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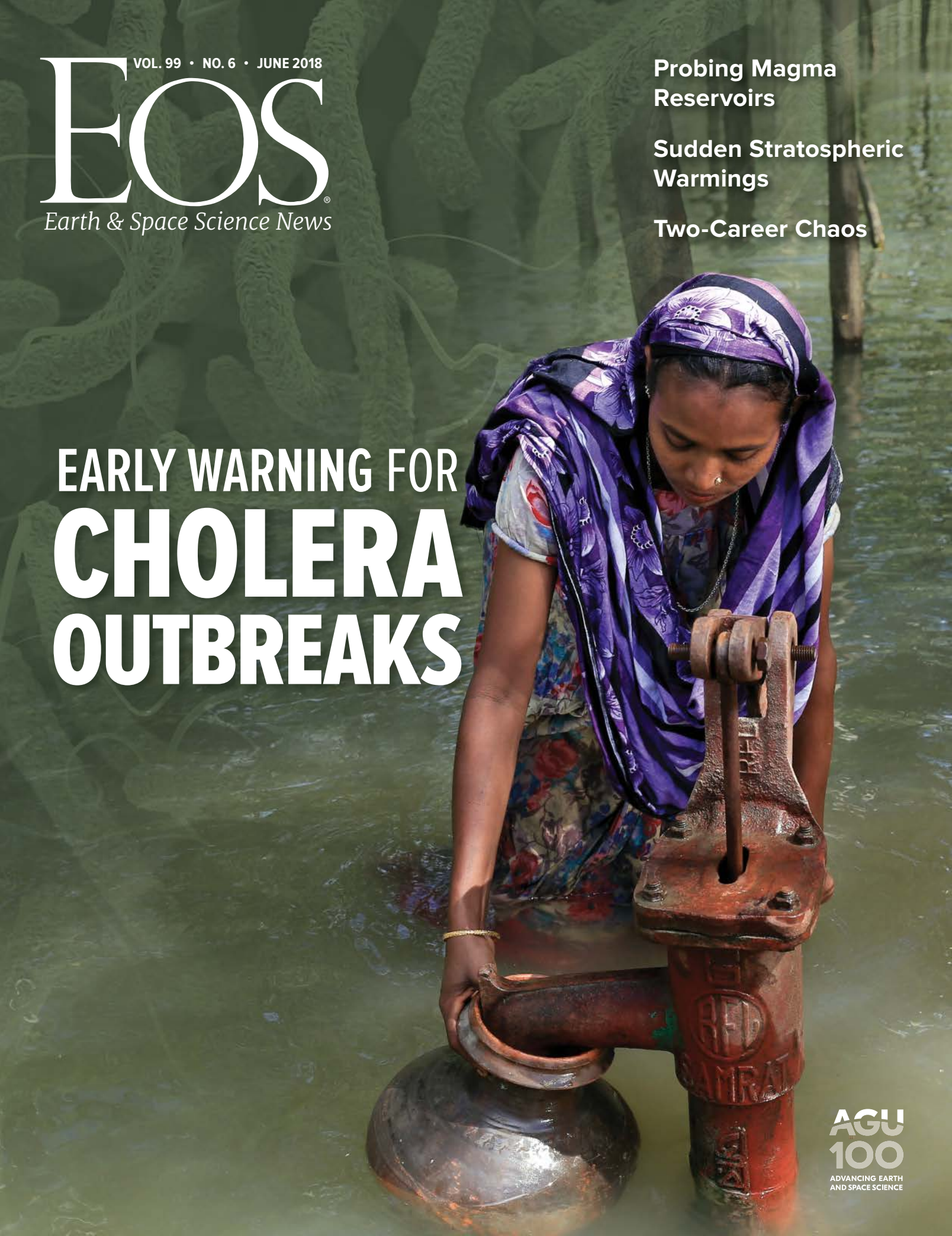

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ADVANCING EARTH AND SPACE SCIENCE

An Aurora of a Different Color

Krista Trinder

A rare aurora-like event, pictured here, paints a green and purple streak across the sky, from bottom left to top right. Called a Strong Thermal Emission Velocity Enhancement (STEVE), this display is criss-crossed by the dusty band of the Milky Way, which curves from top left to bottom right.

A STEVE, captured, in this instance, last year at Childs Lake in Manitoba in Canada, is not an aurora in the traditional sense: Instead of the oval-shaped, blue or green glow of more common types of auroras, a STEVE appears as a thin, purple streak dangling a wavy, green picket fence–like structure. STEVEs always appear at the same time as normal auroras, but they occur at lower latitudes, in an area of the atmosphere called the subauroral zone.

Getting to Know STEVE

In recent years, citizen scientists cataloged dozens of STEVEs and shared them in online forums. They called the phenomenon "Steve" simply for fun within their own group. In 2016, they shared their collection of Steve photos with the scientists running the Aurorasaurus citizen science project, which tracks auroras through tweets and individual reports. The scientists eventually specially crafted the acronym STEVE to give a nod to the original name and its creators.

New insight into the origin and behavior of this rare atmospheric event became possible when, in 2016, a team of amateur and professional scientists used ground- and space-based cameras to image a STEVE and a simultaneous normal aurora. By combining all of the available images, the team discovered that STEVEs and auroras form from a similar process—charged particles interacting with Earth's magnetic field—but the particles that create STEVEs travel along magnetic field lines much closer to Earth than those that make up ordinary auroras. That's why STEVEs occur at lower latitudes than auroras.

In addition, the scientists were excited to discover that STEVEs are the visual counterpart to subauroral ion drift (SAID), a phenomenon studied since the 1970s. Finding out that SAID can have an accompanying visible feature suggests that there may be more going on in the subauroral zone of the atmosphere than scientists had thought, according to the scientific paper on this discovery, which the team published in *Science Advances* on 14 March (http://bit.ly/sci-advcs-steve).

The team is working with NASA on an ongoing campaign to collect more professional and amateur photos of STEVEs, hoping to better understand these rare lights in the sky.

By **Kimberly M. S. Cartier** (@AstroKimCartier), Staff Writer