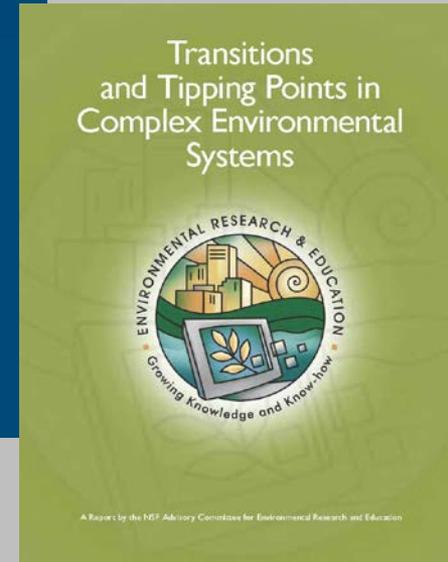
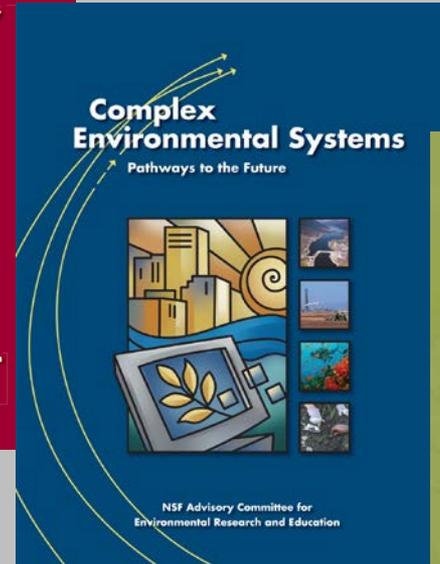
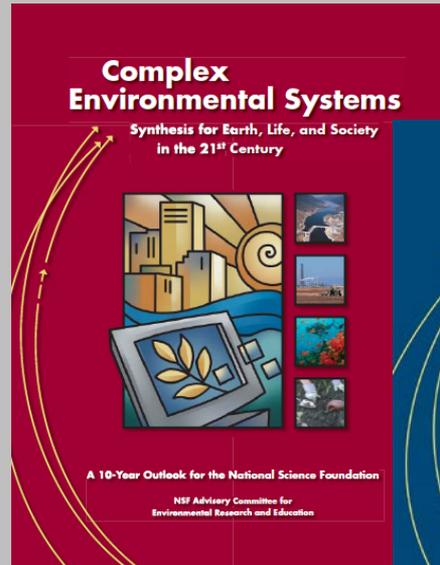
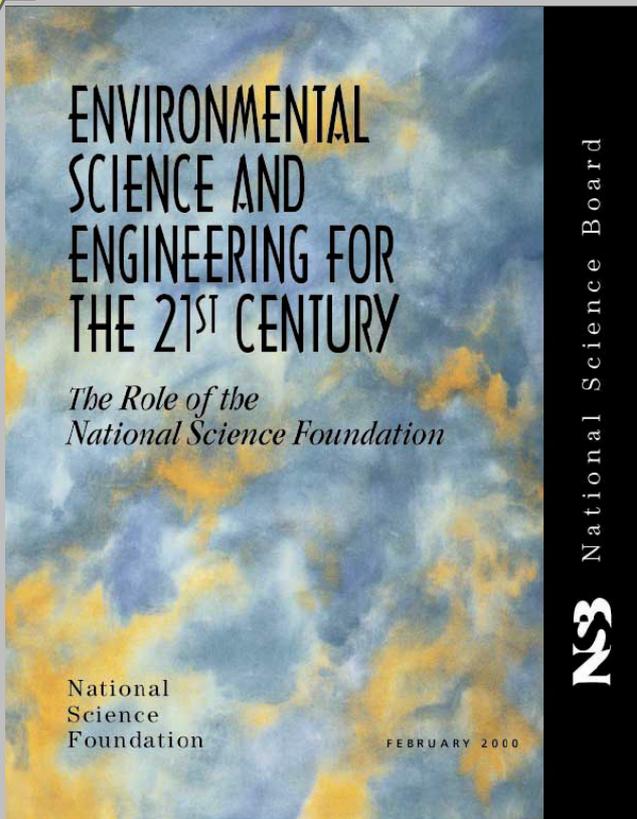




NSF Environmental Science: The role of Biology



Context...

