Elements
An International Magazine of Mineralogy, Geochemistry, and Petrology

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Proofreader: PATRICK ROYCROFT
Printer: ALLEN PRESS

elementsmagazine.org

DID SHAKESPEARE GET IT WRONG?

DOI: 10.2138/gselements.17.4.223

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How many of us have had the chance this summer to look up into the night sky, far from the urban/suburban lights, to engage in some thought-provoking star gazing? Consulting the night sky was the habit of our forebears, for the dance of the stars gave valuable guidance: when to reap and when to sow, how long till dusk, how far from home, whether to engage in battle or in love. Though Shakespeare, for one, begged to differ when he wrote, "Not from the stars do I my judgement pluck".

As a child in the 1960s, I admit that I saw far less of the night sky than TV episodes of *Star Trek*. But I did experience the excitement of watching live images of Apollo 11 on TV and then rushing outside with my sisters that summer evening of 20 July 1969 to peer at the Moon. As a seven-year-old, I strained to see the flicker of movement across the crescent Moon as the astronauts were making their first steps on the lunar surface.

It feels a long time ago, that heady time of Apollo lunar discovery. However, the headline news this past summer suggests we are in a moment of renewed fascination with space and planetary exploration. After all, our society's current crop of billionaires, from Bezos to Musk to Branson, are investing vast quantities of their wealth into what some have described as an expensive joy ride into space. Are these entrepreneurs fiddling while Earth literally burns? This summer, the unprecedented number of wildfires that are currently raging across the northern hemisphere, fouling our air, releasing yet more carbon and methane, is beyond sobering. Would our tech-billionaires' resources be better invested here at home, on planet Earth?

Or is the outward look to space by the commercial, private sector less a dithering distraction and more an essential endeavor to solve the sustainability challenges here on Earth? Can the limited supply of some key metals on Earth—needed for our smart phones, laptops, solar panels, wind turbines, and (most critically) our batteries—be feasibly mined from asteroids?

The hype about space mining may be just that. What is real is the accelerating space race among a growing number of nations jockeying for advantage, while the future of the International Space Station beyond 2024 remains unclear. This summer, China announced plans to send a human crew to Mars in 2033 (was Matt Damon miscast in *The Martian*?). The United States recently added a separate branch to its military called the U.S. Space Force. And the most significant competition among the space-focused billionaires this summer was less about exchanging

Image source https://spacetourismguide.com/night-sky-2021/.

tweets about whose rocket ship had the bigger windows and more about who landed the lucrative United States' NASA contract to build the taxi service to transport people to the Moon after a half-century hiatus. The silver lining to all this geopolitical maneuvering has been a steady increase in research funding for space and planetary sciences.

In the meantime, our ability to stand on Earth and stare up at a star-studded night sky is increasingly in jeopardy, as are the astronomical discoveries that can be made with Earth-based telescopes. To satisfy our itch to surf the net from every remote corner of Earth (perhaps to stream episodes of *The Expanse*), within a few short years our night sky will be blanketed by tens of thousands of bright, reflective satellites, which will greatly outnumber the ~9,000 stars that were visible to our ancestors. As some of that satellite debris inevitably falls back to Earth, expect UFO sightings to skyrocket. Soon, the main incentive to jet-set off into space will be the opportunity to see with one's own eyes the ancestral night sky. It is indeed worth viewing, because it is filled with all manner of astronomical wonders, including other suns and their orbiting offspring.

In this issue of *Elements*, the authors take us on an intriguing tour of what we have gleaned and hope to learn from the ever-increasing number of identified exoplanets (4,771 and counting as of 1 July 2021). What emerges is a dizzying array of alternative paths that a rocky planet and its surrounding atmosphere can take in its evolution, and a clearer understanding of the daunting requirements for the emergence of life, all of which is endlessly fascinating. I am left with a deepened appreciation of Earth owing to the realization that, but for the grace of the Cosmos, our mothership may have turned out very differently.

So, perhaps Shakespeare got it wrong. As this issue underscores, the heavenly stars and their orbiting planets have deep insights to impart about our own blue sphere and our own springing to life.

Becky Lange
Principal Editor