



## **Self-reinforcing preferential flow paths: The influence of rainfall redistribution in the forest canopy**

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Flow in the unsaturated zone was investigated with dye tracer experiments and soil moisture measurements in Malalcahuello, a small catchment in the Chilean Andes. Preferential flow paths were found to dominate unsaturated flow. These flow paths are mostly not the result of macropores but more likely caused by variable or heterogeneous hydrophobicity in the upper soil horizons. A physically based model was used to test whether throughfall patterns as a result of redistribution processes in the forest canopy produce distinct enough patterns of soil moisture to 1) either cause preferential flow paths as a result of soil moisture gradients alone or 2) result in preferential flow paths due to increased hydrophobicity in the dry patches. To this end, flow in the unsaturated zone was modelled with high spatial resolution using the physically based model CATFLOW. Small scale rainfall variability (i.e. throughfall) was achieved by assigning different precipitation time series to different points on the soil surface.