

BOOK REVIEW

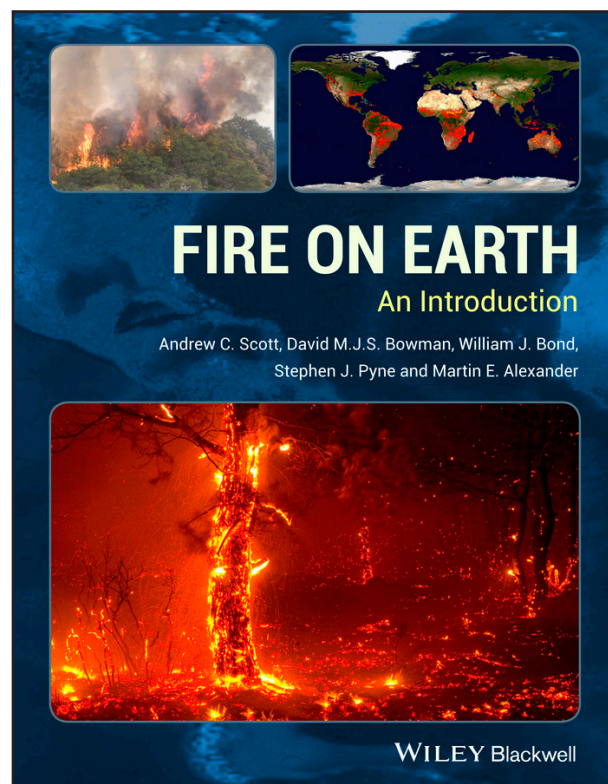
Fire on Earth: An Introduction. 2014. By **A.C. Scott, D.M.J.S. Bowman, W.J. Bond, S. J. Pyne, and M.E. Alexander**. Wiley Blackwell, Hoboken, New Jersey, USA. 434 pages. Paperback, US\$89.95; hardcover, US\$149.95. ISBN 978-1-119-95356-2.

I'd just returned from sabbatical in Spain and was suffering the disillusionment that accompanies reentry into a less exotic work environment. The first few pages of *Fire on Earth: An Introduction* produced the first jab of inspiration I'd felt in weeks. Yes, we have broadly neglected fire in our intellectual disciplines for hundreds of years! Yes, there is no greater integrating and influential force than fire! Yes, I think I actually want to read this 400+ page book cover to cover! This book is the latest addition in the exponentially growing library of wildfire texts, most of which focus on a region, an ecosystem, or a specific challenge (e.g., climate change or managing megafires). However, *Fire on Earth* is unlike its predecessors, and exactly how is succinctly communicated in the preface—a must-read establishment of context and tone, and a guide for the reader's expectations. Along with unabashed apologies to colleagues whose work may be absent from the distilled references and readings lists ("A master bibliography belongs online, not on printed pages." p. xiv), the authors prepare the reader to expect a loosely connected yet comprehensive compilation that falls roughly halfway along the continuum between an edited volume and what the authors warn would be an "artificial" synthesis of fire's multifaceted import.

The four sections of the text: *Fire in the Earth System*; *Biology of Fire*; *Anthropogenic Fire*; and *The Science and Art of Wildland Fire Behavior Prediction*, are indeed comprehensive, but it is left to the reader to construct segues from one section to the next. Perhaps the authors, leaders in their respective fields, are mirroring their own somewhat eclectic collab-

oration, which is impressive in its range of proficiency. Dr. Andrew C. Scott is an expert in the geological history of wildfire; Dr. David M.J.S. Bowman focuses on global environmental change and bushfire activity in Australia; Dr. William J. Bond studies vegetation change and fire ecology; Dr. Stephen J. Pyne explores the environmental and cultural history and management of fire, and Dr. Martin E. Alexander focuses on practical applications of wildland fire behavior knowledge. Although the collaboration is diverse, the shared influence on the resulting work is evident, and the common theme of fire as "an expression of life on Earth and an index of life's history" (p. xiii) ties a loose bow around what emerges as a compelling and wide-ranging fire text.

