

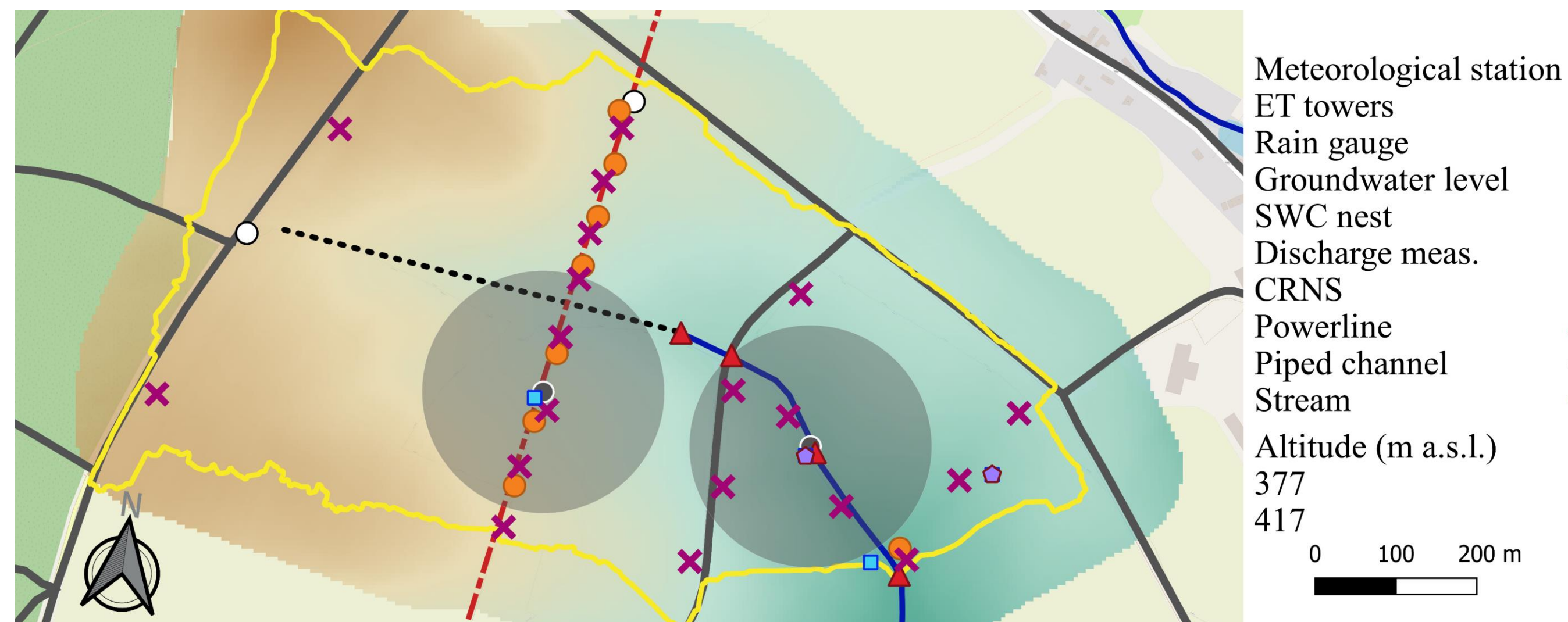
Exploring hydrological processes at a small agricultural catchment in the Czech Republic

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Introduction

A better understanding of hydrological processes in agricultural catchments is not only crucial to hydrologists but also helpful for local farmers. Therefore, we have built the freely-available web-based **WALNUD dataset** (Water in Agricultural Landscape – NUčice Database) for our experimental catchment Nučice (0.53 km²), the Czech Republic. We have included observed precipitation, air temperature, stream discharge, and soil moisture in the dataset. Furthermore, we have applied numerical modelling techniques to investigate the hydrological processes (e.g. soil moisture variability, water balance) at the experimental catchment using the dataset.



Catchment overview

The catchment (0.531 km²) was established in 2011

Location: near Prague (49°57'49"N, 14°52'13"E)

Motivation: to study the rainfall–runoff processes, soil erosion processes, and water balance of a cultivated landscape

Observation

- Meteorological observation
- Stream discharge and suspended sediment
- Soil moisture monitoring
- Field campaigns
- Future instrumentation: 5-7 piezometers, a dense network of soil moisture sensors, new gauging station, weather station.



