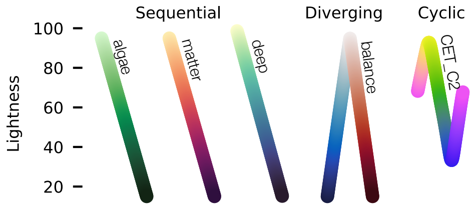
How To Choose A Colormap

Use Appropriate Colormap Type



Sequential to map size of a variable.

Diverging when comparing with a critical point, *e.g.*, sub-/super-critical Froude number.

Cyclic for data that wraps around a circle like phase.

Perceptual Uniformity

Use perceptually-uniform colormaps. Only break from perceptual uniformity-with purpose, *e.g.*, indicating values of particular importance with another shade of color.

Use Intuition

When possible, match colors in plot with intuition (*e.g.*, cool to warm colors for temperature).

Color Blindness

Avoid red and green in the same plot.

Match Colormap To Data

Have one colormap per variable so that it can be tailored to the variable and to build up familiarity.

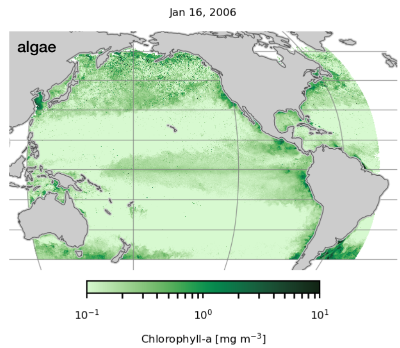
Magnitude vs. Range

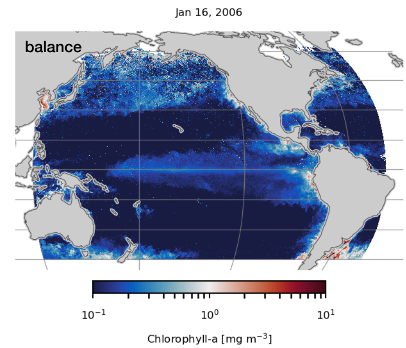
Represent data that is amount of something (rain, turbulence) with shades of a color. Represent a range (temperature), with a multi-hued colormap so low values have a color besides white which may imply less instead of lower.

Sequential Example

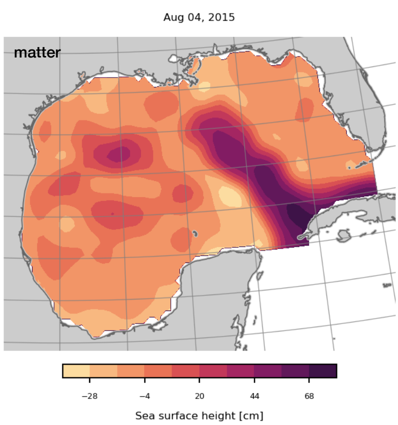
Global chlorophyll data[1] is more clearly shown with a sequential colormap *(left)* than diverging *(right)*, which introduces a meaningless significant color change. Shades of green intuitively represent increasing chlorophyll.

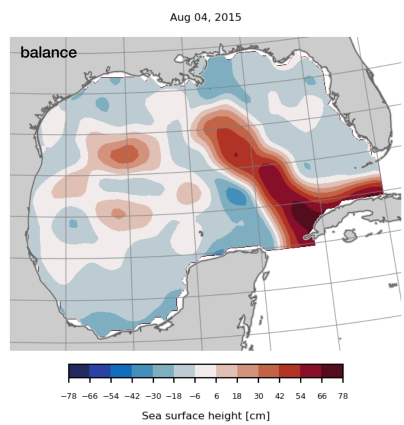
[1] https://coastwatch.pfeg.noaa.gov/erddap/griddap/erdMBchlamday.html





Diverging Example





The diverging colormap *(right)* appropriately compares below and above mean sea level[2], with the important Loop Current in the Gulf of Mexico clearly differentiated with respect to mean sea level. Overlay labeled contours for differentiating postive/negative after printing to grayscale.

[2] https://geo.gcoos.org/ssh/

Cyclic Example

Tidal phase in the North Atlantic Ocean[3] cycles around a circle. The sequential colormap *(left)* has a meaningless disruptive break whereas the cyclic colormap *(right)* maps values with smooth variation around a circle. Changes in lightness help the eye, though give artificial magnitude to numbers.

[3] http://volkov.oce.orst.edu/tides/global.html; Egbert, G. D., and S. Y. Erofeeva, 2002: Efficient Inverse Modeling of Barotropic Ocean Tides. J. Atmos. Oceanic Technol., 19, 183–204, https://doi.org/10.1175/1520-0426(2002)019<0183:EIMOBO>2.0.CO;2.