Fire on Earth: An Introduction's four sections are intended to stand alone, yet motivate intratext interest. References to other sections appear organically throughout, and invite bouts of rapid page-turning. In the preface, the authors also prepare the reader for potential re-



dundancy across the book's sections, which is inevitable given the literary strategy of mutually exclusive interdependence. Although there is some redundancy that may inspire questions of organization, the sections each have their own tone, perspective, and personality. These personalities, reflective of the sections' lead authors, transform redundancy into a virtual discussion forum. The reader can compare how a geologist regards fire regimes (with an emphasis on "deep time" changes in vegetation—climate interactions) with the perspective of a cultural historian, who heralds the integrative and ever-evolving human-fire relationship. In this way, *Fire on Earth: An Introduction* does not provide reductionist "take home messages": a class of university students would likely emerge from its study with as many questions as answers (which is, of course, what we educators strive towards). Still, readers may be distracted by the marked changes in tone, perspective, and scope from one section to the next. Knowing what to expect helps alleviate this minor symptom. As woven into the text, Plutarch's enigmatic reflection captures what seems to be the authors' overarching intent: "the mind is not a vessel to be filled, but a fire to be kindled."

As a fire ecologist who dabbles in fire behavior and fire history, my curiosity was stoked in the second chapter of Part I, "Fire in the Earth System/Fire in the Fossil Record: Recognition." With the exception of a fresh new figure (1.1, p. 4) depicting how fire triangles change over time and space, the first chapter, "What is Fire?" does little to set the stage for the text as a whole. Its aim is deflected by tables of ancillary information (e.g., Table 1.1, which lists over 50 smoke biomarker compounds), and an incongruous emphasis on fire detection satellite technology. Chapters 2 through 5 do much more to establish the text's unique value. Paleoecology books are numerous, but none give such a thorough yet refined rendering of fire's influence and expression through geologic time, and how we have come

to know what we do. The authors succeed in making scanning electron micrographs and proxies of ancient atmospheric oxygen relevant to any student of fire. To learn that wild-fires are indicated in the fossil record as early as the emergence of tiny vascular land plants (*circa* 419 Ma) indeed indicates, as the authors propose in chapter 3, that "fire itself may regulate many aspects of the Earth's system" (p. 66). A detailed discussion of the feedback relationships between fire, atmosphere, and fuels over millions of years provides a captivating substrate from which the reader bounds into the subsequent sections of the text. These chapters left me with the desire to add a new series of lessons to my existing "Fire Ecology and Management" upper-division university course; I would call it, "Fire in Deep Time" and would rely nearly entirely on the material provided in the text, and the generous online features.

This brings me to an important interruption in this chronology. For each of the 16 chapters, the publisher and authors have posted online resources including slide versions of *all* of the figures, pdf-format versions of *all* of the tables, and perhaps the most comprehensive list of websites and links for learning about fire ever compiled (www.wiley.com/go/scott/fireonearth). I would have subscribed to the site for the sole purpose of downloading this list, which ranges from bibliographies and data sharing sites, to fire journals, professional organizations, and even includes links to video content depicting lessons learned from large wildfires, advances in fire experimentation, and more. In compiling these online features, and making them freely available to the public regardless of whether the book was purchased, the authors (and the publisher) demonstrate their dedication to expanding human understanding of fire. They also recognize that the worldwide web has changed the role of the traditional textbook. The title is apropos: the text provides the introduction and foundation, while further readings and online resources ex-

pand the educational scope to a living reference for “fire on Earth.” The other beauty of the substantial online materials is that they effectively increase the half-life of the text, prior to subsequent editions.

Part II, *The Biology of Fire*, addresses the relatively young field of fire ecology. This section presents an efficient discussion of plant, soil, fauna, and ecosystem ecology as it pertains to fire’s role over time and at various scales. The authors argue that the subject has never been more relevant than now, when climate change promises to shift the temporal and spatial dynamics of the fire environment, and therefore life as we know it. The implications are highlighted throughout the section, and it is this perspective that differentiates this text from many other fire ecology works. As stated in the preface to part II, “Fire feedbacks challenge the assumption of simple cause and effect relationships” (p. 112). Instead of getting bogged down in the “devilishly complicated interactions” (p. 168) among ecosystems, the Earth System, and fire, such connections are exemplified in (thankfully only) four fire-feedback figures, and pertinent examples drawing mainly from Australia, Africa, South America, and western North America. In chapters 6 and 7, “Fire and the Control of Biome Boundaries” and “Determinants of Fire Regimes,” respectively, and chapter 8’s “Fire and the Evolution of Fauna” familiarize the reader with key knowledge gaps within the scope of *Biology of Fire*, condensing complicated concepts into salient appetizers to inspire further research and learning.

