

Linking Land Use Changes to Surface Water Quality Variability in Lake Victoria: Some Insights From Remote Sensing (GC41B-1101)

Ashutosh Limaye¹, Robinson Mugo¹(*rmugo@rcmr.org*), James wanjohi¹, Hussein Farah¹, Anastasia Wahome¹, Africa Flores^{2,3}, Dan Irwin²

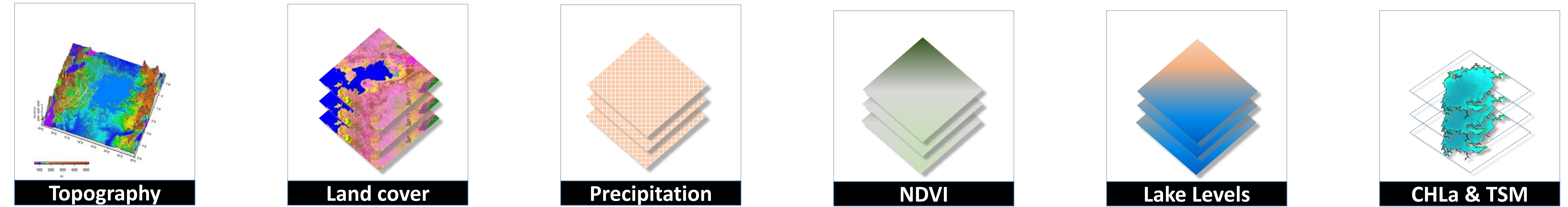
1. Regional Center for Mapping of Resources for Development; 2. NASA Marshall Space Flight Center – Huntsville, AL, United States; ³Earth System Science Center, University of Alabama in Huntsville, Huntsville, AL, United States

1.0 INTRODUCTION

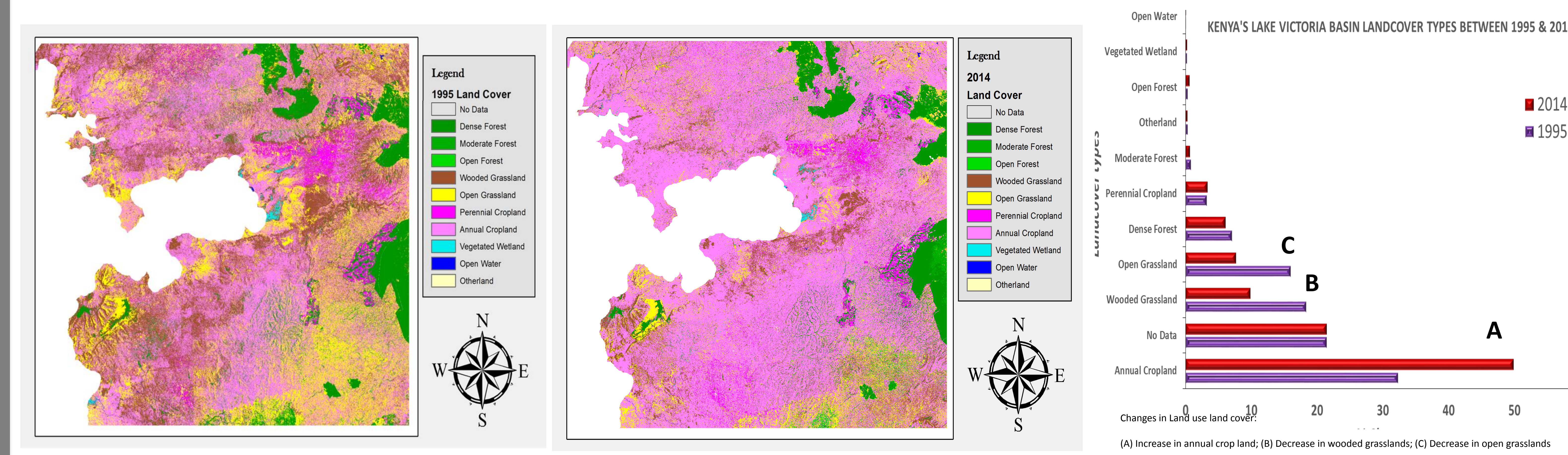
Various land use changes driven by urbanization, conversion of grasslands and woodlands into farmlands, intensification of agricultural practices, deforestation, land fragmentation and degradation are taking place in Africa. In Kenya, agriculture is the main driver of land use conversions. The impacts of these land use changes are observable in land cover maps, and eventually in the hydrological systems. Reduction or change of natural vegetation cover types increases the speed of surface runoff and reduces water and nutrient retention capacities. This can lead to high nutrient inputs into lakes, resulting in eutrophication, siltation and infestation of floating aquatic vegetation. To assess if changes in land use could be contributing to increased phytoplankton blooms and sediment loads into Lake Victoria, we analyzed land use land cover data from Landsat, as well as surface chlorophyll-a and total suspended matter from MODIS-Aqua sensor.

