Improved colorbar proposal for cloud and aerosol lidar parameters

Thibault Vaillant de Guélis[1,2*], Jason L. Tackett[1], and David M. Winker[1]

[1]NASA Langley Research Center, Hampton, VA 23666, USA
[2]Analytical Mechanics Associates, Inc., Hampton, VA 23666, USA

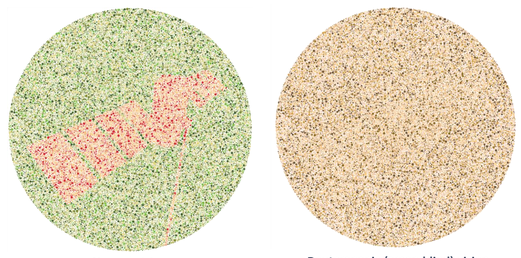
*Contact: thibault.vaillantdeguelis@outlook.com

Problem



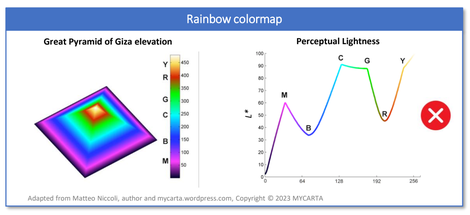
Still many scientific publications with *rainbow* colormaps:

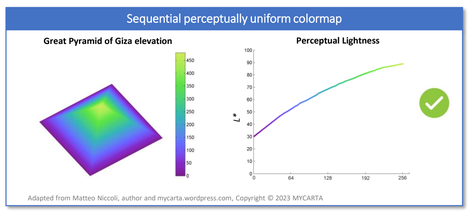
- poorly represent the data because they **distort the information** through non-linear changes in the perceived lightness,
- very difficult to interpret for people affected by a **color-vision deficiency** (Crameri et al., 2020), which affects around 1 in 12 men and 1 in 200 women,
- contravene scientific **journals submission requirement**.



Proposition

One way to achieve colorblind-friendly colormaps is to ensure that the **perceived lightness increases sequentially**.

