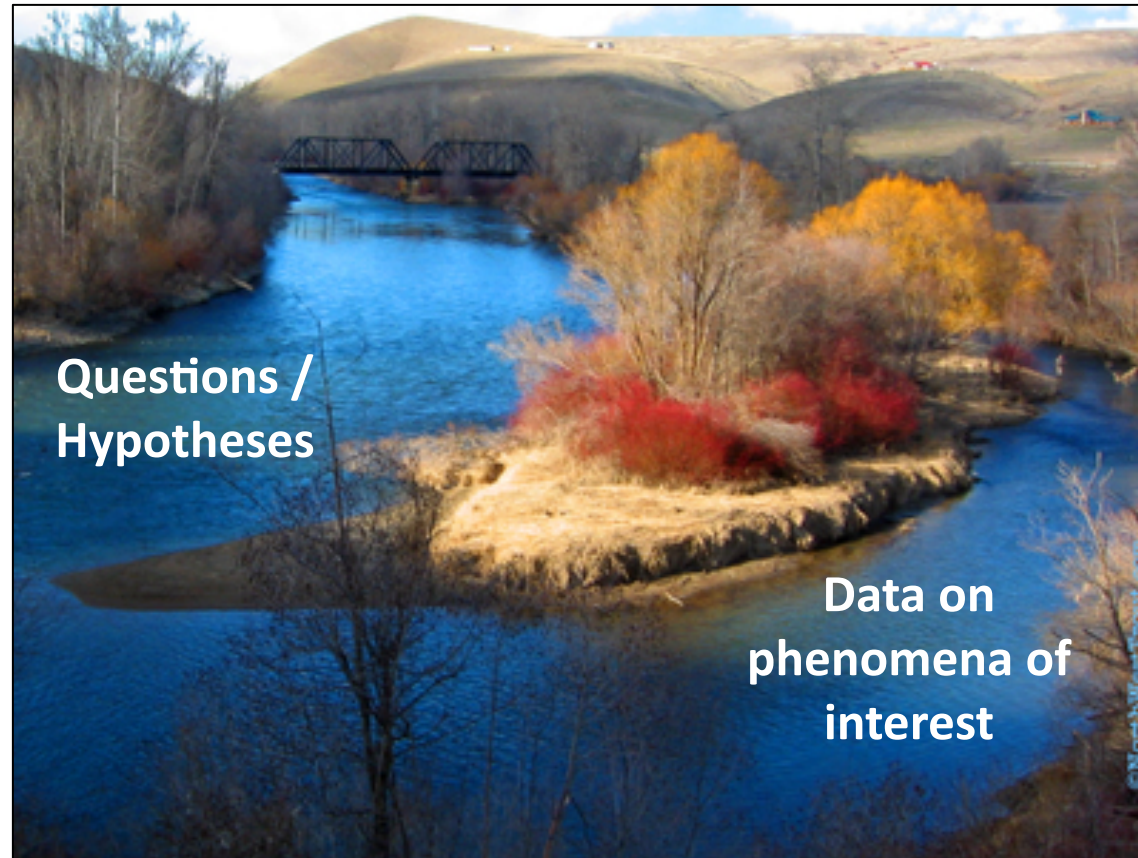


CANON 2012 Experiment Planning

Focus on May-June, Part 2

