

Optimizing the use and outcomes of national RIs through international participation

William H. McDowell, ICRI 2018
University of New Hampshire, USA



funded by NSF

LUQUILLO
CRITICAL ZONE OBSERVATORY





University of
New Hampshire



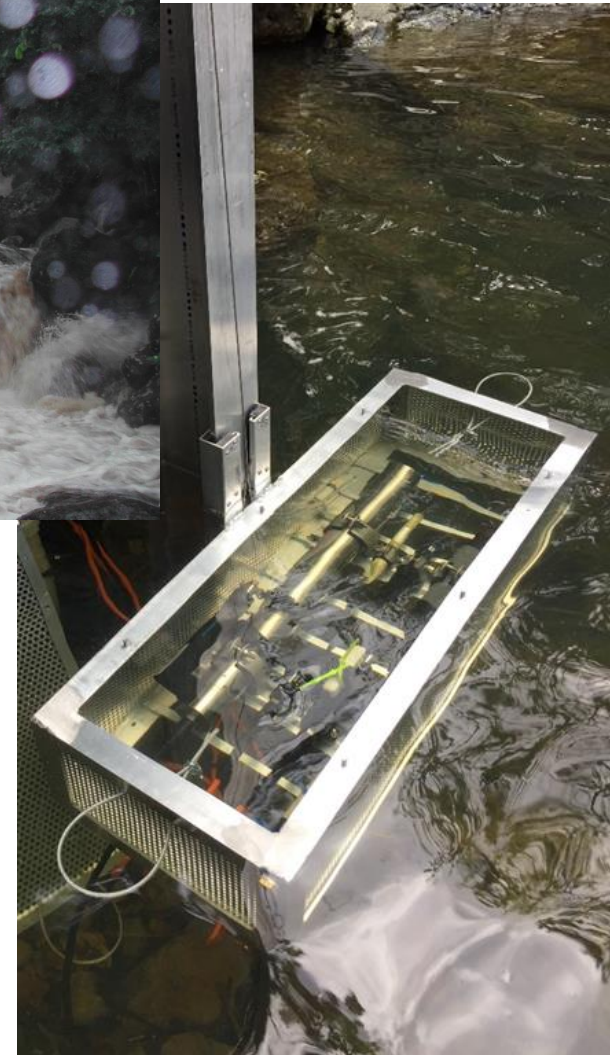
Aquatic ecosystems as a case study in sensor networks as research infrastructure



