

Shany Ben Moshe<sup>1</sup>, Felix Barquero<sup>2</sup>, Jana Sallwey<sup>2</sup>, Noam Weisbrod<sup>3</sup> and Alex Furman<sup>1</sup>

1. Technion – Israel Institute of Technology, Civil and Environmental Engineering 2. Institute for Groundwater Management, Technische Universität Dresden, Dresden, Germany 3. The Zuckerberg Institute for Water Research, Blaustein Institutes for Desert Research, Ben Gurion University of the Negev, Israel

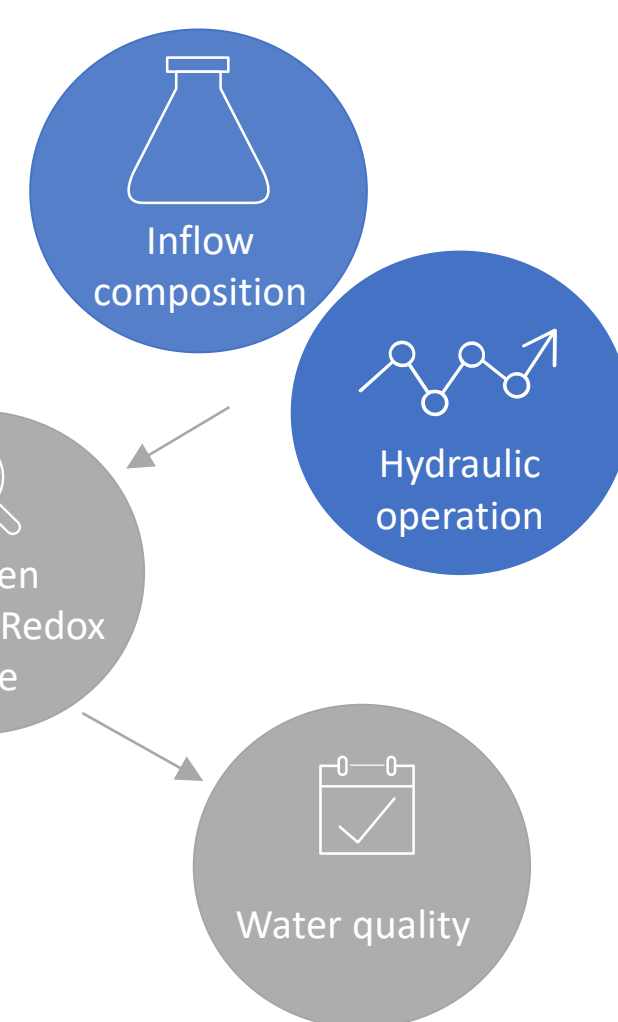
## Background and objectives

### The problem

In the SHAFDAN site, wastewater are infiltrated to the aquifer through infiltration ponds, enhancing their quality in the process using traits of the natural soil environment. The treated wastewater meet regulatory standards and are approved for unlimited irrigation. As population grows, the amount of wastewater directed to SAT sites increases every year, causing a strain on existing sites that in some cases results in untreated water flown directly to the sea or local streams.



Infiltration ponds at the Yavne 2 site, SHAFDAN



### Our main objective

Examine the effect of different flooding/drying periods and inflow composition on the biogeochemical state of the soil profile as well as the outflow quality.