Experiment-plan tributaries

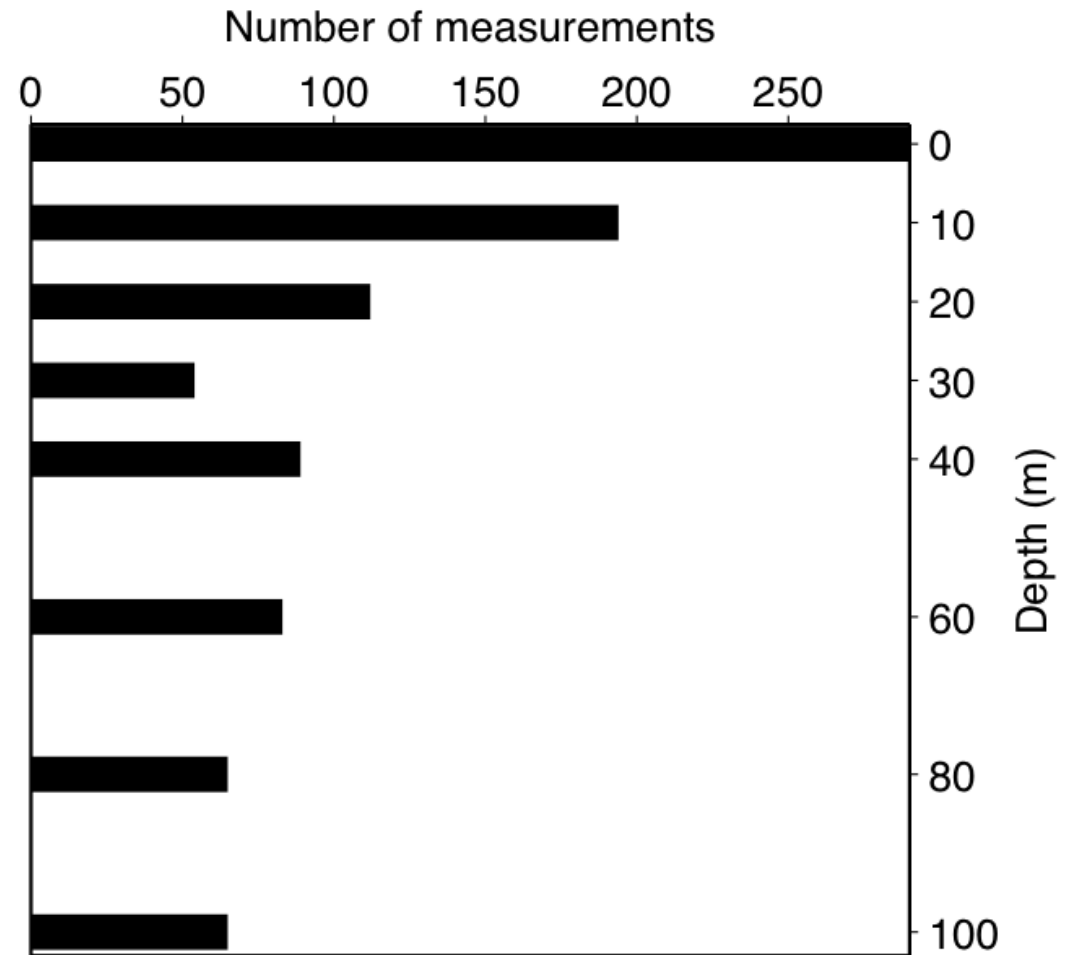
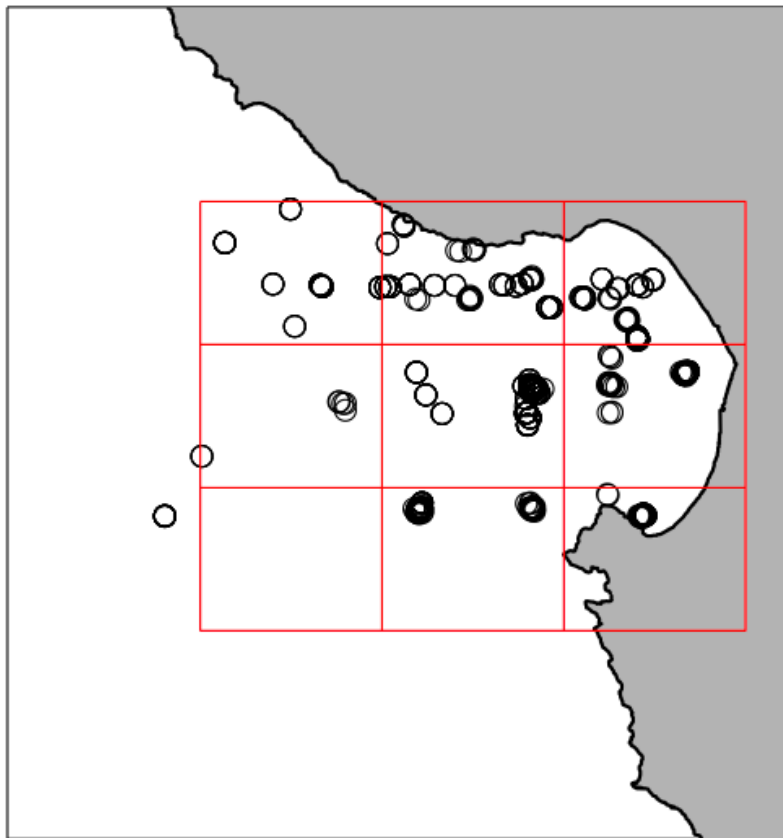


