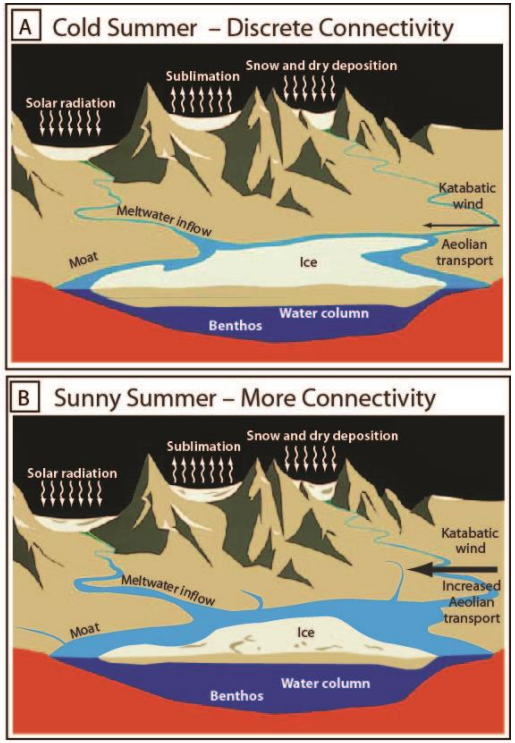
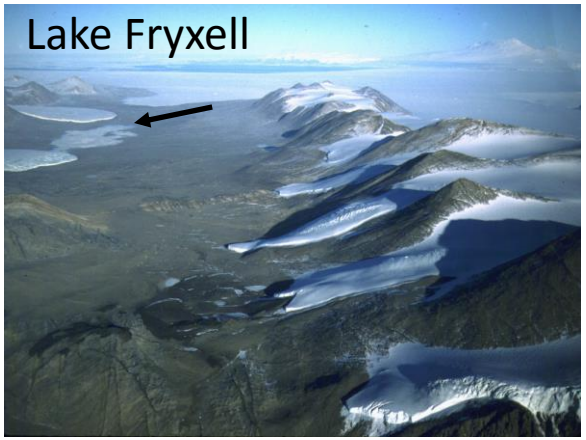
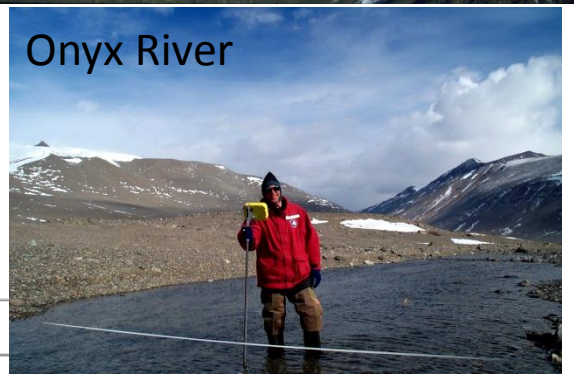
Advancing NPP Research
McMurdo Dry Valleys LTER

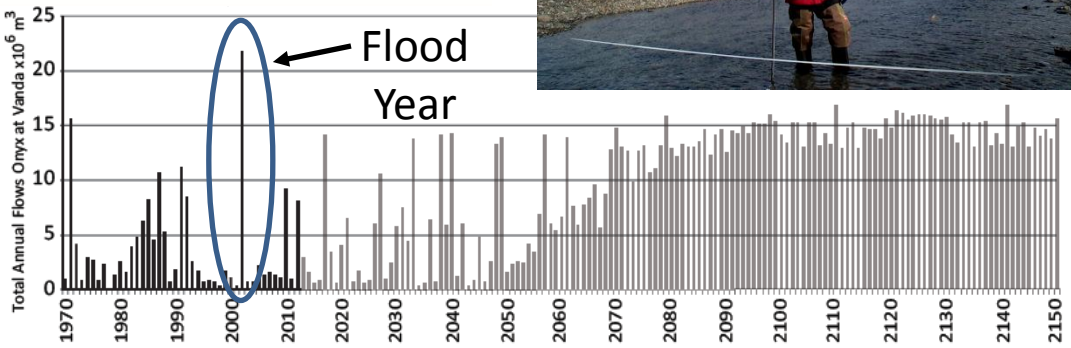
MCM NPP Question:

How does NPP in lakes and streams respond to hydrologic disturbances associated with a dynamic climate?

