

## OKI LAB.

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



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Global Monitoring for Ecology and Environment

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

### Development on methods for estimating population size of deer

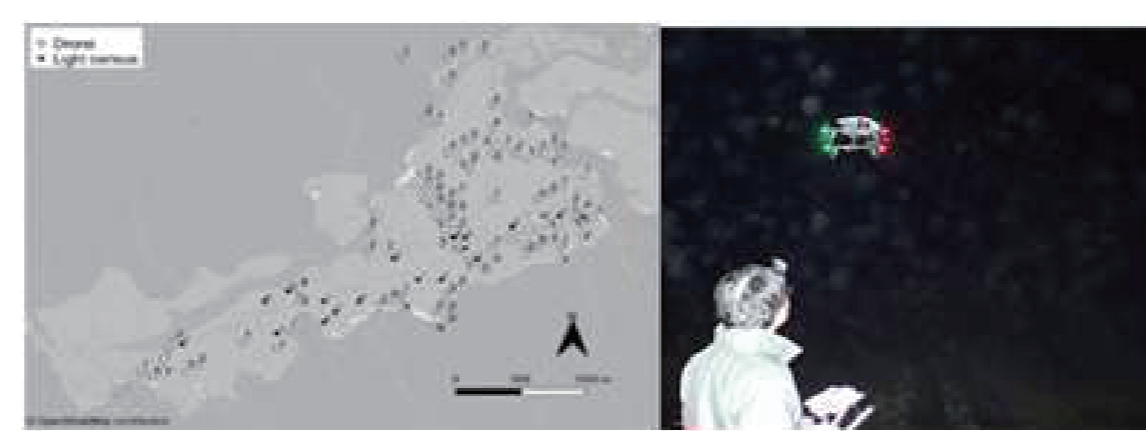
Deer are currently being caught both inside and outside the Oze wetland area, but the number of catches required to reduce vegetation damage in Oze has not yet been established. There is need for a new density survey method that can determine population size in places that are difficult for people to enter, such as Oze.



Deer in Oze



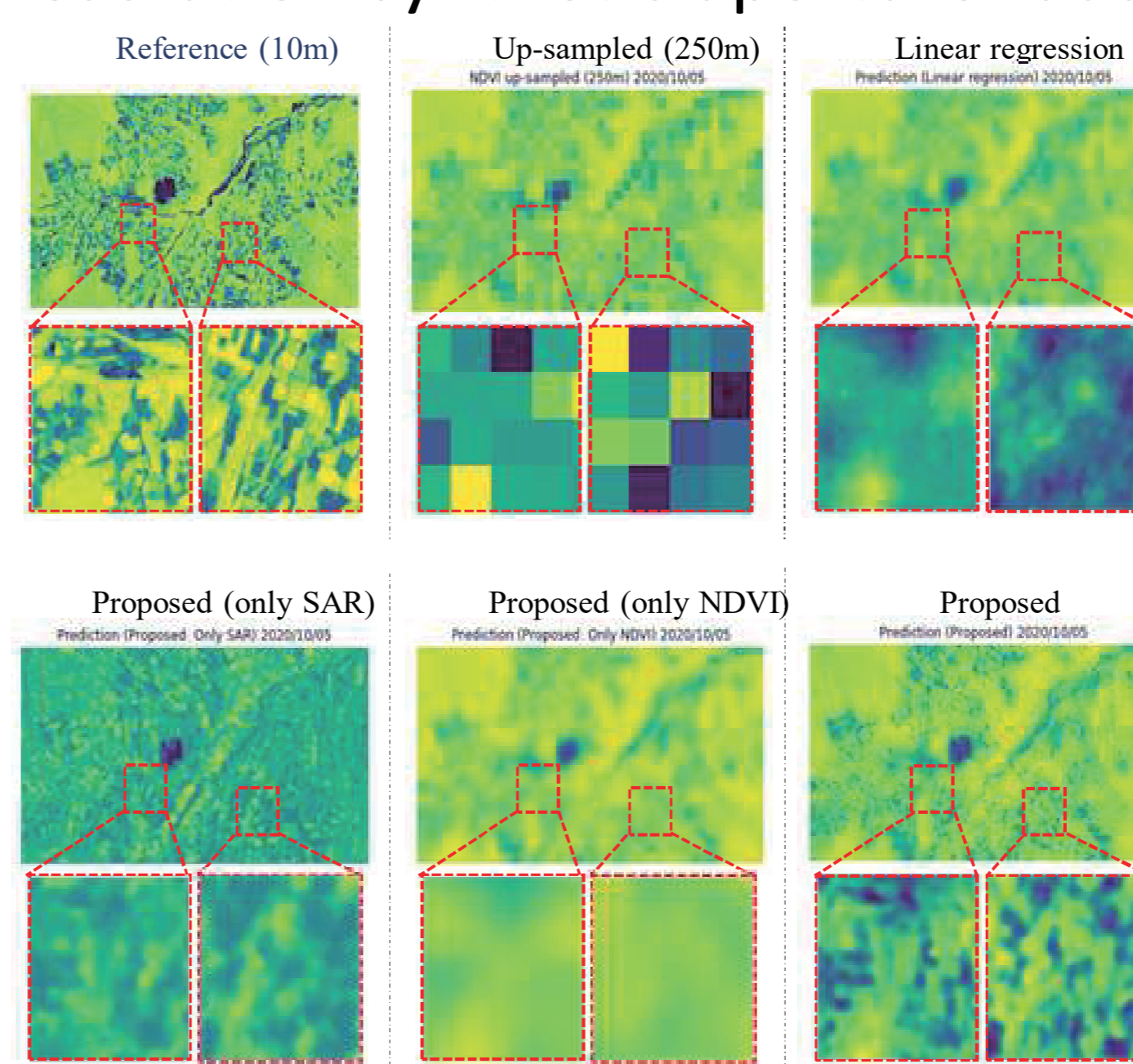
Visualization of deer cry position using multiple microphones