Experimental capabilities

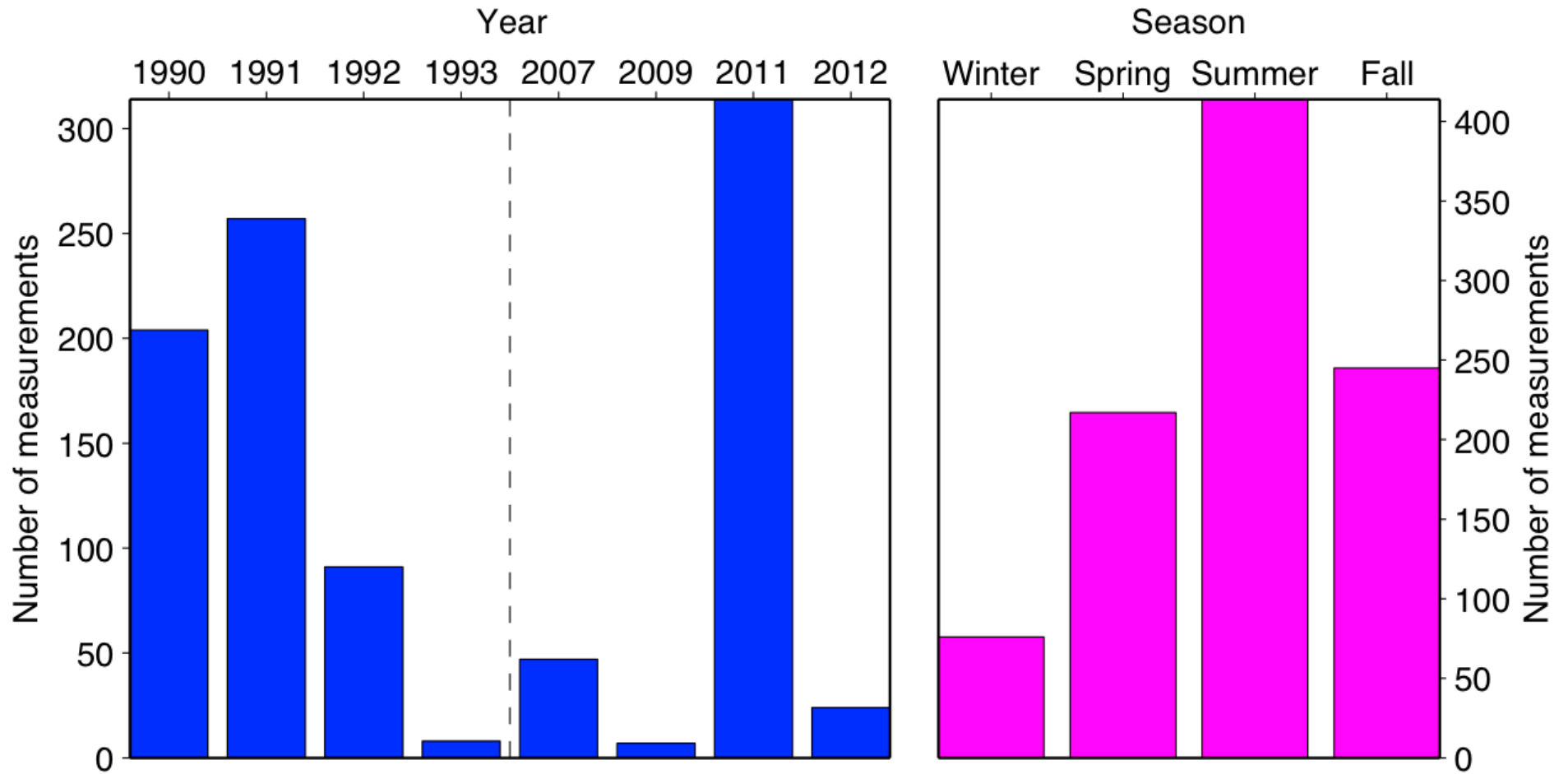


Experiment plan

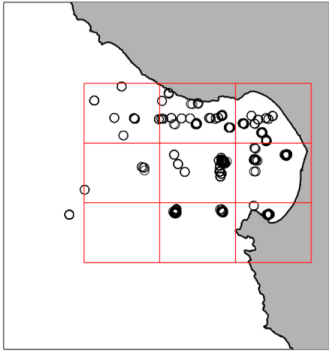
“Bay area” ammonium data: Where?



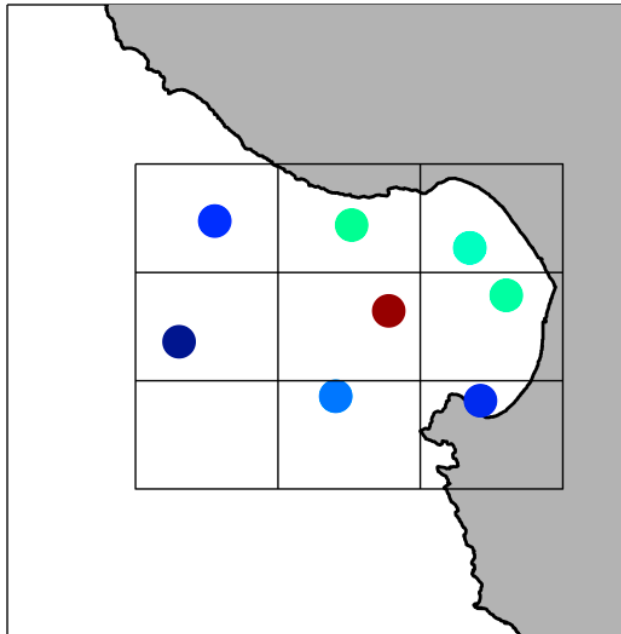
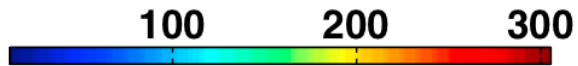
“Bay area” ammonium data: When?



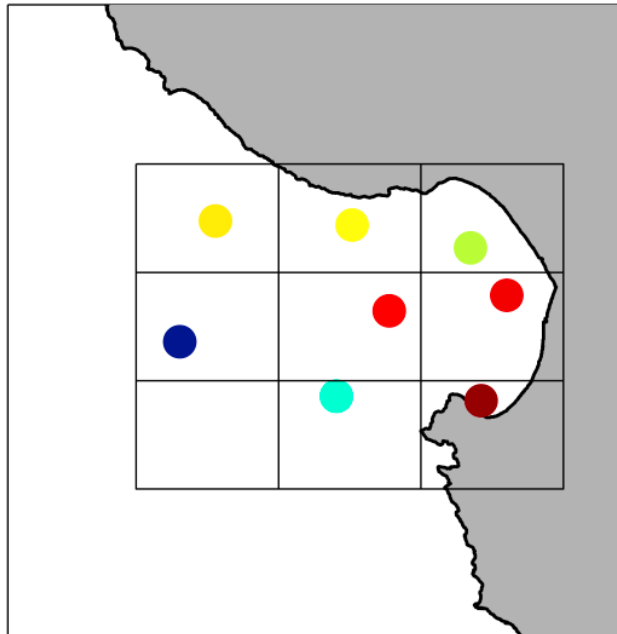
“Bay area” ammonium data: What?