Elevation: 400 m a.s.l.
Humid continental climate
Mean annual rainfall: 630 mm
Mean annual air temperature: 7.9 °C
Landuse: arable land (95%)

Available data

1. Weather data (e.g. precipitation, air-temperature 2013–2020)

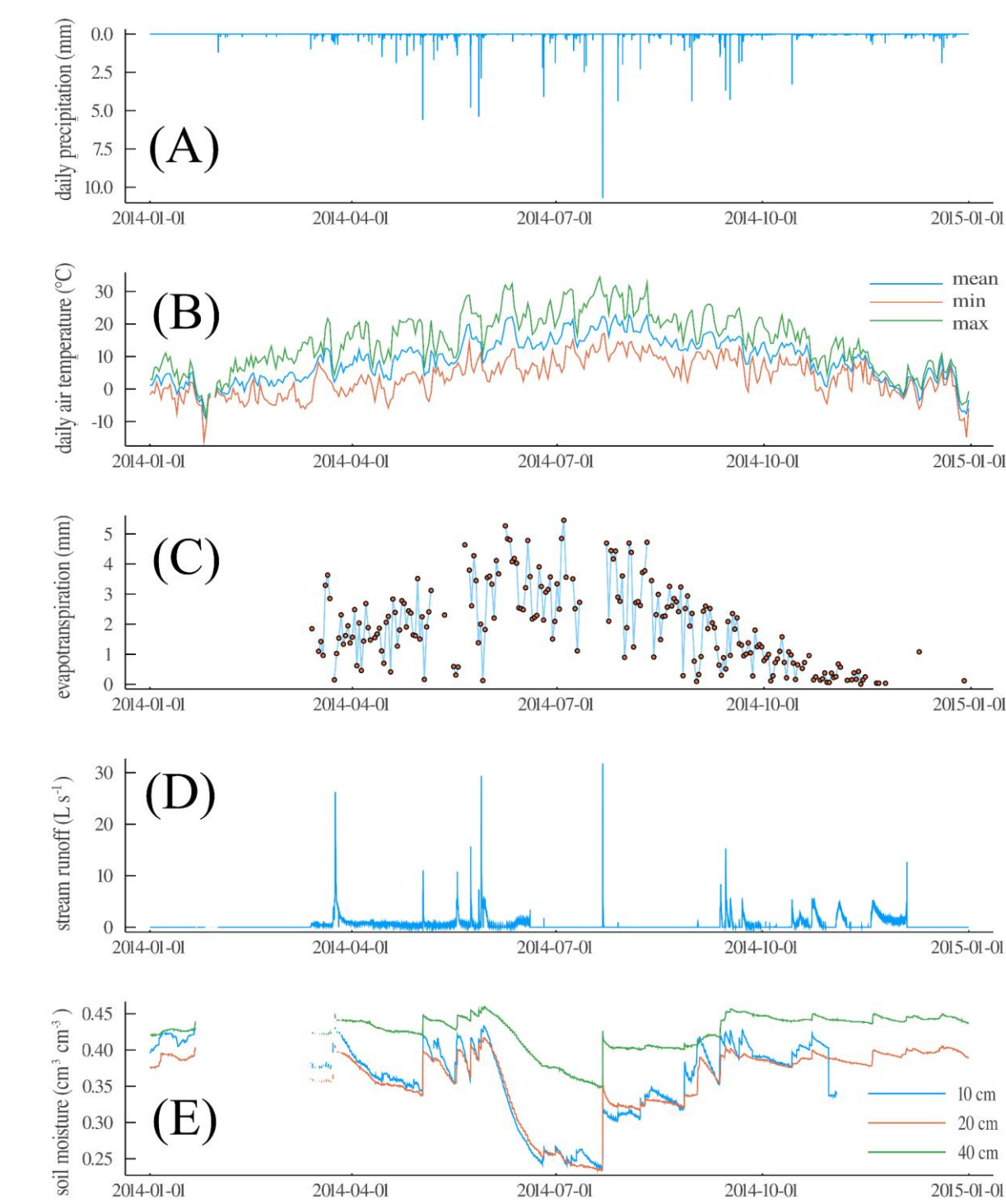
2. Temporal soil moisture data:

□ Point scale: 3 locations (so far only two are functioning)

- SWC 1: near outlet (3 depths 10 - 40 cm)
- SWC 2: in the middle of catchment (6 depths 10 - 60 cm)

□ Field scale: COSMOS: deployed in Sep. 2020 (Not calibrated)

3. Hydrological data: stream discharge, groundwater level



Modelling application

Modelling tool:

MIKE-SHE

(fully distributed model)

