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The LifeWatch ERIC Biodiversity & Ecosystem eScience Conference

LifeWatch ERIC

Heraklion, 30 June - 3 July 2025

1 July 2025 | 9:40

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iMBBC ΙΘΑΒΒΥΚ

Session: Ecological Responses to Climate Change

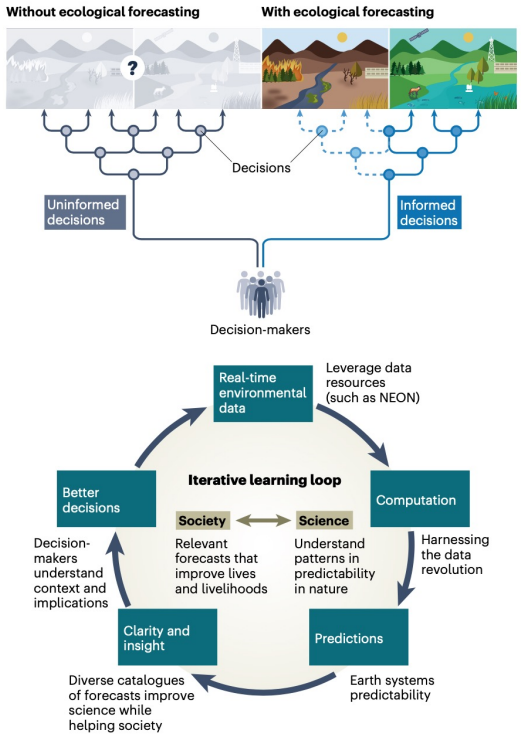
1 July 2025 | 08:30-10:30

Reconciling short- and long-term ecological predictions for assisting decision making: a challenge for LifeWatch ERIC community

Presenter: Marta Magnani
Co-athors: Gianluigi Ottaviani | Paolo Fiorucci | Antonello Provenzale | Mara Baudena

Evidence-based decision making

- Unprecedented global changes are posing significant challenges to human societies, altering the yield of essential ecosystem services (Cardinale et al., 2012)
- Management actions supported by scientific evidence can be designed to limit the impacts – such as the loss of biodiversity and human lives
- Models are key decision-making tools, as they allow to explore the possible consequencies of management plans. **Just as management actions not informed by scientific evidence have led to undesired outcomes (Sutherland et al. 2004), inappropriate modeling frameworks may result in interventions having inefficient or even detrimental impacts**



Dietze et al., Nat. Clim. Change **411**, 2019

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How can models guide interventions that are **timely**, **accurate**, and **long-lasting**?

The suggested approach

Near-term forecast

driven by management objectives

Benefit: to provide information on actionable time frames

Risk: to overlook important processes and links between ecosystem component

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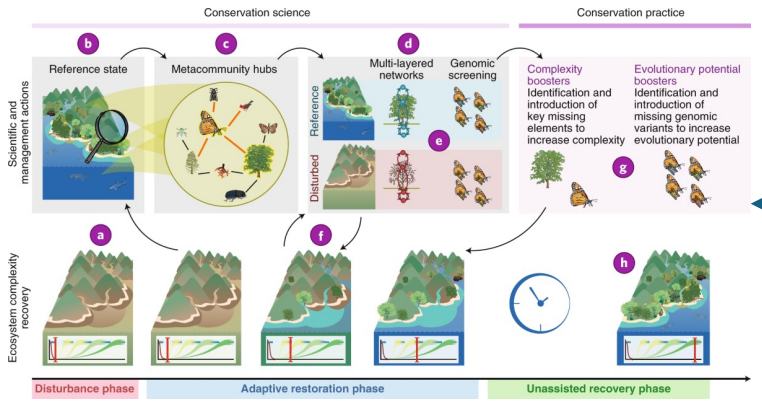
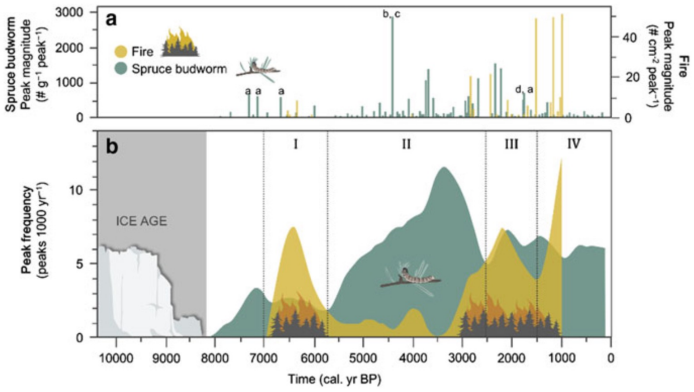
Near-term + long-term predictions