Estimation of deer population by night drone observation

### Downscaling of MODIS NDVI by Using a Convolutional Neural Network-Based Model

This research produce 10-m resolution NDVI in high temporal resolution from MODIS 250-m NDVI by using Convolutional Neural Network-Based Model with higher resolution synthetic aperture radar (SAR) data.

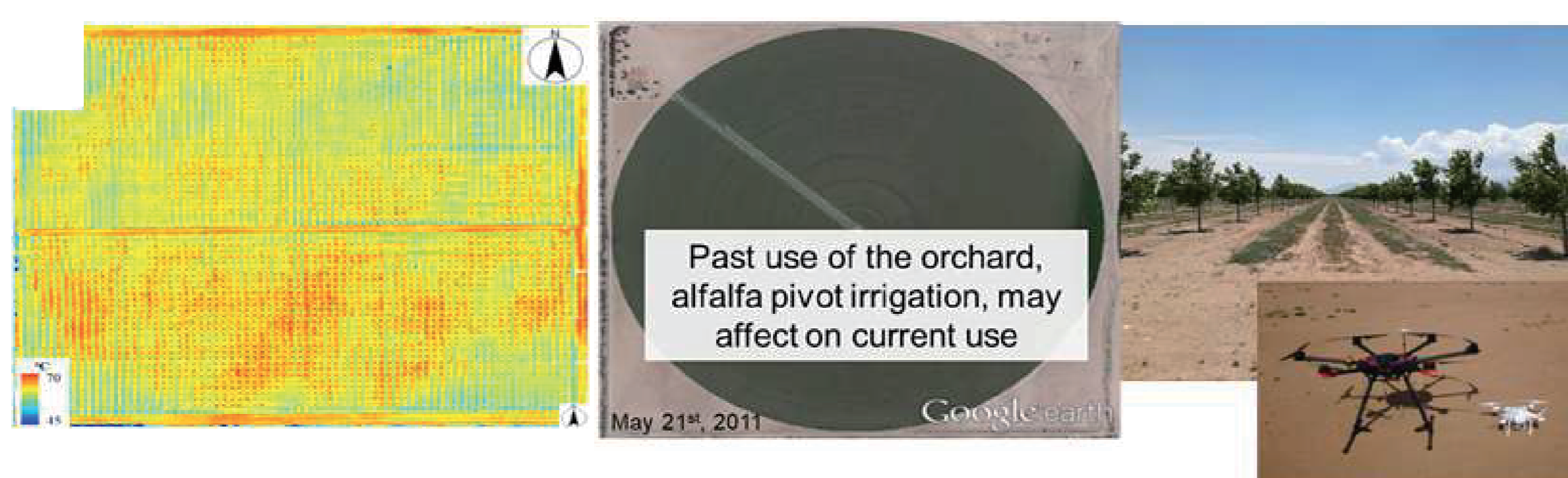


Qualitative results for different methods

	MAE
Only SAR	0.189
Linear Regression	0.114
Random Forest	0.115
Proposed	0.107

### Discovery of a mysterious circle in a pecan orchard with UAV

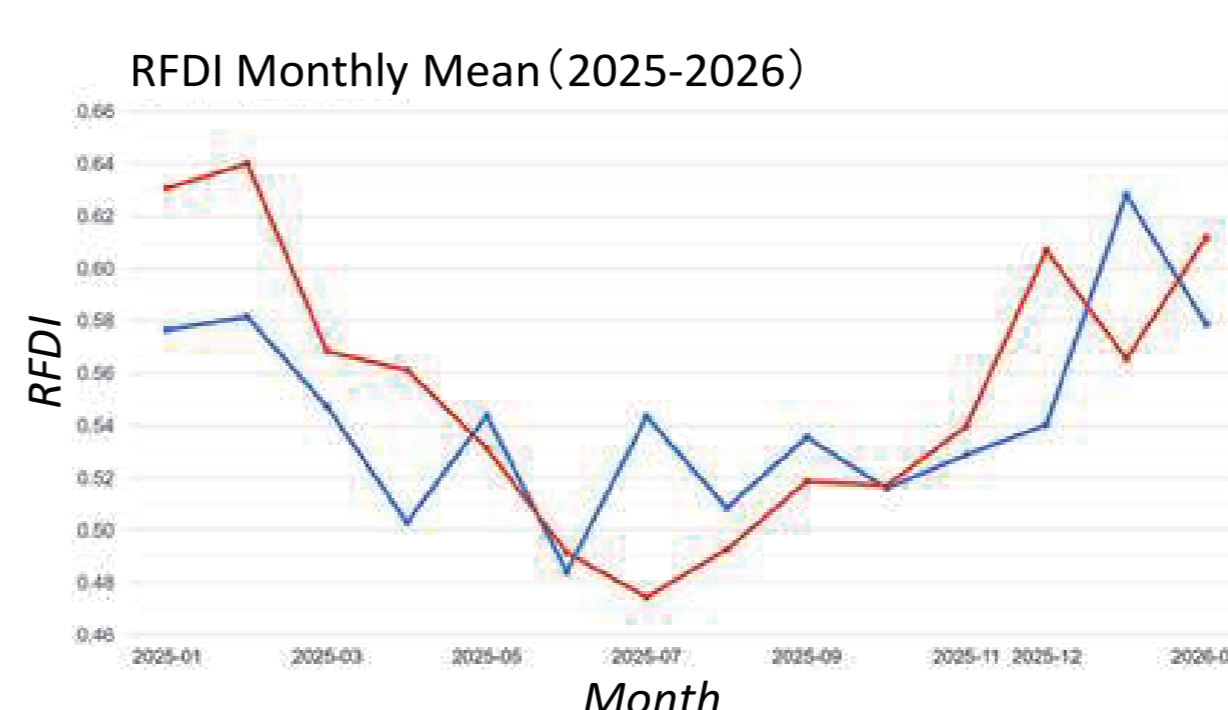
