Uni Split
Faculty of civil engineering, architecture and geodesy
Scientific meeting

Laboratory modeling of the seawater intrusion in coastal aquifers: insight to active and passive intrusion features and mitigation measures
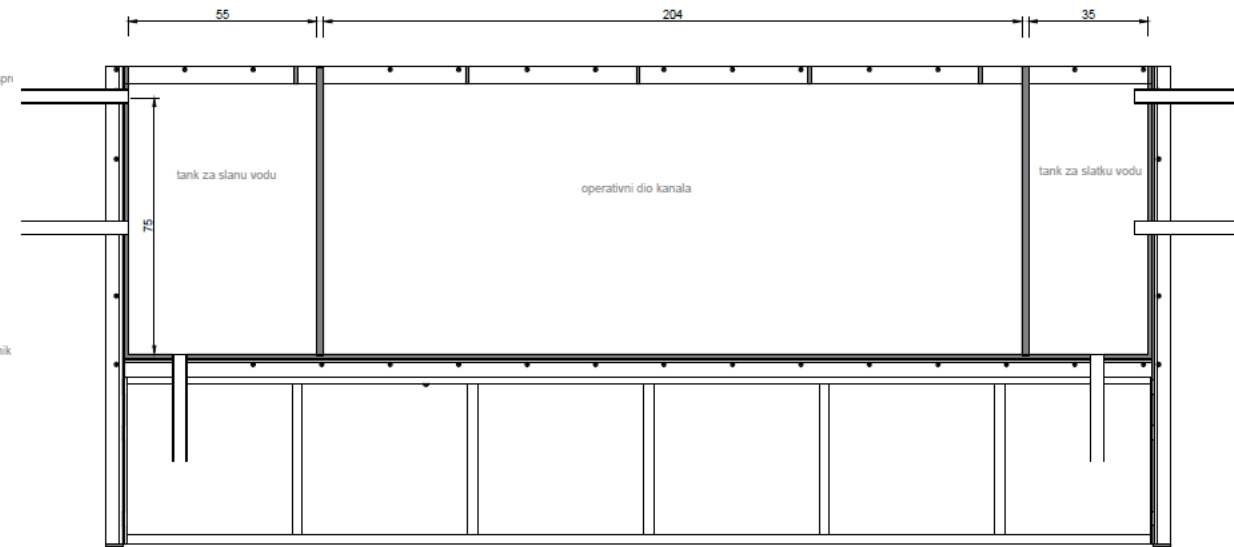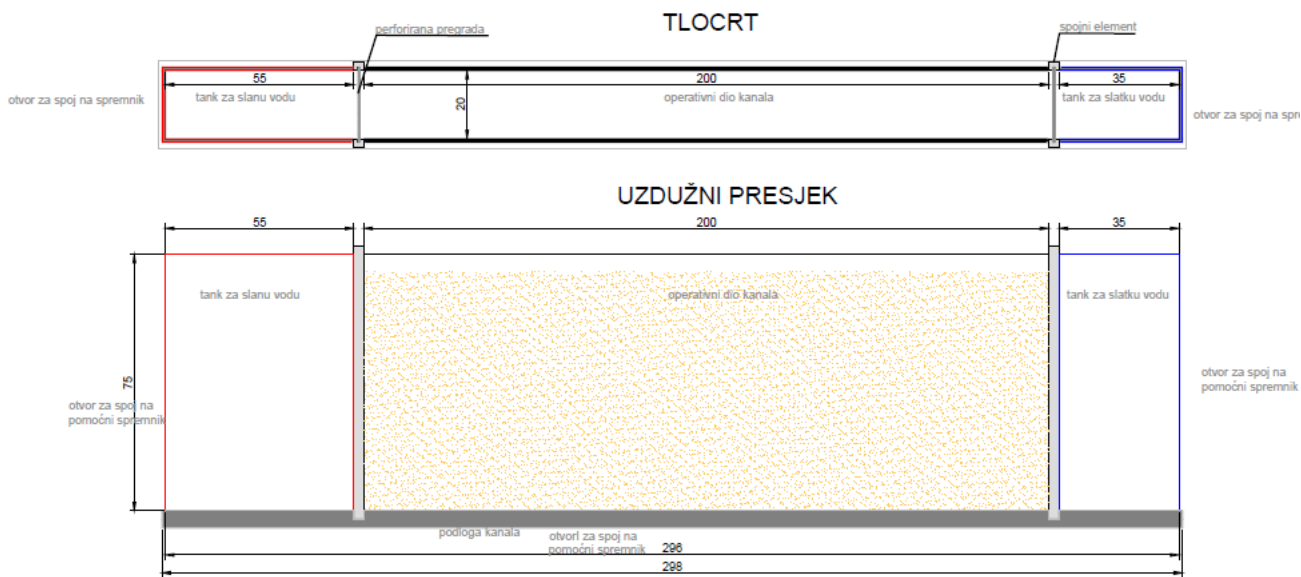
Veljko Srzić

IDROVORA Ca' Bianca, October 11th 2021.

European Regional Development Fund

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Content

➢ Laboratory infrastructure;
➢ Experiments preparation and conductance;
➢ Experiments control;
➢ Passive and active seawater intrusion;
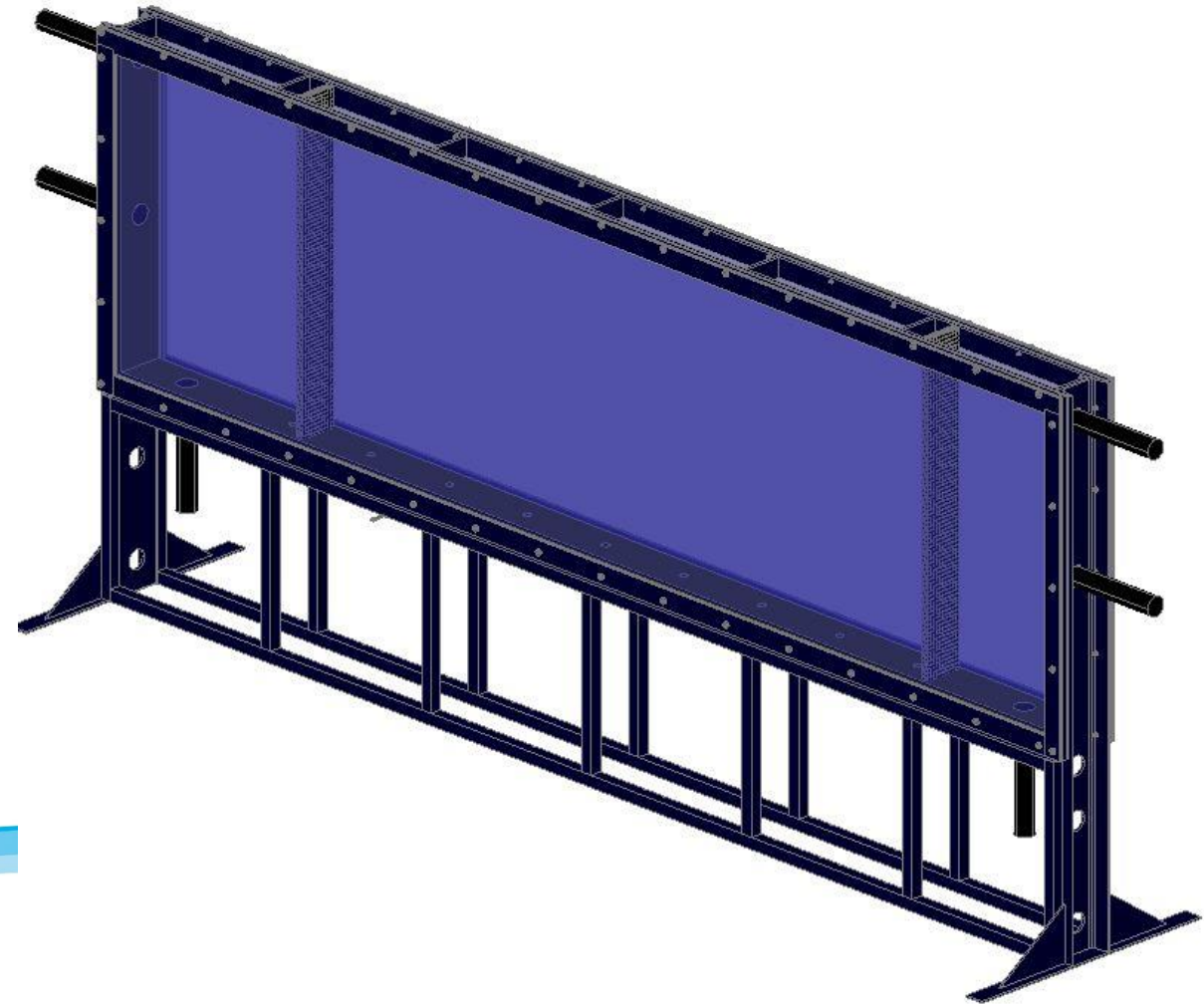➢ Conclusions;

