Geophysical Research Abstracts
Vol. 17, EGU2015-10996-1, 2015
EGU General Assembly 2015

Engaging students in research learning experiences through hydrology field excursions and short films

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One of the best ways to engage students and instill enthusiasm for hydrology is to expose them to hands-on learning. A focus on hydrology field research can be used to develop context-rich and active learning, and help solidify idealized learning where students are introduced to individual processes through textbook examples, often neglecting process interactions and an appreciation for the complexity of the system. We introduced a field course where hydrological measurement techniques are used to study processes such as snow hydrology and runoff generation, while also introducing students to field research and design of their own field project. Additionally, we produced short films of each of these research-based field excursions, with in-house film expertise. These films present a short overview of field methods applied in alpine regions and will be used for our larger introductory hydrology courses, exposing students to field research at an early stage, and for outreach activities, including for potential high school students curious about hydrology.

In the field course, students design a low-budget experiment with the aim of going through the different steps of a 'real' scientific project, from formulating the research question to presenting their results. During the field excursions, students make discharge measurements in several alpine streams with a salt tracer to better understand the spatial characteristics of an alpine catchment, where source waters originate and how they contribute to runoff generation. Soil moisture measurements taken by students in this field excursion were used to analyze spatial soil moisture patterns in the alpine catchment and subsequently used in a publication. Another field excursion repeats a published experiment, where preferential soil flow paths are studied using a tracer and compared to previously collected data. For each field excursion, observational data collected by the students is uploaded to an online database we developed, where students can also retrieve data from past excursions to further analyze and compare their data. At each of the field sites, weather stations were installed and a webviewer allows access to realtime data from data loggers, allowing students to explore how processes relate to climatic conditions. Together, these field excursions give students the necessary tools they will need to carry out field research of their own in future projects, whether in academia or industry, while the short films give potential or first-year students an impression of what hydrology is all about and hopefully inspire them to become future hydrologists.