



Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich

Institute of Environmental Engineering

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Management

SEMINAR

Tuesday, February 26, 16:00 h, ETH Hönggerberg HIL D 60.1

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Contributions by winter versus summer precipitation to catchment runoff and evapotranspiration

Abstract:

Time series of O and H stable isotope ratios are often used to infer the mixing and transport processes that occur with streamflow generation. In using sophisticated isotope techniques, we often overlook the useful hydrological insights conveyed by simple, bulk differences between precipitation and stream water $^2\text{H}/^1\text{H}$ or $^{18}\text{O}/^{16}\text{O}$. Here we use precipitation and streamflow $^{18}\text{O}/^{16}\text{O}$ data from 16 catchments in Switzerland to assess whether summer or winter precipitation are over-expressed in streamflow (relative to their proportional inputs). We find that summer and winter precipitation contribute roughly equally to streamflow in Switzerland. This is in contrast with the common expectation that winter precipitation more efficiently contributes to streamflow because summer precipitation is disproportionately evapotranspired. These results instead imply that evapotranspired waters are sourced from winter as much as they are from summer, despite nearly all evapotranspiration occurring in the warmer season. We also calculated the seasonal origins of soil and xylem water across 182 sites in Switzerland, which suggest that trees mostly transpire winter precipitation. We apply these findings in mass balance calculations to infer critical zone mixing processes and evaporation-transpiration partitioning.

ETH Zurich web page:

<http://www.ites.ethz.ch/people/person-detail.MjM1NDU0.TGlzdC80NTMsMTg3MzAxMjcwOA==.html>

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