ABOUT THIS ISSUE

Alkaline lakes are incredibly dynamic, unique, and fascinating biogeochemical environments. In this issue, a multidisciplinary group of authors uses their diverse insights to portray alkaline lakes' biogeochemical, mineralogical, and geological importance for both science and society. Across all articles, the approachable discussions of the geochemical, biological, and societal aspects of alkaline lake science seek to portray the characteristics of alkaline lakes that make them unique and stimulate continued explorations of these systems.

The issue begins with a standalone *Toolkit*, designed to explain the fundamental but often misunderstood concept of alkalinity. From there, the individual articles explore the unique conditions leading to the formation of alkaline lakes, the distinctively productive and unique microbial ecosystems that inhabit them, their distinguishing chemistry and mineralogy, and their potential to have originated life on Earth as well as Mars. Together, the articles in this issue offer a well-rounded introduction to alkaline lakes. While such a collection could never encompass the breadth of knowledge associated with this field, each reader will undoubtably find something to like and something that they hope to learn more about.

CELEBRATING 2023 WITH A GIFT

Each issue of *Elements* embarks on an exciting tour of the highlights, depths, and most fascinating facets of a current and well-defined topic within the geosciences. Whether you are a long-time subscriber or a first-time reader, we hope that you will find *Elements* issues like this one to serve as a valuable teaching tool for both you and future generations of readers to come.

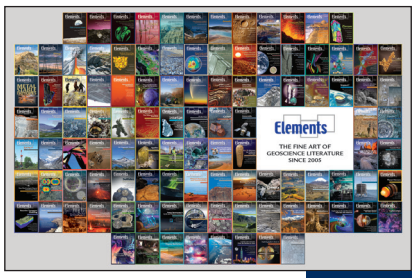

FIGURE 1

Alkaline Lakes is the first issue of our 19th annual volume—and our 108th issue since the first publication in January 2005. As a celebration and special gift, we are pleased to offer you a double-sided complimentary poster on the centerfold of this issue. One side of the poster features the cover images of *Elements* issues published between 2005 and February 2023 (FIG. 1), and the second side is a Periodic Table of *Elements* (FIG. 2) for use in the classroom or office.

To remove the poster, please bend each leg of the staple binding by 90° using a dull knife. Carefully lift the poster out of the binding and then bend the staple legs back to their original positions.

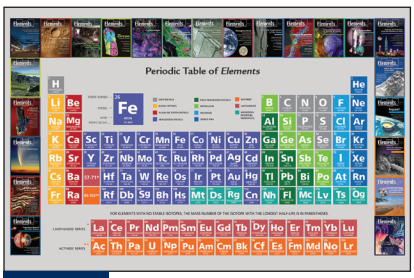

FIGURE 2

We sincerely thank the Guest Editors, Benjamin Tutolo and Nicolas Tosca, and all of the issue's authors for allowing us to include this poster gift for readers within their special thematic issue.

And now, without further ado, we wish you a pleasant journey into the enthralling world—and beyond—of alkaline lakes.

Richard Harrison, **Becky Lange**, **Janne Blichert-Toft**, and **Esther Posner**

EDITORIAL *Cont'd from page 3*

startling breakthroughs in clean energy solutions, geo-engineering feats to pull CO_2 out of the atmosphere, etc. once we begin to make changes?" Indeed, how about the huge potential for clean energy offered by fusion, the Holy Grail of energy, which was finally, after decades of failing, just accomplished for the first time in December 2022 in a breakthrough experiment at Lawrence Livermore National Laboratory using a large laser-based device called the National Ignition Facility? This experiment produced energy via thermonuclear fusion (as in stars such as our Sun) to create more (clean) energy than the laser energy used to drive it. *"But,"* as Becky also cautions, *"those changes will only occur if there is hope. Hopelessness means that there is no point in working toward changing our polluting ways and, if there is no change, then the new emerging climate could be disastrous for civilized humanity."* Many forms of life surely will adjust and may even thrive under such new conditions, given our planet's history of prior mass extinctions and the fact that life has existed on Earth for billions of years, but humans have only existed for a tiny fraction of that time. Human civilization might be the first to go—so we must keep up hope because hope is *the* unique driver of change. At the same time, we must never diminish the seriousness of the climate change issue and its potential for being existential, not necessarily to life per se, but to humankind. To advance and survive, we need hope, and one new thread of hope for achieving a cleaner planet in the future is the science of fusion, which is moving ahead and now beginning to pick up speed. Another thread of hope comes from the encouraging example of something humanity actually did manage to do to protect our planet's entire ecosystem and this was to decrease the use of chlorofluorocarbons (CFCs) by 99% during the last three and a half decades following the 1987 signing of the Montreal Protocol, the international agreement regulating the consumption and production of CFCs, which had created a life-threatening hole in the Earth's ozone layer. As a result, the Earth's ozone layer is now on track to fully recover. To end on a positive note and to loop all this back to the overarching topic of alkaline lakes, these distinctive natural features—alkaline lakes—have shown us, in all probability throughout most of our planet's history, that everything is possible, even that which seems impossible!

Meanwhile, despite humankind's destructive behavior, which if unchanged will put us in the express lane to total ecosystem collapse, alkaline lakes, like the rest of Nature has always done, continue to give generously to society. You will read about how microbial inhabitants of alkaline lakes are utilized in biotechnological applications that we take for granted in everyday life and which probably only few of us, myself included, knew to be derived in one way or another from alkaline lakes. Some examples, remarkable in their diversity, include detergent enzymes, purification of biogas, animal hide, paper processing, and, as implausible as it may sound, even the production of protein-rich foods. In other words, there is far more to alkaline lakes than just salt production!

Please enjoy this tour through the wonderland of alkaline lakes—and don't forget to pack your *Toolkit*!

Janne Blichert-Toft