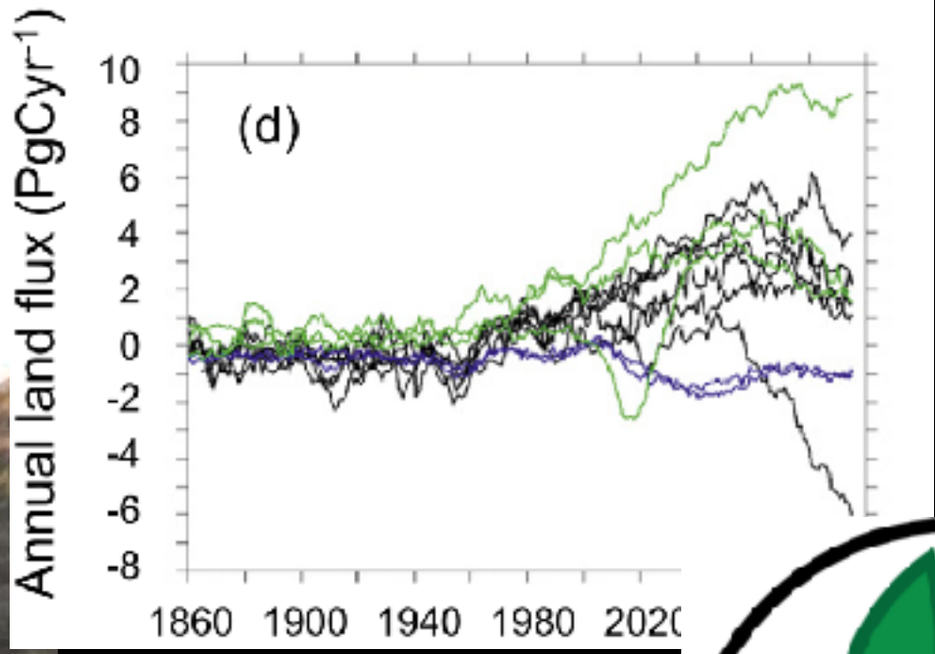
NEAR-TERM ECOLOGICAL FORECASTING INITIATIVE

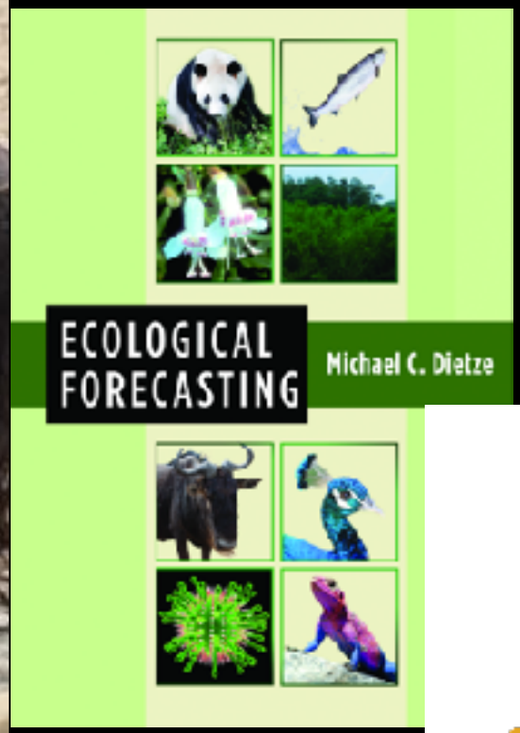
SUMMER COURSE

Boston University, June 27-July 1, 2022

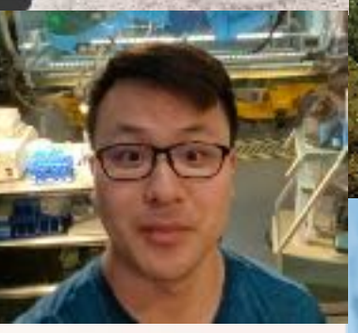
WELCOME TO BOSTON!

