Colocation Day 1 BOG - RESETLakes

Daniel Odermatt*, Iestyn Woolway, Elisa Calamita, Caren Binding, Laura Boyall, Luiz Oliveira, Ann Scheliga, Christiane Zarfl

17/02/2026

Project Objectives

ITT Funding Call: Tipping Points

Aim: Enhance understanding of the risk and processes associated with tipping elements and abrupt transitions in lake ecosystems

- **Identify and understand tipping points in lakes**
- **Integrate satellite data with model simulations**
- **Promote ecosystem resilience**
- **Explore broader implications of tipping points in lakes to other environmental systems**
- **Contribute to IPCC and other evidence reports about interacting tipping systems**
- **Quantify and characterise uncertainty**

RESETLakes Approach

WP1: understand knowledge gaps

- e.g. what is known about tipping points in lakes

WP2: development of methodologies

- Analytical techniques e.g. tipping mechanisms
- Conducting pilot studies e.g. Great Bear Lake

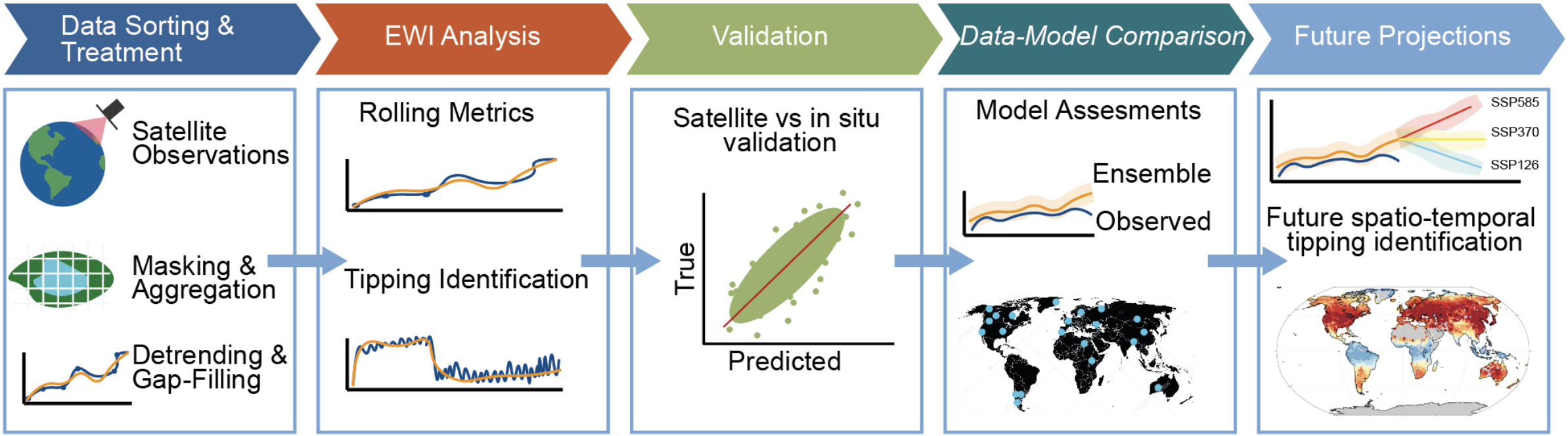
WP3: scientific analysis

- Analysis of lake cci data
- Integration and model collaboration

WP4: uncertainty and validation

- Uncertainty quantification
- Validation with insitu data and model validation

RESETLakes Approach



ECVs being used

Essential Climate Variables – Lakes

- Lake Water Level
- Lake Water Extent
- Lake Surface Water Temperature
- Lake Water Leaving Reflectance

Use of ECV products in RESETLakes

- **Lake Surface Water Temperature (LSWT)**: allows the detection of vertical mixing via the temperature of maximum density.
- **Lake Water Extent and Lake Water Level** : Used to assess the seasonal changes in lake volume
- **Lake Water-Leaving Reflectance**: detection of algal blooms and observations of the state of and anomalies in lake biogeochemistry.

