# 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

Temperature change of rivers/lakes has an influence on ecosystems and human activity. Therefore, it is important to observe it. However, it is a challenging task to perform observation on a wide scale for a long time. In this study, we could overcome this challenge by developing an algorithm to observe water surface temperature using 30-year of Landsat images.
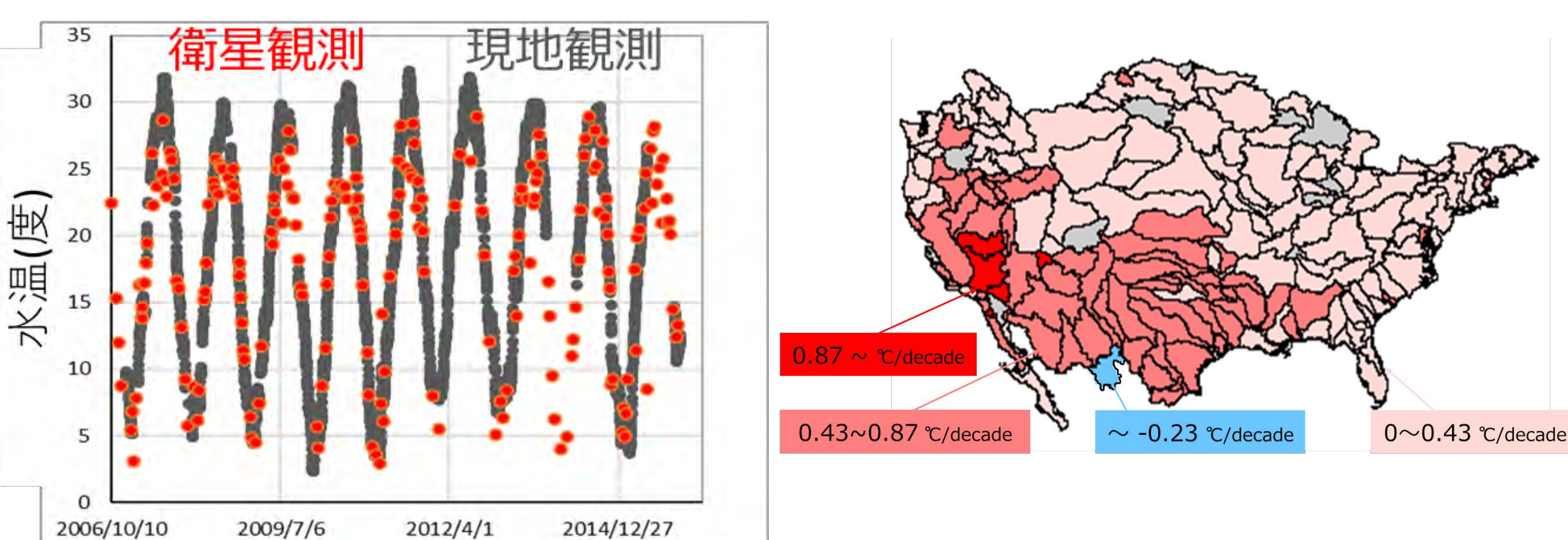


Comparison between in situ and satellite observation water temperature

Water temperature trend in US basins(1984-2015)

## A new monitoring technique of water quality

Water in lakes contains 90% of the global liquid fresh-water. Monitoring its quality from space can be achieved by deriving concentrations of water constituents such as chlorophyll-a. We performed an extensive evaluation of the current chlorophyll-a techniques to know their strength and limitation. Moreover, we proposed a new estimation technique which combined their merits.



Observation at Lake Kasumigaura

2band [665, 709]
3band [665,709,754]
MCI [665,709,754]