Lab infrastructure

➢ Planning, design, development and design (February - July 2020);

Lab infrastructure

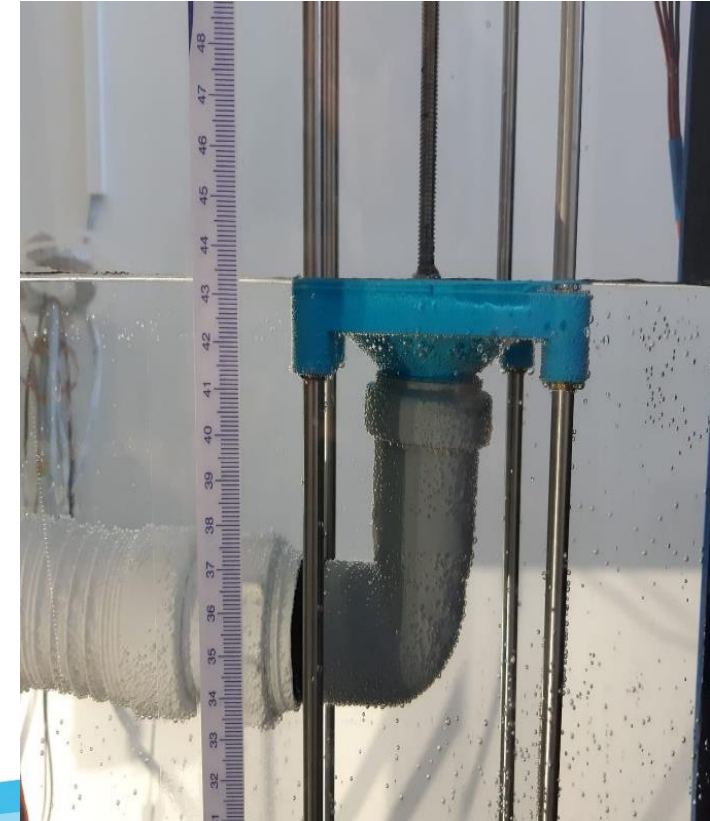➤ Flume for simulation of dual density transport (driven by advection, dispersion and bouyancy);
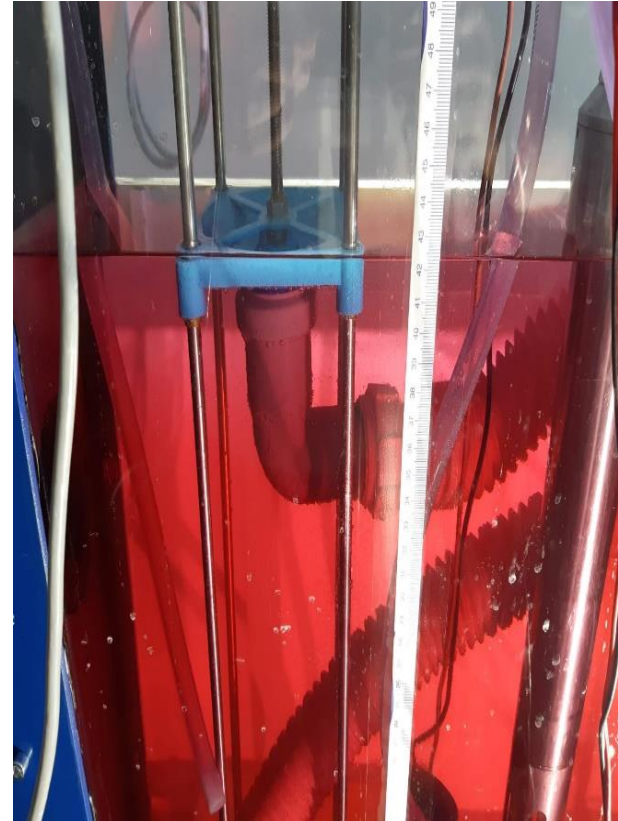
Lab infrastructure

➤ Experiment preparation;
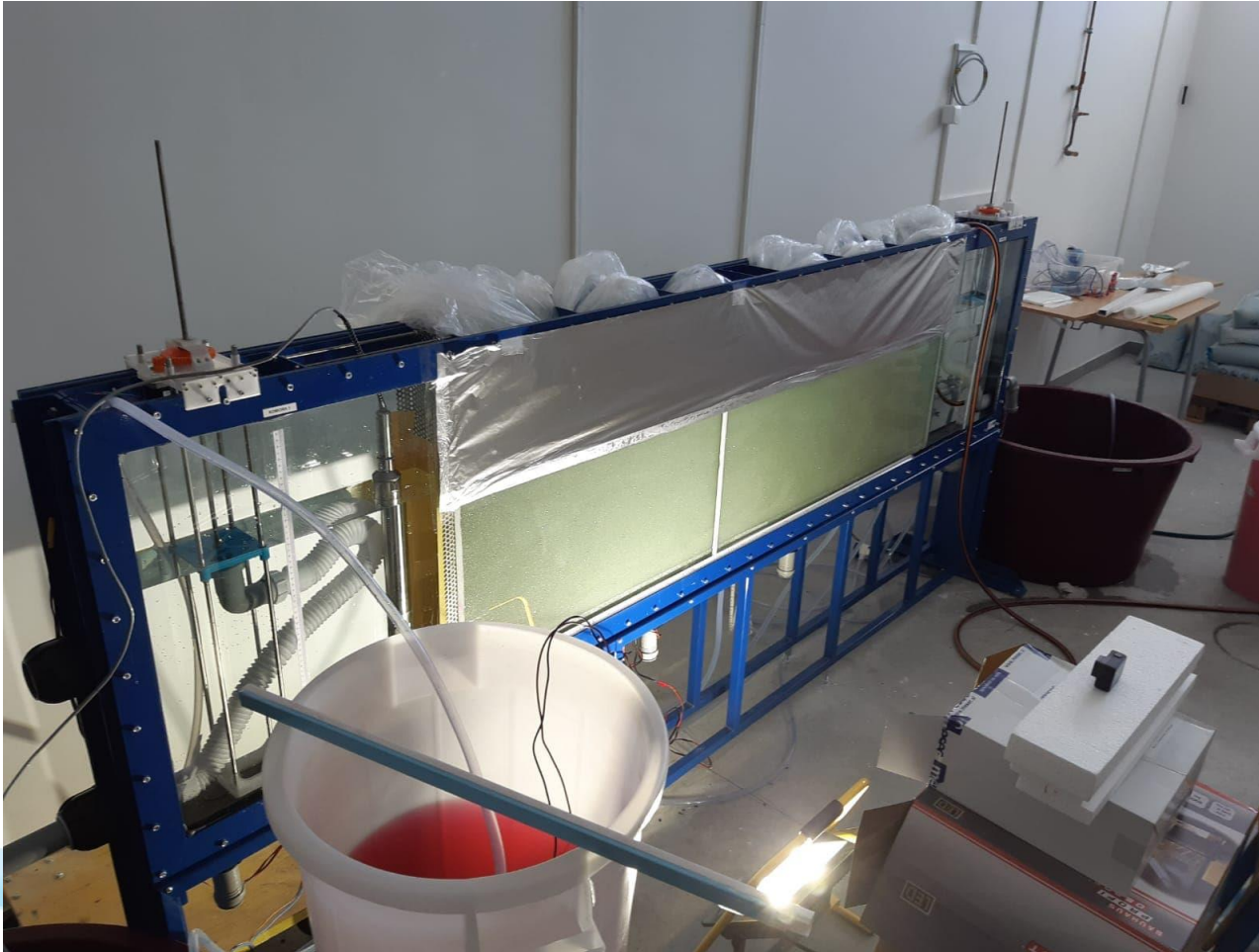➤ Confined and unconfined conditions;

Exp. preparation work and conductance

➢ Experiments preparation and control;
➢ First experiments;

