

# KAZUO OKI LAB.

## [Global Monitoring for Ecology and Environment, and its applications]

Department of Human and Social System

Global Monitoring for Ecology and Environment

Department of Civil Engineering,

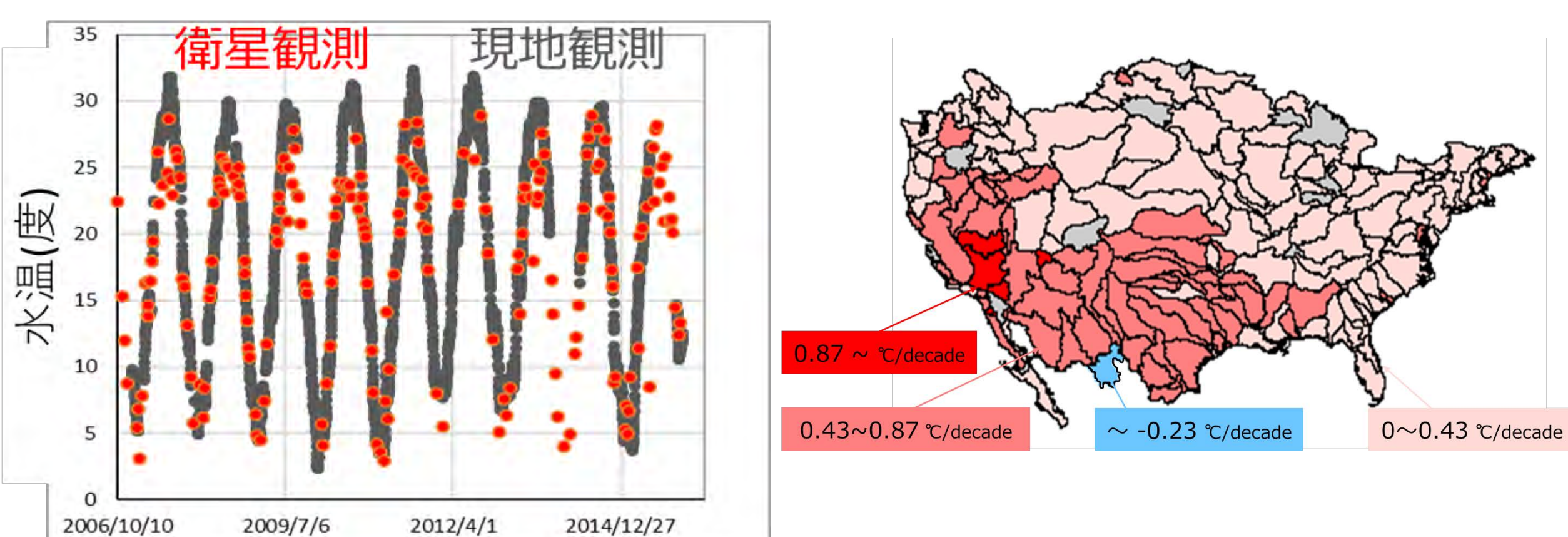
Department of Biological and Environmental Engineering

<http://hydro.iis.u-tokyo.ac.jp/indexJ.html>

**In K. Oki lab, by using *wide-area environmental monitoring & remote sensing techniques*, we capture and improve current situations of *water, food & energy*.**