1. Conceptual reasons

Moreno-Mateos et al., **Nat. Ecol. Evol.**, 2020

2. Technical reasons



Aakala et al. In: **Boreal Forests in the face of climate change: sustainable management (pp. 53-87)** Springer Internat. Pub.2023

The suggested approach

Near-term forecast

driven by management objectives

Benefit: to provide information on actionable time frames

Risk: to overlook important processes and links between ecosystem component

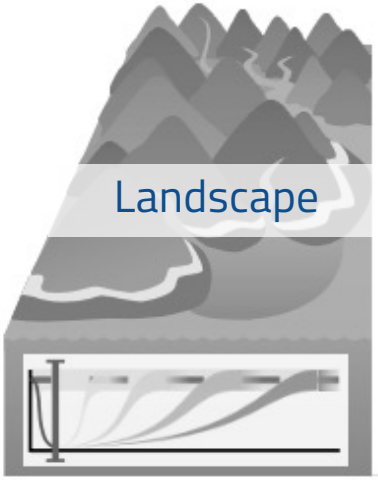
Near-term + long-term prediction

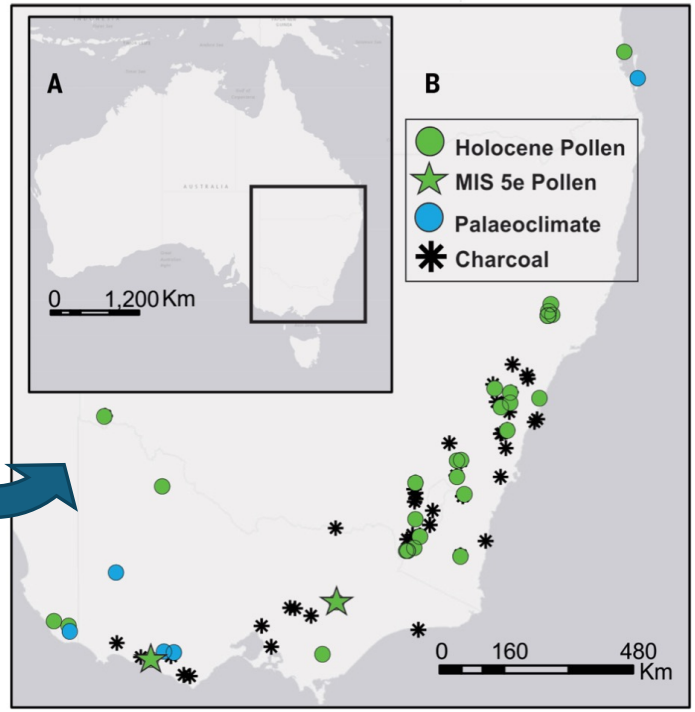
driven by the intrinsic features of the system (ecological dynamics, abiotic porcesses, human management and activities)

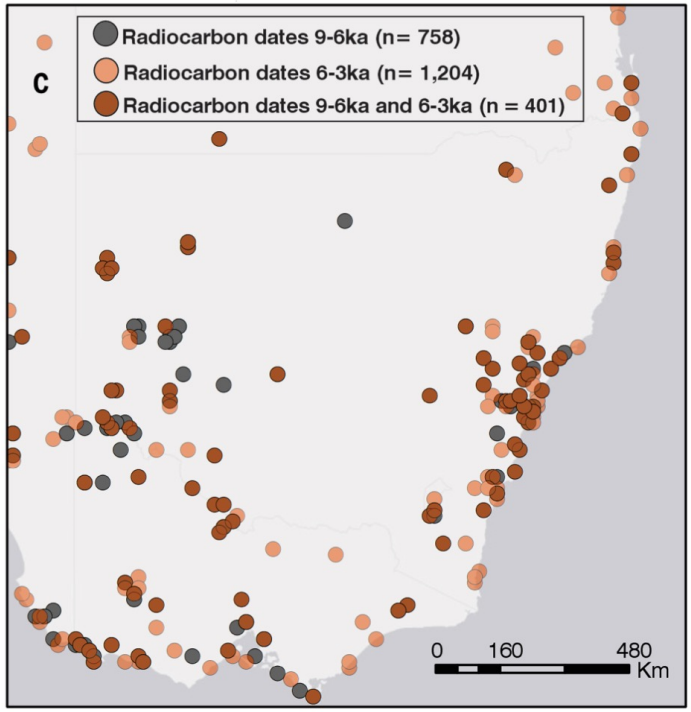
Benefits: 1) to test the ability of the model to reproduce observed states (sanity check); 2) to test whether the effect of management are detrimental over long times

Issue: Who to identify relevant processes? Do data allow to build such a model?