Exp. preparation work and conductance
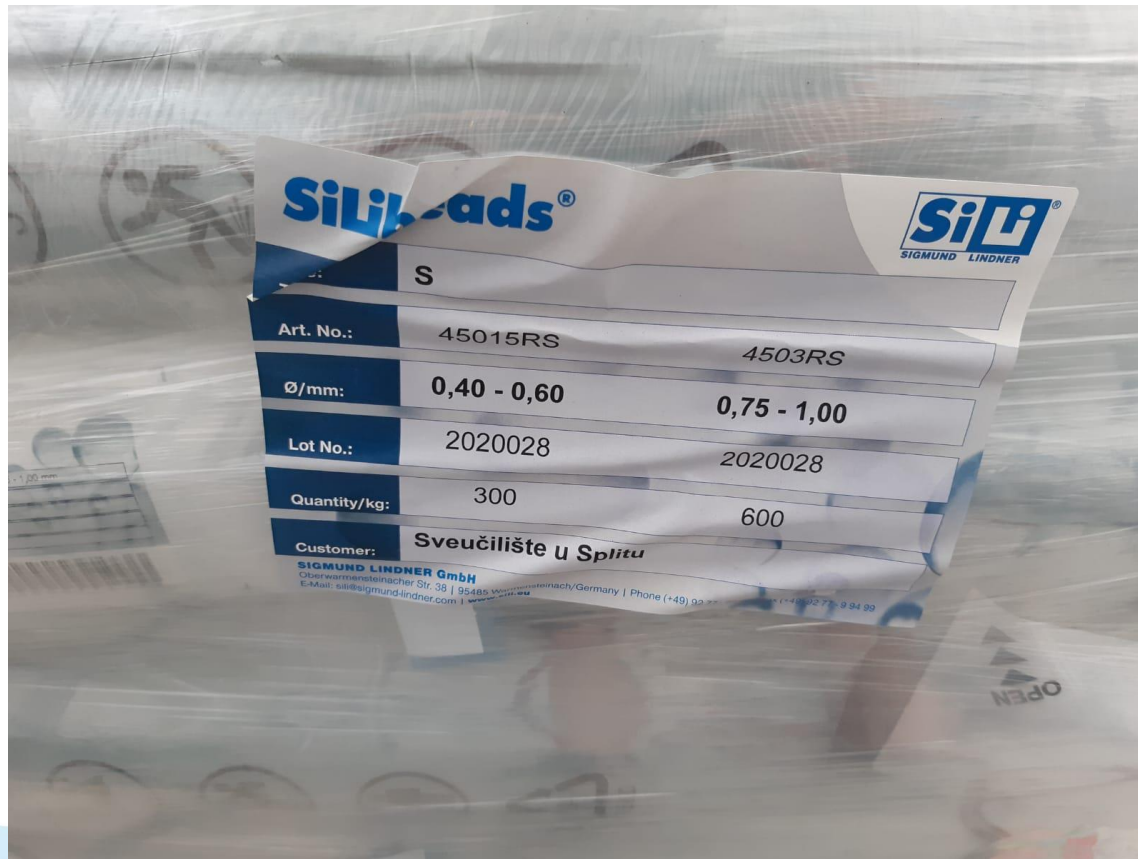
➢ Diffrent conditions, boundary and initial conditions);

Exp. preparation work and conductance

- Glass beads with diameter of 0.04 – 1.30 mm;
- Producer SiLibeads Gmbh;

Firma:	Sigmund Lindner GmbH
Benutzer:	Quality Control
Ergebnisdatei:	Glaskugeln Typ S \45015R_Lot_1953098_001.rdf
Messaufgabe:	C:\Camsizer\CAMSYS\45015 R 0.4-0.6mm 07-03-01.afg
Zeit:	31.07.2019, 8:34, Dauer 5 min 46 s bei 0.5 % Flächendichte , Bildrate 1:1und 60 mm Rinne mit Leitblech
Größendefinition:	xc_min
Partikelanzahl:	CCD-B = 804183 , CCD-Z = 49934
Anpassung:	nein
Material:	Glass Beads Typ S
Kommentar:	p3 < 0.425 max. 5%; p3 > 0.6 max. 10% p3 > 0.71 max. 2%; b/l3 = mind. 0.930;

Kornklasse [mm]	[mm]	p3 [%]	Q3 [%]	1-Q3 [%]	b/l3
0.003	0.350	2.05	2.05	97.95	0.975
0.350	0.400	6.14	8.19	91.81	0.978
0.400	0.450	15.90	24.09	75.91	0.978
0.450	0.500	20.58	44.67	55.33	0.977
0.500	0.550	20.07	64.74	35.26	0.973
0.550	0.600	19.65	84.39	15.61	0.973
0.600	0.650	13.10	97.49	2.51	0.972
0.650	0.700	2.28	99.77	0.23	0.962
0.700	1.022	0.23	100.00	0.00	0.821

Kenngrößen

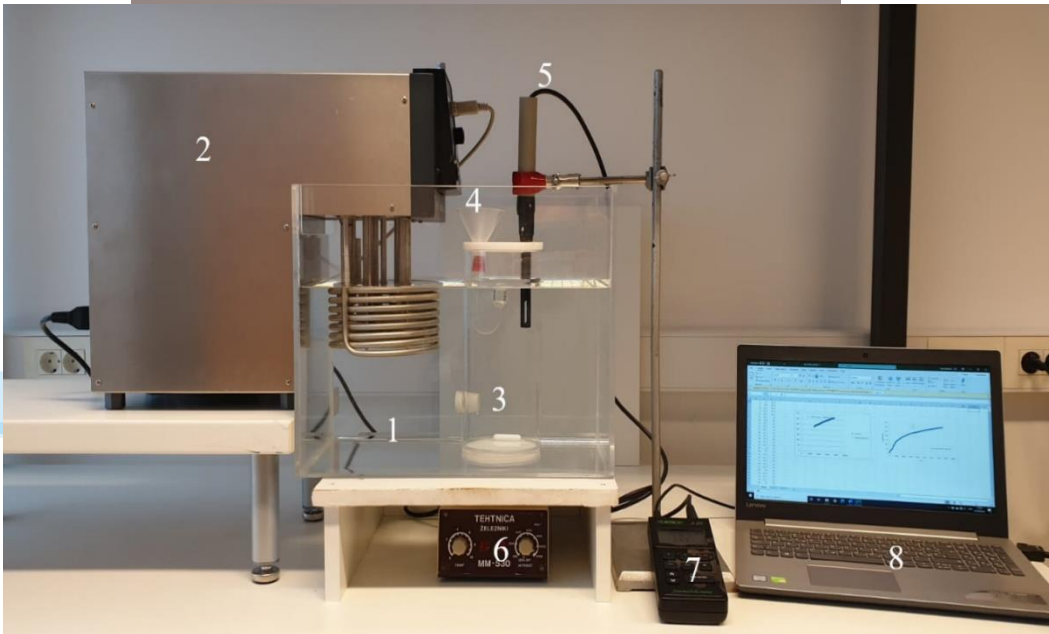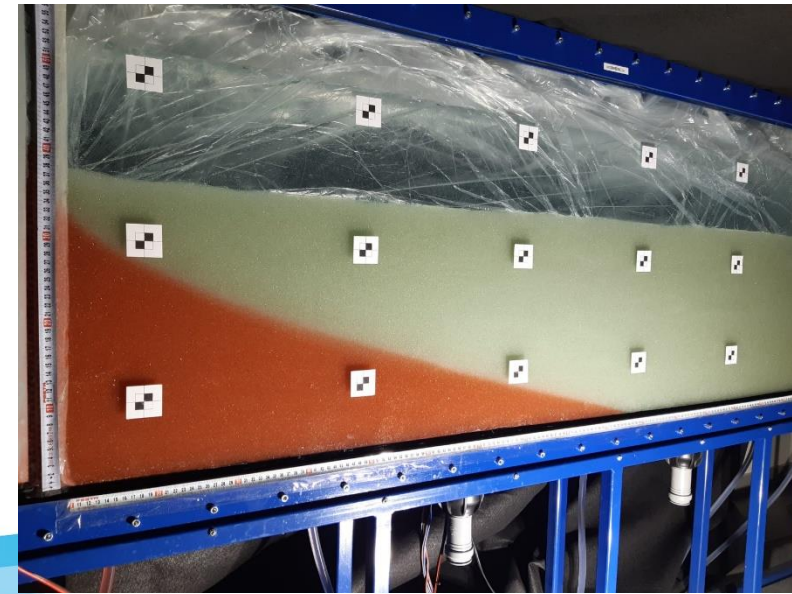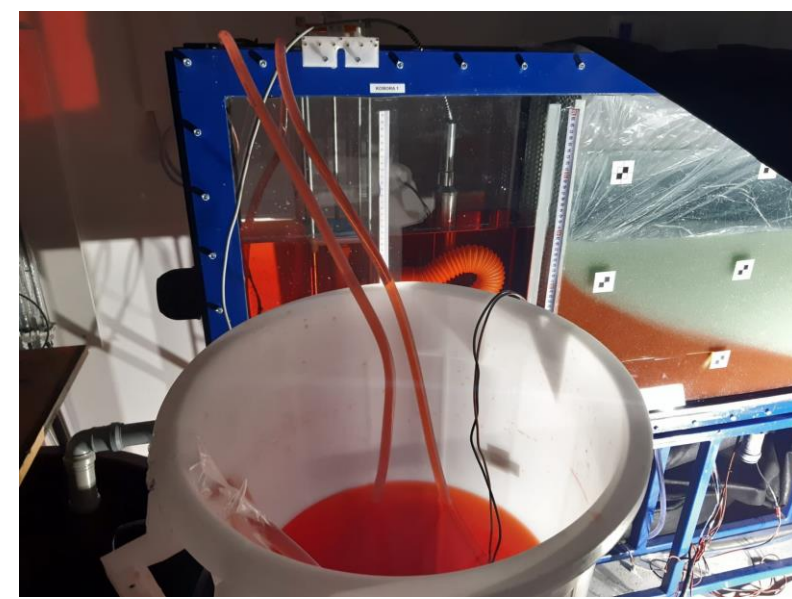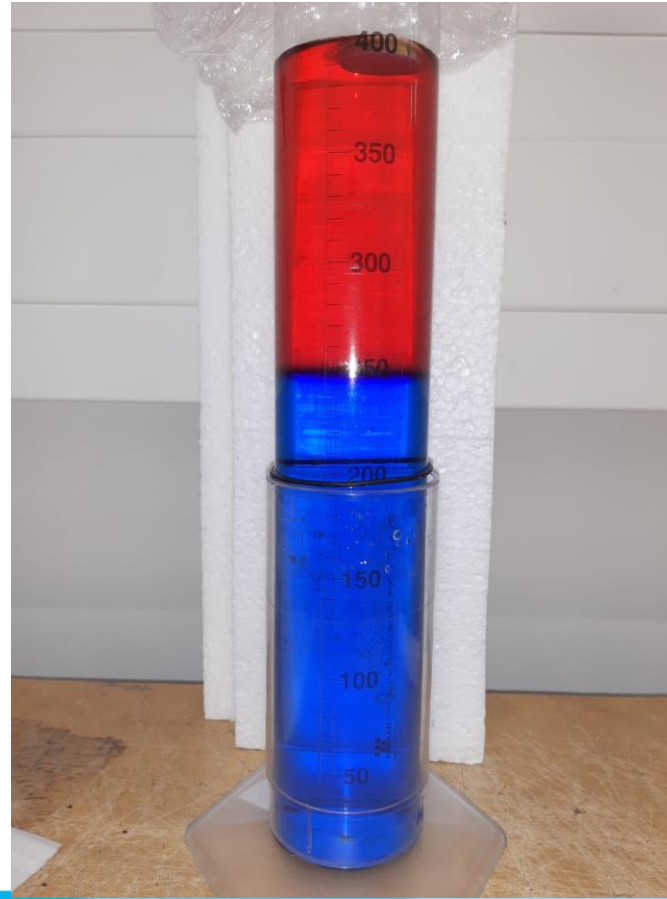| Q3 [%]	x [mm]
10.0	0.408
50.0	0.513
90.0	0.615