### Water surface temperature observation using Landsat image

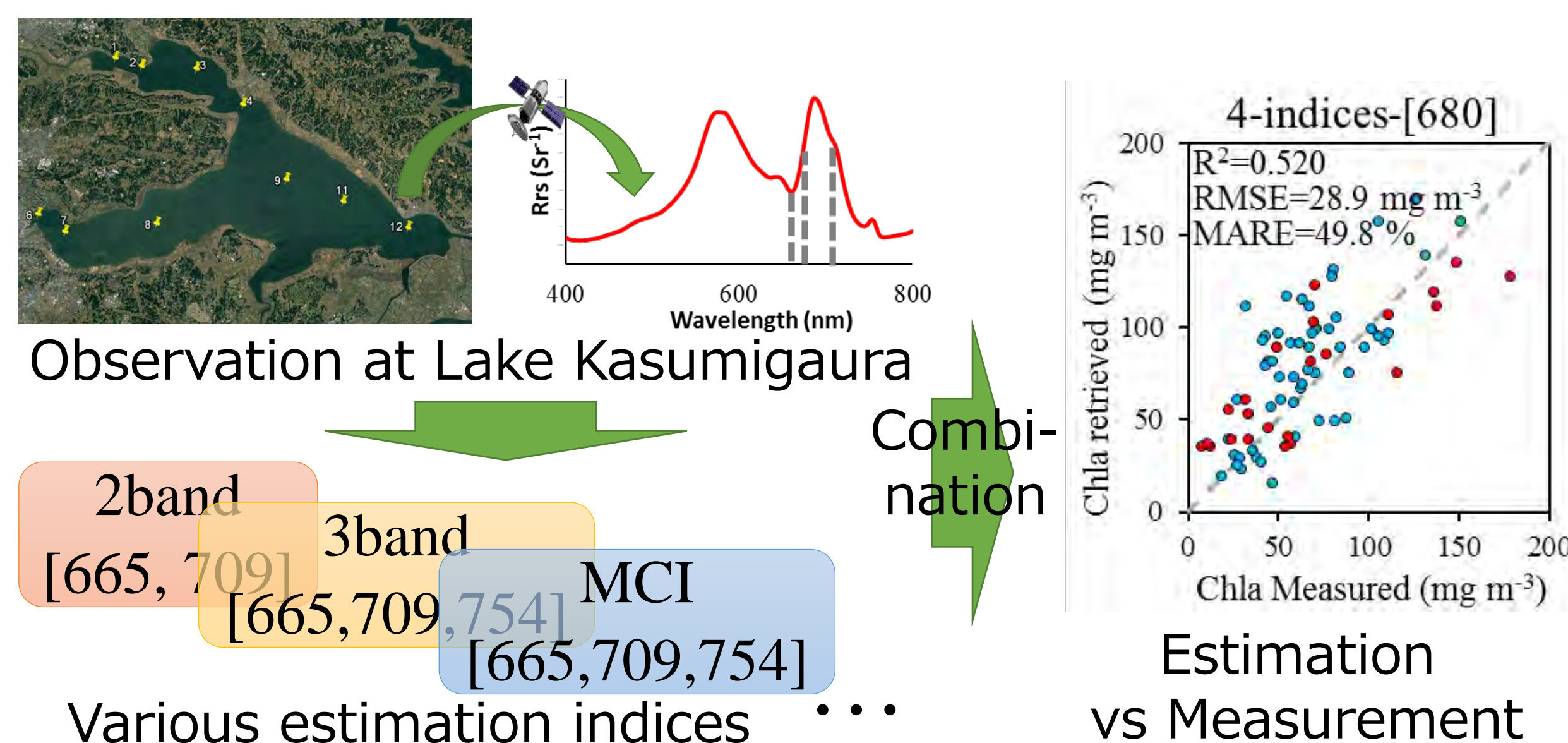
River/lake temperature change has an influence on ecosystem and human activity, and therefore it is important to observe it. However, it is difficult to do it widely and specifically at the same time. In this study, to overcome this challenge, we established an algorithm to observe water surface temperature using 30 year-Landsat images.



Comparison between in situ and satellite observation water temperature in US basins(1984-2015)