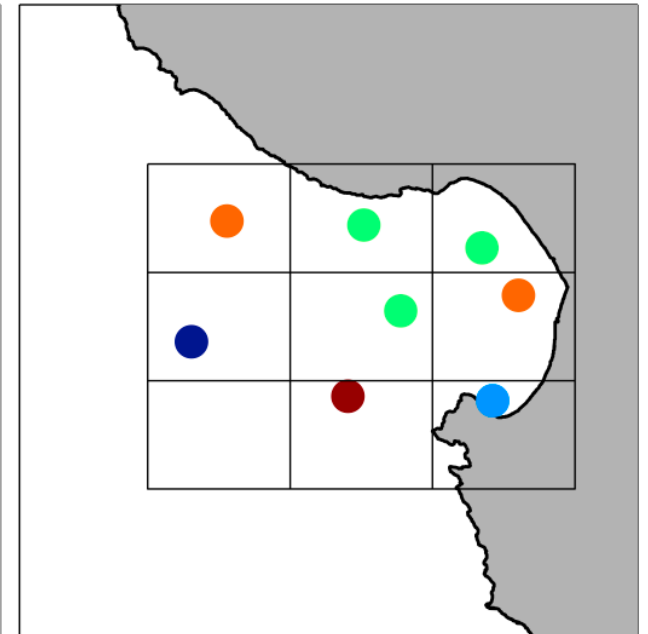
Number of Observations



Maximum observed (μM)



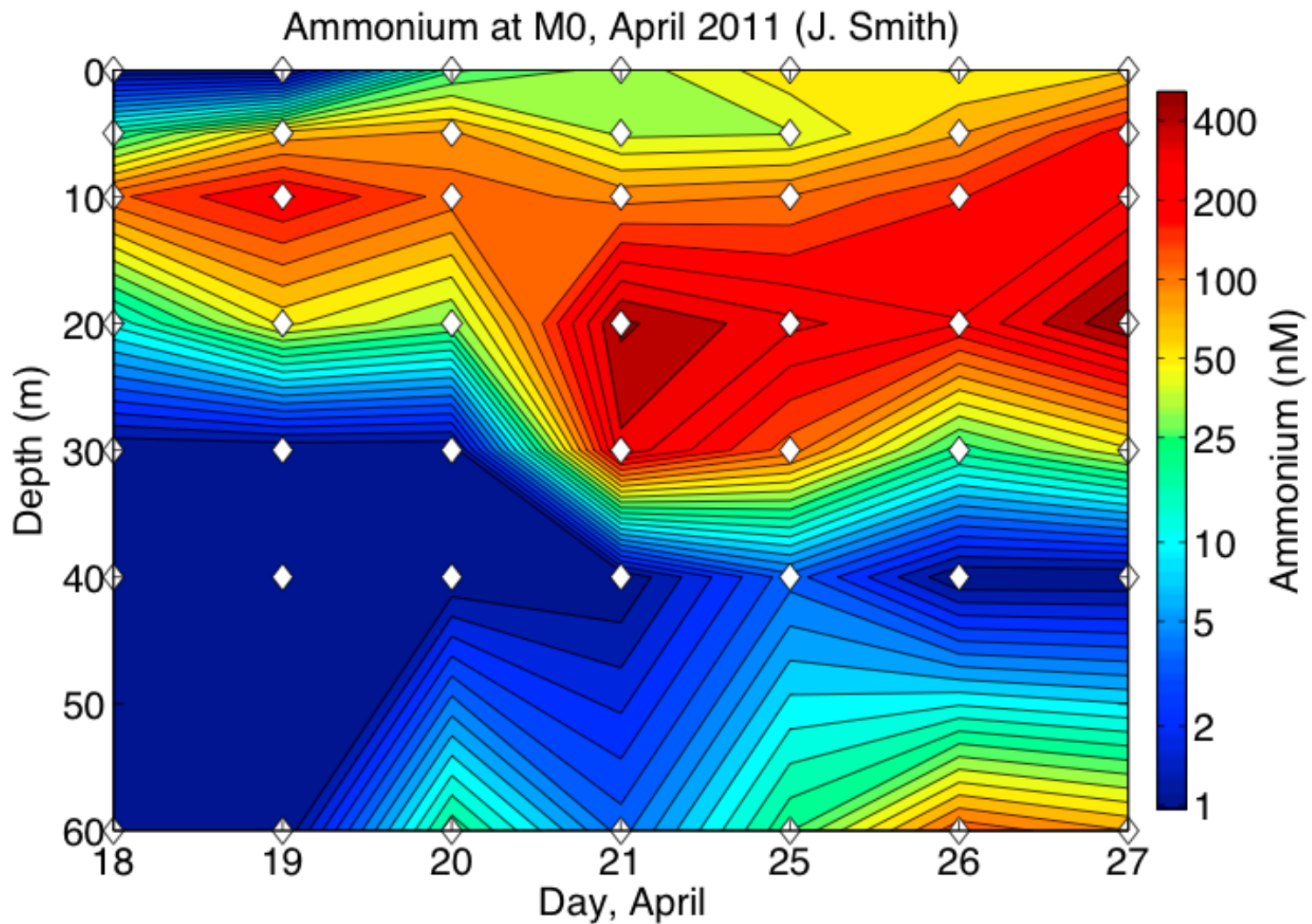
Depth of mean-profile max (m)



