Monitoring of Algal Blooms via Remote Sensing

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Introduction: The use of remote sensing to monitor inland water quality parameters has been increased in the last decade. The development of radiometric equipment as well as bio-optical algorithms supported the evolution of remote sensing studies on water quality monitoring, in which the monitoring of algal blooms is one of the main issues. The importance of monitoring algal blooms is based on the capability of some species to produce toxins that can cause problems to environmental and public health.

Goal: The goal of this project was to develop remote sensing tools to monitor algal blooms in inland waters.

Use of the Indiana View Scholarship: to promote student development in remote sensing and other geospatial technologies, the scholarship was used to:

- Support field and laboratorial work on the analysis of water quality and radiometric parameters from Eagle Creek Reservoir, Indianapolis, IN, USA
- Support the attendance to the Association of American Geographers Annual Meeting, where a poster was presented (Figure 1)

Results:

- Development of a bio-optical algorithm to detect algal bloom, bloomy and non-bloom conditions (Figure 2A, B, C, and D) in inland waters based on the difference in the slopes between red and near infrared (Figure 2E)
- Weekly data acquisition of *insitu* radiometric (remote sensing reflectance and absorption coefficients) and limnological (chlorophyll-*a*, phycocyanin, dissolved organic carbon and total suspended solids) parameters from Eagle Creek Reservoir, Indianapolis, IN, USA

Next steps:

- Analyze the data collected during the summer of 2015 in Eagle Creek Reservoir to identify different phytoplankton groups via remote sensing data.

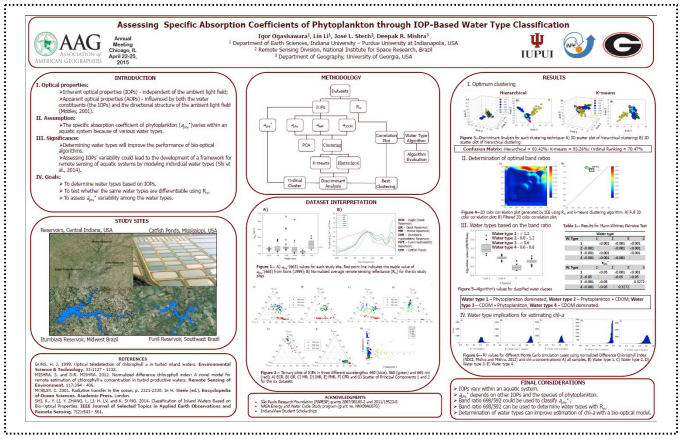

Figure 1. Poster presented at Association of American Geographers Annual Meeting 2015, in Chicago, IL, USA.

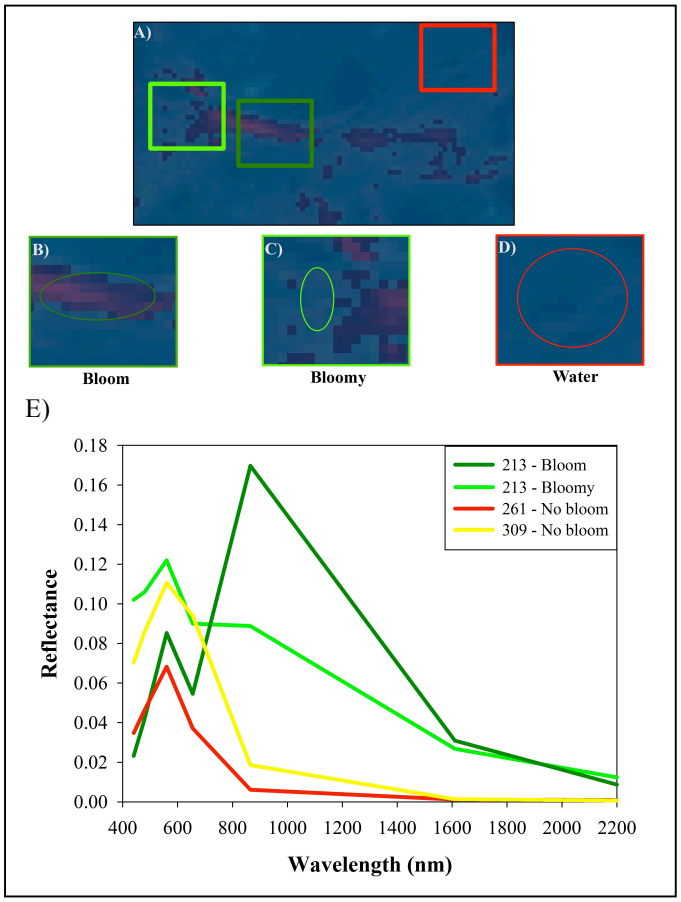

Figure 2. A) Three classes in this area of the RGB composed image; B) Bloom area, tick scum of algae which appears as red-purple area; C) Bloomy area, thin scum of algae in the surface which appears as a thin pinkish cloud in the image; D) Water area, no presence of blooms usually appears as blue in the image; E) Average irradiance reflectance from OLI/Landsat 8 for pixels classified as bloomy (light green), bloom (dark green) and no bloom (red and yellow) conditions

PUBLICATIONS FROM THE PROJECT:

OGASHAWARA, I.; LI, L.; STECH, J.L.; MISHRA, D.R. Assessing the variability in the specific absorption coefficient of phytoplankton through water type classification. In: Association of American Geographers Annual Meeting, 2015, Chicago. 2015 AAG Annual Meeting. Chicago: AAG, 2015.

OGASHAWARA, I.; MORENO-MADRINÁN, M.J.; LI, L. The use of Landsat 8/OLI to map algal blooms in inland waters. Remote Sensing (submitted)