A field experiment to improve model representation of ecosystem dynamics, carbon cycling, hydrology and land-atmosphere feedbacks associated with climate change in high latitude ecosystems.

The discussions went full circle from an intensive, single site manipulation in the model of past FACE experiments to a completely distributed natural gradient experiment to a "single grid cell" scale characterization, manipulation and modeling effort.

We discussed the need to balance an experiment focused on specifically improving the representation of high latitude ecosystems in a changing climate with collection of the data necessary to validate the resulting models (i.e., benchmarking). Both perspectives were judged to be important. This argues for an approach of system examination that combines manipulation with a broader effort to collect representative observational data.

Modelers acknowledged that “we don't know what we don't know” and stress that even if we had significantly improved understanding of high latitude systems, that the models are currently unable to implement that understanding. We recognize the need to invest in both improved understanding of the processes with parallel improvements in modules for Arctic representation in models.

Based on these discussions, one possible approach would be a large scale manipulative experiment combined with a distributed observational component and low-intensity manipulations at other locations. Treatments would be warming and possibly CO2. There would be a number of subsidiary variables that would need to be monitored and possibly controlled (e.g., hydrology). The target main ecosystem would be continuous permafrost with potential low-level manipulations in other systems.