2.0 DATA & METHODS

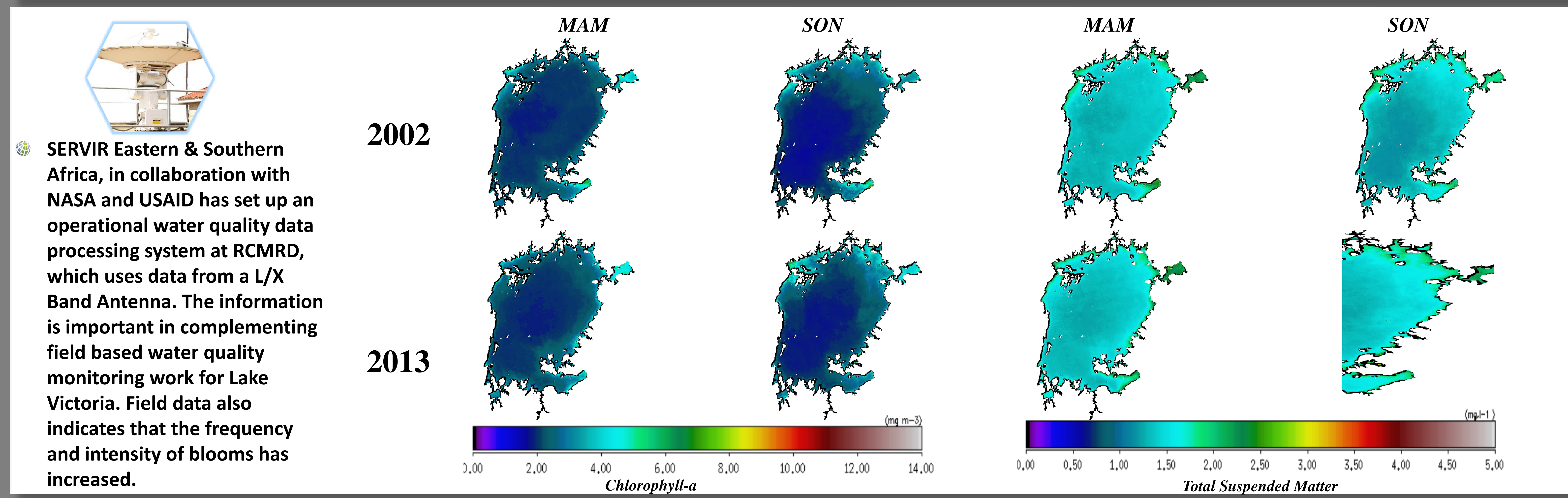
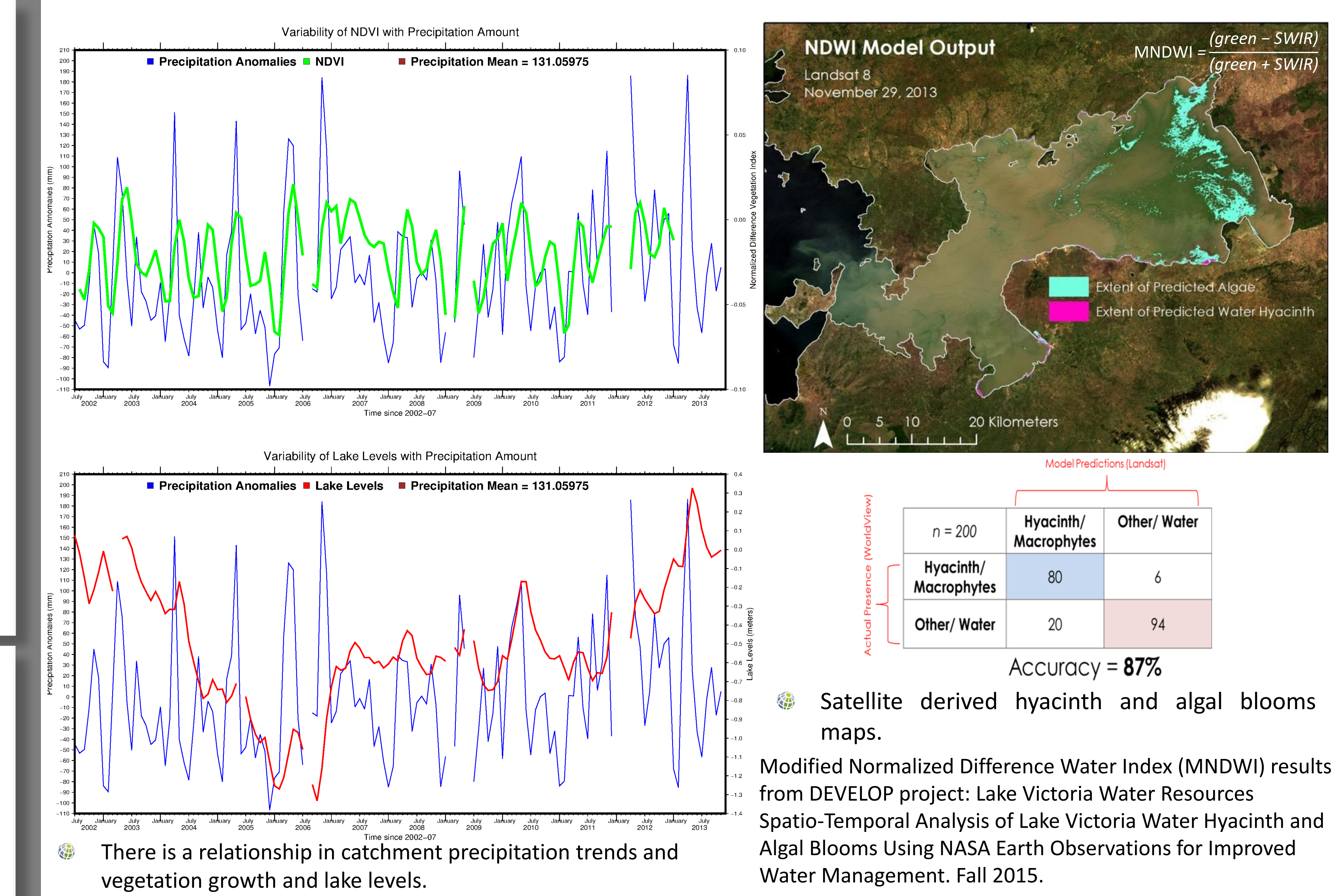
Changes in land cover were identified through change maps and statistics using Landsat imagery. Variability in NDVI (MODIS) and lake levels (Jason-2/OSTM) relative to precipitation (CHIRPS) was also assessed. Further, the surface water chlorophyll-a concentration and turbidity were derived from MODIS-Aqua data for Lake Victoria. The trends in chlorophyll-a and turbidity concentrations were analyzed and compared to the land cover changes over time.



3.0 RESULTS (land cover change & water quality)



3.1 Rainfall, NDVI, Lake Levels



4.0 CONCLUSION

- Land use changes:** Significant land use changes have taken place in the Lake Victoria Basin.
- Blooms:** Nutrient inputs spur chlorophyll blooms in the lake. There is a likelihood that the frequency and concentrations of blooms are increasing.
- Hyacinth growth:** Hyacinth proliferation is also an indicator that the land use changes in the catchment have an impact on the lake health.
- Management:** This information can be used to promote sustainable farm management practices, to monitor fertilizer inputs and come up with measures to reduce large nutrient inflows into the lake.