Temporal Patterns in Nitrate Leaching in Forest Ecosystems of the Sierra Nevada. (S07-dahlgren164438-Poster)

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Abstract:

Forest ecosystems in the Sierra Nevada show contrasting abilities to retain nitrogen. The pattern of nitrate export from forested watersheds is strongly regulated by seasonal patterns in hydrological and biological processes that are especially pronounced in Mediterranean climates. This study examines biogeochemical and hydrological processes that control nitrate leaching from three contrasting ecosystems: low-elevation oak woodlands, mid-elevation mixed conifer forests and high-elevation, snow-dominated conifer forests. Soil solution and stream waters were used to decipher processes affecting soil nitrogen dynamics and nitrate export. Watersheds with conifer forests showed little loss of mineral nitrogen, except for small pulses of nitrate during large storm events. Mineral nitrogen was strongly retained in the upper soil profile, even during the melting of the snowpack when soil temperatures were near freezing. In contrast, oak woodlands showed episodic nitrate leaching during the early winter due to temporal asynchrony between hydrologic fluxes and plant nitrogen demand. Even though oak woodlands may be nitrogen limited, they appear to have a limited capacity to retain excess nitrogen.

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