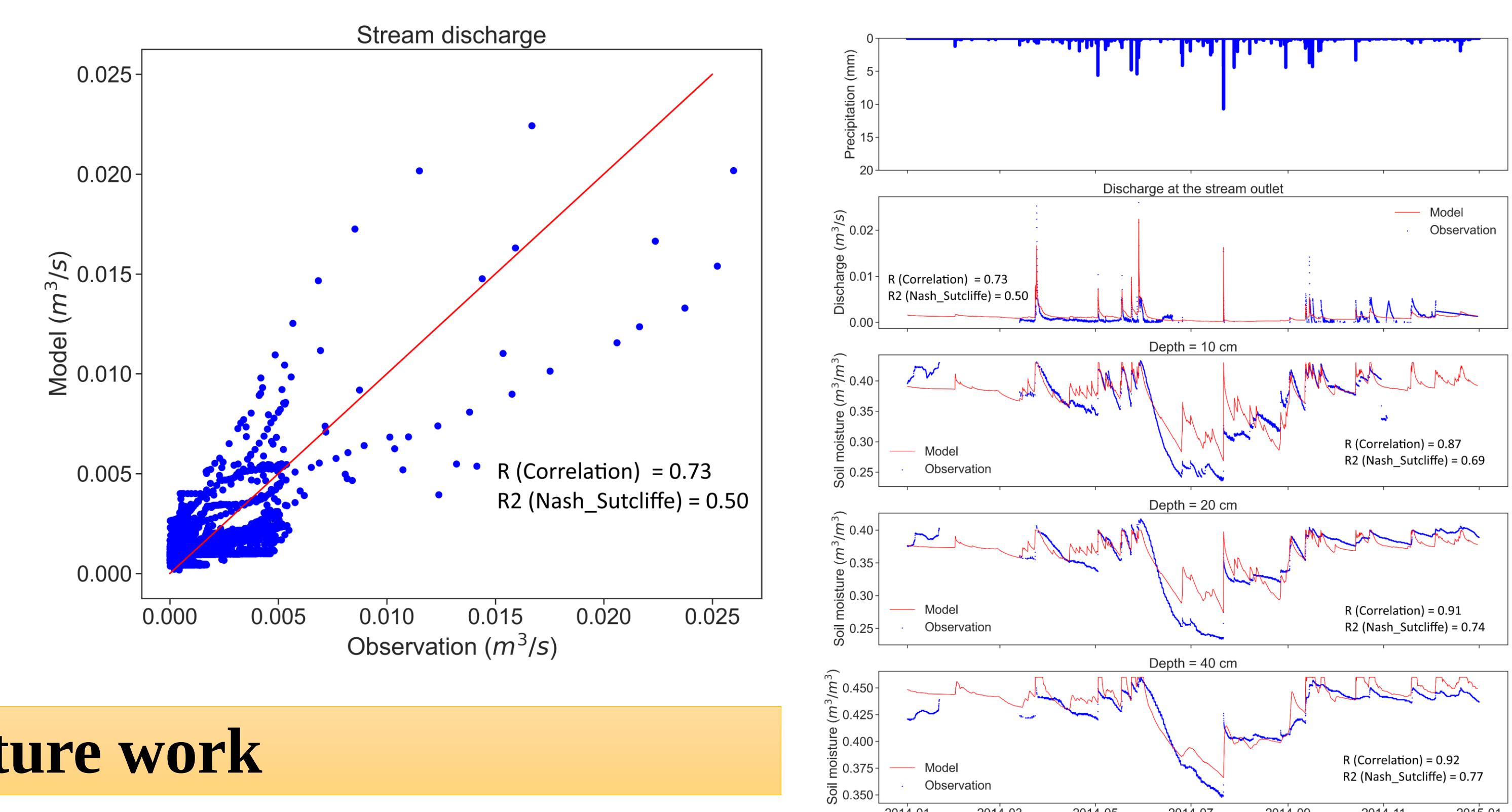
Calibration Period:

01-01-2014 -- 12-31-2014

Timestep: 1 hour

Calibration indexes:

1. Runoff
2. Soil moisture



Future work

Observation:

Continue with the instrumentation

Modelling:

- Setup the validation period and conduct model validation
- Compare the simulated results with the CRNS outcome

More information about the dataset:

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RESEARCH AND OBSERVATORY CATCHMENTS: THE LEGACY AND THE FUTURE

WILEY

An overview of hydrometeorological datasets from a small agricultural catchment (Nučice) in the Czech Republic

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Abstract
We introduce the freely available web-based Water in an Agricultural Landscape–NUčice Database (WALNUD) dataset that includes both hydrological and meteorological records at the Nučice experimental catchment (0.53 km²), which is representative of an intensively farmed landscape in the Czech Republic. The Nučice experimental catchment was established in 2011 for the observation of rainfall–runoff processes, soil erosion processes, and water balance of a cultivated landscape. The average altitude is 401 m a.s.l., the mean land slope is 3.9%, and the climate is humid continental (mean annual temperature 7.9 °C, annual precipitation 630 mm). The catchment is drained by an artificially straightened stream and consists of three fields.