Colors play a significant role in how people interpret and interact with the world, as certain colors can evoke different emotional responses based on personal associations. These emotional, or affective, associations are influenced by the three dimensions of color space: hue, chroma, and lightness. To represent continuous data in visualizations, color scales, which vary in hue, lightness, and saturation, can be used varying in lightness and chroma. Our research explored what factors influence the affective connotations of color scales that are used to represent continuous data.

To approach this question, we first collected association ratings between eight affective terms and greyscale maps. Maps were created using data from a map of aboveground biomass stock and were selected based on how uniformly the data was represented, such that each value in the data set was relatively equal in being represented in the map. Sixteen maps were then selected from this set for the next experiment, where participants rated emotional associations with colored maps. These maps were created using color scales generated through an orthogonal combination of four hues (Red, Yellow, Green, and Blue), two lightness levels (light, dark), and two chroma levels (saturated, unsaturated). Color scales were generated using Color Crafter, which is a program that allows people to create scales using a single seed color.

The results showed that lightness did have an effect on association ratings, with positive emotion terms being positively correlated with lighter scales and negative emotion terms being positively correlated with darker scales. The emotion term “calm” was positively correlated with lighter scales. Future experiments will focus on maps that are skewed towards one end of the color scales, such that they appear lighter or darker based on the data used. This is necessary to emphasize the importance of being data aware when using color scales.