

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