Profiles: seasonal and spatial variability

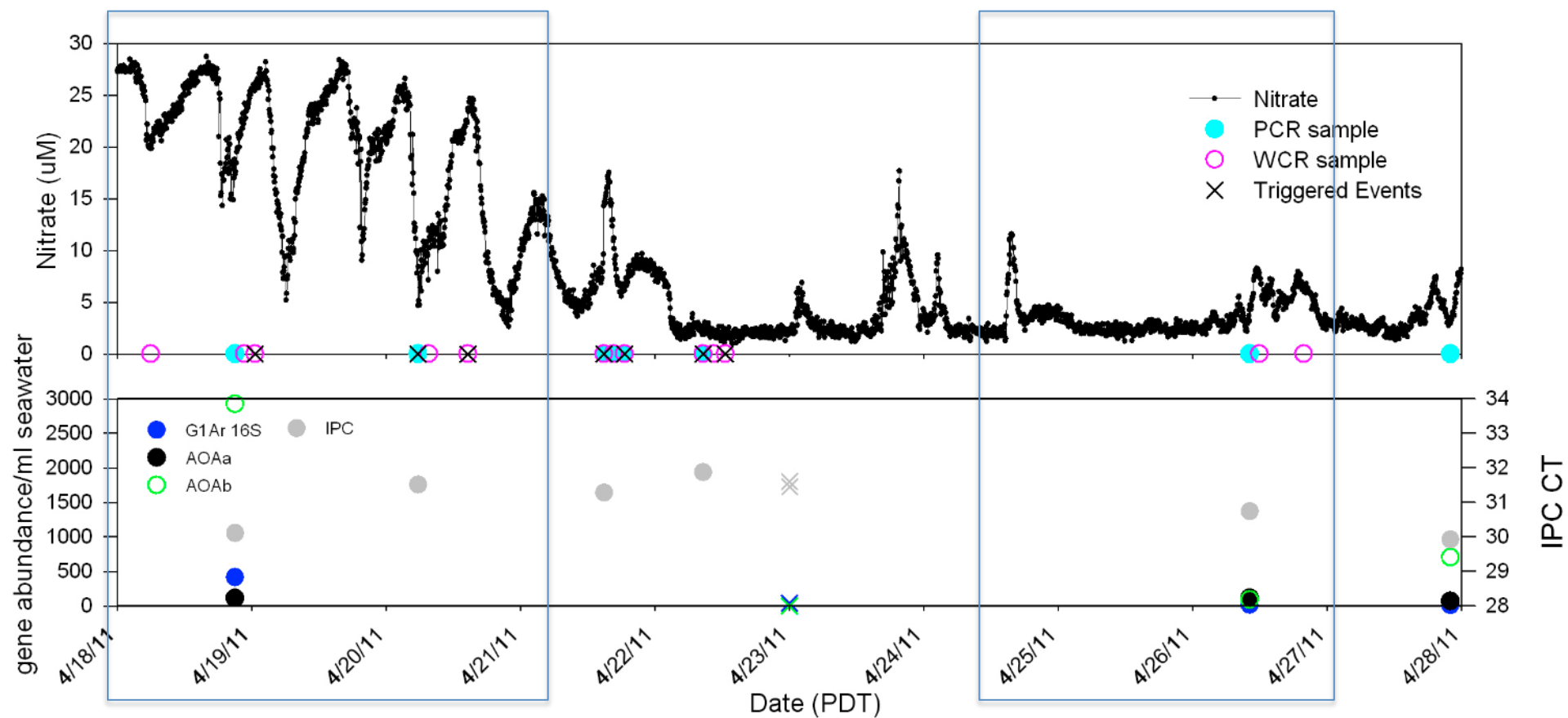
Analysis started

A time-series of ammonium and nitrate (M0)

