

Faith at Large -- Profile

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Sacred starry night

Astronomer finds spiritual, intellectual home in the night skies

By RENÉE LaREAU

Canton, N.Y.

Even in the early evening, the two-lane highway that stretches south from the Canadian border across the St. Lawrence Seaway into Canton, N.Y., threads through a desolate darkness. No streetlights point the way on the quiet road; no blazing truck-stop signs illuminate the night. In one sense, the blackness is unsettling, almost eerie.

But the darkness can be magical, too, even mystical, especially if you see it through the eyes of St. Lawrence University physics professor Aileen O'Donoghue. A rural night sky, studded with stars and bathed in the gentle glow of the Milky Way, makes for a fascinating classroom. Huddled in an open field with a dozen undergraduate students, their heads tipped skyward, O'Donoghue leads a night observation for her introductory-level astronomy class. Using a laser pointer, she gives a guided tour of the September sky. Though summer's end draws near, the three-star formation stargazers call "the summer triangle" still shines brightly. O'Donoghue carefully points out Vega, Altair and Deneb, three distinct points of light first named by Egyptians thousands of years ago.

The students nod, point and spin around in curiosity, their gazes directed toward the soft light of constellations like Cassiopeia and the Big Dipper. They pepper O'Donoghue with questions, which she patiently answers, then drawing their attention to faint, lesser-known constellations that are more difficult to see.

Interpreting the night skies is a way of life for this passionate, faith-filled professor of physics, who generously shares her extraordinary knowledge of planets, constellations and all the mysterious bodies that rattle around the universe so many light-years away. For O'Donoghue, the cosmos is her classroom, and she works tirelessly to help others gain access to its wonders.

"I have my students do some observing of the constellations; they watch the moon through its waxing phases, and I also have them observe the sunset six times throughout the semester," she said. "Naked eye observation is really important -- it makes it real to them. If all I give them is the gamma ray telescopes, it's not an experience to them -- they're taking it on faith."

O'Donoghue, 47, knows firsthand the importance of "keeping it real" for students. This tenured professor and accomplished researcher, born and raised in the Rocky Mountains near Denver, used to hate science.

"It didn't connect with the world outside my window," O'Donoghue said. "We were measuring liquids in beakers and dissecting frogs -- it had nothing to do with the mountains, the sky, the trees, the plants and animals. I memorized phyla. They took the universe, which is fascinating, squeezed everything out of it and

made high school science.”

When she enrolled in an introductory earth science class at Colorado Mountain College in Glenwood Springs, however, a professor piqued O’Donoghue’s interest. “He wasn’t flamboyant or spectacular,” she said. “But he walked up in front of the classroom and threw open the curtains of the universe for me.”

O’Donoghue was hooked on the universe for life. She eventually completed her doctorate, and began her lifelong quest to open the curtains of the universe for others. Teaching everything from upper-level classical mechanics to an introductory astronomy class for non-science majors, O’Donoghue’s passion permeates her teaching whether she’s manipulating quadratic equations or explaining the weather conditions that gave rise to Hurricane Katrina.

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In her early-morning classical mechanics class (for the uninitiated -- it’s a systematic study of motion and force), O’Donoghue scrawls a jumble of integrals, derivatives and logarithms on the chalkboard, wearing one of her trademark T-shirts emblazoned with planets. As she reviews the previous night’s homework, she offers a brief tribute to Sir Isaac Newton, describing how he invented calculus after he was sent home from university during an outbreak of the plague. She clutches one student’s miniature equation book and waves it in the air.

“This is a treasure trove of centuries of math innovation,” she says. “I hope that when you do your homework you realize that you are standing on the shoulders of giants!”

O’Donoghue’s passion carries over into her introductory astronomy class, as she lectures on the composition of the Earth’s atmosphere and its wide variety of gases. The Earth’s atmosphere is so thick and dense, O’Donoghue tells her students, that it bends sunlight, acting like a prism and increasing the amount of visible sunlight the earth receives each day.

“The sun is actually already below the horizon when you see it set,” she says. “Thanks to the atmosphere, we see the sun for six minutes and 22 seconds more than we would if we had no atmosphere.”

“What a generous universe!” she exclaims. “The atmosphere gives this to everyone on earth. It’s not a zero sum game -- nobody’s losing. Our economists hate that! They think that somebody always has to lose. But this extra daylight is pure gift. For your homework, I want you all to spend six minutes in gratitude for the generosity of our universe.”

Perhaps because of her own gratitude for the stuff of the skies, O’Donoghue has embraced a life of teaching even beyond the bounds of St. Lawrence, a private, liberal arts college tucked into the St. Lawrence River Valley that serves 2,100 students. She teaches continuing education courses throughout the “North Country,” as residents refer to this northernmost tier of New York state. North Country Public Radio listeners can tune into O’Donoghue’s monthly “What’s Up?” broadcasts from Canton’s local National Public Radio affiliate, where O’Donoghue invites listeners to observe the seasonal changes in the sky, which, miles away from urban lighting or smog, makes for stellar stargazing territory.

“She’s a dynamo -- she lives in more dimensions than I do; more than most people do,” said North Country Public Radio news director Martha Foley.

“She turns the sky into her own personal planetarium,” Foley said. “We have long nights here, and a lot of the year we are out in the dark. Aileen gets you oriented in a very meaningful way.”