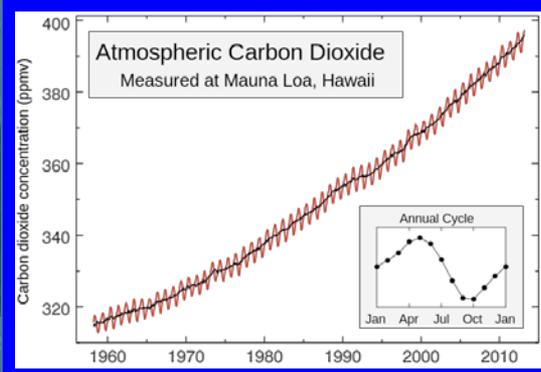
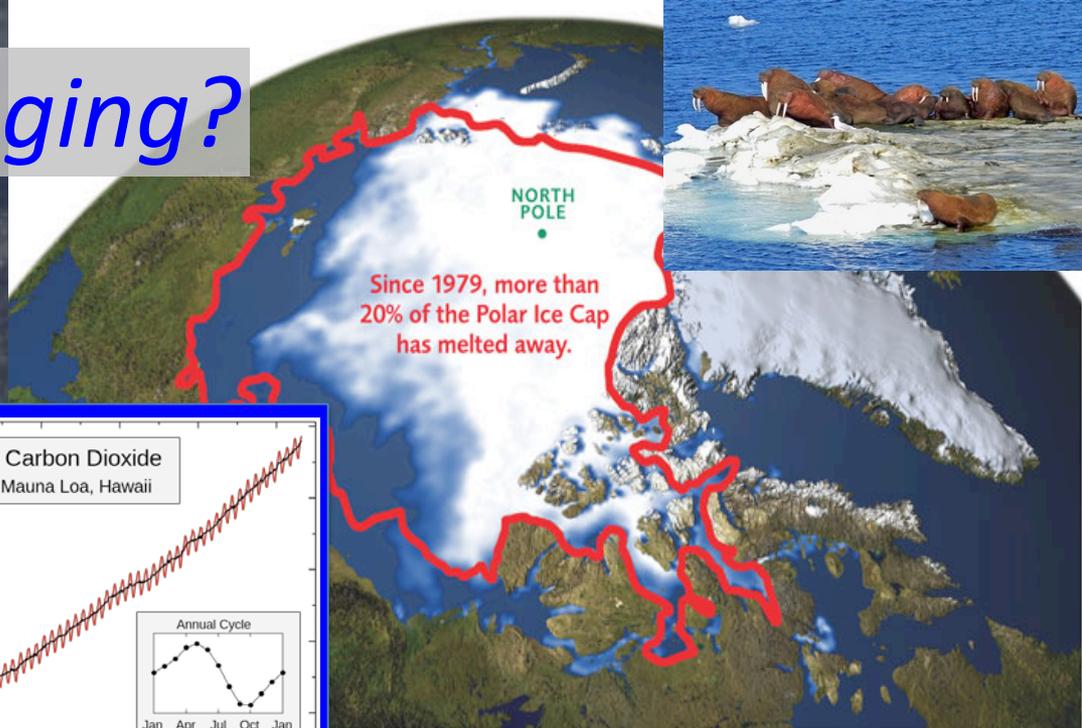
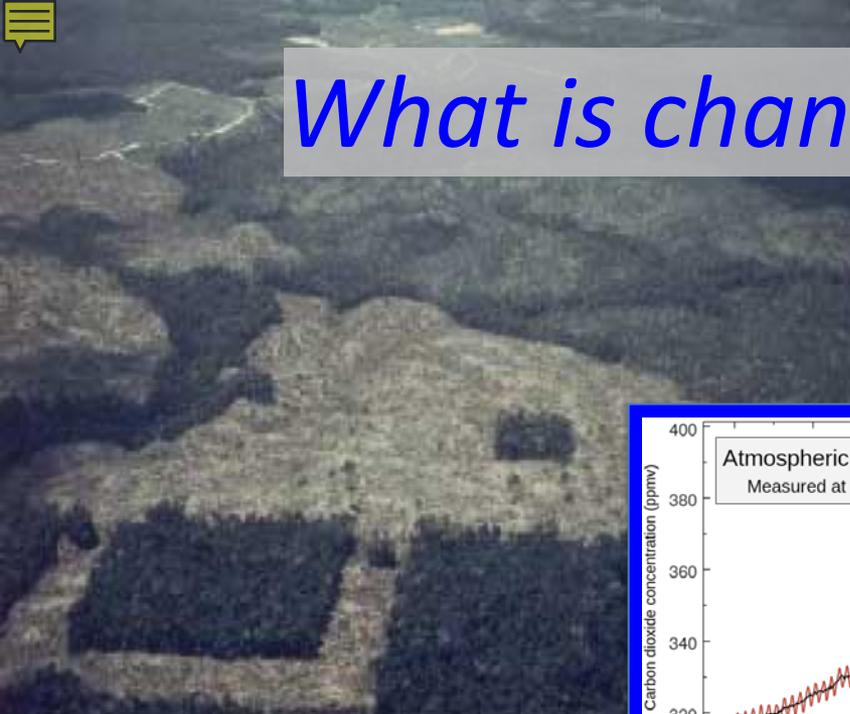