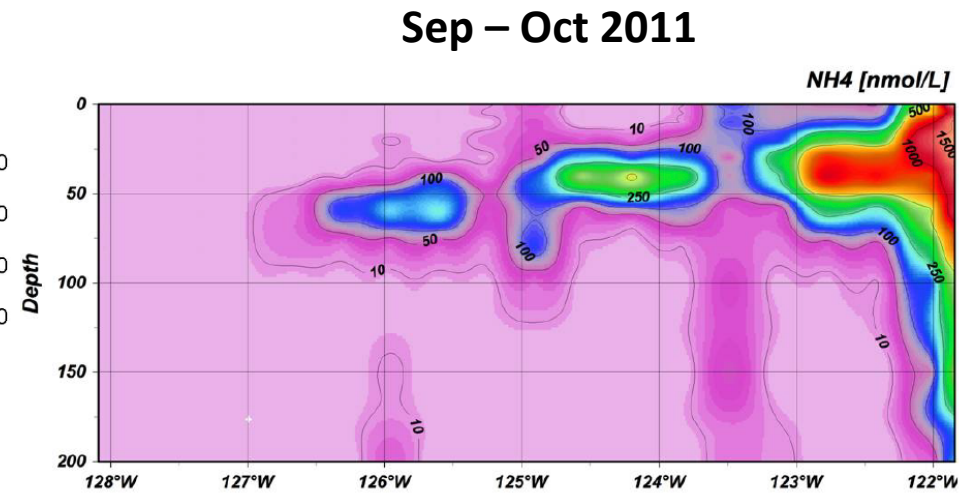
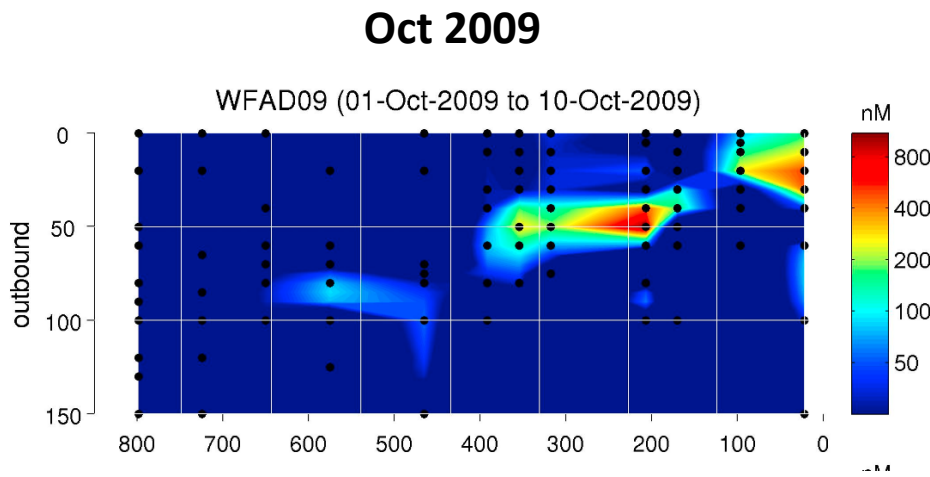
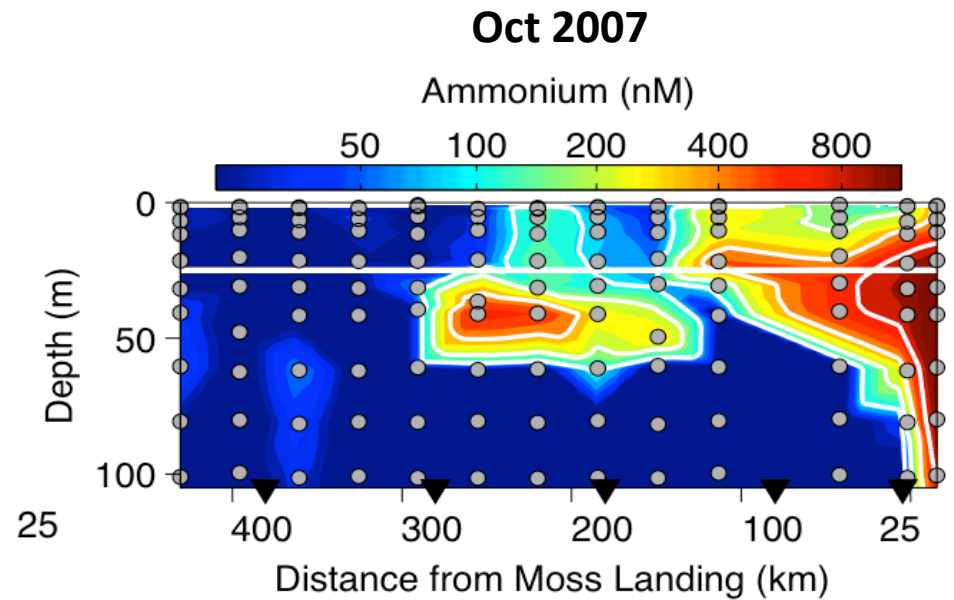
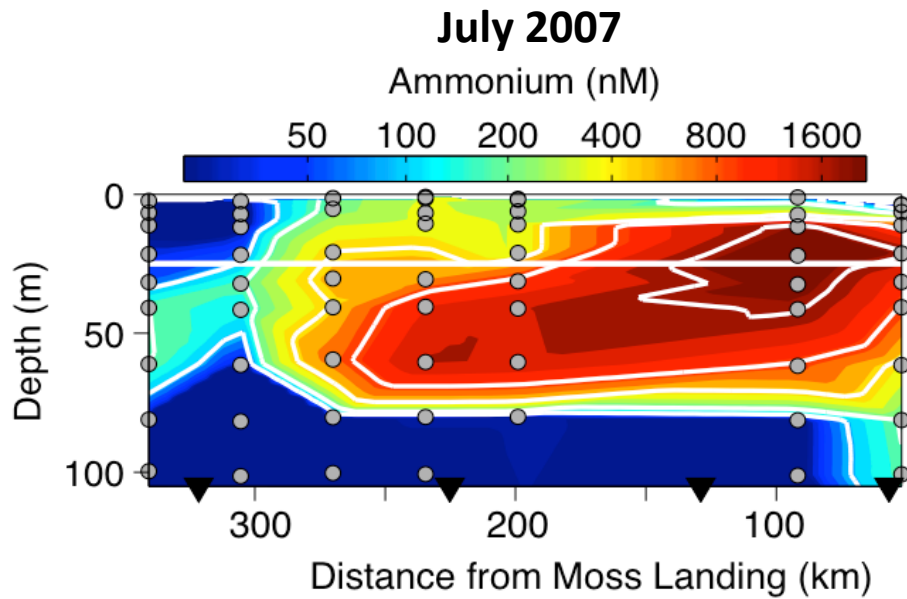