Sm = 44.335 cm²/g
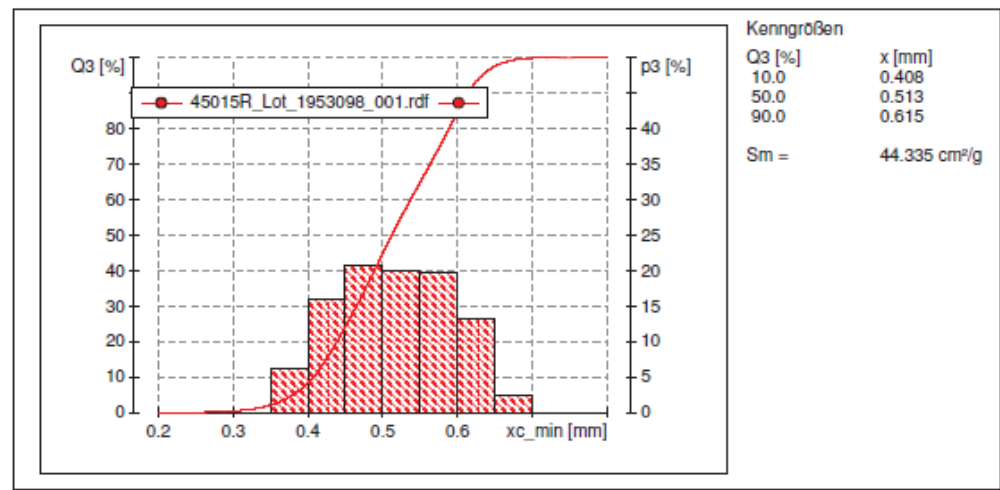
x(Q3=10.00 %) = 0,408 mm
x(Q3=60.00 %) = 0,538 mm
D60/D10 = 1,318
p3(0.100 mm,0.425 mm) = 15,06 %
p3(0.600 mm,1.000 mm) = 15,61 %
p3(0.710 mm,1.000 mm) = 0,15 %

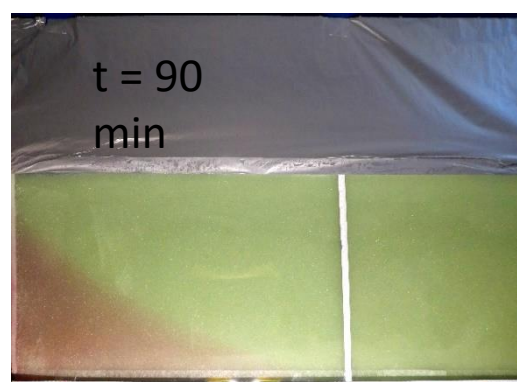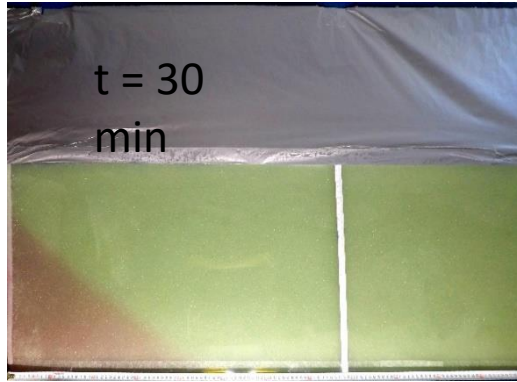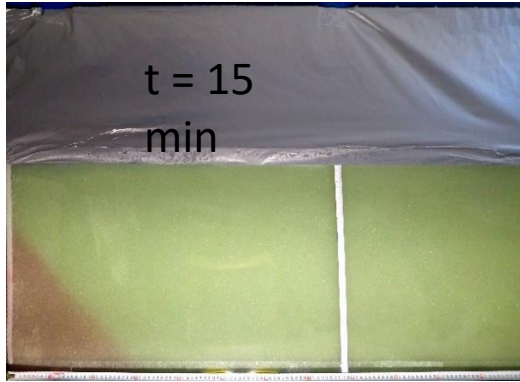1-Q3 (b/l=0,93) = 92,9 %   Mittelwert b/l3 = 0,974

