2015 summer field trip of measuring shallow water optical parameters in Saginaw Bay, MI

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The field works include HyperSAS detection and ASD measurements. The HyperSAS aims to measure water Rrs at the depth between 3ft to 16ft. The ASD is used to detect the underwater radiance at very shallow waters (<= 3ft). The sample sites were selected according to both water depth and CDOM variations. The Figure 1 shows cruises and sample sites in the Saginaw Bay. In this field trip, water optical variations will be concerned. The sample locations selection was referenced by both water depth contour data and water color from high spatial resolution images. The total of 24 sites were selected. The black line indicates the cruise which is initiated from North to South. The ASD will be applied to measure underwater radiance at very shallow waters. Total of three sites were chose at bay offshore from Saginaw River plume and Kawkawlin River plume. These three sites all near accessible road according to google earth image.

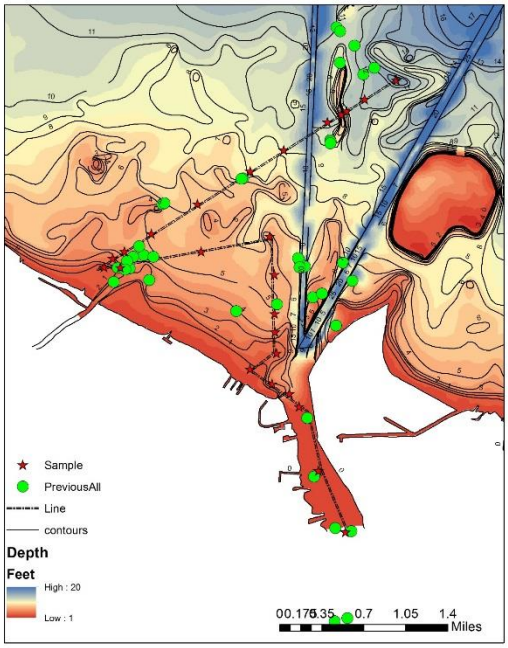

Figure 1. Study sites of Saginaw Bay

These field measurements aim to provide in-situ data for the development of new Shallow water Bio-Optical Properties algorithm (SBOP). The core concept of this algorithm is to model R_{rs} as the contribution of both water column and bottom sediments. The attenuation of underwater upwelling radiance is concerned as the function of optical depth. So this algorithms can be applied on inland shallow waters. The remote sensing reflectance can be modeled from total of four wavelengths with four unknown components (B, G, X, H) as: $R_{rs}^{model}(\lambda) = f(\boldsymbol{B}, \boldsymbol{G}, \boldsymbol{X}, \boldsymbol{H})\ (\lambda)$. Then SBOP solves four unknown variables via spectral optimization. Then solved components will be further applied to calculate water properties as following: B for bottom reflectance, G for CDOM absorption, X for particle absorption and backscattering and H for bathymetry. These will lead to the better understanding of the carbon cycles at land-water interface.

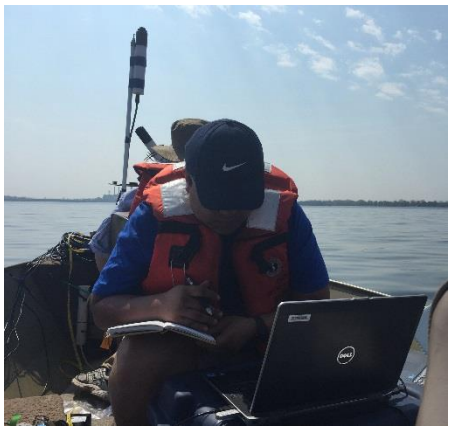

Figure 2. Field trip in Saginaw Bay, Lake Huron