YSI EXO – turbidity, pH, conductance,
Dissolved organic matter



SUNA Nitrate analyzer

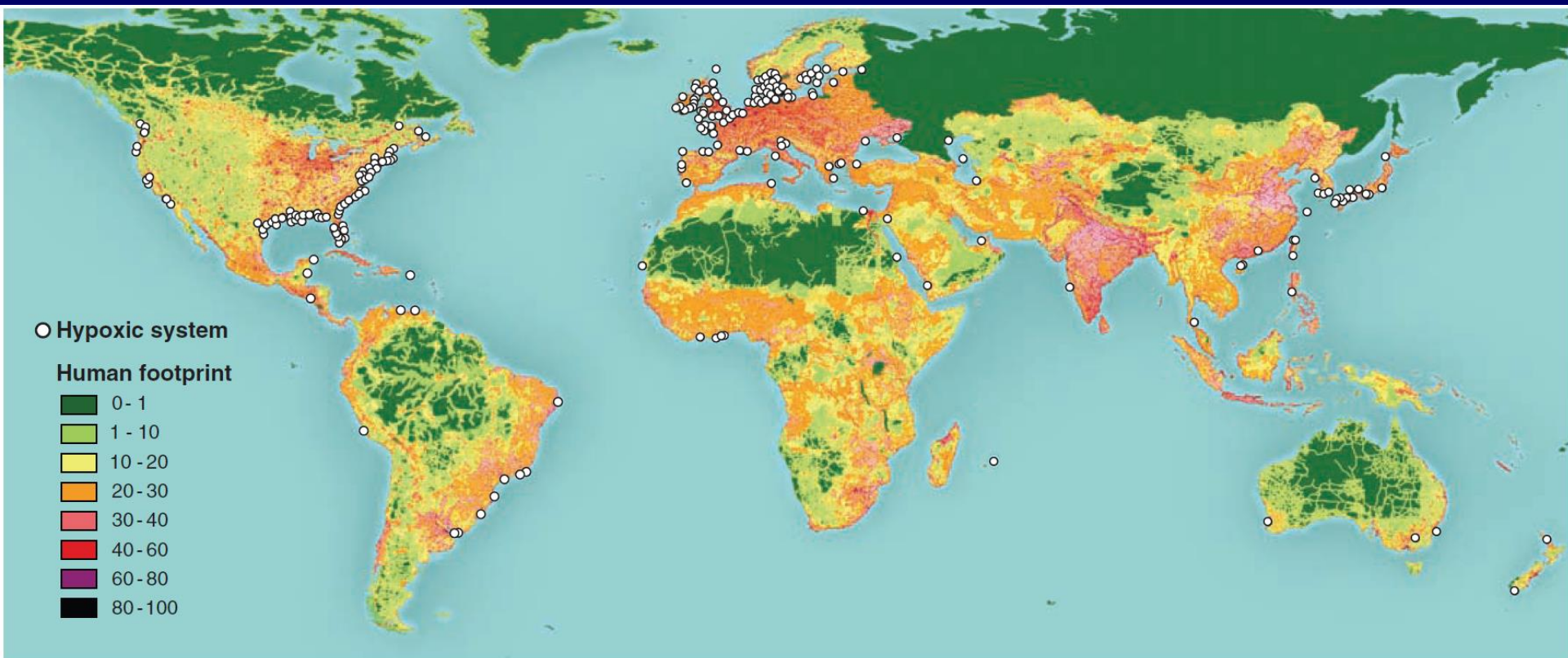




University of
New Hampshire



Why bother?



Many aquatic issues are continental to global scale in scope... e.g. rivers systems drive dead zones due to human footprint (Diaz and Rosenberg 2008. Science 321:926-929)



University of
New Hampshire



What will we learn?

- How aquatic ecosystems *function* (fundamental biogeochemical fluxes and biotic functions)
- ***Global*** rules for ecosystem function that can lead to better management and protection globally
- ***Regional*** or biome-specific variation from national networks



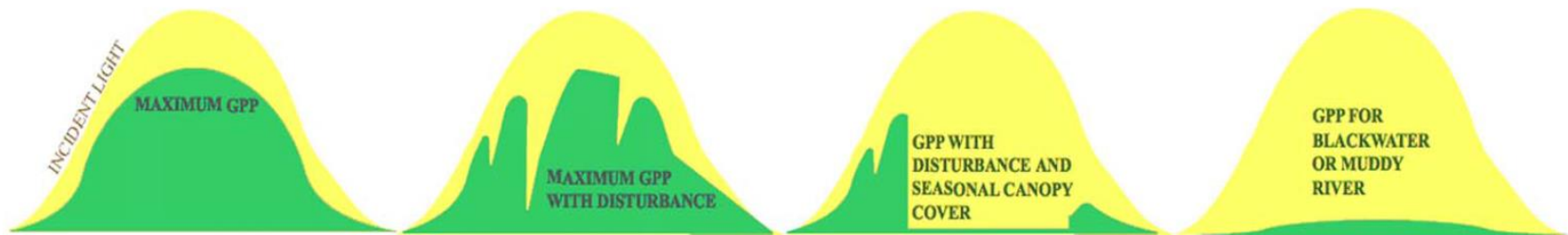
University of
New Hampshire



When are streams green? Establishing phenology of stream metabolism

(Bernhardt et al. 2018, Limnology and Oceanography)

Light, disturbance, nutrients all potentially interact to affect primary productivity; challenge is to quantify metabolism and understand drivers at the continental scale



