Scientific Colour Maps: Reducing error across the Geodynamics community

Fabio Crameri
University of Oslo, Centre for Earth Evolution and Dynamics (CEED), Mathematics and Natural Sciences, Oslo, Norway
(fabio.crameri@geo.uio.no)

A colour map is a virtual axis that displays a third dimension within a 2-D plot. Hence, the colour axis needs to fulfil the exact same conditions as the position axes (i.e. x and y axes) are generally subjected to: An equal change of data has to be equally represented all along the axes. Such an undistorted and error-free mapping of data to colour is only given if the colour palette is perceptually uniform.

Nevertheless, non-scientific colour maps are dominant in the Geodynamics community today. In fact, the most-used colour map in presentations at the EGU general assembly in 2018 - including the Geodynamics sessions - was one of the most data-distorting (see https://betterfigures.org/2018/04/16/how-many-rainbows-at-egu-2018/). A common switch to non-data-distorting, perceptually uniform colour maps today would, therefore, likely be the most effective way to significantly reduce error across the whole Geodynamics community and beyond.

Therefore, I present here the first large suite of scientific colour maps (Crameri 2018, GMD). The Scientific Colour Maps feature five crucial characteristics: They are (1) perceptually uniform (i.e. not distorting the data), (2) perceptually ordered (i.e. intuitively readable), (3) colour-vision deficiency (CVD) friendly (i.e. not excluding minorities), (4) readable in black-and-white prints (i.e. effective and useful), and (5) freely available in all major data formats (i.e. open accessible).