


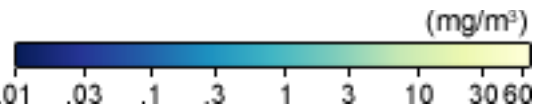
- An important question comes up with any color map for the NASA NEO data.
- How much Chlorophyll Concentration is a particular color on the Kindlmann scale?
  - NASA encodes each GeoTiff has an 8 bit Gray Scale TIFF. 8 bit implies there are 256 levels.
  - Then the Kindlmann color map is applied, turning the 8 bit Gray data into Red, Green, Blue, Alpha data
  - NASA did not publish the values that went into the original color map, so a model was created below.

To estimate the Chlorophyll Concentration for a color, do the following

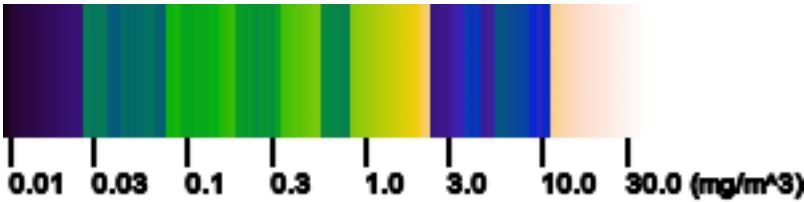
- 1) Using the raw RGBA data from the Kindlmann map, Given an RGB value, e.g., (7, 145, 56), map to an 8 bit value, (Gray = 134)
- 2) Compute using the estimation model

$$\text{Chlorophyll} = \exp \left( \left( \text{Gray} - 134.53 \right) / 28.826 \right)$$

  $\text{RGB} = (7, 145, 56) \quad - \quad \text{Gray} = 134 \quad - \quad \text{Chlorophyll} = 0.98 \text{ mg} / \text{m}^3$



The legend from the original NASA NEO site.



The Kindlmann color map.

Estimated relationship between Color and Chlorophyll Concentration

mg / m^3	8-bit Gray Value	mg / m^3	Gray = 28.826 ln(Chlorophyll) + 134.53	Chlorophyll = e ^ ( (Gray - 134.53) / 28.826 )
0.01	1	0.01	2	0.01
0.03	35	0.03	33	0.03
0.1	68	0.1	68	0.10
0.3	100	0.3	100	0.30
1	134	1	135	1.00
3	166	3	166	3.00
10	200	10	201	10.00
30	232	30	233	30.00
60	254	60	253	60.00