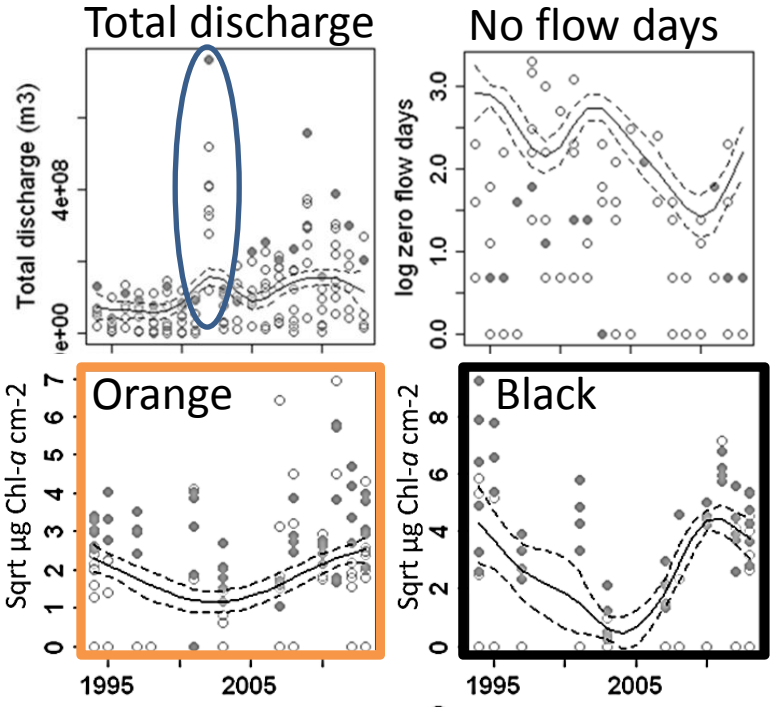




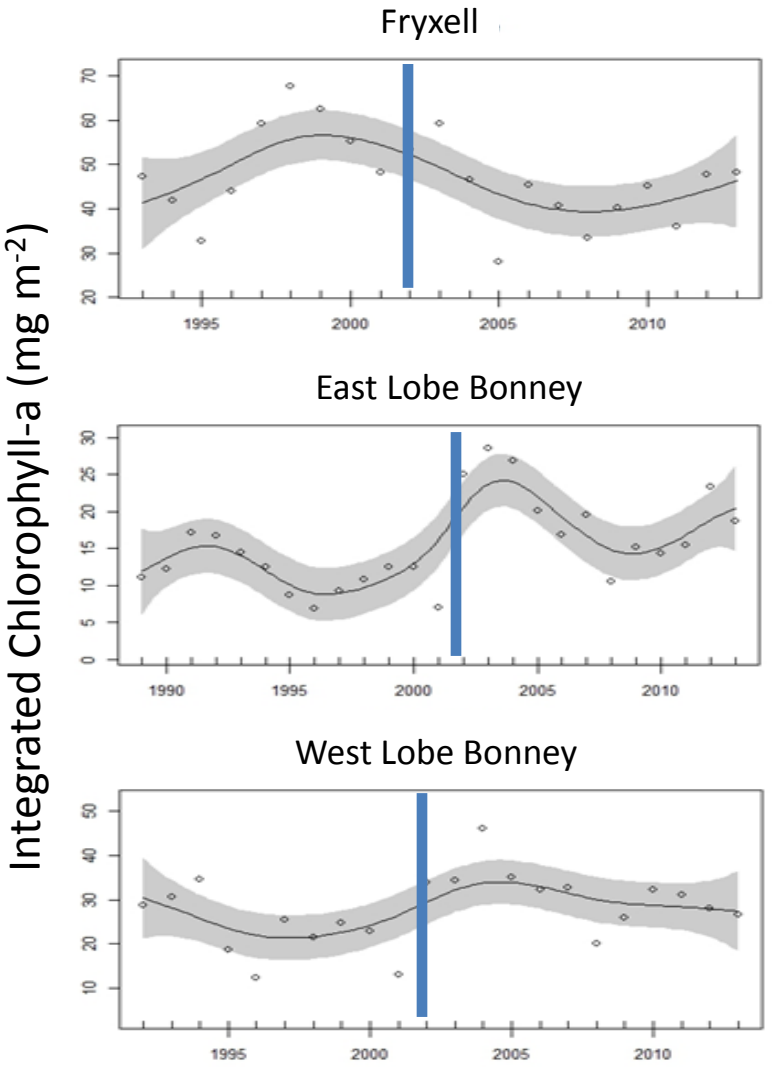




Hydrologic extremes regulate algal biomass of lakes and streams



Lake phytoplankton biomass stopped increasing after the “flood”



Discoveries made possible by LTER:

- Prolonged cooling due to ozone hole:
  - Caused gradual increase in lake NPP related to increased ice-cover and nutrient dynamics
  - desiccates microbial mats reducing NPP
- Enhanced connectivity during high flows :
  - promotes gradual decrease in lake NPP
  - scours microbial mats, transporting CPOM to lakes

Suggestions for synthesis:

- Ecological interactions among global scale stressors
- Hydrologic extremes and aquatic ecosystems: the return of the flood-pulse

Predicted responses to flow

			High Flows	Low Flows
High Coverage	Losses	Green	• Scour of mats on stable stone pavement	• Desiccation of habitat outside thalweg
		Orange X		
		Black		X
	Gains	Green X	• *High growth rates*	X • *Slow growth/little scour*
		Orange		
		Black		
Low Coverage	Losses	Green X	• Scour of talus, mobilization of deltaic substrata	• Desiccation outside thalweg, hyporheic zone
		Orange		X
		Black		
	Gains	Green	• *Gain habitat at stream margins, hyporheic zone*	• *Slow growth rates*
		Orange X		
		Black		

Kohler et al., *Ecosystems*, in revision

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