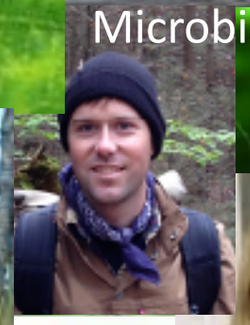
About Me

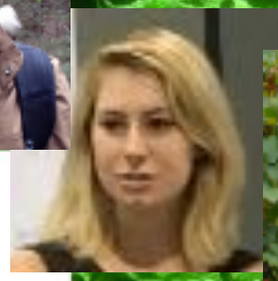




neon
National Ecological Observatory Network







Wheeler, Helgeson, Zheng:
C Fluxes & Phenology

Weathers, Lofton, & GLEON: HABs

Malmborg: Forest pests

Bhatnagar, Averill, & Werbin:
Microbial diversity

McCabe:
Invasive
Species

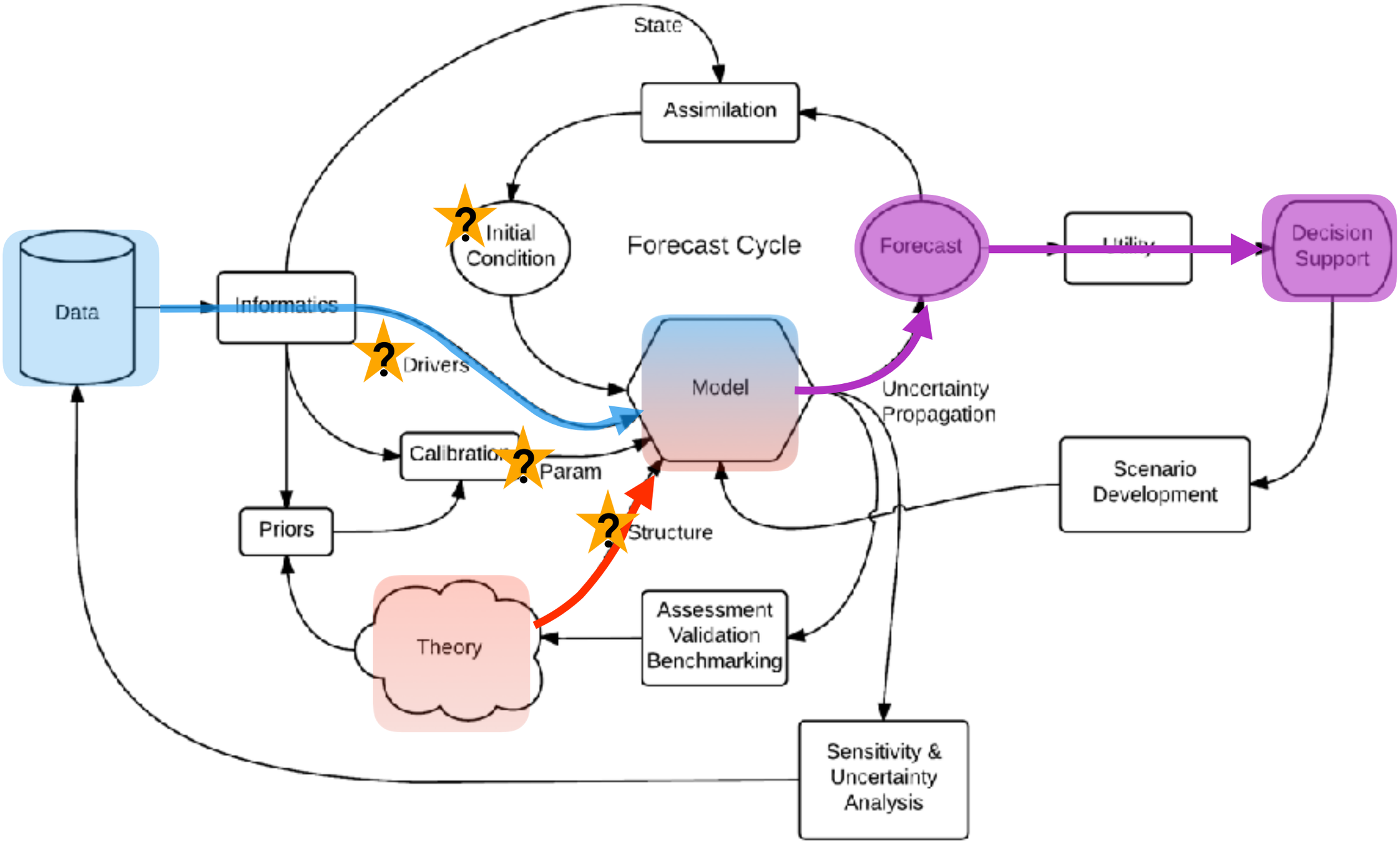
LaDeau & Foster:
Ticks & Small
Mammals

NEFI 2018

NEFI 2019

FILAMO 2019

NEFI 2020



Dietze 2017 “Ecological Forecasting” Princeton University Press

Time	Monday	Tuesday	Wednesday	Thursday	Friday
9:00	Introductions (0:40)	State-space (0:30)	Analytical DA (1:15)	Ensemble DA (1:15)	Model Assessment (1:00)
9:30	Lightning talks (0:35)	Hands On			
10:00	Project descriptions & polling (0:20)		Break (0:15)	Break (0:15)	Break (0:15)
10:30	Break	Break	Hands On (1:15)	Hands On (1:00)	Forecast Infrastructure (1:15)
11:00	Characterizing Uncertainty (0:30)	Dynamic Models (0:30)			
11:30	Hands On	Project	PROACT (1:00)	Human dimensions of ecological forecasting (1:00)	Hands On (1:00)
12:00					
12:30	Lunch	Lunch	Lunch	Lunch	Lunch
13:00					
13:30	Hierarchical Bayes (1:15)		Machine Learning (1:15)	Project	Project
14:00		Propagating Uncertainty (1:15)			
14:30	Break (0:15)		Break (0:15) at 15:45		Break (0:15)
15:00	hands on (1:15)	Break (0:15)	Project		Project Presentations (1:00)
15:30		Hands On (1:30)		Break (0:15)	
16:00	Break (0:15)			Round Table (1:00)	Wrap up (0:45)
16:30	Expert Elicitation (0:30)				

INTRODUCTIONS

GROUP PROJECTS