Exp. preparation work and conductance
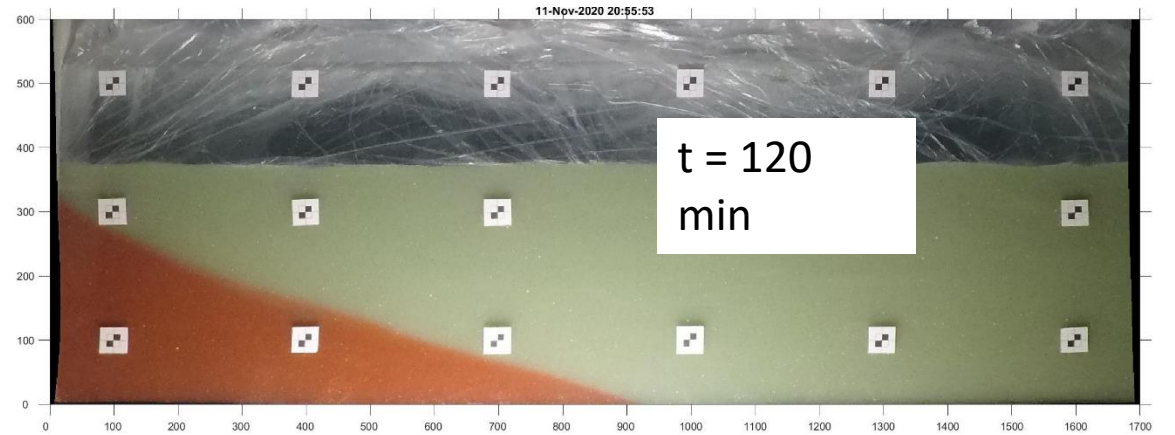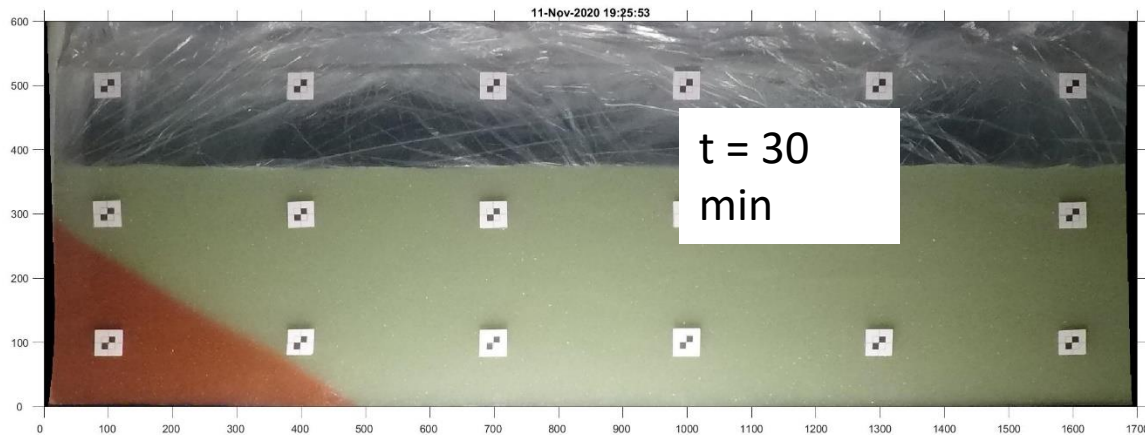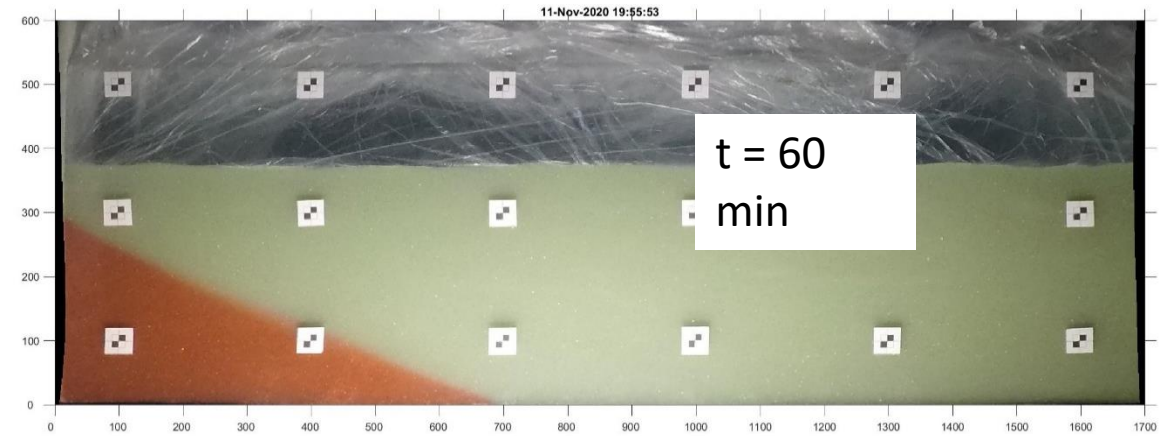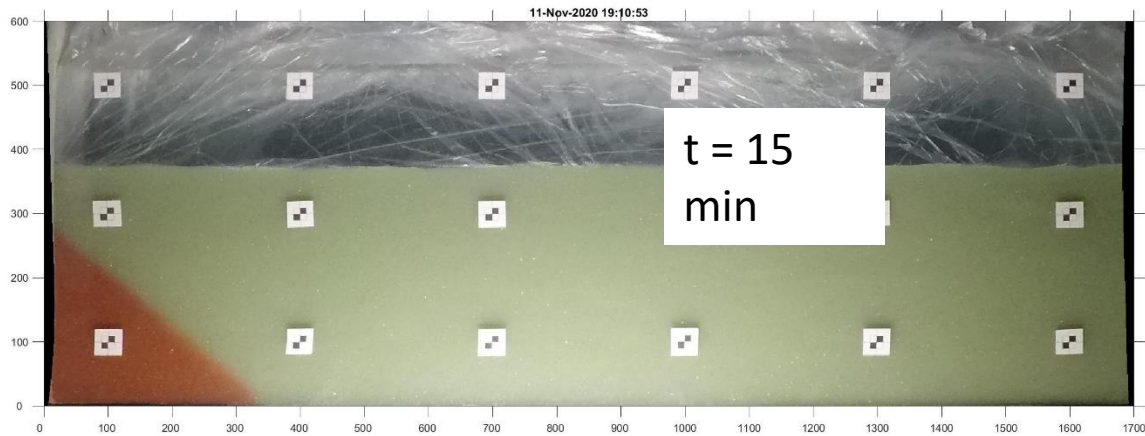
➢ E 134, stable, conservative, soluable;

Exp. preparation work and conductance

➤ High resolution camera recording every 1 min;
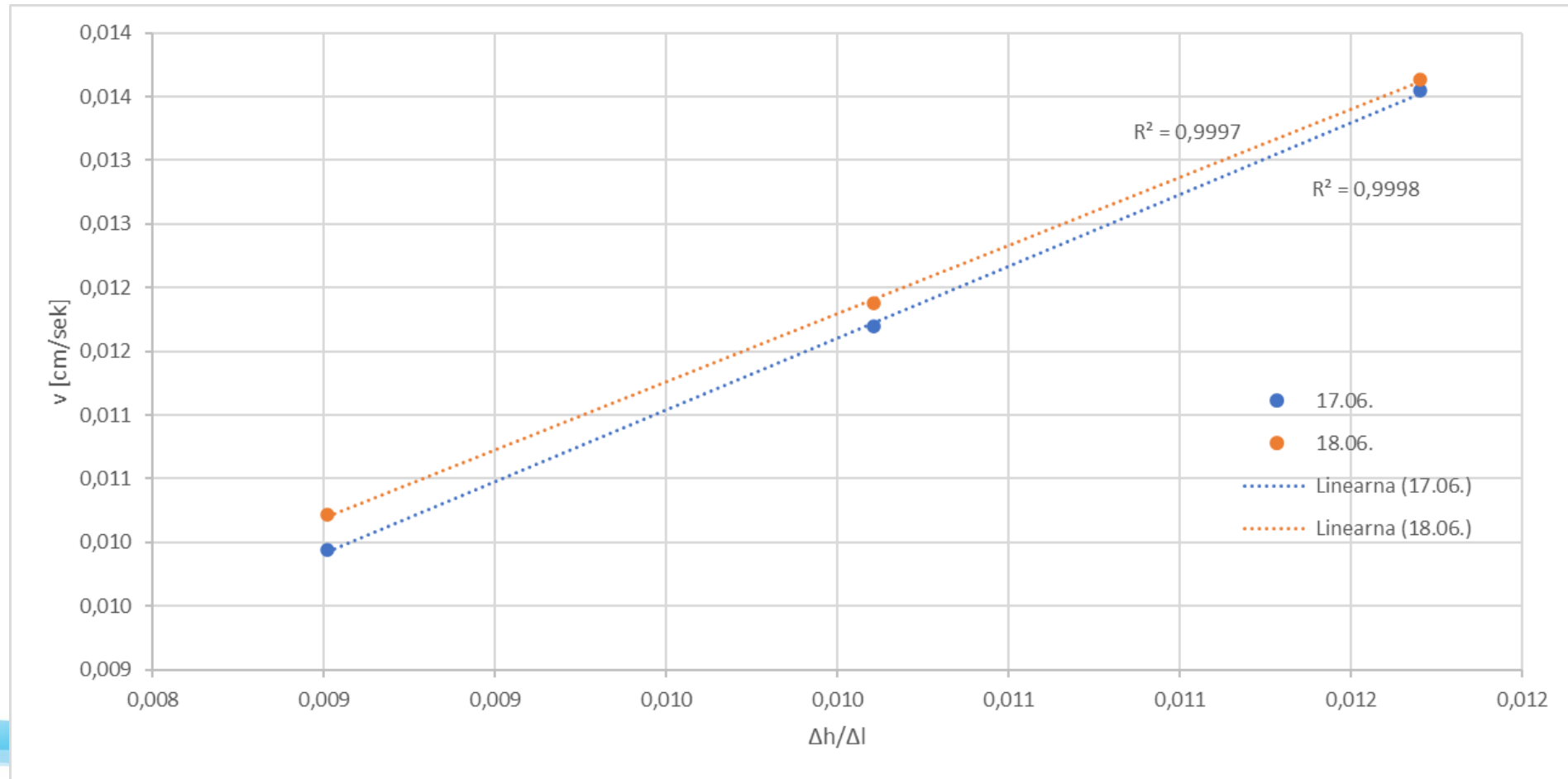➤ Postprocessing in accordance to the scope;