Strengths and Weaknesses of lake cci dataset

Strengths of lake cci	Weaknesses of lake cci
Covers 2,024 lakes worldwide with **daily coverage**	Multiple (temporal and spatial) gaps present in all variables
Ability to look at interacting lake processes	Overlapping and changing sensors causes non-stationary behaviour in timeseries – leads to **false positive detection of tipping points**
Quick visualization and interactivity with **Web GIS**	**Inconsistent time coverage within variables**

Improvement Wish List

1) Gap filled data

2) Consistency across the start date for each of the lake variables

3) More data-processing to detect real-life stationary or non-stationary changes in the datasets with changing sensors – multi-mission harmonisation

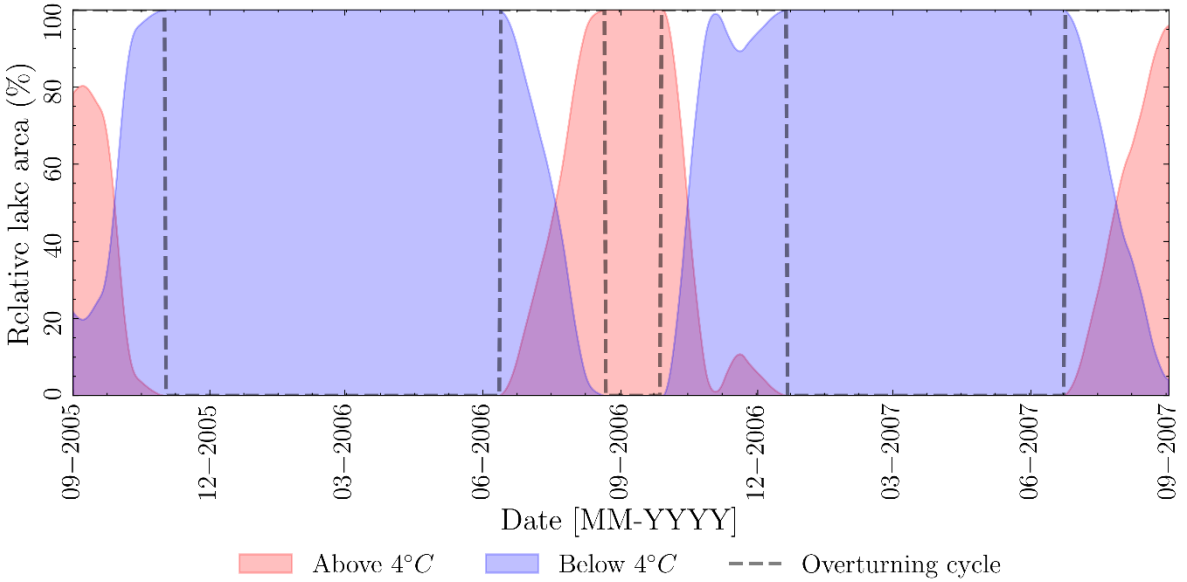
4) Expanded spatial and temporal coverage for lake ice thickness product

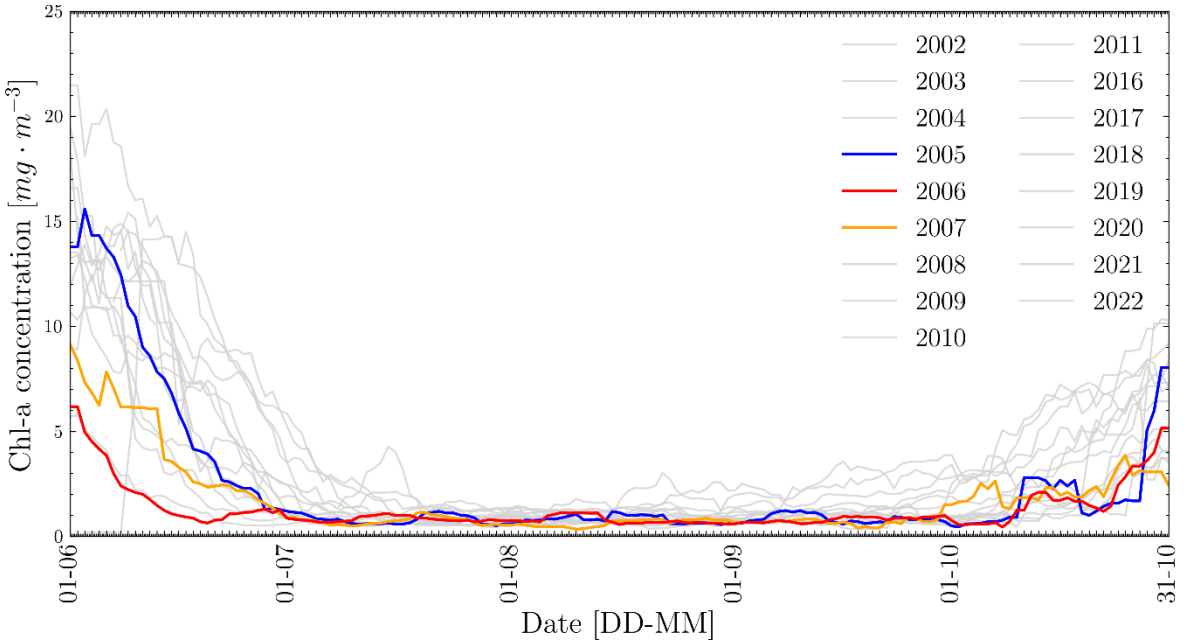
Results & relevance to the CCI communitv

Case Study: Great Bear Lake

Cold monomictic lake with **occasional non-perennial dimictic anomalies** in its mixing regime.

