3. Results

3.1 Simulating Spectral Signal

\[ f_{\text{R}}(\text{ISS, Depth, Chl}_a, \text{and OSS}) = a_1x_1^n + a_2x_2^n + \ldots + a_nx^n + b_0 \]

Using polynomial curve fitting

3.2 Florescent Line Height (FLH) and Chlorophyll a Concentration

\[ \text{FLH} = \frac{y_3 - y_1}{(x_2 - x_1)} \times \frac{x_2 - x_1}{(x_3 - x_1)} \]

Where \(a = \frac{(x_3 - x_1)}{(x_2 - x_1)}\) \(x_1=600\text{nm}, x_2=740\text{nm}, \) and \(x_3=700\text{nm}. y_1, y_2, \) and \(y_3\) are the observed reflectance at the respective wavebands \(x_1, x_2\) and \(x_3.\)

3.3 Turbidity and Secchi Depth

\[ \text{Turbidity} = a(y_{740} - y_{708.94}) + b \]

Where \(a = 186.59\) and \(b = 8.5516. y_{740}\) reflectance at 740nm, and \(y_{708.94}\) reflectance at 708.94nm. \(a\) and \(b\) were from Shafique et al. (2002).

Figure 5: Relation between in-situ Secchi depth measurements and turbidity derived from reflectance at 740nm and 708.94nm.

3.4 Phosphorus Derived from Estimated Chlorophyll a

Figure 6: Relation between in-situ Chla measurements and phosphorus.

3. Conclusions

This study suggests how spectral observations from airborne instruments can be used to derive various water constituents. Specifically,

- We simulated reflectance with a function of ISS, Depth, Chl\_a, and OSS using a polynomial curve fitting.
- We developed algorithm to obtain chlorophyll a concentrations using Florescent Line Height (FLH) based on three bands, 600nm, 700nm, and 740nm.
- We found that the Secchi depth relates to turbidity, which can be estimated from reflectance.
- We illustrated that the total phosphorus may be related to chlorophyll a concentrations which can be estimated from FLH.

Since the spectral shape of water leaving radiance integrates the optical signature of biological, chemical, and geological properties, we may identify some of individual radiance components as demonstrated in this study.

References