1.1. Diffuse Attenuation Coefficient (K_d)

The diffuse attenuation coefficient (K_d) is a measure of how light dissipates with depth in water. K_d is an Apparent Optical Property (AOP), a property of water that changes with a changing light field, but is expressed in the same units (m^{-1}) as an Inherent Optical Properties (IOP), a property of water that does not change with a changing light field). The K_d product that is being processed here is a somewhat simplified version of the K_d proposed by Wang et al. (2009). The K_d is an indicator of the turbidity of the water column, and is directly related to the concentration of scattering particles into the water column. The K_d for the MODIS dataset is calculated by:

$$K_d = 2.8 \left[\frac{R_{rhos}(645) - R_{rhos}(858)}{R_{rhos}(469) - R_{rhos}(858)}\right] - 0.69 \qquad (8)$$

Where $R_{rhos}(\lambda)$ is the Rayleigh-corrected reflectance at wavelength λ (Tomlinson et al. accepted).

For the MERIS and the OLCI sensors, it is as follows:

$$K_d = 0.7 \times \left\{ \frac{\left[\frac{(\rho(620) + \rho(665))}{2}\right] - \rho(865)}{\left[\frac{(\rho(442) + \rho(490))}{2}\right] - \rho(865)} \right\} \qquad (9)$$

At this point, the respective K_d numbers can be used to calculate a calibrated K_d in Eq. 10.

$$K_d calibrated\ (m^{-1}) = (4.0 \times K_d) - 0.69 \qquad (10)$$

The standard set of algorithms used in the K_d algorithm are: no data, land, clouds, and invalid pixels (See appendices 9 and 10 for more details).