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Oceanography

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Common Graphics Misconceptions

FOR A CERTAIN generation of scientists, graphics education began by drafting dissertation figures on mylar, taking photographs in the field with cameras that used real film, and getting slides made for meeting presentations. Over the years, we have been forced to learn new graphics tricks to comply with digital requirements for journals and presentation formats for conferences. But even diligent converts to the new era can find the jargon confusing, and it can be time-consuming to generate graphics in the needed formats and resolutions.

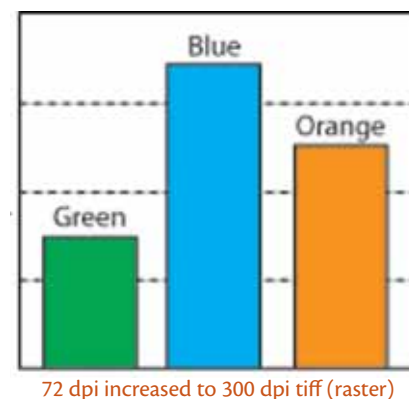
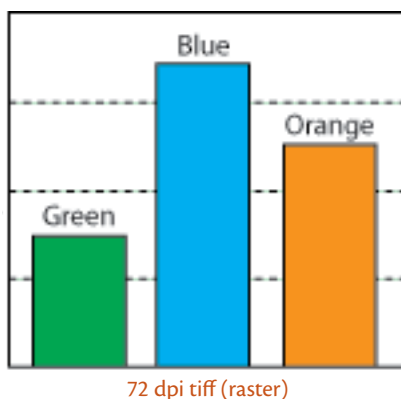
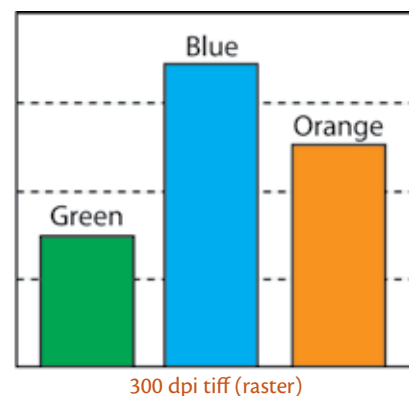
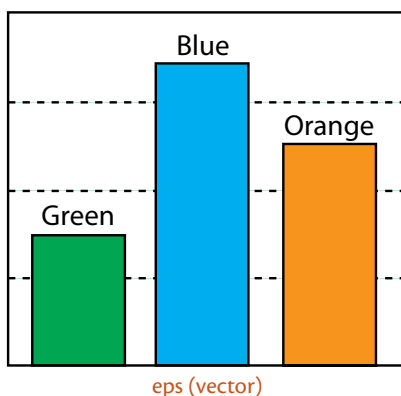
Oceanography works extensively with authors to obtain the best-quality graphics for manuscripts. Although graphics guidelines are posted on the *Oceanography* Web page (<http://www.tos.org/oceanography/guidelines.html>), it often takes several tries to get what we need. Experience has highlighted several common misconceptions about graphics, which are summarized below. The brief attempt to identify and correct those misconceptions may help authors generate graphics in proper format for *Oceanography* as well as for other periodicals.

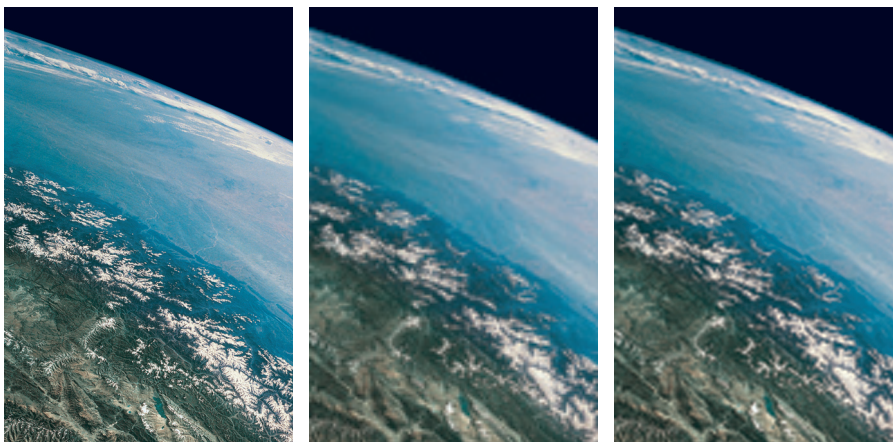
Common Misconception 1: Adobe Photoshop can increase the resolution of my graphics. Photos and satellite images are excellent examples of graphics that are made up of dots or pixels (picture elements). Image resolution means the number

of dots per inch (dpi) or pixels per inch (ppi) an image contains. Standard computer screen resolution is 72 dpi for a Macintosh and 96 dpi for a Windows computer. For sharp printing, the minimum graphic resolution required is 300 dpi. Thus, low-resolution 72 dpi images, perhaps grabbed from a Web site, will look large and wonderful on your computer screen, but will look fuzzy when printed on a laser printer at the size you see on your screen. Increasing the resolution of these 72 dpi images to 300 dpi means their dimensions must

shrink. It's a simple math problem.