Biocomplexity in the Environment

SEES: Science Engineering and Education for Sustainability

What is on the horizon?

What is changing?



What is changing?

- Rapid evolution modifying traits and dispersal of organisms
- Novel ecosystems emerging globally from feedbacks among processes operating at multiple scales
- Changing nature of species interactions and ecological functions





What is changing?

SUBJECT

SCALE

SCOPE

Environmental Science Event Horizon

Individual Site Based Data

2015 – 2017

Regional-Continental Data

10's of sites

Question-driven monitoring

Somewhat networked

Long-term experiments

10 – 100's sensors

Gigabytes³, eventually

100's – 1000's of sites

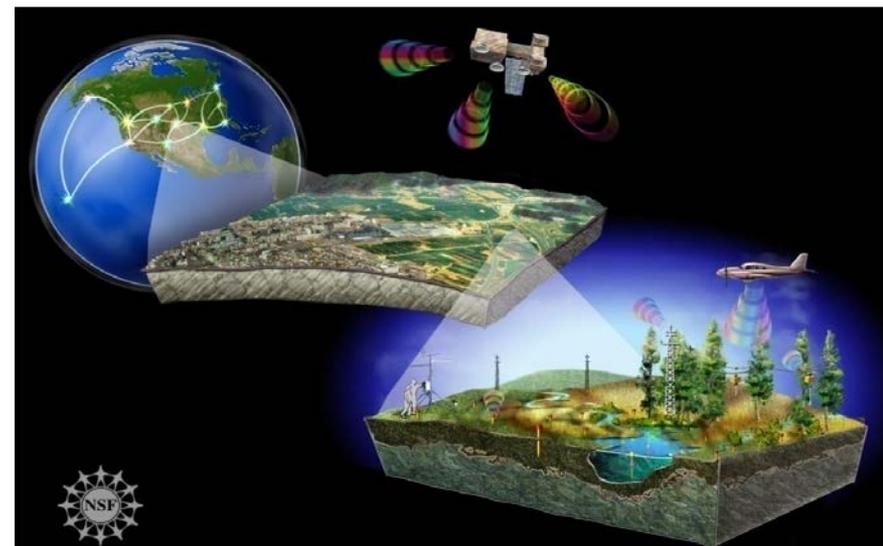
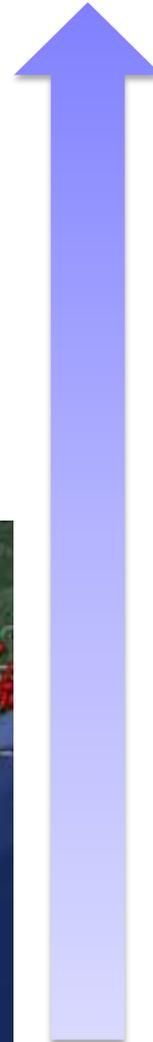
Standardized monitoring