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The awe-inspiring majesty of the universe, with its incomprehensible dimensions of space and time, provokes a paradoxical sense of both the nearness and the distance of God. As one who views the cosmos through the lens of faith, O'Donoghue shows a keen understanding of this complexity. Her bookshelves alone speak to the enormous amount of intellectual energy she has devoted to exploration of this paradox, holding diverse titles such as *Chaos*, *Vital Dust*, and *Through a Universe Darkly*, as well as the writings of Fr. Richard Rohr and religion scholar Karen Armstrong. O'Donoghue speaks eloquently about the interplay between faith and science.

"I believe completely in the cosmology that physics teaches in evolution," she said. "And I believe God works somewhere within the laws of physics. I look at the generosity of the universe, the richness of it, the fact that life manages to live in every environment, from the boiling pools of Yellowstone to the dry pits of Antarctica. Life is just everywhere and it is so abundant. The universe doesn't tell me to believe in God, but once I believe in God, the universe tells me a lot about God -- the abundance, the exuberance, the fecundity of it all."

According to O'Donoghue, even what she calls the universe's "weirdness" reveals a lot about God.

"It's always weirder than you expect," she said. "Weird enough that we can point at places in the sky where black holes exist, and that light can be both a wave and a particle at the same time -- two things that are seemingly contradictory."

It's the universe's weirdness and its sheer magnitude, according to O'Donoghue, that are given short shrift by proponents of theories such as intelligent design.

"Their idea of God, their sense of scale of the universe, their sense of time is so small," O'Donoghue said. "They think that God can only make things in ways that we understand. It's narrow and it's hubris."

In casual conversation and in her professional life, O'Donoghue readily integrates her faith and her scientific pursuits. She writes daily reflections for *Living Faith*, a quarterly compendium of daily scripture-based reflections, and she spent her 2000-01 sabbatical year with the Vatican Observatory Research Group in Tucson, Ariz. She has offered retreats to religious communities, centered on the intersection of spirituality and science.

But O'Donoghue has not arrived at this intersection easily. She admits to having felt a "deep existential loneliness" while ensconced by a starry night sky. She acknowledges that she has struggled, at deep intellectual and spiritual levels, to reconcile her faith life and her professional life as a scientist.

"I had to bushwhack my way to it," she said. "And I still have to practice believing every day." It's these very real struggles, according to one of her former colleagues, that render O'Donoghue's integration both robust and credible.

"She currently connects her scientific work with her spiritual life quite naturally, but this ease comes through having overcome quite a disconnect earlier," said Jesuit Fr. Chris Corbally, vice director of the Vatican Observatory Research Group.

In the midst of her searching, O'Donoghue found a kindred spirit in Jesuit paleontologist and philosopher Pierre Teilhard de Chardin, especially when she read his *Hymn of the Universe*.

“He delights not just in things like a pretty sunset, but in the very elements in the earth’s rocks,” she said. “I delight in them too -- the very elements things are made of. The iron in our blood was forged in supernovas -- we had to have giant stars blow themselves to bits for us to carry oxygen from our lungs to our brain.

“The metals of the earth are from a supernova,” she continued. “I look at a pile of junked cars and I want to weep. These incredible elements have just been tossed aside. With the ingenuity and the care with which they were made, it’s like seeing a stack of corpses in a way for me, because of my reverence for the very elements.”

According to O’Donoghue, practitioners of religion and science bring their disciplines to life on individual and communal levels. Both science and religion, she says, are enlivened, shaped and purified by skeptical communities.

“We have this image of a mad scientist in a basement, working alone,” she said. “But it’s not science until you publish it, until people try it, break it, reproduce it.”

Like a scientific theory, O’Donoghue said, religious precepts are enriched by similar testing and refinement. “You can’t go at it alone -- you have to be able to explain it to someone who is a little bit skeptical,” she said. “It’s about analyzing and comparing one’s experience with others.”

Community provides a healthy system of checks and balances for both science and religion, O’Donoghue said. “Both fields can produce kooks in the absence of a skeptical community,” she said. “Both require faith. We have to believe in our experiments, and we have to believe in our experiences of God.”

O’Donoghue has chronicled much of her spiritual and intellectual journey in a sheaf of eloquent, as-yet-unpublished essays. In their pages, an intelligent and deeply spiritual astronomer wrestles with the fundamental questions that propel her to deeper levels of understanding.

One essay excerpt crystallizes her journey:

Finding my home in the darkness was not easy. Before I knew the depths of the sky, I saw it as a bespeckled roof that dazzled me with its beauty. The patterns of the stars, in rhythm with the seasons, were comfortable friends that made every place from which I viewed them familiar. I sought to know more of them by studying astronomy. I did not know when I began, that one’s intellect cannot travel without one’s spirit and that my intellectual journey to the cosmos would carry my soul to a vast darkness in which it would have to find a home.

Like the astronomers who lived thousands of years before her -- Ptolemy, Galileo, the ancient Egyptians -- O’Donoghue continues the search to find meaning in the darkness. At first glance, that darkness is frightening, disorienting, and infinite. But, as a few nights under the North Country skies with O’Donoghue can teach you, it’s the darkest, blackest skies that best display the heavens’ riches. In other words, it’s often the darkness in all of its mystery that guides you toward the light.

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