Experiments control

➤ Quality assurance internal proceedures proceedures (dye solution preparation, glass beads packing, BC control, IC control) ;
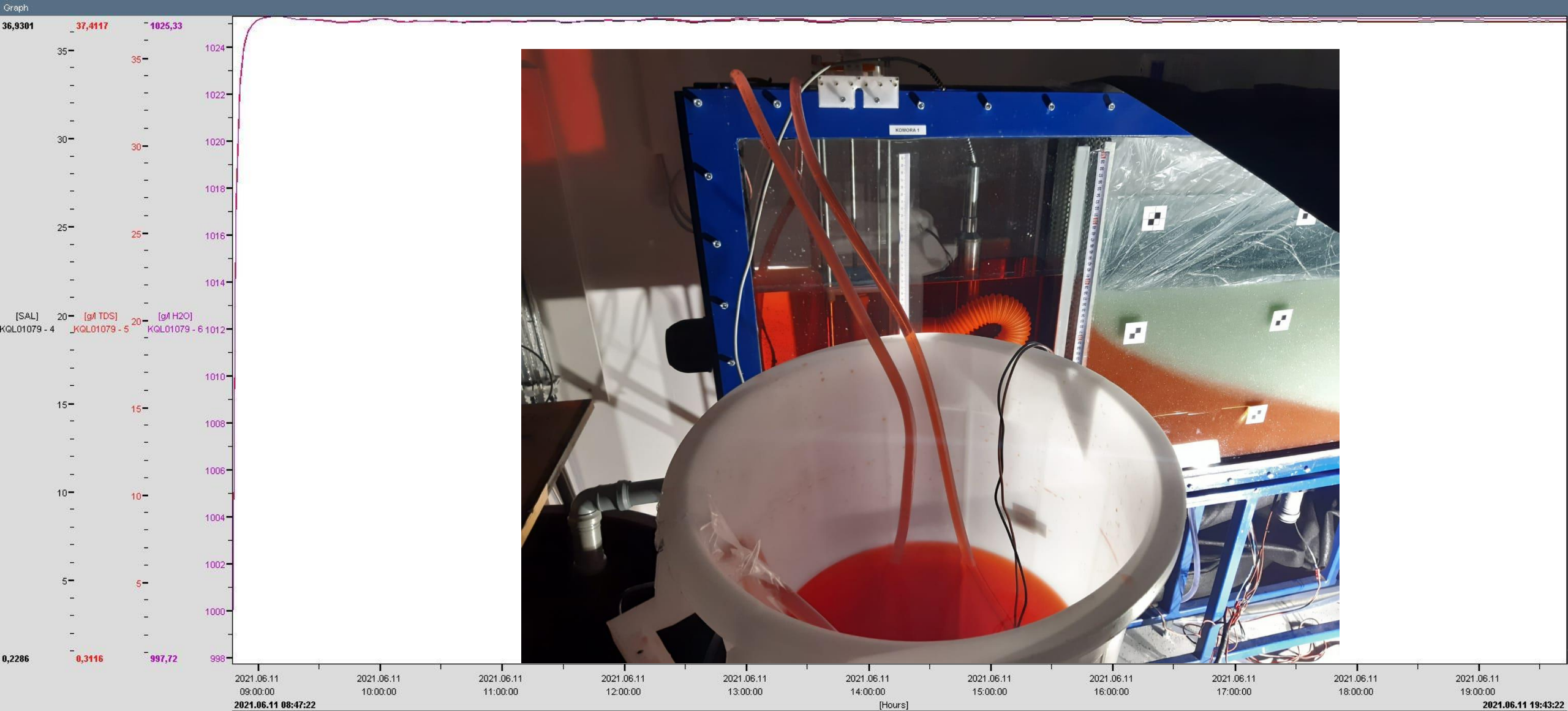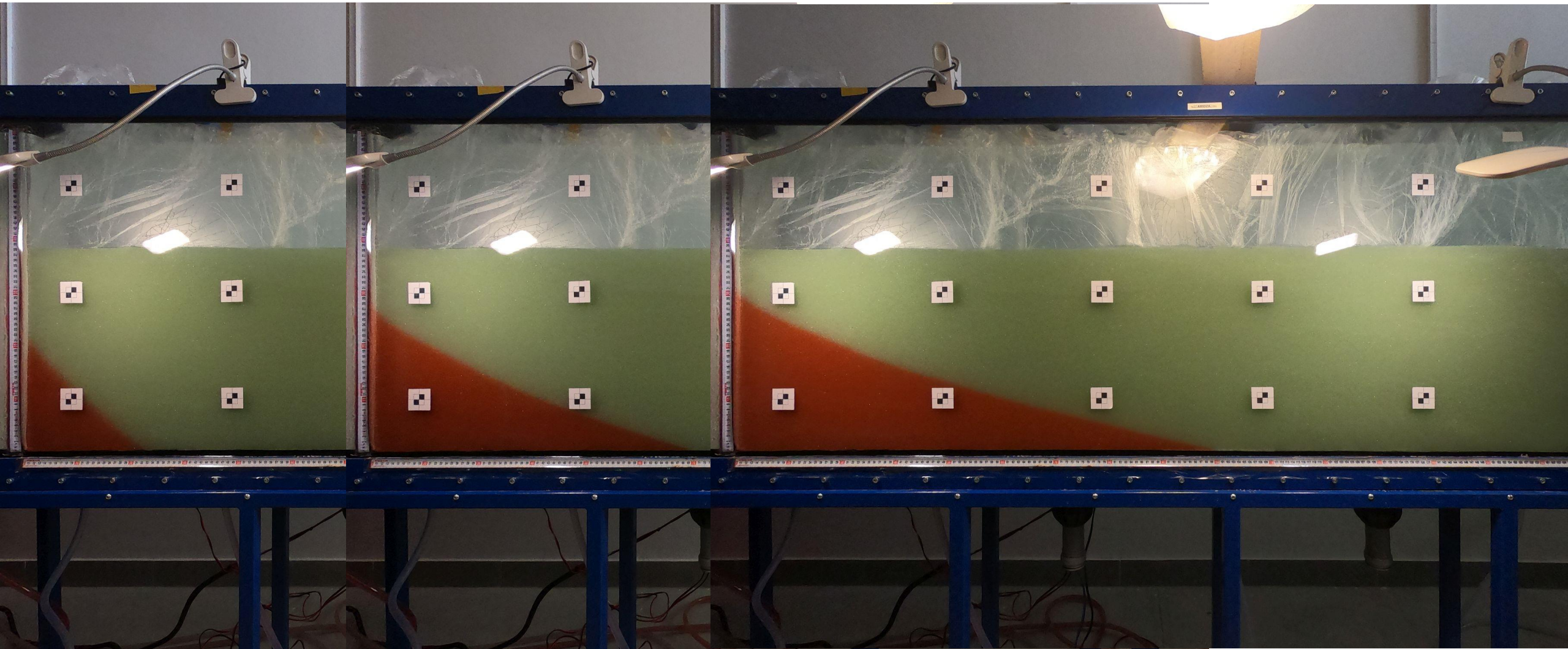
Experiments control

