Remote Sensing Principle of Ocean Color

- Away from both sun glitters and whitecaps, the satellite-observed reflectance at wavelength λ, $\rho_t(\lambda)$, includes the contribution from atmosphere ($\rho_{path}(\lambda)$) and ocean ($\rho_w(\lambda)$), i.e.,

  $\rho_t(\lambda) = \rho_{path}(\lambda) + t(\lambda)\,\rho_w(\lambda)$.

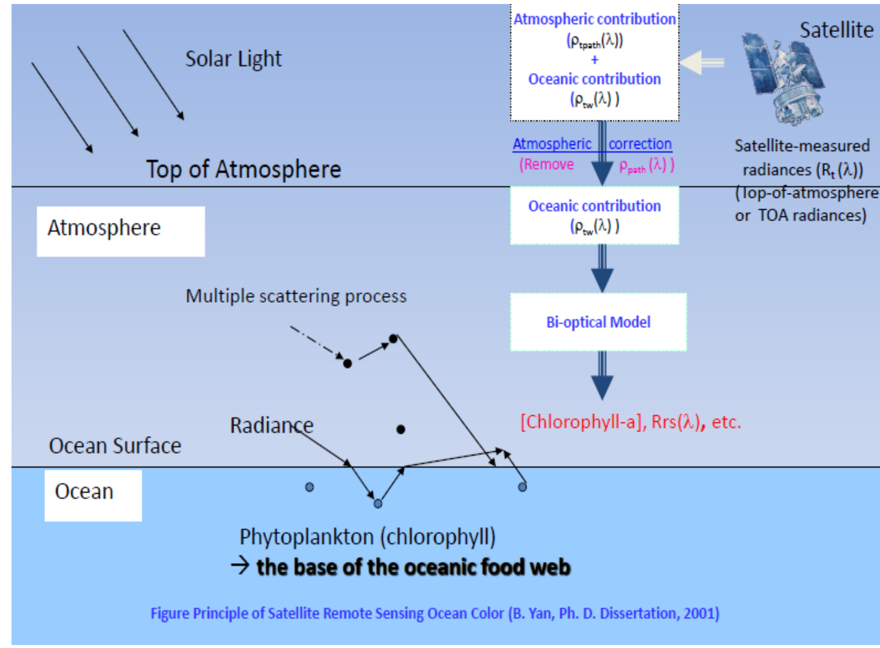
  where $\rho_{path}(\lambda) = \rho_r(\lambda)$ (Rayleigh scattering)

  $+ \rho_a(\lambda)$ (aerosol scattering)

  $+ \rho_{ra}(\lambda)$ (interaction);

  $\rho_w(\lambda)$ is the reflectance resulting from oceanic species;

  $t(\lambda)$ is the diffuse transmittance.



(Reference: Banghua Yan, Ph. D. Dissertation, 2001)

- At the NIR wavelength (open ocean) or the short-wave (turbid water),

  $\rho_{path}(\lambda_{NIR\ or\ SW}) \cong \rho_t(\lambda_{NIR}\ \text{or}\ \lambda_{SW})$.

  Thus, $\rho_{path}(\lambda_{VIR})$ can be derived from $\rho_{path}(\lambda_{NIR}\ \text{or}\ \lambda_{SW})$.

- Then, $\rho_w(\lambda_{VIR})$ can be derived from satellite-measured $\rho_t(\lambda_{VIIR})$ and $\rho_{path}(\lambda_{VIR})$.

- Finally, the Chlorophyll concentration is derived from $\rho_w(\lambda_{VIR})$ based on a given bio-optical model.