## Experiment set-up

### Three main experiments

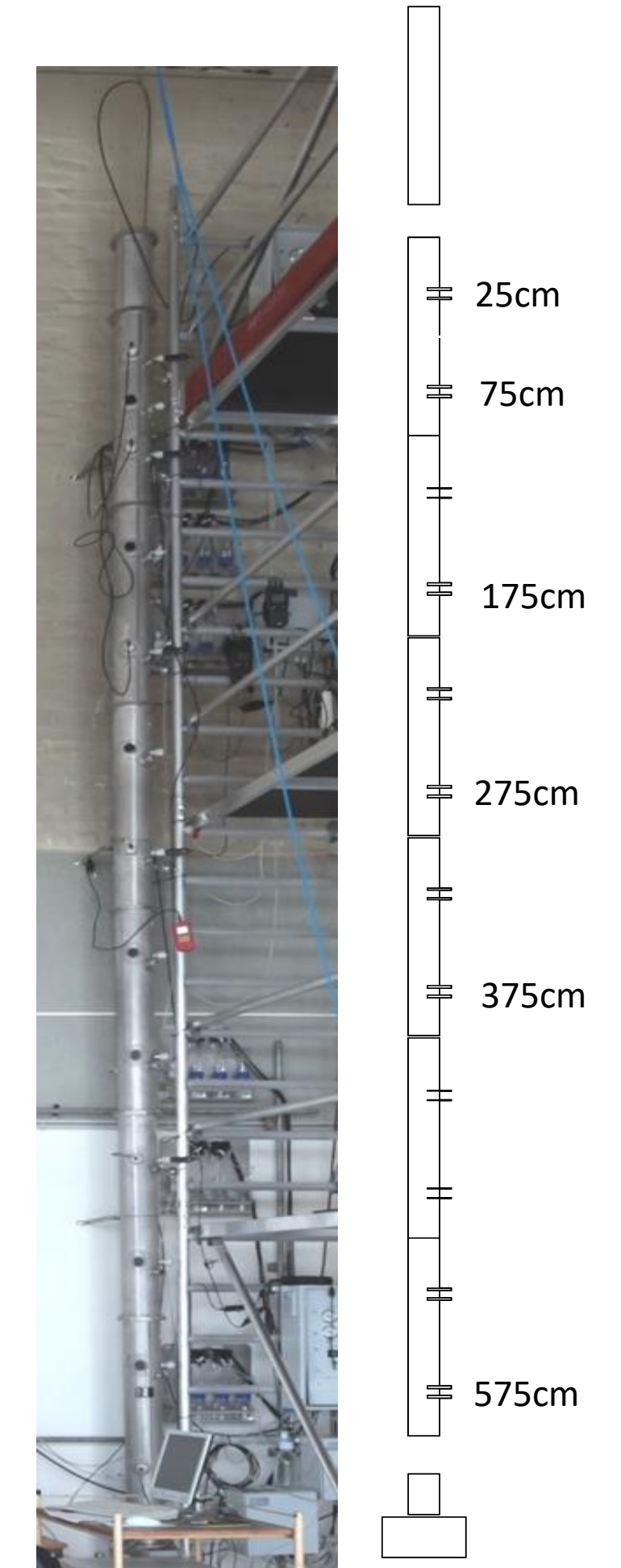
	Cycles	Inflow	Results
<b>Experiment 1</b>	60 min flooding 150/240 min drying	synthetic w.w	1 2
<b>Experiment 2</b>	60 min flooding 150 min drying	real w.w*	3 4
<b>Experiment 3</b>	60 min flooding 240 min drying	real w.w*	3 4

\* Wastewater were collected from the Dresden WWTP. Glucose and Ammonium were added .

Continuous monitoring of:

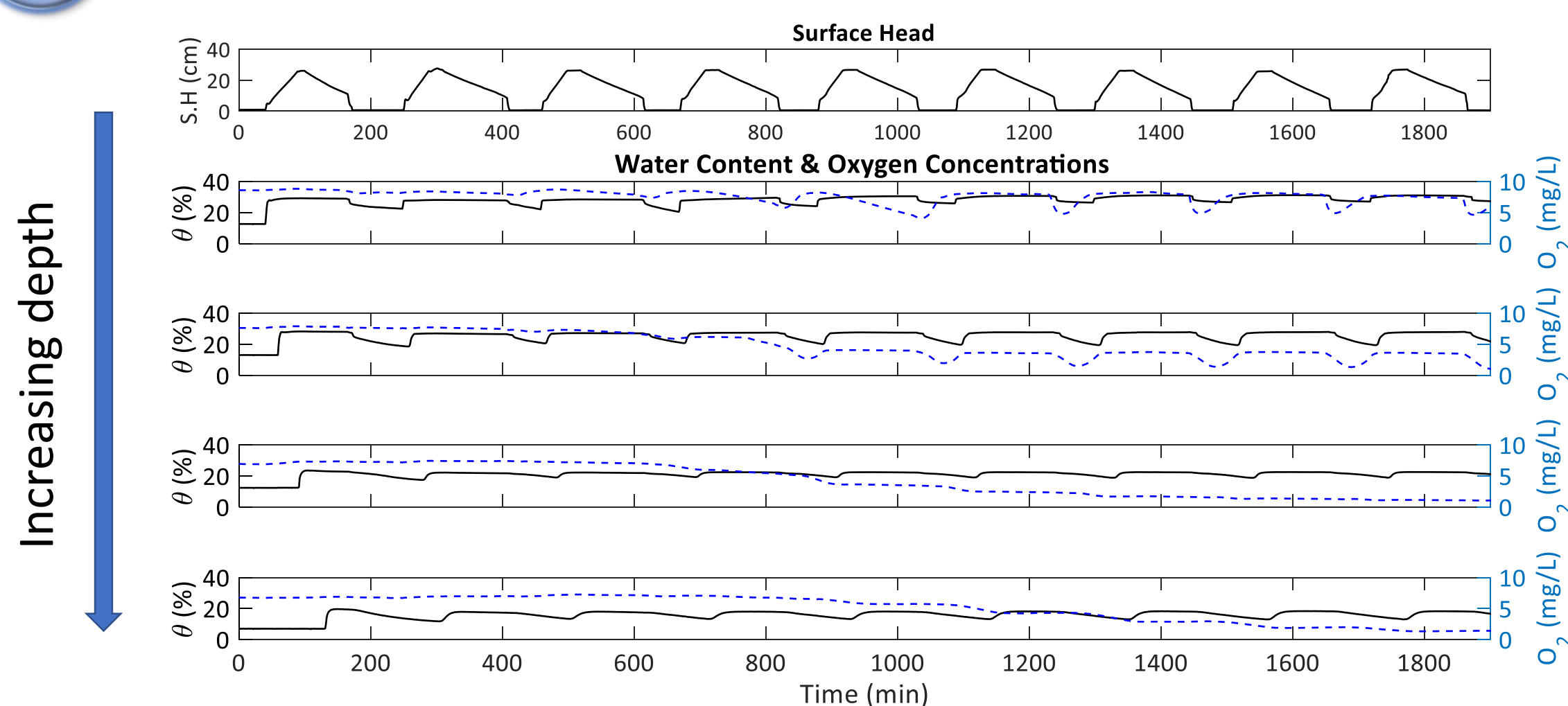
- Water content
- Oxygen concentrations
- Redox potential (two upper sensors)

Chemical analysis :  $\text{NO}_2^-$ ,  $\text{NO}_3^-$ ,  $\text{NH}_4^+$ , DOC, TKN