### A new monitoring technique of water quality

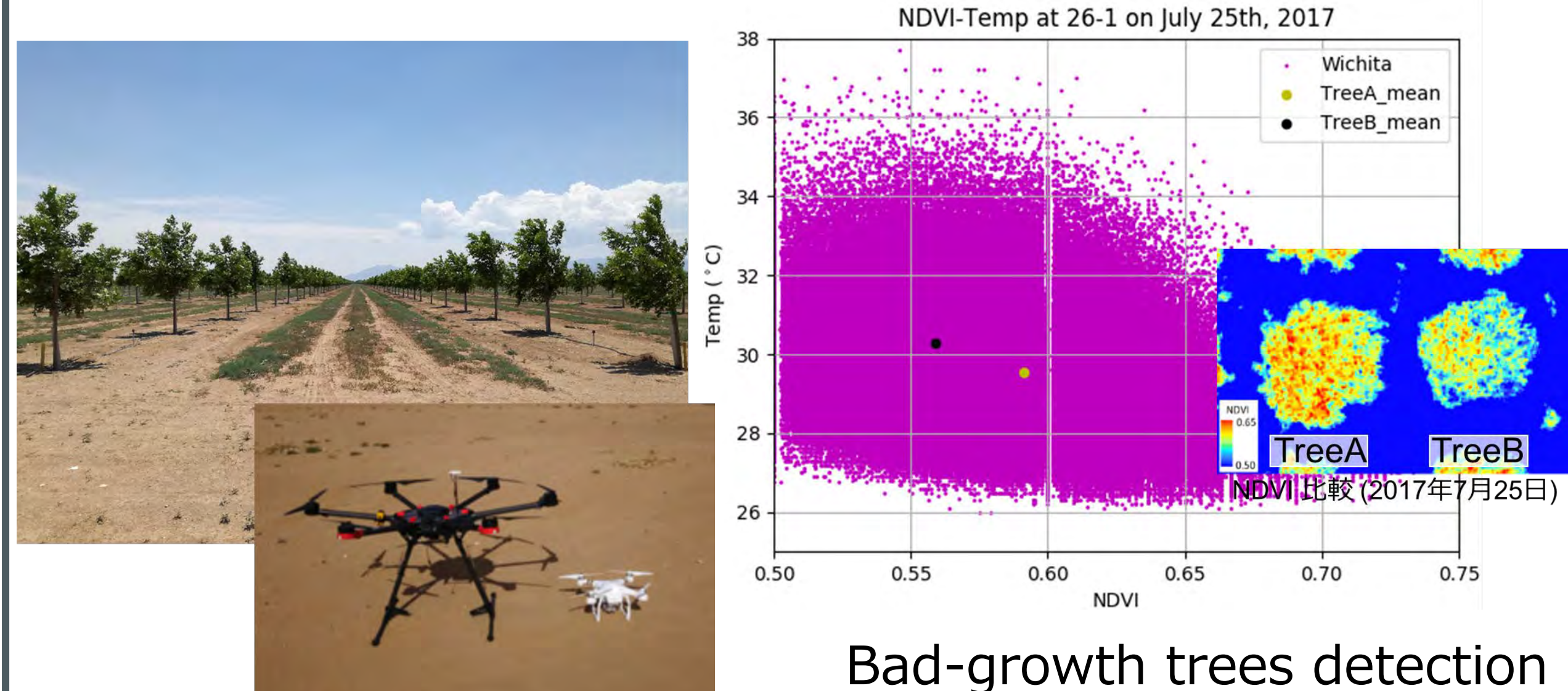
Lake water contains 90% of the global liquid freshwater. To monitor the water quality in lake, chlorophyll-a concentration can be estimated from satellite remote sensing. Existing various techniques have their merits and demerits. So we reassessed them for the same lake. Moreover, we proposed a new estimation technique which combined their merits.



Observation at Lake Kasumigaura  
 Various estimation indices: 2band [665, 709], 3band [665, 709, 754], MCI [665, 709, 754]  
 Estimation vs Measurement