Step 1: Zooming out from the landscape

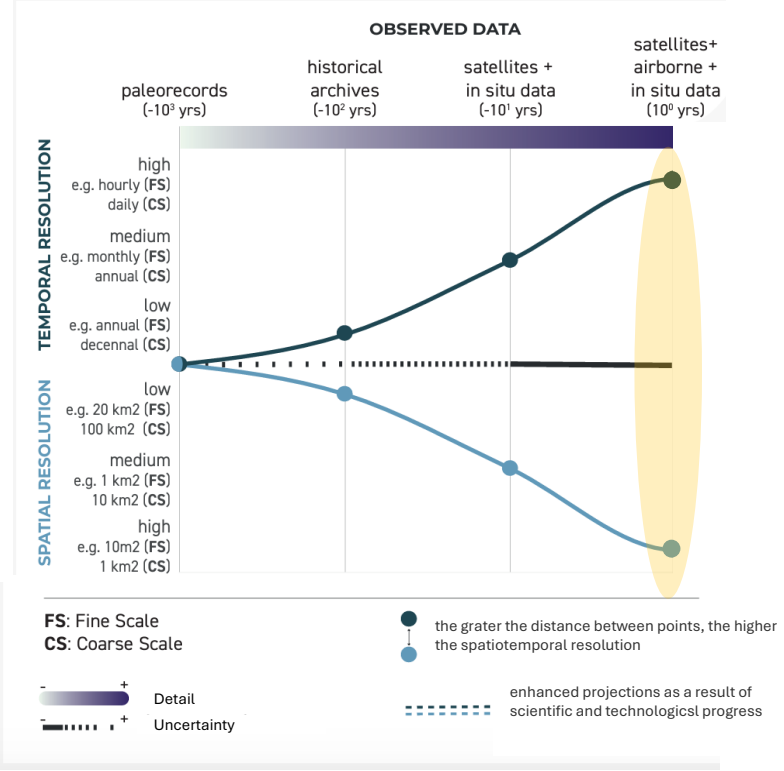




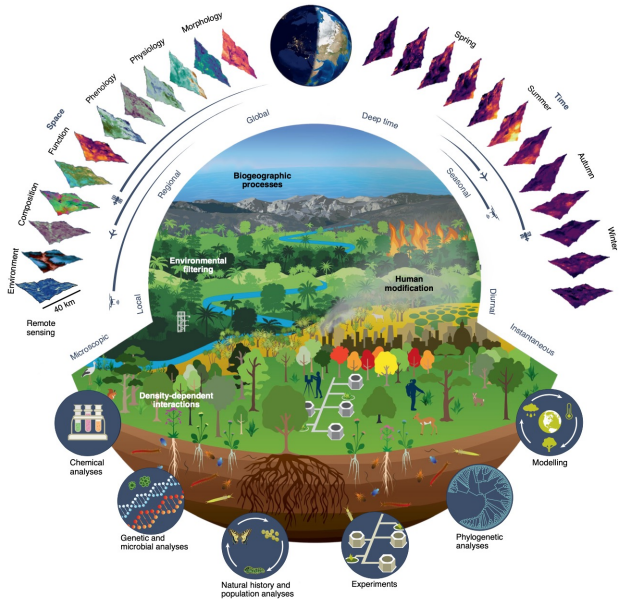


Mariani et al., Science, 2024

Step 2: Use different information sources



Magnani et al., in prep



Cavender et al., Nat. Ecol. Evol. **6**, 2022