Years with an anomalous summer dimictic regime (in red) and/or summer stratification consistently exhibit an **earlier late-spring algal blooms, and earlier end of winter stratification** compared with non-anomalous years (e.g., the previous year in blue and the following year in orange).

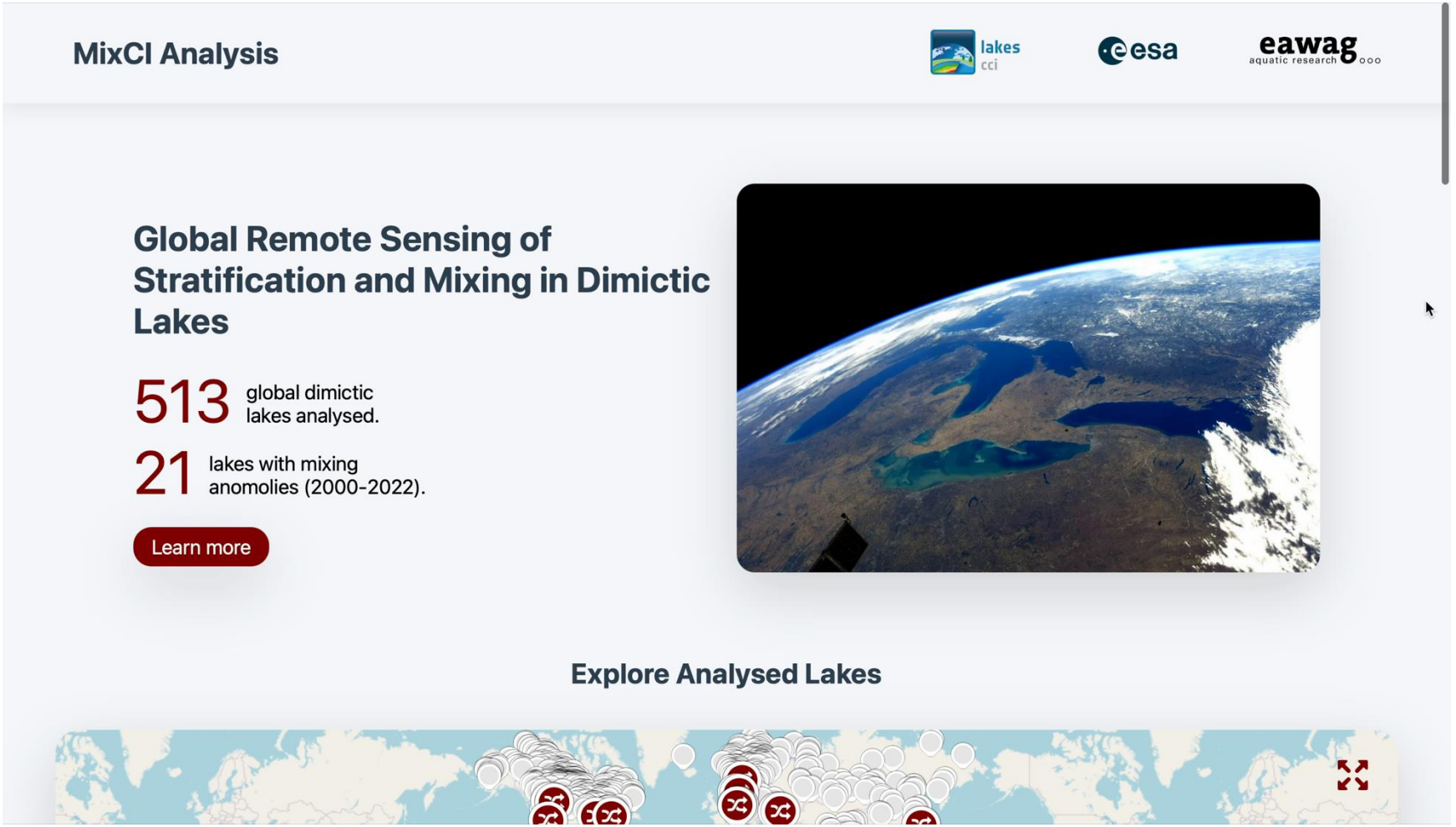




Next steps and questions

1. Can these anomalies be detected using thermal inertia or atmospheric temperature forcing?
2. Which early indicators could link these physical and biological anomalies?

Results & relevance to the CCI community



Thank you for listening