The Terrestrial Carbon Community Assimilation System: A Tool for Tracking Carbon in the Landscape

Peter Rayner

2024-02-26

The Superpower Institute
https://www.superpowerinstitute.com.au/

My Favourite Question

Have you ever thought about applying this to . . . ?

The Policy Problem

- It is hard to quantify changes in carbon in the landscape
- It is harder to attribute these changes to deliberate human action given large natural changes
- It is yet harder to assign risk to this stored carbon given future climate trajectories
- These vitiate market transparency and credibility
- They also drive sub-optimal mitigation activity

The Technical Problem

- ▶ There are many streams of information on landscape form and function
- ▶ All are imperfect, incomplete and don't measure what you want
- ▶ They measure different things so are not directly comparable

An Assimilation Approach

- ▶ Build a physical model of the system
- ▶ Build algorithms ("observation operators") to map model state onto observations (simulations)
- ▶ Optimally adjust model to minimise mismatch between simulations, and observations
- ▶ Adjustments may include model state (e.g. carbon stocks) and physical parameters of model
- ▶ Approach draws heavily on weather prediction

Example Use Cases

- A landowner plants trees: Run model with and without the land cover change to isolate the impact and fairly award ACUs
- Run model with climate scenarios to assess climate risk for sequestration in different locations
- Use model for "prospecting" to find optimal combination of sequestration potential and risk

Speculative Applications

- Can we model the landscape's ability to support biodiversity?
- What about pasture and cropping systems?