All too often, authors figure a quick fix for this resolution dilemma is to use Adobe Photoshop (or equivalent software) and reset the image resolution to 300 dpi (in Photoshop, go to Image in the file menu and then click on Image Size). Like many quick fixes, this one turns out to be too good to be true. When Photoshop is used in this manner, the software is simply filling in the missing pixels required to increase the resolution using a "best guess" process that results in a much-less-than-





300 dpi tiff (raster)

72 dpi tiff (raster)

72 dpi increased to
300 dpi tiff (raster)

optimum image, usually blurred, often with any sharp lines appearing jagged.

Oceanography's consistent practice is to ask authors to hunt down the original, high-resolution image whenever possible. Unfortunately, not all images start at high resolution (e.g., satellite images are often only available at screen resolution), so sometimes the author's initial submission is the only available option. But, we will always ask if something better exists.

Common Misconception #2:
All graphics should be saved in encapsulated postscript (eps) format because graphics in that format will print the best.

That statement is true only in that we want all **vector** graphics—those developed in drawing programs such as Adobe Illustrator, Denaba Canvas, Macromedia Freehand, and CorelDRAW, and images created in MATLAB—to be saved from that software in eps format. Rather than building an image from dots, vector graphics use lines, curves, points, and polygons based on mathematical formulas to create shapes on the computer screen. Vector images can be

scaled—made larger or smaller without any loss of resolution—and print crisply. Vector images should be saved in eps format rather than the native software format (e.g., .ai, .cdr, .cnv, .FH8) so that we can open images that were created in software that we don't own.

Raster graphics (e.g., photos, satellite images, side-scan sonar images) should be saved in tiff format. It is fine, however, to import a high-resolution photo or other raster graphic into one of the drawing programs and then overlay text or other enhancements. Such hybrid graphics should be saved in eps format for the best print quality.

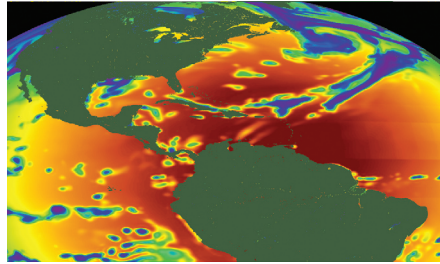
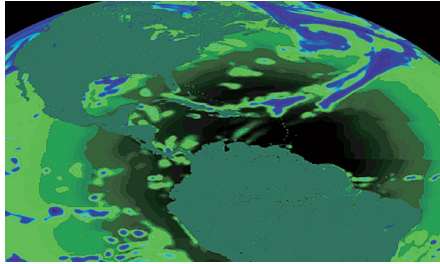
Common Misconception #3:
Raster graphics re-saved in eps format will satisfy *Oceanography*'s requirements.

Sometimes it is obvious that a low-resolution raster graphic submitted to the magazine had been created originally in a vector drawing program. In such instances, we will ask the author to return to the original graphic in the drawing software and save the image in eps format so that will print crisply.

Authors who receive such a request should **not** use the shortcut of opening up the low-resolution raster graphic in a drawing program and then resaving it in eps format. Once a graphic has been made into pixels, it can never be a vector graphic again, and the shortcut accomplishes nothing. A vector image is only obtained when the original graphic is opened in the drawing software and saved in eps format.

Common Misconception #4:
It's not really necessary to fix the color mode to CMYK (and what is it, and how do you do that anyway?).

A typical color printer mixes cyan, magenta, yellow, and black inks (our CMYK color mode) in each ink dot to generate a color graphic. In contrast, a computer monitor uses red, green, and blue (RGB) light to generate millions of screen colors. Thus, CMYK is the mode for optimal color printing, while RGB is the mode for optimal screen viewing. Graphics software—Adobe Photoshop for raster graphics, Adobe Illustrator for vector graphics, or equivalents—allows users to select the color mode. The change from RGB to CMYK color mode can sometimes greatly modify the color scheme and change how a graphic looks. As a result, we prefer that authors change their images' color modes (particularly satellite images) from RGB to CMYK themselves so that they, rather than the *Oceanography* staff, can adjust the colors. To change color modes in Photoshop, go to Image on the menu, and select the color mode from the dropdown Mode menu item. In Illustrator, go to Document Color Mode in the File menu and make the switch.



An example of potential color problems with graphics submitted in Microsoft Word. On the left is a graphic we extracted from Microsoft Word and placed in Photoshop, where we then changed the color mode from RGB to CMYK and saved in tiff format for print. On the right is the same graphic submitted to us as an independent tiff file with the color mode set to CMYK by the author.

Common Misconception #5: *Oceanography* will accept graphics that are embedded in Microsoft Word, PowerPoint, or Excel because the graphics print fine in those formats.

Microsoft Word, PowerPoint, and Excel are not graphics software. We cannot import images in those file formats directly into our design program. If we receive graphics drawn or placed in any of these programs, we have to extract them, place them in Illustrator or Photoshop depending on whether they are vector or raster images, check their resolution, change the color mode, and save each graphic as a single file in the appropriate printing format (eps or tiff). Graphics drawn in Microsoft PowerPoint or Word can be a particular problem. These programs are not for professional graphic design and we often cannot extract images from them as authors drew them. The exception is Microsoft Excel, where charts and graphs produced in that software can be copied and pasted into Illustrator or equivalent and saved in eps format. We prefer that authors perform these actions themselves.

The increasing costs for producing *Oceanography* include costs associated with the time required to prepare graphics to look their best in print. It is a tremendous help when graphics come to us ready to go. If at any point you have questions about our graphics requirements, we are always happy to provide instruction. It will save all of us time in the end if we are educated about what makes a good, printable graphic.

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