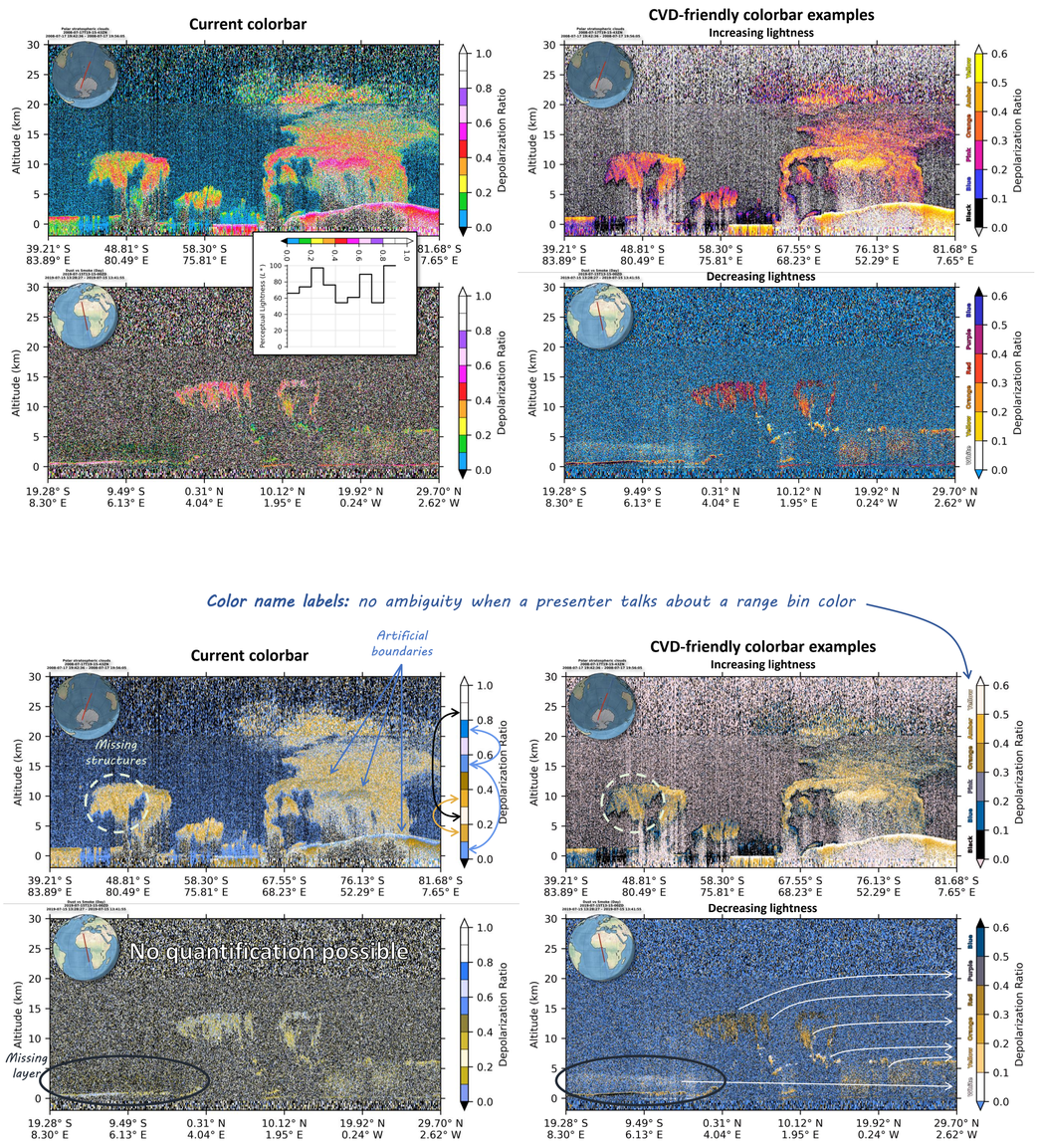


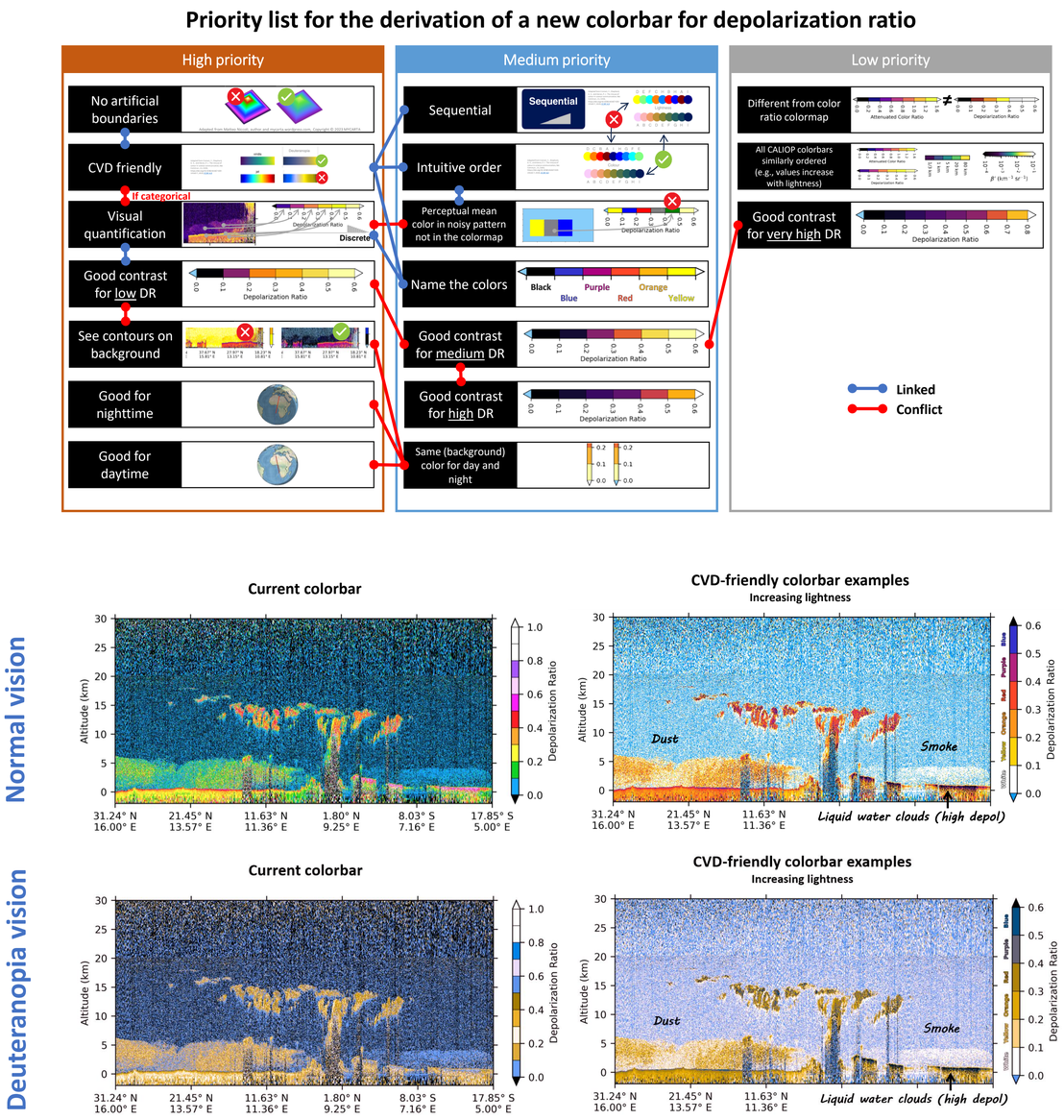