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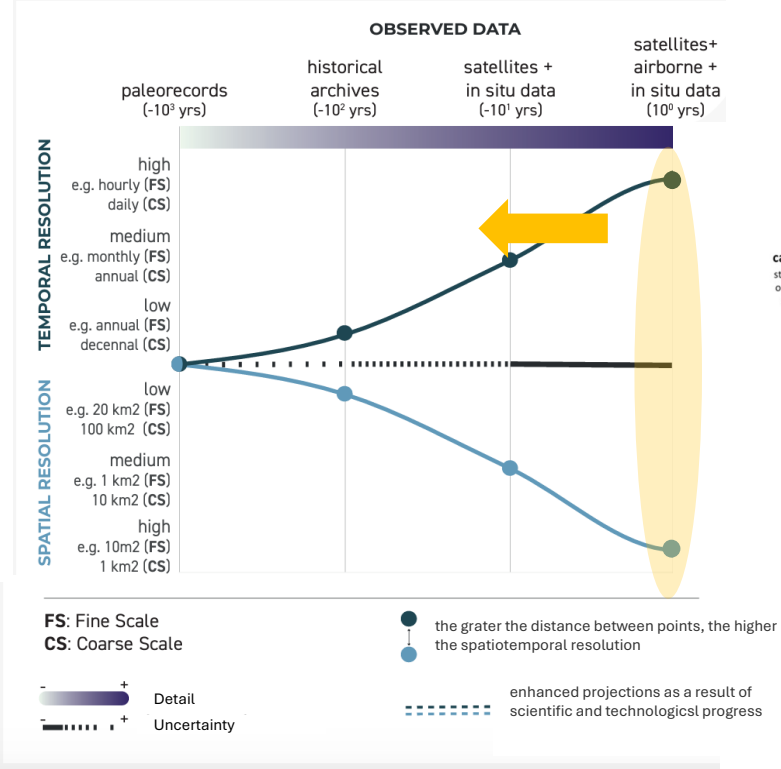

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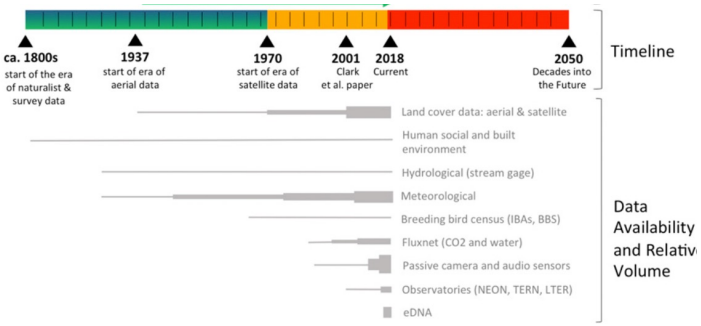
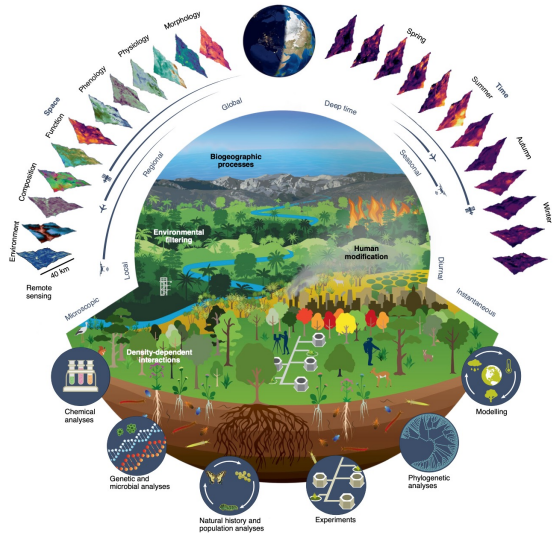