- Rank preference
- Goals:
  - Apply course concepts to a new problem
  - Connections to EFI NEON forecast challenge
- Elements
  - Calibration
  - Prediction (& partitioning)
  - Validation (reserve out-of-sample data)
  - Bonus: Iterate
- Group presentation on Fri afternoon

NEON FORECAST CHALLENGE

- Goal: Predict NEON site-level observation before they're collected
- Open to all participants and approaches (statistical, machine learning, process-based, etc)
- Round 1: >2M forecasts from >50 teams (5 courses)
- Round 2: 2022 https://ecoforecast.org/efi-rcn-forecast-challenges/
  - Tick nymph populations
  - Aquatic Chl-a, DO, and water temperature
  - Phenocam vegetation phenology
  - Ground beetle biodiversity
  - Terrestrial carbon and water flux

Ecological Forecasting Initiative
UNDERSTAND · MANAGE · CONSERVE

NSF | neon Operated by Battelle

@eco4cast

WHAT IS PROVIDED (API)

- "Targets" file: historical NEON data for each theme for calibration and scoring. Continually updated

- NOAA GEFS
  - ensemble weather forecasts: 35 days, 31 members, archived back to 09/20
  - "stacked" first day time series

- helper packages & tools https://github.com/orgs/eco4cast/repositories neon4cast_*

- submission and scoring portal

- For course, OK to run past dates as if they were a true forecast

ECOLOGICAL FORECASTING

- Is more than forward simulation
- Requires a fusion of models and data
- Must address multiple sources of uncertainty and variability
- Think Probabilistically!!