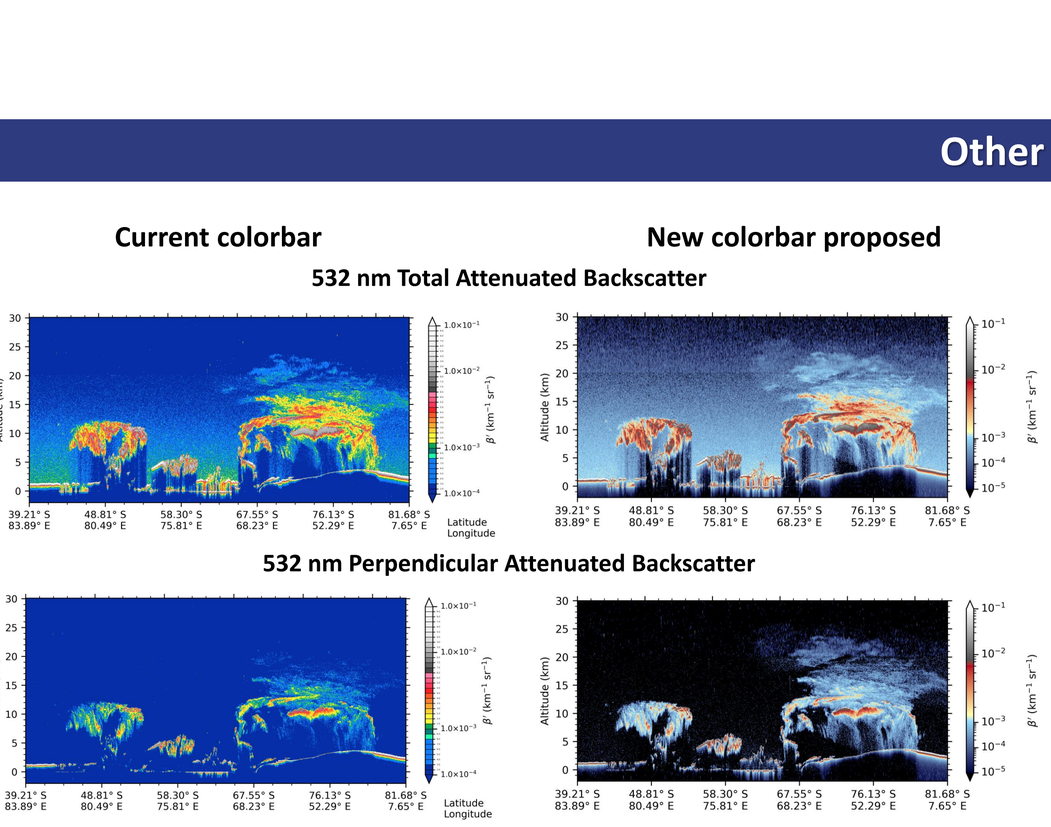
Main goals:

- Improve visual quantification
- Color vision deficiency friendly
- Adaptable to other lidar systems
- Final CALIOP data release to adopt new colormaps

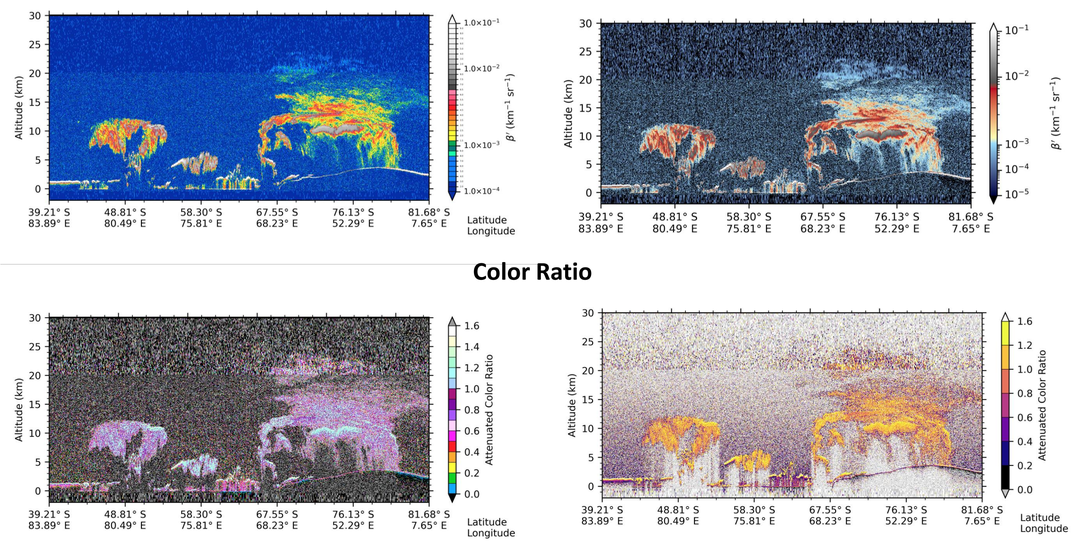
Illustrations with depolarization ratio CALIOP images







Other CALIOP parameters



Conclusions & Perspectives



We want your feedback!

Adapted from Uncle Sam I want you for Wikidata.png by Ebraminio via Wikimedia Commons, Public domain

For now, colormaps proposed for:

- **backscatter**,
- **color ratio**,
- **depolarization ratio**.

Defining colorblind-friendly colormaps on space lidar observations are very challenging:

- **very noisy** signal generating images with high variations at a pixel level,
- attenuated backscatter signal spreads over **multiple orders of magnitude**.

A critical objective of presenting this effort to the ILRC is to get **feedback from the atmospheric lidar science community** to potentially converge to common set of colormaps for the commonly used atmospheric lidar variables as was done in the ocean science community (Thyng et al., 2016).

References

Crameri, F., Shephard, G.E. & Heron, P.J. The misuse of colour in science communication. Nat Commun 11, 5444 (2020). https://doi.org/10.1038/s41467-020-19160-7

Thyng, K. M., Greene, C. A., Hetland, R. D., Zimmerle, H. M., & DiMarco, S. F. True colors of oceanography. Oceanography, 29(3), 10 (2016).

Please send your comments to: thibault.vaillantdeguelis@outlook.com