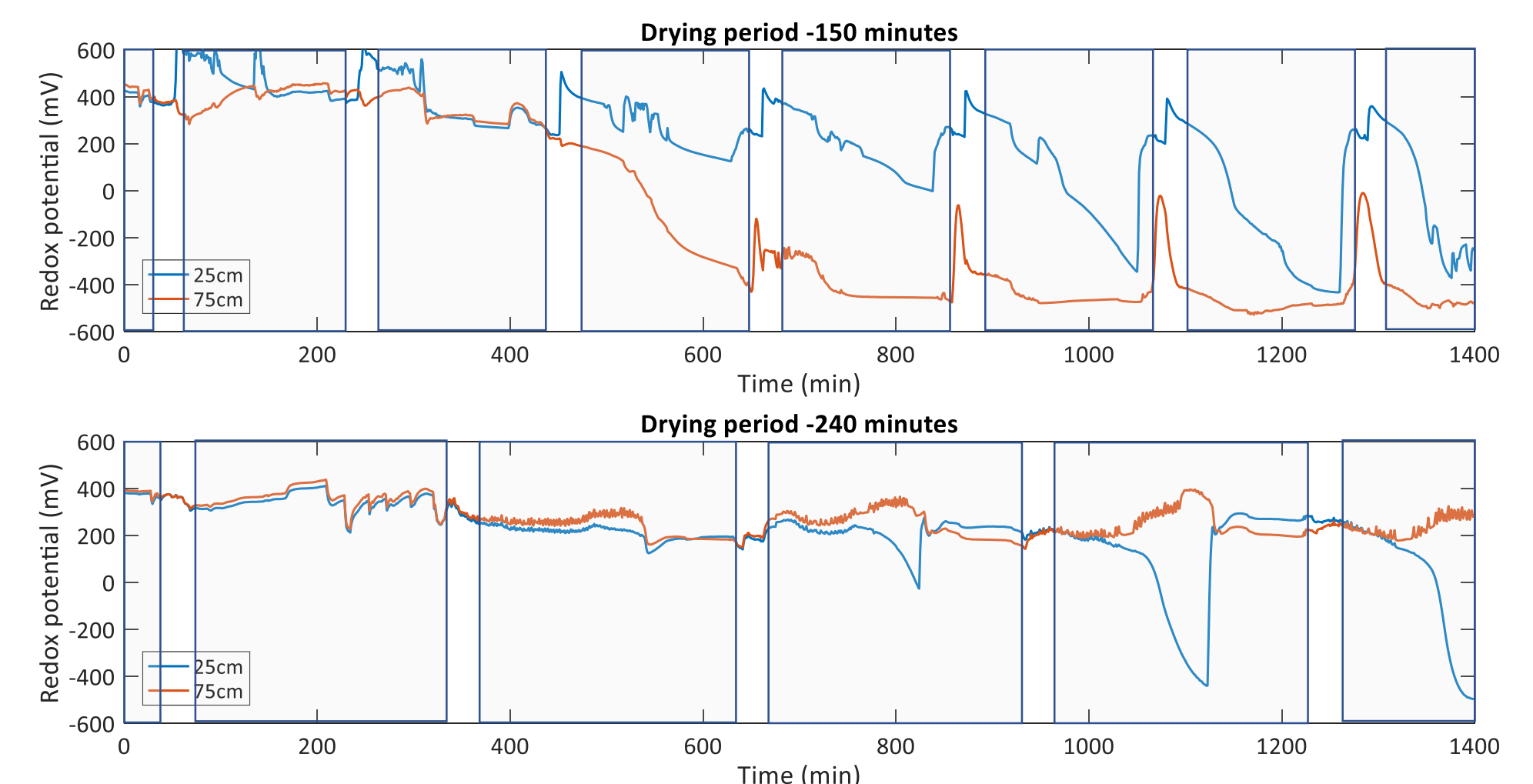
## Results

### 1 Water content and oxygen concentrations vs time



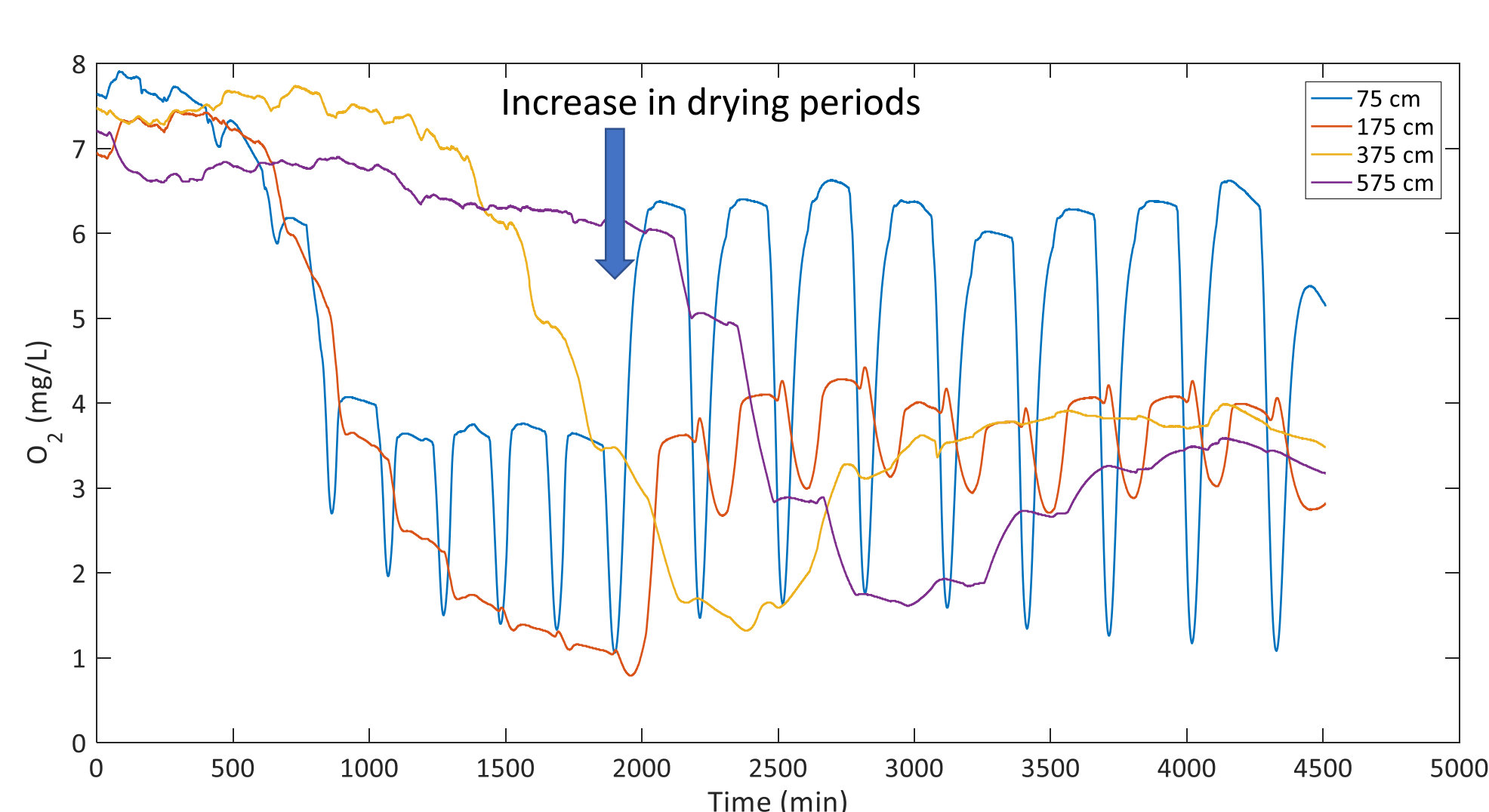
Water content (%) and oxygen concentrations (mg/L) at different depths (25,75,175,275cm) vs time. On top: surface head versus time.

