We continue work on effects of changing climate on hydrology and biogeochemistry of forest watersheds. There are two components to this work. First we continue long-term measurements and experiments on climate change at Hubbard Brook and its effects on snowpack accumulation and below ground winter processes. We believe that climate change is driving the northern forest toward a condition of oligiotrophication (Duran et al. in press). This experimental work expanded starting in 2015 with a new NSF-funding projecting examining the effects of ice storms on the structure and function of the northern forest. Plots have been established and an ice storm experiment has been initiated this winter (Figure 1).

The second component of this research program on climate change effects is the application of statistically-downscaled climate projections from global general circulation models (GCMs) as inputs to PnET-BGC to simulate the long-term hydrology and hydrochemical response to forest watersheds to future climate change (see Figure 2). We have been evaluating and comparing different approaches for downscaling GCM projections to local sites (former Ph.D student Pourmokhtarian et al. 2016). These simulations have been conducted at long-term study sites across the US (e.g., Hubbard Brook, NH; Huntington Forest, NY; Sleepers River, VT; Fernow Experimental Forest, WV).

Figure 1. Photos of experimental water application to the forest canopy to simulate icing conditions at Hubbard Brook.
Figure 2. Relationships between projected increases in mean annual temperature and annual precipitation for the period of 2070-2100 compared to the reference period of 1970-2000 for seven intensive study sites in forest watersheds of the Northeast developed from output from General Circulation Models used to project changing climate. The sites are generally projected to experience both increases in temperature and precipitation during the next century under climate change. The black dotted line shows the overall regression line for all data.

References:
