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Tundra vegetation properties along a latitudinal gradient of the Yamal Region of Russia

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An understanding of land-atmosphere interactions in any system is predicated by knowledge of the spatial distribution of vegetation properties, and the capacity for vegetation to exchange carbon and water between the land and the atmosphere. In many regions of the Siberian arctic tundra, this baseline information on vegetation in a spatial context does not exist in any systematic fashion. As part of a U.S. NASA/NEESPI Land Cover Land Use Change project, we analyzed in detail the vegetation properties of three tundra locations along a latitudinal gradient in forest-tundra and arctic tundra east of the Ural Mountains, including the Yamal Peninsula. Our locations were situated near Nadym (65˚ 18' N), Laborovaya (67˚ 41' N), and Bovanenkova (Vaskiny Dachi – 70˚ 17'). At a minimum of two sites per location, using 50m x 50m grids, we systematically sampled leaf area index (LAI), Normalized Difference Vegetation Index (NDVI), species composition, vegetation biomass, and foliar nutrient concentrations. The LAI of vascular plants declined from an average of 1.08 m^2 m^{-2} at Nadym to 0.36 at Vaskiny Dachi along the 5˚ latitudinal transect. NDVI values of the tundra vegetation did not decline with latitude and were 0.60 for Nadym, 0.67 for Laborovaya and 0.58 for Vaskiny Dachi. This is likely due to the contribution of non-vascular, understory vegetation to the NDVI signal. Related, average foliar nitrogen concentrations were greatest at Laborovaya, the site with the highest NDVI. A key result is that, even along this transect of approximately 500 km, the heterogeneity of vegetation properties within a location can be greater than that over the entire

transect. This heterogeneity needs to be considered in estimations of land-atmosphere exchange in the Yamal region. Our research plan is to continue sampling further north to encompass a broader arctic transect.