- ❖ Shallow relative to offshore
- ❖ Variable in depth: targeting

ESP: riding the top of the NH₄ max

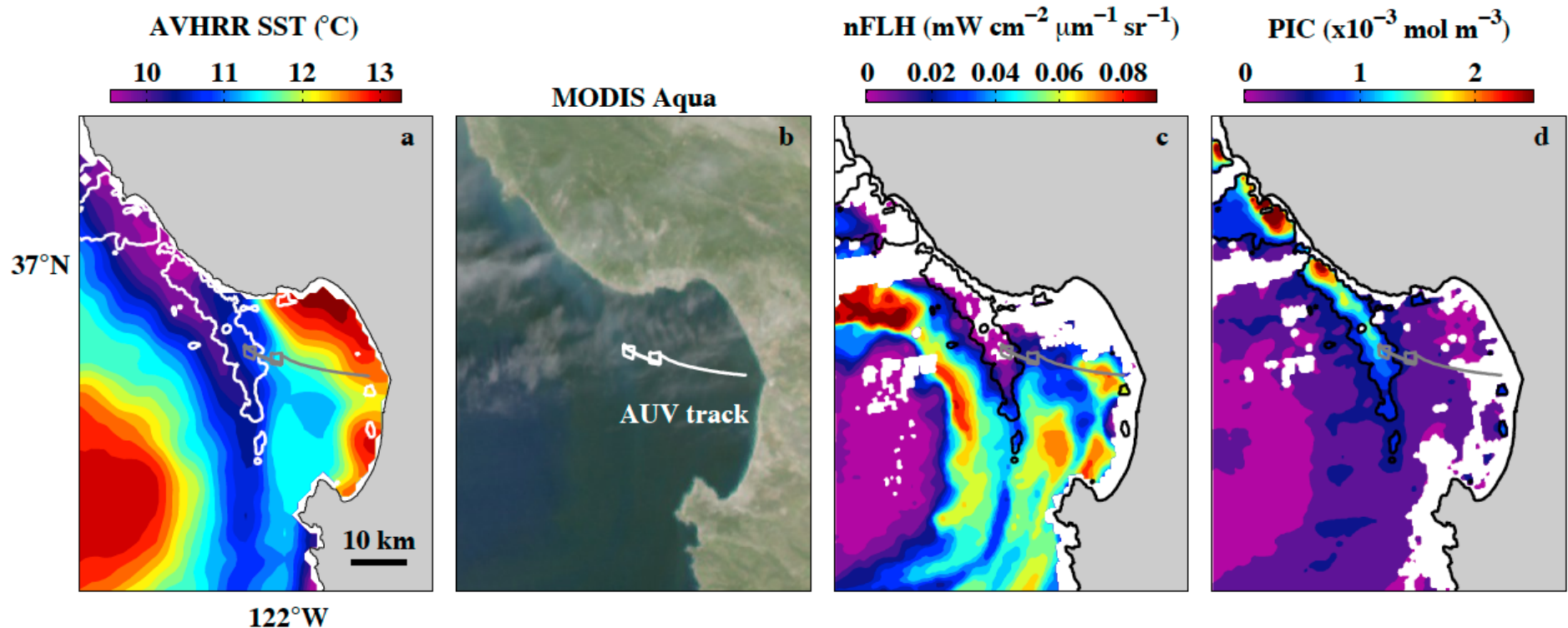


Ammonium maximum: the bigger picture



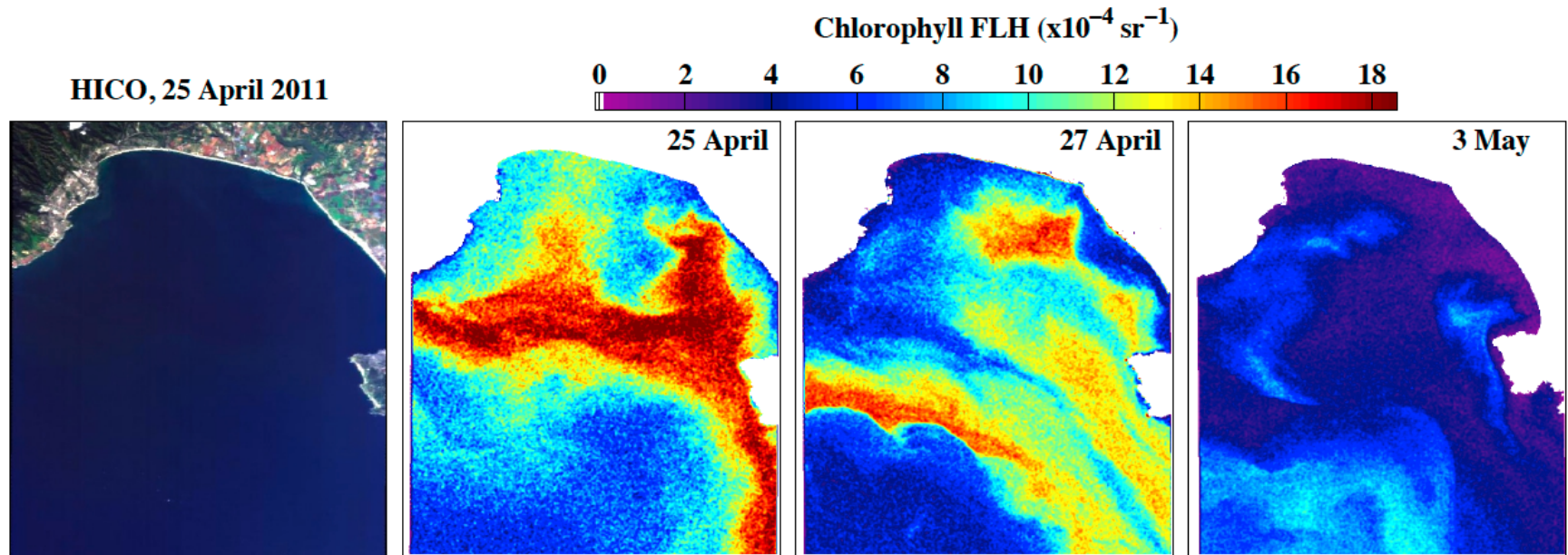
Upwelling filaments as ecosystem process integrators