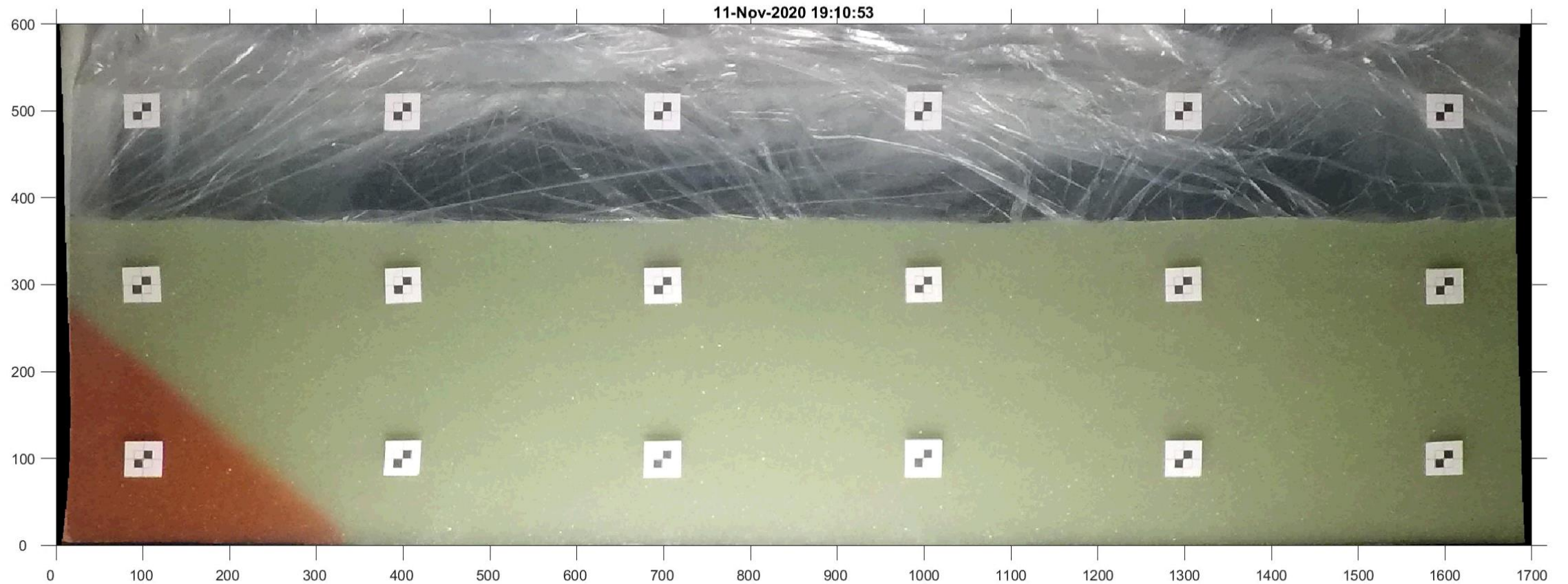➢ Hydraulic conductivity determination (1.18-1.21 cm/s)
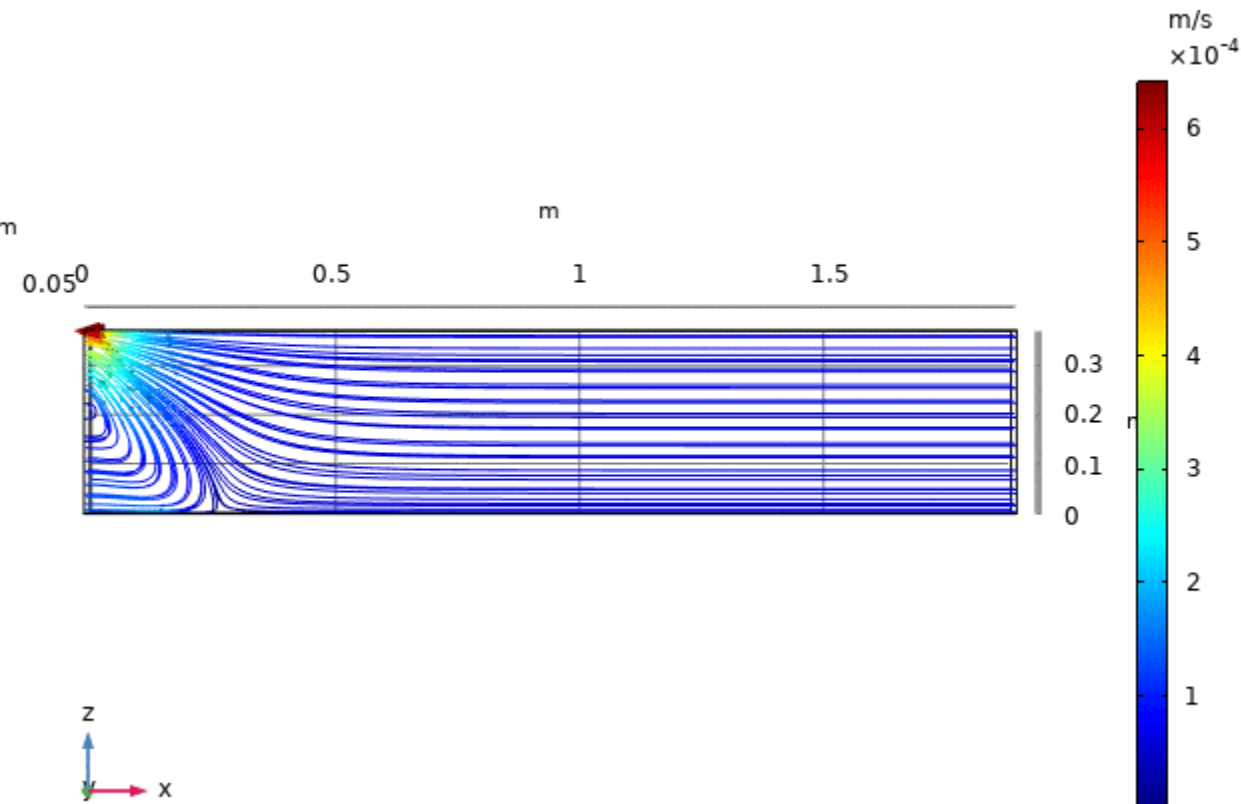
Experiments control