Dietze et al. PNAS, **115(7),** 2018



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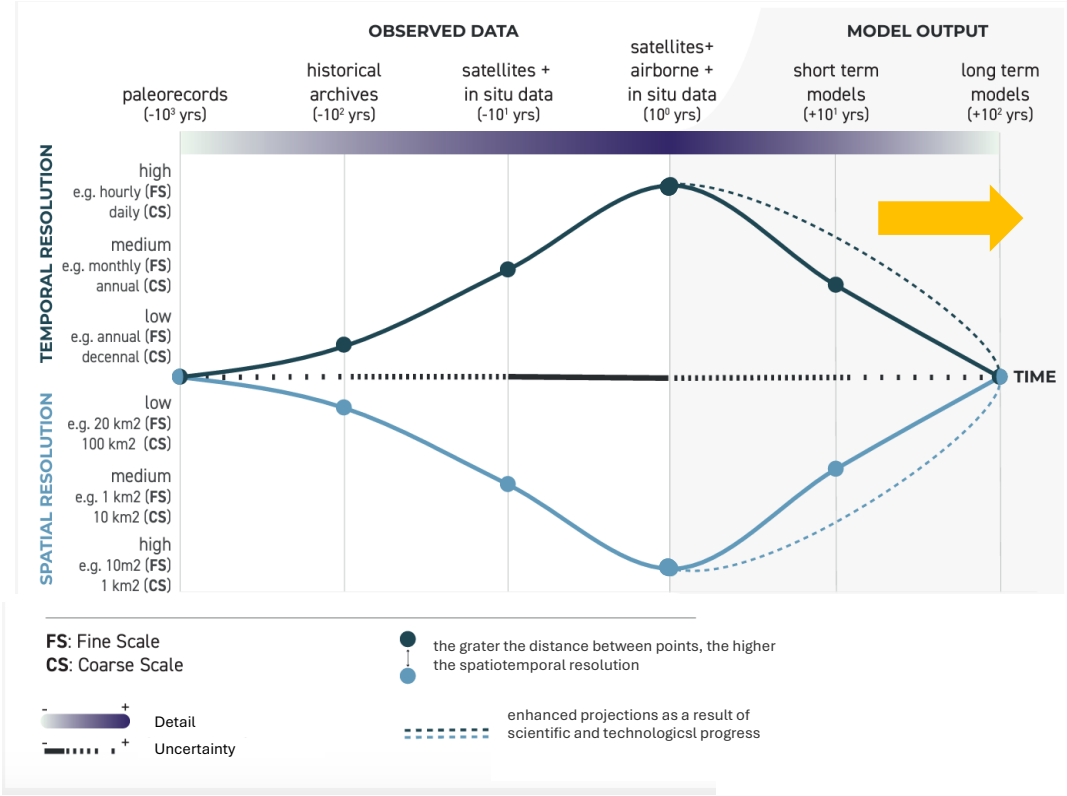

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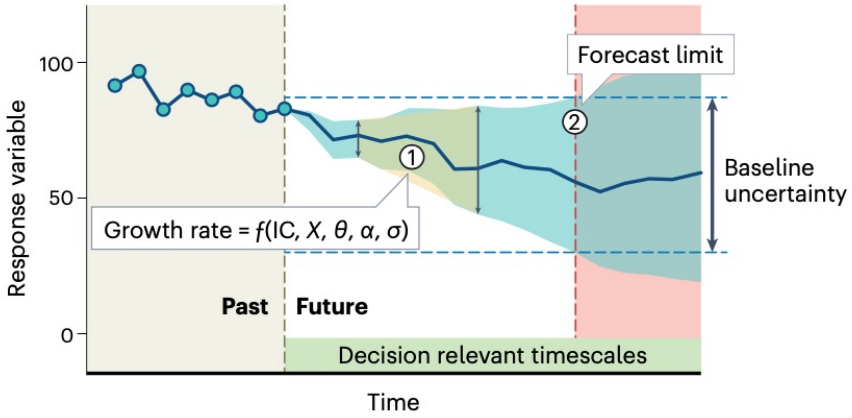

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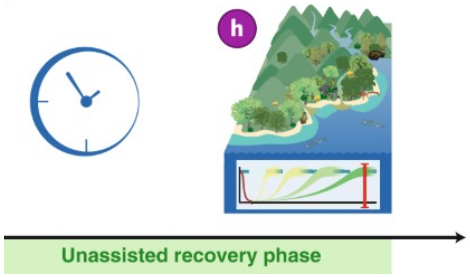

Step 3: Communities of practice

International networks for the convergence of experiences from different disciplines to produce timely and reliable ecological predictions, involving transdisciplinary teams (i.e., also engaging stakeholders, such as landscape managers, local and regional agencies, national park rangers) sharing knowledges, competences, and aiming at mutual learning.

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Concluding remarks

- Models aiming at assisting decision-making should not forget about **long timeframes**
- Steps:
  1. move the focus from the landscape to higher biogeographical levels (e.g. ecoregions)
  2. collect all the available information (present data, historical archives, paleorecords, …)
  3. **Use integrate this information in models, tackling short and long timeframes via communities of practice**

- **Why not forming this communities within LifeWatchERIC?**

Thank you!

Questions?
marta.magnani@cnr.it

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