### Precision Agriculture with UAV

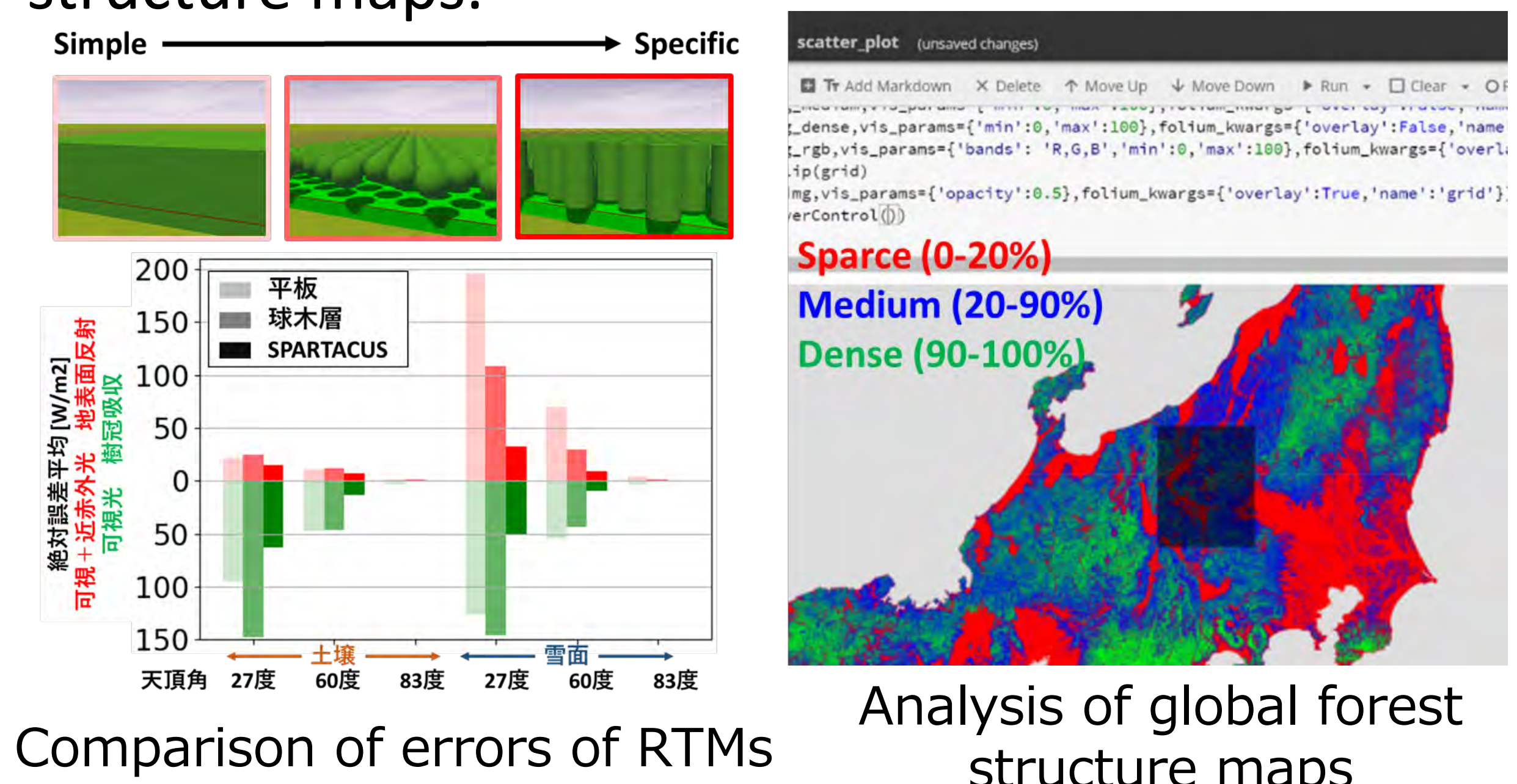
Tree growth monitoring techniques using UAV is recently advancing, because UAV doesn't cost much and it can take high resolution images. In this study, we established an algorithm to analyze UAV images, and our result shows NDVI-Temperature differences between different species and also shows it could detect trees which don't grow well, showing usefulness of our method.



Bad-growth trees detection

### Link of forest structure & light use

Radiative transfer models (RTMs), which estimate the amount of lights vegetation uses or discards, is essential to anticipate the future of climate change affected by deforestation etc. In this study we compare RTMs which express forest structure in different ways, and also analyze global forest structure maps.



Comparison of errors of RTMs

Analysis of global forest structure maps