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Key Points:

- Soil microbes are nitrogen (N) limited in surface soils, but deeper layers are N rich; permafrost thaw will alter this stratification
- Warming will release inorganic N (1) by thawing N-rich permafrost and (2) by accelerating N mineralization within active layer soils
- These two sources of inorganic N are similar in magnitude during the first 5 years of thaw and together exceed plant N demand

Supporting Information:

- Supporting Information S1

Adding Depth to Our Understanding of Nitrogen Dynamics in Permafrost Soils

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Abstract Losses of C from decomposing permafrost may be offset by increased productivity of tundra plants, but nitrogen availability partially limits plant growth in tundra ecosystems. In this soil incubation experiment carbon (C) and nitrogen (N) cycling dynamics were examined from the soil surface down through upper permafrost. We found that losses of CO₂ were negatively correlated to net N mineralization because C-rich surface soils mineralized little N, while deep soils had low rates of C respiration but high rates of net N mineralization. Permafrost soils released a large flush of inorganic N when initially thawed. Depth-specific