Combi-nation
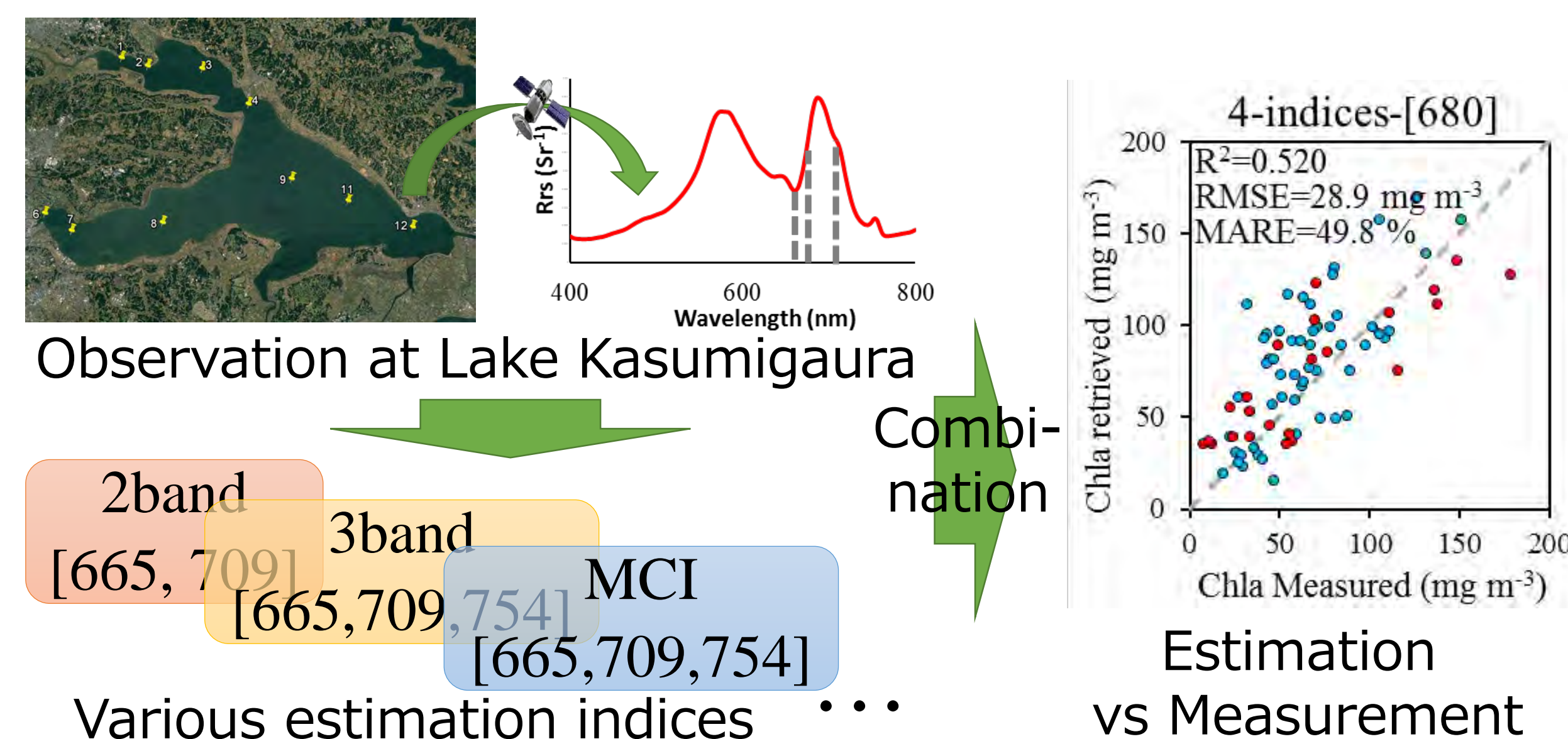
Various estimation indices

Estimation vs Measurement

## Precision Agriculture with UAV

Tree growth monitoring techniques using unmanned aerial vehicle (UAV) have been increasing due to the recent advancement in the image resolution with decreasing the cost. In this study, we developed an algorithm to analyze UAV images. Our results illustrate NDVI-Temperature differences between various species. In addition, our method could distinguish if the trees don't grow well, revealing the importance of our method.
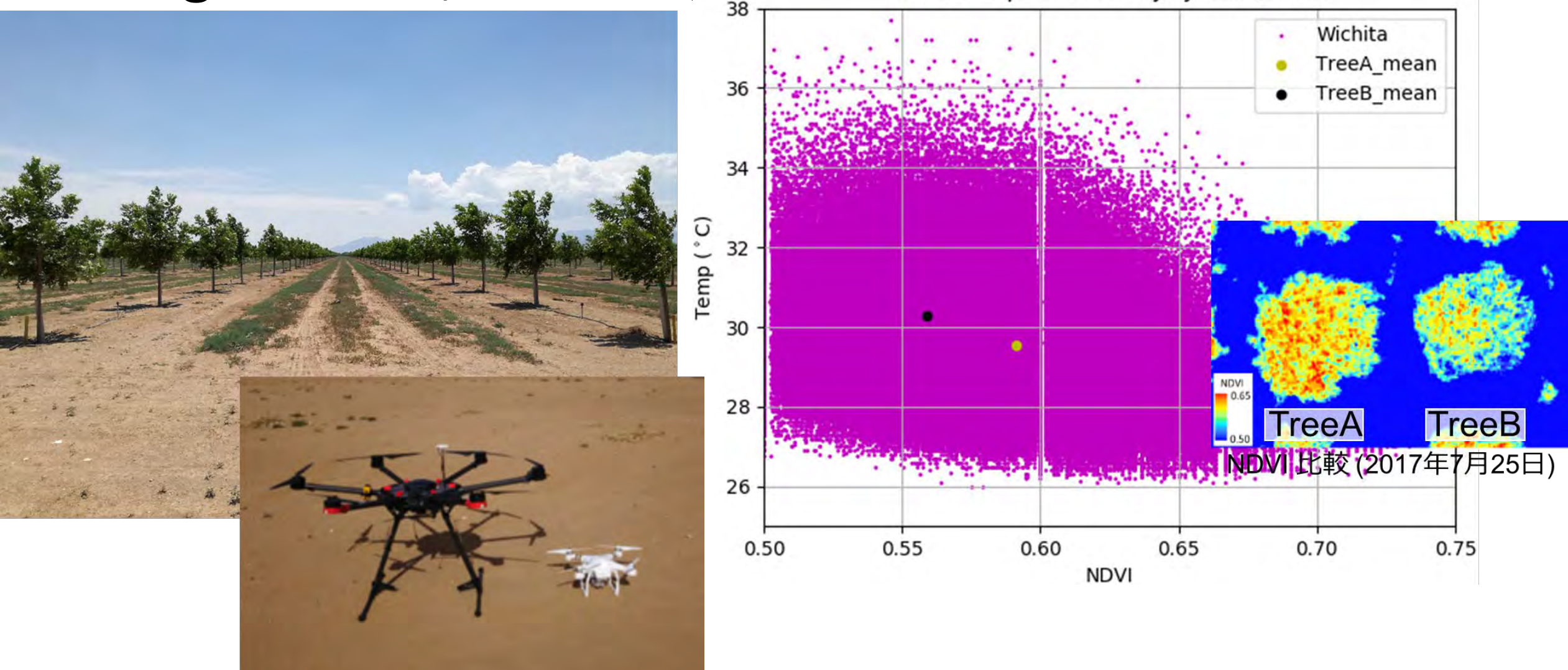


