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Responses of sensible heat flux to soil water variation over a forest in a subalpine mountain valley

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Sensible heat flux is a vital component of Evapotranspiration (ET) and a critical process in the energy budget of the earth-atmosphere system. In our early study, it's found that soil water variation may be a critical factor for sensible heat flux over the forest in a subalpine mountain valley. The components of surface energy fluxes were measured for 2 years using the eddy covariance technique in Jiuzhaigou Valley, a subalpine mountainous area of Southwest China. Meanwhile, transpiration was measured by sap flow sensors. Within the observation period, the magnitude and distribution of energy fluxes and the magnitude of transpiration were mainly controlled by leaf emergence and seasonal changes in net radiation and soil water content. Large increases in transpiration were observed after leaves emerged around May, while evapotranspiration started to increase from February, which increased from nearly zero during winter to more than 5 mm d-1 in summer. Large increases in soil water content were observed despite increases in evapotranspiration during early spring. In spite of the large increases in net radiation, obvious decreases in sensible heat flux were observed with the variation of soil water content over the same period. Therefore, the most influential effect on the variability of sensible heat flux was the soil water content. These general characteristics can help us have a better understanding of the energy budget and water consumption of forest and their responses to net radiation and soil water content.