Poster #1-21

Effects of Short-Term Warming on Allocation and Nutrient Acquisition in an Arctic Grass

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Arctic ecosystems are warming rapidly and are expected to reach hot extremes more frequently in the coming decades. Nitrogen (N) and phosphorus (P) availability are low in the arctic and these nutrients are known to limit the productivity of tundra plants more directly than temperature. To better understand the relationship between temperature and nutrient cycling within arctic plants and soils, we investigated the impact of short-term warming on soil nutrient availability, plant N uptake, and plant N allocation. A warming treatment was implemented in Utqiaġvik, Alaska on the Northern coastal plain using Zero Power Warming (ZPW) chambers that elevated air temperatures by 4°C (n=5) during the 2018 growing season. Ion-exchange resins were deployed from June-September to assess availability of inorganic N and P in surface soils. An injection of tracer ^{15}N-NH_4 was performed at 3 cm depth in July and left for one week (+200 mg N/ m^2). At this point in the growing season, the ZPW treatment was increasing soil temperature at 5 cm depth by ~1°C. At the end of one week, harvests of 9 × 9 cm squares of tundra were performed, targeting labeled and unlabeled patches of the grass *Arctagrostis latifolia*. Back in the laboratory, *A. latifolia* biomass was sorted into blades, sheaths, inflorescences, attached litter, rhizomes, and fine roots. Rates of ^{15}N-NH_4 uptake will be determined by comparing the 15N content of tissues from labeled and unlabeled tissues. Initial results suggest P availability in surface soils has increased with warming. Aboveground biomass of *A. latifolia* was not impacted by warming treatment, nor were aboveground traits associated with productivity (height, specific leaf area, leaf area index, leaf %N, leaf N mass per unit area). Chemical analysis of aboveground tissues, however, showed warmed plants have decreased %N within inflorescences (p=0.01) which could be due to warmed plants developing a larger and more mature pool of inflorescences. Belowground fine-root data is still forthcoming, but rhizome data suggest warming is associated with thinner rhizomes, potentially indicating a warming-induced increase in lateral growth. Under warmed conditions, *A. latifolia* also had significantly higher atom percent enrichment in live, aboveground tissues (p=0.02) with the greatest differences observed in sheaths and blades. These preliminary findings suggest that a single growing season of elevated temperature can increase soil nutrient availability, alter plant N allocation, and impact the development of key plant tissues.