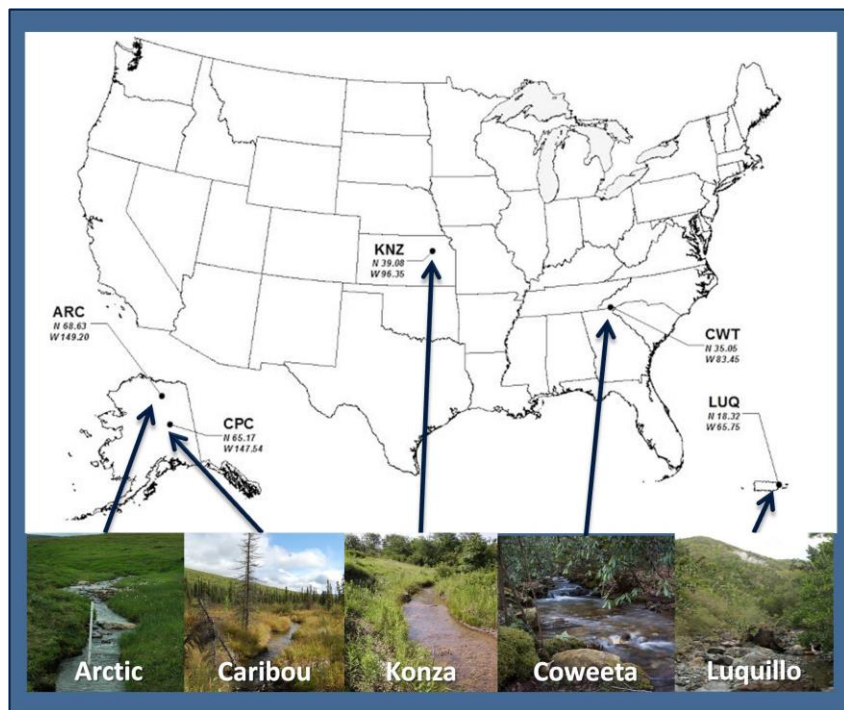


University of
New Hampshire

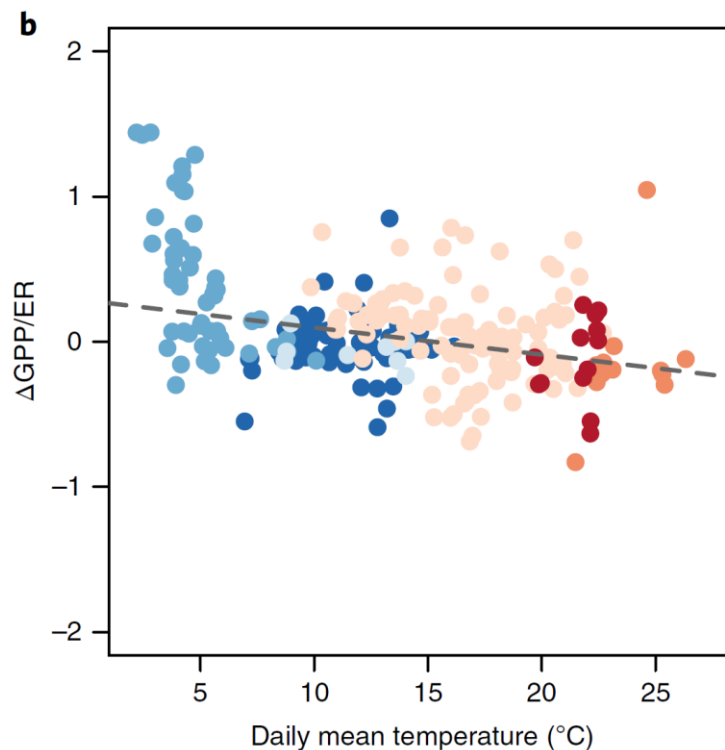


Stream metabolism in a warming world

(Song et al. 2018 Nature Geosciences)



SCALER Macrosystems sites

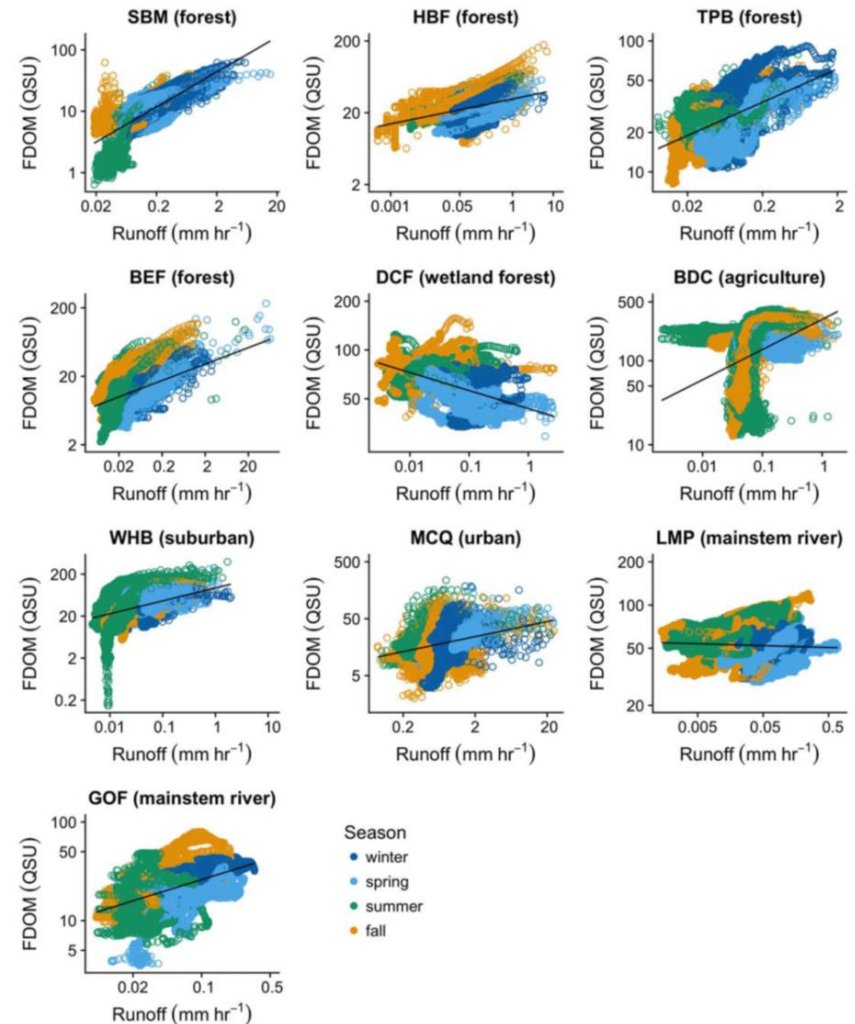
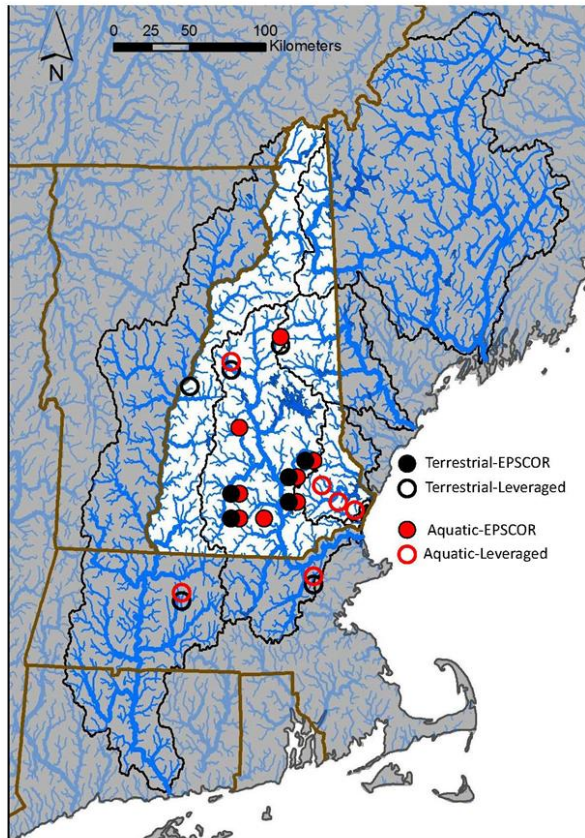


With increasing temperature, **respiration increases faster than photosynthesis** at the warmest sites; CO₂ release dominates uptake

Lessons from a prototype network

(Koenig et al. 2017 WRR)

Terrestrial-Aquatic Sensor Network



Four years of 15-minute data by season show a ***surprising lack of regional coherence*** in response of FDOM (a proxy for dissolved organic carbon, DOC) to river runoff