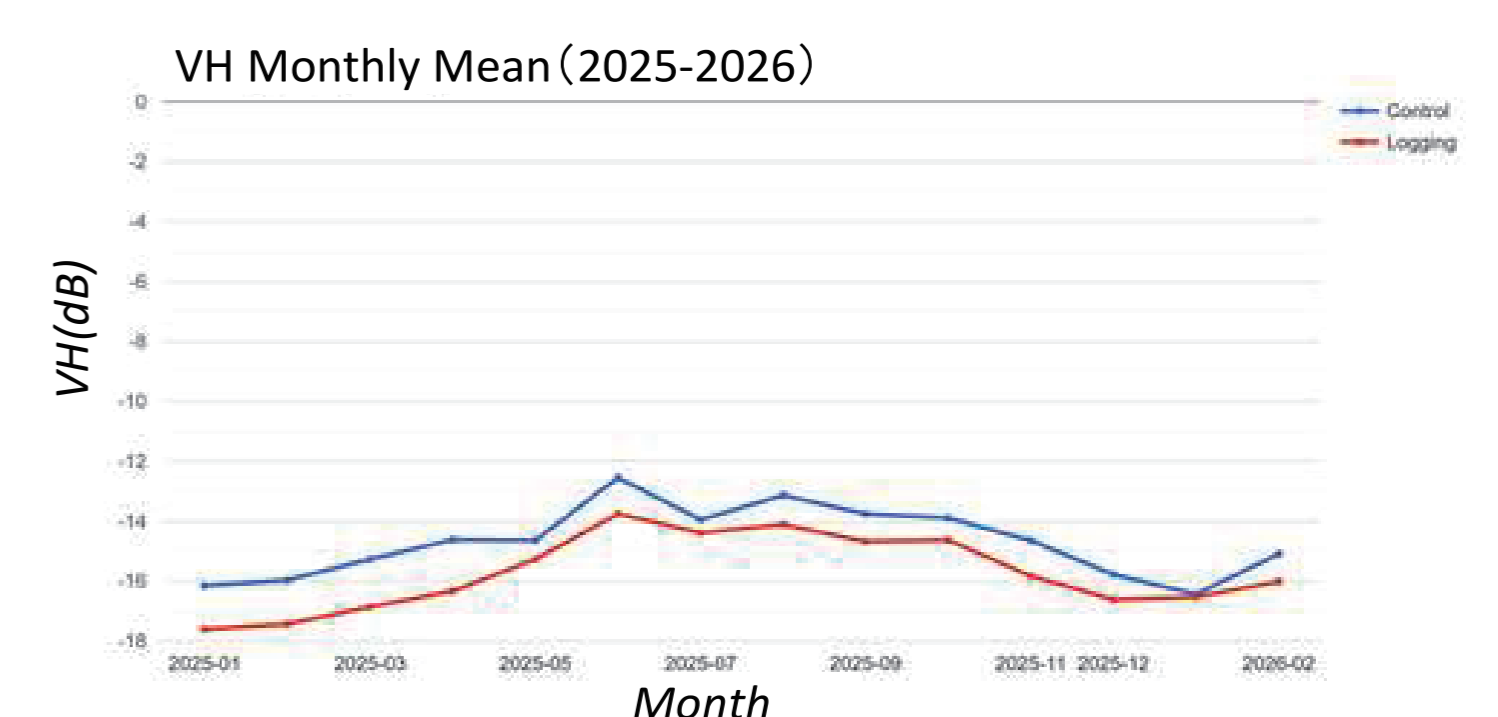
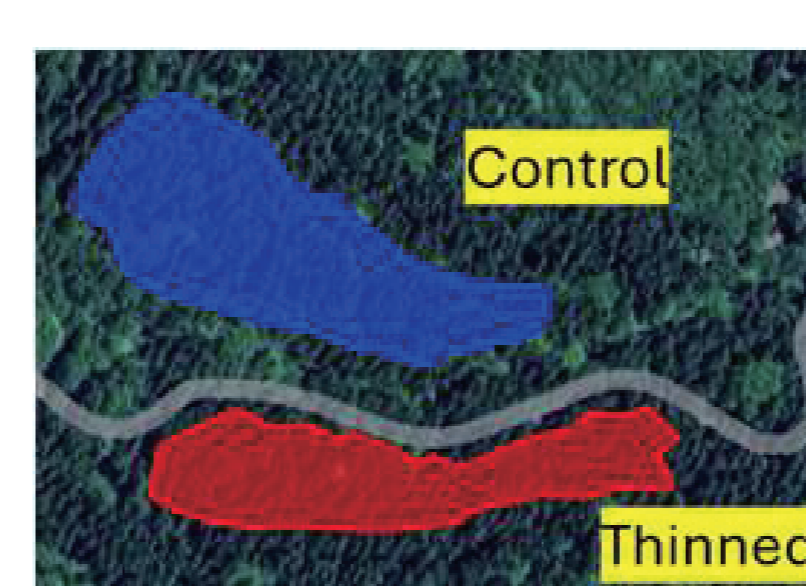
In this study, we established consecutive monitoring methods using UAV in pecan orchards of 64 ha each, in Arizona, USA. Using established continuous monitoring methods, the UAV images of a three-year-old pecan orchard showed circular traces of alfalfa cultivation prior to the installation of pivot irrigation that was previously not observed.



Ground surface temperature map on June 3rd, 2017.

### SAR and GEDI for thinning detection

As part of the SMBC-Digital Twin project, this study uses SAR data and field data to detect historical thinning. The initial survey was conducted in Nishiawakura Village, Okayama Prefecture, which contains both control and thinned forest sites.



Baseline: May–Oct 2025 (30 images)  
Event/post-thinning: Nov 2025–Mar 2026 (22 images)  
Structural  $\Delta VV = +0.257$   
Structural  $\Delta VH = -0.204$   
Structural  $\Delta \text{Ratio}_{dB} = +0.441$   
Structural  $\Delta \text{RFDI} = +0.031$   
Strict thinning area = 0.0316 ha  
Relaxed thinning area = 0.0753 ha  
Persistent thinning area = 0.1255 ha