Bad-growth trees detection

## Link of forest structure & light use

Radiative transfer models (RTMs), which estimate the amount of light that vegetation uses or discards, are 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.
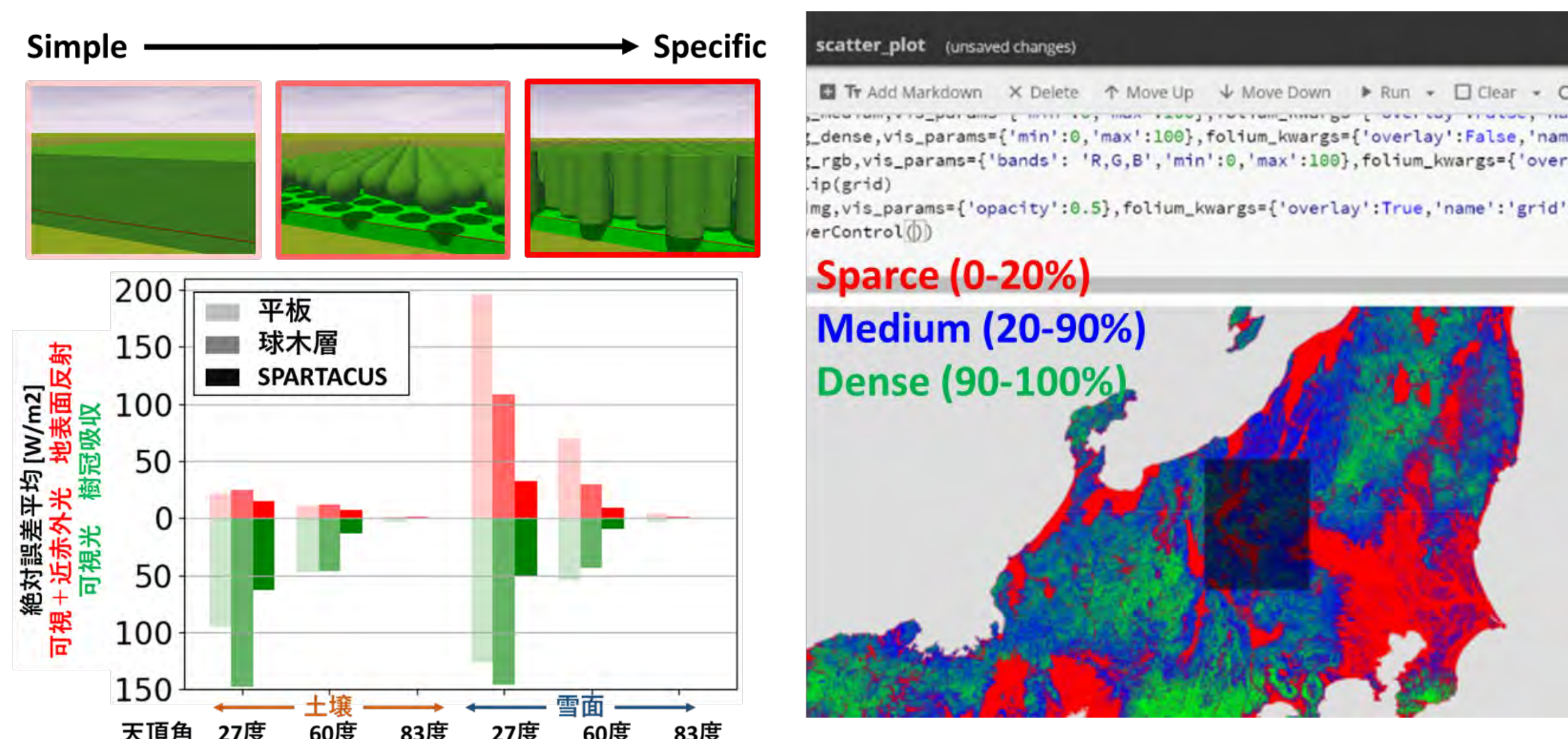


Comparison of errors of RTMs

Analysis of global forest structure maps