

Review of “El Niño: Unlocking the secrets of the master weather-maker” by J. Madeleine Nash

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Review by William S. Kessler, NOAA / Pacific Marine Environmental Laboratory, Seattle

Since part of my job is to respond for NOAA to public questions about El Niño, I am continually made aware that there are many non-scientists who are trying hard to understand the natural world around them but are undone by lazy or incompetent science in the media. They read or see a typical report that has dumbed down the content until all that's left is a bag of extraneous information that follows no logical path. Irritated, and hungry for explanations that make sense, some of them write to NOAA asking serious and thoughtful (though perhaps naive) questions about how the climate system fits together. Producing such explanations is not different in character from preparing a good seminar; many details that would be necessary in a paper are omitted, but the fundamental logic of the work must be explained or the talk becomes incomprehensible. L. Madeleine Nash's "El Niño: unlocking the secrets of the world's master weather maker" fails this test, especially as regards the physical science discussed. The reader comes away with a vivid sense that much weather variability around the world is correlated with the ENSO cycle, but virtually no idea why this should be so or how it comes about.

Ms. Nash, senior science correspondent for Time magazine, is at her best at writing about how scientists develop hypotheses and work through their implications. She likes scientists and can explain the process of research realistically, including both the "Aha" moments and the long path to establishing a hypothesis into an accepted fact. She conveys the excitement at conferences when new ideas are about, the competition to explain new pieces of data, and the interplay among funding agencies and academic and government institutions that comprise researchers' working environment today. While there are plenty of stories in the book of scientists climbing snowy mountains, crossing deserts, braving sharks, and bucking big waves in small ships to get data, Nash is equally interested in the work of those sitting in front of computers, and she describes their role in thoughtful detail. She chronicles pioneering climate scientists such as Walker, Bjerknes and Wyrki, as well as numerous others more briefly, both with anecdotes and their parts in the development of ideas, that fill in the sociological history of how the many pieces of the puzzle were put together over a century. Present-day scientific notables familiar to those in the field fill these pages, with entertaining stories of motivation and early work that their colleagues don't often hear. For these reasons the book will be interesting to climate researchers.

The major, deeply-disappointing, failure of the book is the near-total absence of physical reasoning in the explanation of climate phenomena. I was not expecting a discussion of Rossby waves in shear flow, or moist convection, or stability of nonlinear dynamical systems. But she leaves her readers with nothing more than a useless list of facts when she describes El Niño's eastward-spreading SST warming, and the heavy rainfall that goes with it, in separate sections without ever making the connection between heating from below and convective precipitation. Surely anyone who chooses to read a book about El Niño will want to understand that level of physics and will be bewildered trying to fit the pieces together without it. When facts are stated without a logical trail, the story becomes meaningless and eventually boring, like a poorly-taught junior high school history class forced to memorize the dates of U.S. presidents without context. Nash's recounting of physical processes is breathless, as if she knows she must mention a few facts but rushes through to avoid having to really explain anything. Similarly, the coupled nature of the trade winds generating both east Pacific upwelling and the west Pacific warm pool, with the resulting SST gradient a positive feedback for the easterlies, can easily be explained to a non-scientist. Armed with that picture of coupled air-sea interaction, the collapse into El Niño is a largely comprehensible event whose explanation would leave the reader having learned something illuminating about how the climate system works. Nash's descriptions do nothing of the sort, leaving the curious reader with the idea that the physics are probably just too complicated to understand. Since most readers of this book will be the people who are seeking such illumination, it is an opportunity lost.

Nash is much better with biology and ecosystems, where she has obviously been paying closer attention and can draw the trail. We learn the intricate relationships among species of mosquitos, and how the social structure of deer mice populations interacts with swings of the ENSO cycle. There are interesting chapters on how ancient agricultural people of the Andean highlands dealt successfully with El Niño-induced rainfall fluctuations. Perhaps the most detailed portrait in the book is of glaciologist-turned-paleoclimatologist Lonnie Thompson, whose fieldwork in the Andes produced the first paleoclimate records of El Niño in glacier cores, based on dust layers and oxygen isotopes. Nash follows Thompson through the stages of his career as he gradually realized that the tropical glaciers contained records of interannual and lower-frequency variability, and how he and others learned to meld those data sets into a convincing time series of climate fluctuations.

The other major shortcoming of the book is its relentless depiction of El Niño as an unmitigated disaster. After reading chapter upon chapter recounting floods, fires and diseases in lascivious detail, one wonders how humanity could have survived this long with El Niño on the loose. Somehow Nash never manages to mention that an El Niño winter appears to be a net advantage to the United States, in both lives and money saved compared to typical winter conditions, because the benefits of milder weather across the northern states outweigh the more spectacular negative impacts in the south (Changnon 1999). Though she spends considerable time on ecosystems, she does not note that since El Niño has been part of the tropical Pacific environment for millions of years, the web of life there has evolved with it, presumably able to take advantage of its opportunities and adequately evade its dangers. It is like describing winter in Alaska as a terrible catastrophe: deliciously lingering over the brutal cold, the bitter winds and the ice-covered vegetation, without mentioning that this apparently harsh environment supports a rich spectrum of year-round mammals.

From the climatologist's viewpoint, this book's unphysical content is a real disappointment. One imagines the readership of such a book to be interested enough to want to learn more than that there are many weather disasters associated with El Niño. They must know that already. The likely readership is the same people who write to NOAA asking for a deeper explanation of how ENSO works, and I could not recommend this book to them for that purpose. It is the subtitle of this book: "Unlocking the secrets of the master weather-maker" that is misleading. An accurate subtitle would be "The Pacific weather-maker's global repercussions". Then it would be clear that the real subject of this work is the impacts of El Niño and society's responses to it, not the phenomenon itself.

References

Changnon, S.A., 1999: Impacts of 1997-98 El Niño-generated weather in the United States. *Bull. Amer. Meteor. Soc.*, **80**, 1819-1827.