



Exploring two centuries of the science of water

Scientists experience firsthand how the vagaries of politics, funding, interpersonal relationships, and personal motivations influence the march of science. Historian Sarah Dry's new book, *Waters of the World: The Story of the Scientists Who Unraveled the Mysteries of Our Oceans, Atmosphere, and Ice Sheets and Made the Planet Whole*, highlights that human side of science by focusing on the lives and accomplishments of six scientists, all of whom studied water in its different forms. The stories cover nearly 200 years of history, and along the way, Dry builds a clear and cogent picture of Earth's climate system from the different disciplinary foundations of her chosen characters. It is unusual for a history book to contribute to the readers' appreciation and knowledge of both science and history, but Dry has accomplished that.

Although the author's name is Dry, the text is anything but. *Waters of the World* has an engaging narrative, and I enjoyed reading the stories behind geophysical theories and processes I learned about in graduate school. Dry explains scientific concepts clearly enough to enable lay readers to gain a basic understanding of the physical climate system; her explanations also help readers appreciate the accomplishments of the historical figures. I

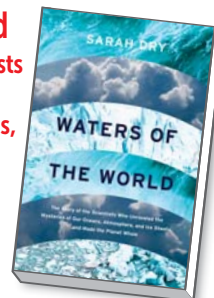
especially admired the way Dry's narrative referenced other great scientists of the day, which supplemented the rich and vivid picture of the six main characters' lives with a reminder of which other scientific giants were working in parallel with them.

Waters of the World is relatively short for a history book. Pithy chapters exploring the science of ice bookend the text; the middle four chapters explore atmospheric phenomena and ocean water. The volume begins with physicist John Tyndall, known for his study of glacial movement. His work helped scientists begin to see that Earth's climate had shifted enough to create vast ice sheets over Europe and North America. Tyndall also studied the absorption of heat by water vapor in the atmosphere; Dry uses that work as a link to the next chapter, which is about the atmospheric phenomena studied by scientist Charles Piazzi Smyth.

Moving from the midlatitude atmosphere to the tropics, Dry covers the life and work of Gilbert Walker, a mathematician by training who made strides toward understanding the Indian monsoon and tropical atmospheric circulation by taming the growing pile of data amassed by the global administrative power of the British Empire. Her next subject is physi-

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cist Joanne Gerould, more commonly remembered by her married names of Joanne Malkus and Joanne Simpson and known for her contributions to our understanding of tropical atmospheric convection. The ocean provides heat for all of that tropical convection, and Dry examines global ocean circulation and heat transport in a chapter about physical oceanographer Henry Stommel. The whirlwind tour through the history of water science ends with Willi Dansgaard's investigations into water isotopes and the record of past Earth temperatures archived in the isotopes of ice.

Dry explores not just the scientific accomplishments of her subjects but also their motivations and foibles. Her nuanced stories teach readers about how we arrived at our present state of knowledge, how science works in the real world, and how we learned about Earth's climate system from the investigations of different forms of water spread over time and space. Dry shows us that science is done both despite and because of the human flaws we all have, and she illustrates how politics and governments influenced the arc of scientific history. She highlights how the pursuit of knowledge by scientists is often also a personal pursuit of wonder, adventure, beauty, and peace.

As a paleoclimatologist, I am a student of both history and climate; *Waters of the World* merges both, and I highly recommend it. I think experts and nonscientists will enjoy the read, and both will gain perspective they didn't have before. I am certainly thinking about getting more copies to give to my family for Christmas this year, and I am even considering asking my graduate students to read it as part of my course on climate change.

K. Halimeda Kilbourne
University of Maryland Center
for Environmental Science
Solomons, Maryland