### 3 Redox potential vs time - different drying periods



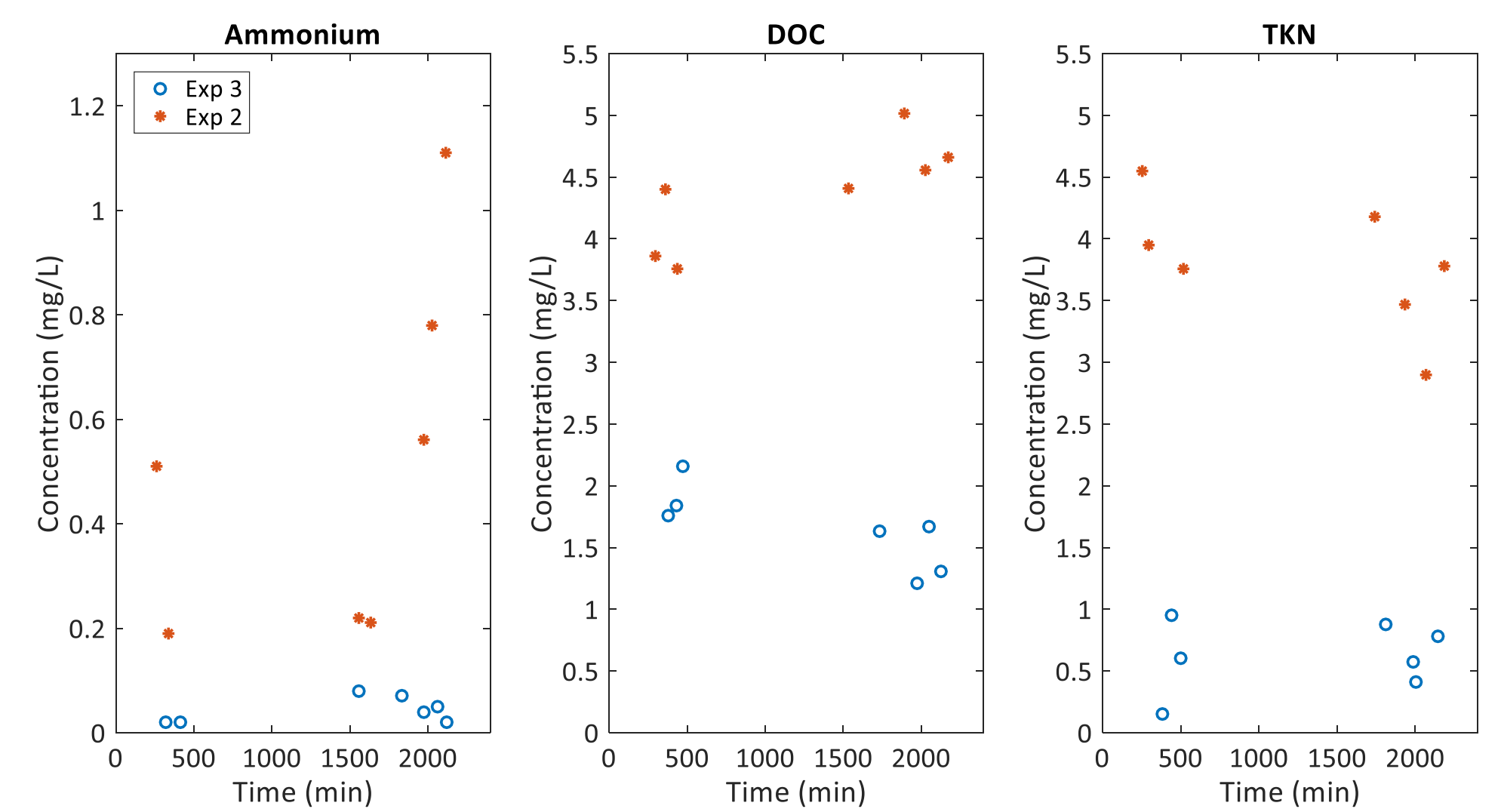
Redox potential (mV) at 25,75cm depth during experiments 2 (top) and 3 (bottom). Gray areas symbolize drying periods and white areas – wetting periods.

### 2 Oxygen concentrations vs time at different depths



Oxygen concentrations (mg/L) vs time at 75,175,375, 575cm depth during experiment 1. The arrow symbolizes increase in drying periods (150 to 240 min)

### 4 Ammonium, DOC and TKN concentrations in the outflow



Concentrations of Ammonium, DOC, TKN at the outflow vs time during experiments 2 (red) and 3 (blue).

## Conclusions

✓ Water content and oxygen concentration patterns during wetting and drying cycles vary significantly with depth

✓ Short drying periods that allow aeration in the upper parts of the profile might not be long enough to affect depths of over 75cm

✓ Longer drying periods led to higher oxygen concentrations in the deeper parts of the profile and resulted in higher quality outflow

