Alaska Climatology Model/Water Clarity viewer using Sentinel-3

Sentinel-3 is a multi-instrument mission to measure sea-surface topography, sea- and land-surface temperature, ocean color and land color with high-end accuracy and reliability. The mission supports ocean forecasting systems, as well as environmental and climate monitoring. Sentinel-3A was launched on 16 February 2016 and Sentinel-3B joined its twin in orbit in 2018.

The files used to create NOAA's Alaska climatology model are monthly composites (where possible) for 2016-2020 of OLCI Sentinel-3 daily imagery at a resolution of 300 meters.

Kd is a measure of how light dissipates with depth in water. Sentinel 3 has three color channels that are impacted by turbidity differently. Kd is determined by using the relative intensity information from these color channels, calibrating them and calculating a total value that approximates the amount of scattering particles in the water column. The method is based on Tomlinson et al. (2018)[1]. Below is the equation used to calculate the Kd_Rhos product, as well as the scaling equations:

[2]SAPS_product_desc=Calibrated Kd (4.0 *(0.7 * (([3]rho620+rho665)/2)/((rho442+rho490)/2))) - 0.69 (rhos_865 corrected)

SAPS_product_rev_scaling=2.71828 / ((325.0 / DN) - 1)

SAPS_product_scaling=np.round(325 / (1 + 2.71828 / kd))

Below is the Kd_Rhos colorbar. In general, the blue-to-cyan-to-green is going to best represent what will be 'good' conditions near shore for topobathy lidar and satellite derived bathymetry. The Kd is an indicator of the turbidity of the water column, and is directly related to the concentration of scattering particles into the water column. So the least turbid water is going to be represented by blues.
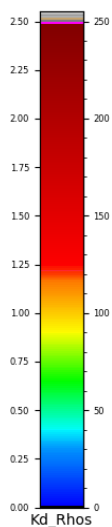
[1] *Tomlinson, M.C., Stumpf, R.P. and Vogel, R.L., 2019. Approximation of diffuse attenuation, Kd, for MODIS high-resolution bands. Remote sensing letters, 10(2), pp.178-185.*

[2]*SAPS is a package of custom python modules that facilitate the downloading and processing of the level 0, 1, or 2 input files for one or more pre-defined geographic regions. It uses NASA's SeaDAS software package including the OceanColor Science Software (OCSSW), distributed as part of SeaDAS, to standardize processing of low level input files to a standard level 3 GeoTiff.*

[3]*Rhos(lamda) is the Rayleigh-corrected reflectance at wavelength lambda.*