

Q&A: Treading on shrinking ice

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Author Marco Tedesco on the Russell Glacier, southwest Greenland, summer 2018. Credit: Kevin Krajick/Earth Institute

Geophysicist Marco Tedesco has an affinity for ice in all its forms—snow, glaciers, ice sheets, sea ice—and has spent his career exploring its qualities and fates. He has worked in Antarctica and the United States, but most of his research has centered on Greenland,

where he studies the climate-driven forces attacking the fast-wasting ice sheet.

In a new book, "[The Hidden Life of Ice: Dispatches From a Disappearing World](#)," Tedesco takes the reader on a personal journey through his sometimes dangerous work, and the wonders of the frozen world. Going beyond physics, he delves into the history of polar exploration and the deep history of these remote regions, along with the particulars of how to avoid falling into a crevasse or getting sucked into a subglacial river. A native of rural southern Italy, Tedesco is now a research professor at Columbia University's Lamont-Doherty Earth Observatory. We spoke with him recently about his life, and thoughts about his work.

What draws you to ice?

I always was, and still am, fascinated by how the world works. Once, as a kid, I blew up the electrical system in my parents' home when I was trying to generate a [magnetic field](#) using two bare cables plugged into the electric plug. I decided to study [electronic engineering](#), the closest thing I could think of to practical applications of physics that could provide me with a job. I interviewed to be an engineer, but felt I couldn't have survived. So, I answered a call looking for Ph.D. candidates to use microwaves from satellites to study either the ocean or snow. My advisor assigned me to study snow. It became for me a journey that continues. I did not grow up, as some of my colleagues did, surrounded by snow, or hiking mountain peaks. This is one reason why I am still falling in love with ice and the outdoors. It is almost like I am reborn, living a second life that is fascinating in the same way as when I was a kid. The more I know ice, the more I feel attracted to know more. I can't explain rationally the rest.

A lot of key data about polar ice comes from satellites, but you also carry out expeditions on foot. Why?

Remote sensing from satellites or drones is playing a fundamental role in our understanding of how ice, and our planet in general, is changing. Nevertheless, it often doesn't allow us to capture the processes at work. In the field, we can measure quantities that cannot be captured by satellites, that allow us to understand what is driving the changes. On-the-ground data is also used to assess the quality of satellite data. Remote sensing, fieldwork and models complement each other and help us project future changes. And seeing things with your own eyes can be a life-changing experience. It is very different from looking from space or at a bunch of outputs from a model. It is inspirational and humbling, and allows us to uncover new thoughts that can ultimately lead us to new research questions.

Are there any surprises you and others have uncovered in the small details?

As scientists, we are always surprised by the things we observe. I clearly remember the first time I saw a cryoconite on the ice. That is a pocket of soot, dust, algae and bacteria that drills into the surface. Given their dark nature, they absorb more solar radiation and, therefore, enhance melting. These mini ecosystems are the only place on the ice where life strives to hang on. Another surprise is what I call melting cannibalism. As [snow melts](#) and refreezes, its grains grow and, as a consequence, they start absorbing more solar radiation. A white snowfield might actually absorb more energy than a dark one. As the grains grow more and more, the snow absorbs more solar radiation, hence promoting more melting through a vicious, positive feedback.

What was your scariest moment in the field? The

best?

All moments are great on the ice. However, I clearly remember the exact moment when I first stepped out of the helicopter to walk on the [ice sheet](#). I wasn't scared, but fearful. I approached the ice as when you approach a majestic animal who is letting you interact with it, but who can destroy you in a second. Another episode occurred in Greenland, when we heard cracks in the ice opening below us. It was like thunder coming from below our tents. A few hours later, a nearby two-mile-wide melt-water lake suddenly drained into the ice below. Although I tried to play it cool with the team, I was concerned something could happen.

Why do so many Americans deny the realities of climate change? How do you deal with that?

I think a lot has to do with misinformation promoted by private interests. Climate change has been made into a partisan issue. Unfortunately, some people read only headlines, tweets or Facebook messages, and tend to think that whatever they read is the pure truth. My job is to show our results based on the scientific method, and to communicate these results. I personally try to be as engaged with the public as I can. When I meet a skeptic, I try to listen to their reasons, and explain how those reasons are supported by only a handful of people whose science background is weak, or in a field different from climate. Obviously, being skeptic is not a bad thing—the opposite. But selecting only information that makes your point is not about being skeptical; it is about forcing reality to achieve private interests.

Do you consider yourself a warrior in a war against climate change? If so, does that conflict with your role as a scientist?

I don't consider myself a warrior, but a fighter. In my work, I try to support our fight to mitigate the effects of climate change, support future solutions and understand what are the current impacts on people. I don't think that being committed to social challenges interferes with one's role as a scientist. I think the age where scientists were isolated in their ivory towers is over, at least in climate science. I consider being involved in the fight to be one of the most crucial aspects of my job, and I strongly invite my colleagues to join the fight. Science is a vocation, I agree, but it has to fulfill a social purpose, for many reasons.

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