[CANON April 2011 Experiment: Tethys leads Dorado in robot ballet.]

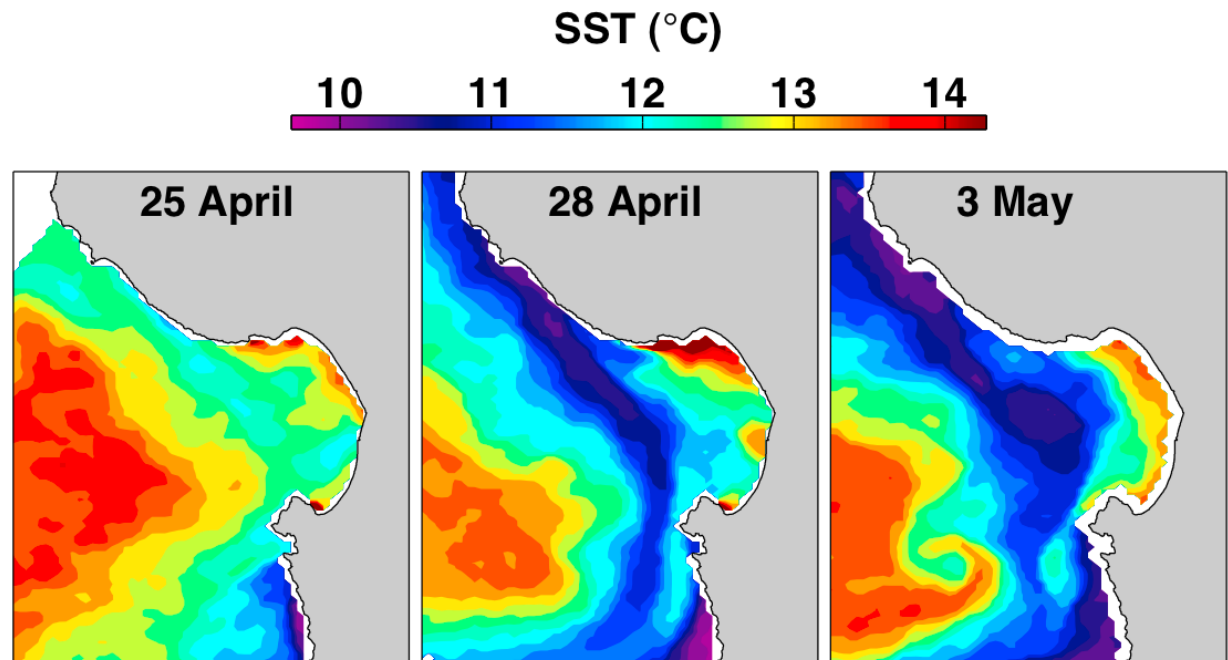


- ❖ Supply of nutrients, including *ventilation* of subsurface ammonium maximum → phytoplankton productivity
- ❖ Zooplankton aggregation → ammonium production (nutrient recycling)
- ❖ Transport of sediments, with consequences for phyto / zoo ecology.
- ❖ Establishment of primary ecosystem physical / chemical structure and processes.

Variability: intelligent sampling.



- ✧ **Physical:** Destratification, advection, mixing
- ✧ **Chemical:** Nutrient concentrations and composition
- ✧ **Biological:** Aggregation / trophic interaction



Synoptic patterns of ammonium across a front

Virtual plot

Ammonium maximum in the bay:

Which questions to focus on?

- Can we quantify the roles of bacteria, phytoplankton and zooplankton in creating, maintaining and eroding this feature?
- How do physical processes affect the disposition of this feature? For example, how do near-coastal upwelling dynamics interact with the subsurface ammonium maximum?
- When and where do consumption and the decay of organic material happen? Is it in the euphotic zone proper, or below the euphotic zone as we have believed for decades?
- Who are consumers and what environmental factors disrupt the pump? What is the role of viral infection and lysis of phytoplankton before their particulate organic carbon enters the pump?
- What are the differences in biological pump dynamics between coastal diatom-dominated and offshore picoplankton dominated systems in relation to the ammonium maximum?
- Can we distinguish between physical and biological factors driving evolution of the ammonium maximum, e.g. by using Lagrangian experimental methods.

→ Specifically where, what and how.

→ Adaptable plans, dependent upon conditions.