GUIDE
ORGANIZATION

Form and Structure, Process and Time, Compare and Contrast
The first three chapters will help you define the purpose of your graphic. We identify three major types of scientific graphics: those that illustrate form and structure; those that illustrate processes over space and time; and those that encourage readers to compare and contrast. We explore examples of each of these types used in current research; we define the purpose of the graphic, suggest improvements, and present a revised version. You might note that some of the examples could comfortably reside in more than one chapter, which points to interesting overlaps in concepts and principles.

Case Studies
In this chapter, we explore selected works by researchers and designers in depth, written in their own words. Along with the "before" and "after" figures, the text describes the process and includes the "in-betweens," with explanations of their decisions. The stories describe the evolution of selected figures and animations— —and how the researchers' thinking shaped the process.

Interactive Graphics
In this chapter we take a closer look at interactive graphics. Some are explanatory animations. Some are exploratory graphics, sometimes called data visualizations. In both cases, we describe what the interactivity brings to the graphic. The lessons learned about static graphics in the first four chapters will also apply to these interactive examples. The principles are the same. The strategies in this book are fundamental to any form of visual expression and will always provide a solid starting point for thinking about your visual expression, regardless of its final form.

Visual Index
Here you will find a grid of images relevant to each example in the guide and cite references for each for quick visual reference.

Appendix
The Appendix contains a brief description of the website associated with this book and suggested further readings.

A ROADMAP: HOW TO USE THIS GUIDE

GUIDE DESIGN

The design of this guide reflects the way in which we hope you will use it: as a source of inspiration and as a workbook to refine your critical thinking skills regarding graphics. We present a great variety of examples because we think that the best way to learn how to make effective graphics is by dissecting why some graphics are effective and others are not—and how they can be improved. We also present the strategies used to create each graphic in a succinct visual format, to allow you to quickly see how these strategies are applied in multiple contexts.
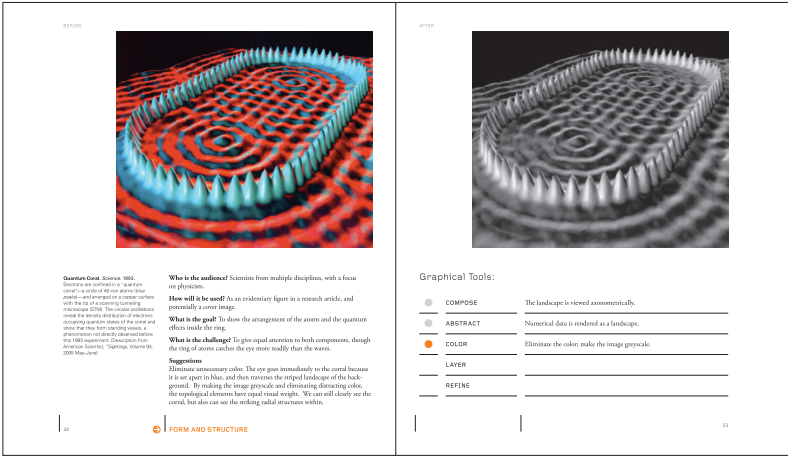
Show by Example

Throughout these pages, we explore different types of graphics to illustrate how they were imagined, created, and refined. We encourage you to consider all of the examples—static images and animations—because it is our belief that the challenges in making good graphics are consistent across different disciplines and all types of representations. Many examples are displayed on two-page spreads to demonstrate how a figure can be improved, represented by a "before" (on the left) and an "after" (on the right) version. A caption provides a brief description of the image and its reference (see the example above). We offer brief answers to the following questions: *Who is the audience?* For whom is your figure intended? How will it be used? In what format will the graphic appear, e.g., a journal article, textbook, grant submission, presentation? *What is the goal?* What do you want the viewer to see first? *What is the challenge?* What is difficult about achieving that goal?

We then offer suggestions for improving the graphic—suggestions made either by us or by the researcher or designer, credited in the caption. There is, of course, not a single correct way to visually represent data or concepts. In fact, you might disagree with how we arrived at a particular "after" representation—or you may have additional ideas for improving an illustration. We welcome those conversations and invite you to share them on our website forum (see Appendix). We hope that these examples will encourage debate and help you develop an analytical approach to creating graphics—just as scientists do in their research.

GUIDE DESIGN

Tabs

The colored tabs on the right edge of the pages identify the chapters of the guide. We included tabs to visually separate the different sections, and to allow you to easily find a section that interests you. *Form and Structure*, *Process and Time*, and *Compare and Contrast*, marked with orange tabs, identify simple concepts that can be tackled in preparing graphics. In *Case Studies* (with a yellow-orange tab) and *Interactive Graphics* (a chartreuse tab), these concepts are explored in more depth.

Graphical Tools:

●	COMPOSE	The landscape is viewed axonometrically.
●	ABSTRACT	Numerical data are rendered as a landscape.
●	COLOR	Eliminate the color; make the image grayscale.
	LAYER	
	REFINE	

Graphical Tools Grid

On the bottom right of each two-page spread you will find a grid to help you quickly identify which graphical tools were used in each example to achieve the goals of the adjoining graphic. Dots indicate which tools are used in the figure: Gray dots indicate tools that were used in the original graphic, and remain unchanged. Orange dots indicate tools that were used to improve the figure.