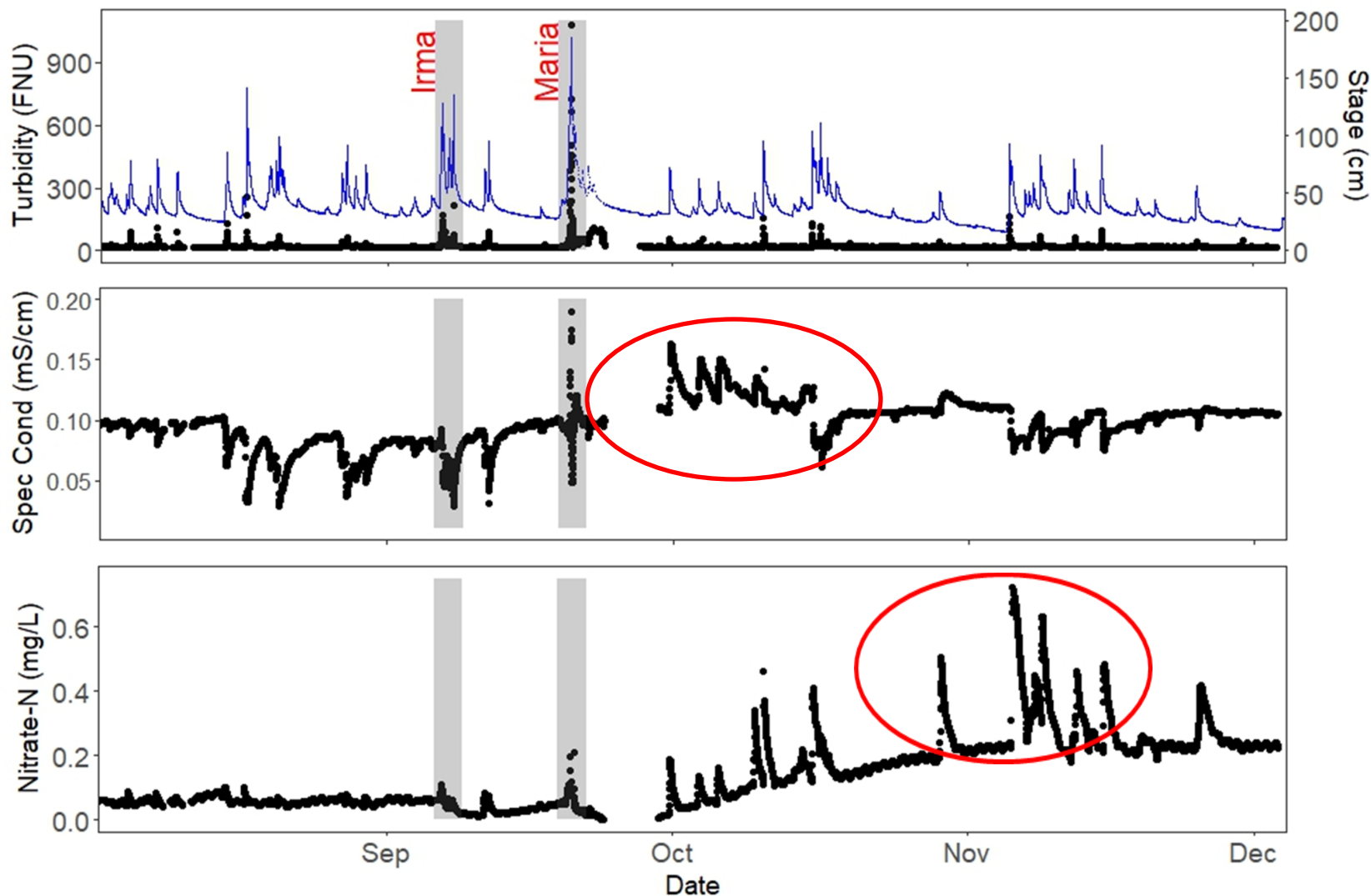


University of
New Hampshire



What will we learn?

Surprise me!





University of
New Hampshire



Specific data challenges

- ***Use it or lose it***...using data provides new insights and new level of QA/QC, and keeps data structure up to current standards for interoperability
- ***Infrastructures*** for data preservation and data exploitation must be brought together as noted yesterday
- Data sources should ***open by default***



University of
New Hampshire



Values/challenges/issues of internationalization

- Scientific value of this RI is based on a wide range of sites that cover global conditions and engage diverse stakeholders
- Very different model from a single national infrastructure (collider) that others can visit
- Analogous to LIGO network looking inward at Earth not outward at gravitational waves in the universe



University of
New Hampshire



Internationalization (Continued)

- Every user of data should be a generator of data (this may require funding to less developed nations)
- Each user thus has a stake in the success of the joint enterprise

Questions?

