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Effects of snow cover on CO 2 production and microbial composition in a thin topsoil layer

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Temperate rain forest soils (>8000 mm yr -1) of south of Chile in the East Andes range are intensively affected by increasing freezing and thawing cycles (FTC) due to increasing climate variability in the last 20 years. Most of these volcanic forests soils are unpolluted (pristine) and receive seasonal snow-cover. In spite of pollutant free precipitations, the snow cover in these ecosystems contains aerosols, nutrients and microorganisms from circumpolar south west winds. These inputs and FTC generate specific conditions at the shallow layer at the soil surface for soil microbiology and biochemistry. The objectives of the study were to compare (micro)biological and chemical properties of topsoil and snow cover in an pristine forest and after clear-cut. The organic matter mineralization was monitored in a microcosm experiment to explore the effects of FTC and snow melting on redox potential and other topsoil parameters. FTC for soil+snow released more CO 2 in closed forest (81.9 mg CO 2 kg -1) than that after clear-cut (20.5 mg CO 2 kg -1). Soil texture and soil organic matter accumulation played a crucial role for organic matter mineralization and CO 2 fluxes. Gradually increase of temperature after freezing reveled that loamy soils with certain amount of available C maintain active microbial population that response very fast to temperature change. Sandy soils with very low C content showed the opposite results – very slow response of microbial community and CO 2 fluxes. In conclusion, microbial community structure and functions have distinct transition from snow to the soil in temperate snow-covered forest ecosystem. FTC showed that different microbial groups

are responsible for organic matter mineralization in soil under forest and clear-cut, because the pH and redox potential are influenced by snow melting.