Although this reader is biased, it was surprising to note that in part II, the authors draw few examples from the southern US, the most frequently and vastly burned region in North America. The region is characterized by arguably some of the most fire-adapted species (e. g., longleaf pine, *Pinus palustris* Mill.) and most flammable, diverse fire-dependent vegetation communities in the world. Some of the concepts introduced in chapters 6, 7, and 10

might have been more holistically illuminated, including the chapter 7 discussions of fire regimes and the evolution of fire traits. For example, the authors’ generalizations about the sprouting characteristics of savanna trees, and C₄ grasses being highly competitive, are both curiously contradicted by the mature longleaf pine-wiregrass savannas of the southern US. The sensitivity of these ecosystems to minor shifts in fire frequency and seasonality make their study uniquely valuable for exploring the effects of changing climate on “...making sense of the plant-fire nexus” (p. 145).

In part III, *Anthropogenic Fire*, the tone shifts to a more narrative, embellished style characteristic of the lead author, Dr. Stephen Pyne. The multitudes that have enjoyed his previous writings won’t be disappointed here. Once again, he manages to weave together landscape, culture, and history to present an equally humanist and environmentalist perspective on the legacy of fire on Earth. The author establishes numerous guiding principles and paints the fire-human relationship with an enjoyably meandering brush, discussing examples from across the world that illustrate the variety of fire’s utility in human life, along with what it says about its culture. The author quips, “Fire follows people like vermin do...” (p. 199): you will have to read the rest of the chapter to interpret the loaded logic of this simile. Fire as a cultural artifact is not a new idea, but its thorough exploration here provides a refreshing complement to the more traditional (irony intended) fire science in the text. A paraphrase would be an injustice to this conclusive sentiment: “Managing fire remains the signature of our ecological agency and ... our ecological duty to Earth ... this issue is not whether we must manage fire, but how well or how poorly we will do it” (p. 257).

Part of how we do it is colored by our attempts to understand and predict fire behavior. This is the text’s most abrupt transition, from *Anthropogenic Fire* to *The Science and Art of Wildland Fire Behavior Prediction*. Again, it

is the responsibility of the reader to segue, if the sections are being read consecutively (although they were not written this way, a consecutive reading enables the “virtual discussion” mentioned previously). The style of this section differs from its predecessors in that “boxes” are added to figures and tables. Although the box labels are difficult to read, their content contributes to illuminating the topics with anecdotes, case examples, lessons learned, and excerpts from other publications. After the first chapter (14), which presents a standard introduction to the fire environment of fuels, weather, and topography, chapters 15 and 16 transport the reader into the mind-state of a fire behavior analyst. Table 15.3 listing “The 10 most dangerous decision traps to avoid in wildland fire behavior forecasting or prediction” (p. 364) can actually be applied to any course of natural resource decision-making, including fire restoration, prescribed fire use, and fuels management. The entire discussion on the limitations and processes of wildland fire behavior prediction is novel and absorbing. As the author states, “Very little research or even thought has been given to the ‘art’ of

fire behavior prediction...” (p. 372). The reader will surely benefit from the detailed thought put into the author’s discussions and comparisons of fire “research” and the more nuanced, experience-based fire “knowledge” (p. 389).

In summary, *Fire on Earth: An Introduction* succeeds in what it set out to do: to reintroduce the reader to the world, this time as seen through a fire lens. This text covers an ambitious range of subjects, yet the readability, inclusive range of examples, and engaging, unpretentious style invites readers from all walks of life and levels of higher learning. Fire and earth scientists, anthropologists, ecologists, resource managers, and especially advanced students in natural sciences will find the text, along with its online resources, a requisite addition to their libraries. Not only is it a pleasure to read, simply put, it sparks the imagination.

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