Deliberately networked

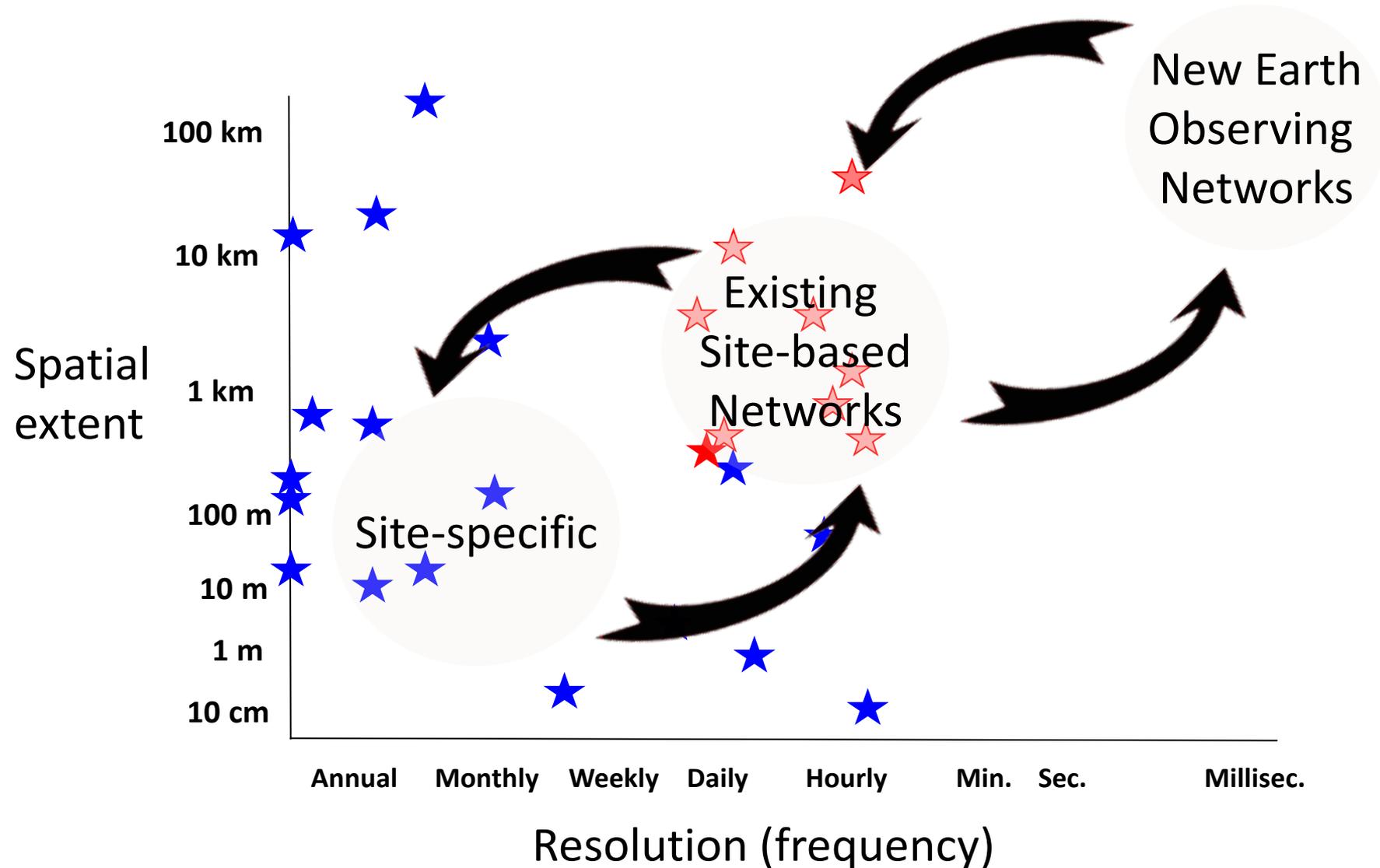
Long-term observations

10,000 – 100,000's sensors

Yottabytes⁸ online, real-time



Environmental Science Event Horizon



“Horizons” initiative?

Vision: A new biology of unprecedented environmental change...

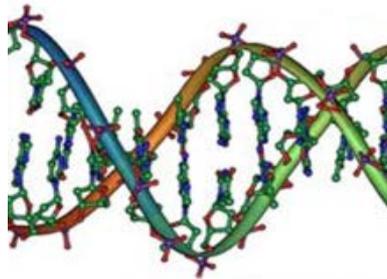
*...that focuses on **poorly-understood** biological processes, functions and feedbacks that **drive and respond to** rapid, large scale and novel change*



“Horizons” initiative?

Key challenges:

- Coupling **new data streams** with classic process-based approaches
- Linking theoretical frameworks **across scales of inquiry**
- Integrating modes of research (observations, experiments, models) to develop process-based understanding of pattern **across levels of organization**



“Horizons” initiative?

Framing priorities:

- Cooperative engagement among broad domains of study to prioritize investments
- Next-generation training to bridge conceptual and tactical gaps between current biological work and emerging EON investments
- Strategic domestic and international partnerships to leverage efforts





What are the priorities for BIO in a
“Horizons” initiative?