

Editorial

What Use Is Astronomy?

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Why do people such as AAVSOers observe or analyze variable stars? A few readers may simply say that observing is a relaxing, outdoor pastime, like fishing, and that analysis is a way to keep the mind occupied, like solitaire. But most will say “to advance the science of astronomy.” But what use is astronomy?

Googling “value of astronomy” usually leads to professional astronomers’ websites which emphasize the economic value of astronomy to other sciences, and to engineering, and to society. Often, this is to counter the claim that astronomy is not relevant or useful today. In Canada, an independent study showed that government investment in astronomy repaid itself several times over.

Astronomy has practical value. Almost every civilization has used the sky as a clock, calendar, and compass. Nowadays, we have other technologies for these, but we can intuitively know the time, date, and direction by glancing at the sun or stars. But knowledge of astronomy is now *essential* for understanding space weather, space hazards such as asteroid and comet impacts, and the nature and reality of climate change.

Historically, astronomy spurred the development of mathematics. Now, it spurs the development of high-performance computing, and the analysis of “big data” with artificial intelligence and machine learning. Graduates of astronomy programs are now in demand for a wide range of careers which utilize these powerful skills. Astronomy has led to low-noise radio receivers and other communication technology, and to sensitive detectors and their application to image-processing for fields such as medicine and remote sensing. By providing the ultimate laboratory—the universe—astronomy has also advanced the physical and earth sciences which are the basis of so much of our everyday life.

Over the millennia, astronomy has also occupied a deep spiritual role in society and its culture, and this has led to the relatively new field of “cultural astronomy.” Skywatching began as an attempt to understand the nature and cause of earthly and human events—what we now call astrology. The heavens were seen as the abode of the gods, and the sun, moon, and planets represented them in the sky. Buildings, and whole communities were aligned to the sky, especially to the rising and setting points of the sun. For centuries, churches and graves in some Western cultures retained these traditional alignments. The calendar was important for setting the date of religious observances, as it still is today. Eclipses and comets were “omens of disaster.”

Unfortunately, astrology is still widely accepted, even though there is no evidence for its efficacy, beyond the “placebo effect.”

Among the scientific revolutions of history, astronomy and astronomers stand out. Think of Copernicus, Galileo, and Newton. Astronomy continues to resonate deeply with both philosophers and the public. I give numerous non-technical lectures to general audiences. They appreciate learning about the vastness, variety, and beauty of the sky and the universe, and are as excited about black holes as schoolchildren are. In the words of Doug Cunningham, a teacher colleague of mine, astronomy “harnesses curiosity, imagination, and a sense of shared exploration and discovery.”

For a 2003 conference of the International Astronomical Union, I outlined the many reasons why astronomy should be part of the school curriculum: www.astro.utoronto.ca/~percy/useful.pdf, and I’ve been active for many decades in creating curriculum, reviewing textbooks, and providing training and resources for schoolteachers. In addition to the considerations listed earlier, astronomy can be used to illustrate otherwise-boring or difficult topics in math and physics. It requires and enables students to think about vast scales of size, distance, and time. It provides an example of the role of observation and simulation as ways of doing science. It’s the ultimate interdisciplinary subject. In my lectures and writings and other outreach activities, I love to explore astronomy’s connections to the arts and humanities, and to culture, as well as to other sciences. If properly taught, astronomy can promote rational thinking and an understanding of the nature and value and power of science—something sorely needed in this age of “fake news.”

And “the stars belong to everyone.” You may have an expensive telescope and CCD camera, but one can still enjoy—and even contribute to—astronomy with binoculars and the naked eye. We need to get young people started as enthusiasts, observers, and “citizen astronomers,” to replace the graying, primarily white male observers of today. Astronomy is benign. It is environmentally friendly. It has no borders. It’s “one world, one sky.” These considerations are important to young people today.

What has this got to do with you, the variable star observer or analyst? First of all: you are adding a brick or two to the wonderful edifice called “the known universe.” Astronomy, like other sciences, isn’t just big, Nobel-prize-winning discoveries. We all contribute. Your observations help to build the picture which, thanks to popularizers such as Neil deGrasse Tyson,

Stephen Hawking, and Carl Sagan, and Terence Dickinson and Helen Sawyer Hogg in my country, informs and inspires millions. That might include a young student who, attracted to science, will make the discoveries of tomorrow.

And there will be such discoveries. What is the “dark matter” that makes up most of the stuff of the universe? What is the “dark energy” that pushes the universe apart at an accelerating rate? When will we first detect a spectroscopic signature of a biogenic molecule in the atmosphere of an exoplanet?

And in the field of variable stars: what are fast radio bursts (FRBs)? How can we “sharpen” Cepheids and supernovae as tools for determining precise extragalactic distances? And at a more mundane level: what causes the unexplained phenomena in long-period variables—wandering periods, variable amplitudes, and “long secondary periods”—that I and my students study?

But don’t leave all the popularizing to the professionals. In addition to your variable star observing and analysis, you can help to advance astronomy through education and public outreach. I’ve outlined how you can do this, and why (Percy 2017). There are eager audiences out there in your community, from schoolchildren to seniors.

Astronomy has value. Your observations and analyses have value. The AAVSO has value. *JAAVSO* has value—in communicating your contribution to “the known universe” to other AAVSOers and to the rest of the worldwide astronomical community.

Reference

Percy, J. R. 2017, *J. Amer. Assoc. Var. Star Obs.*, **45**, 1.