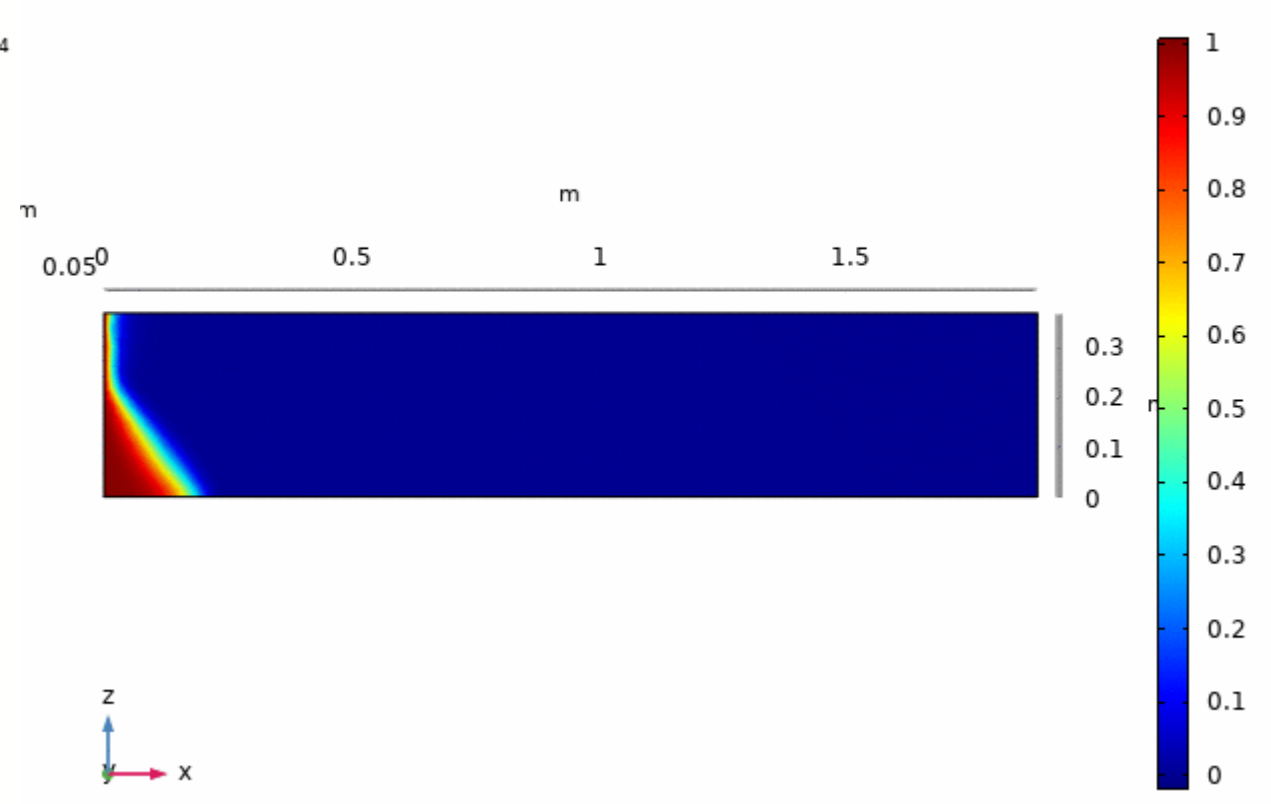# Experiments control

Experiments control

Experiments control

Passive and active seawater intrusion
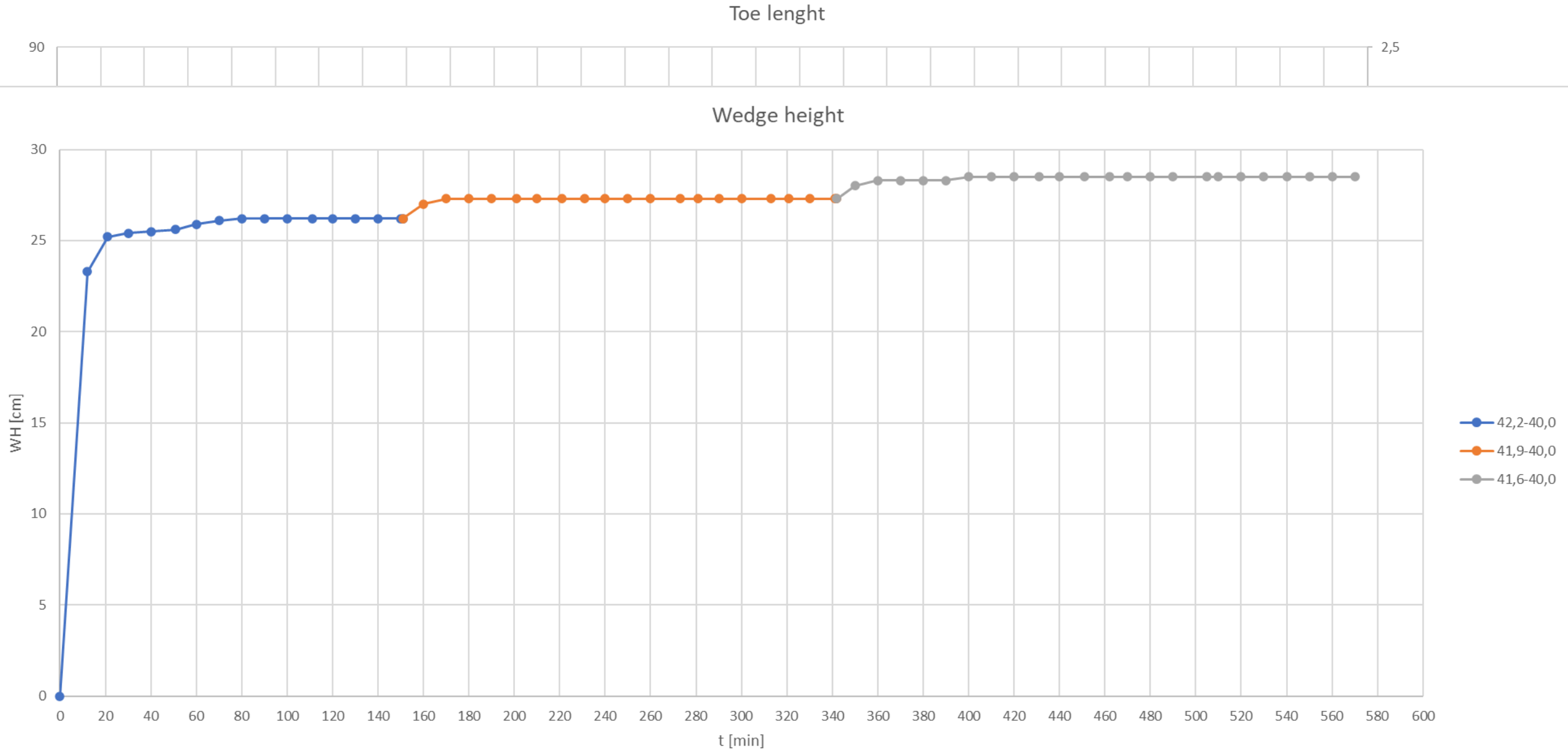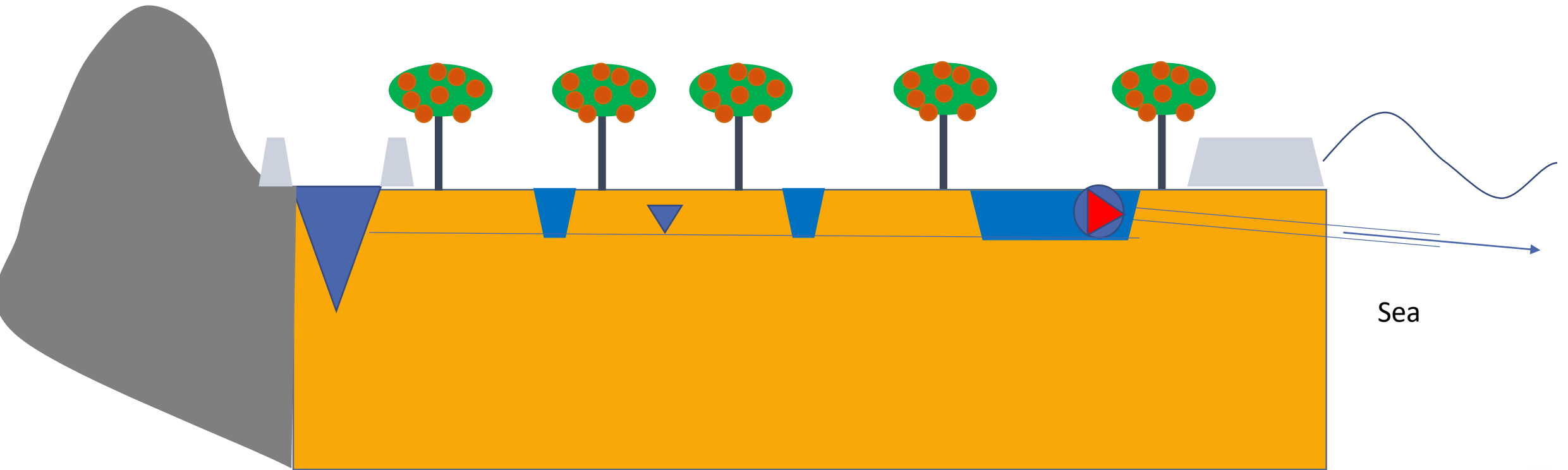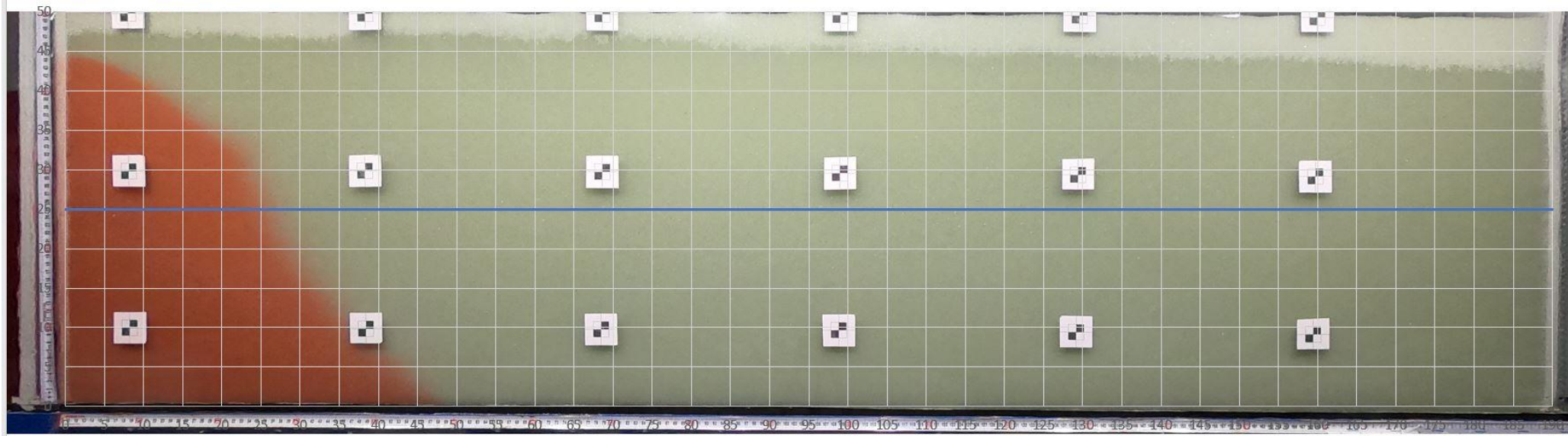
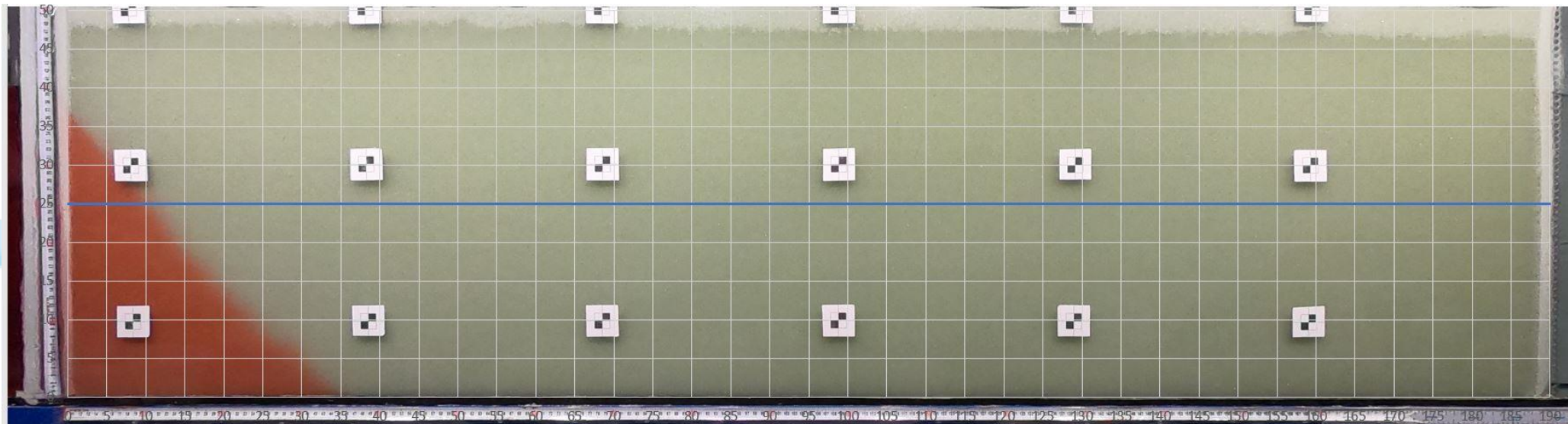# Passive and active seawater intrusion

Passive and active seawater intrusion

Sea
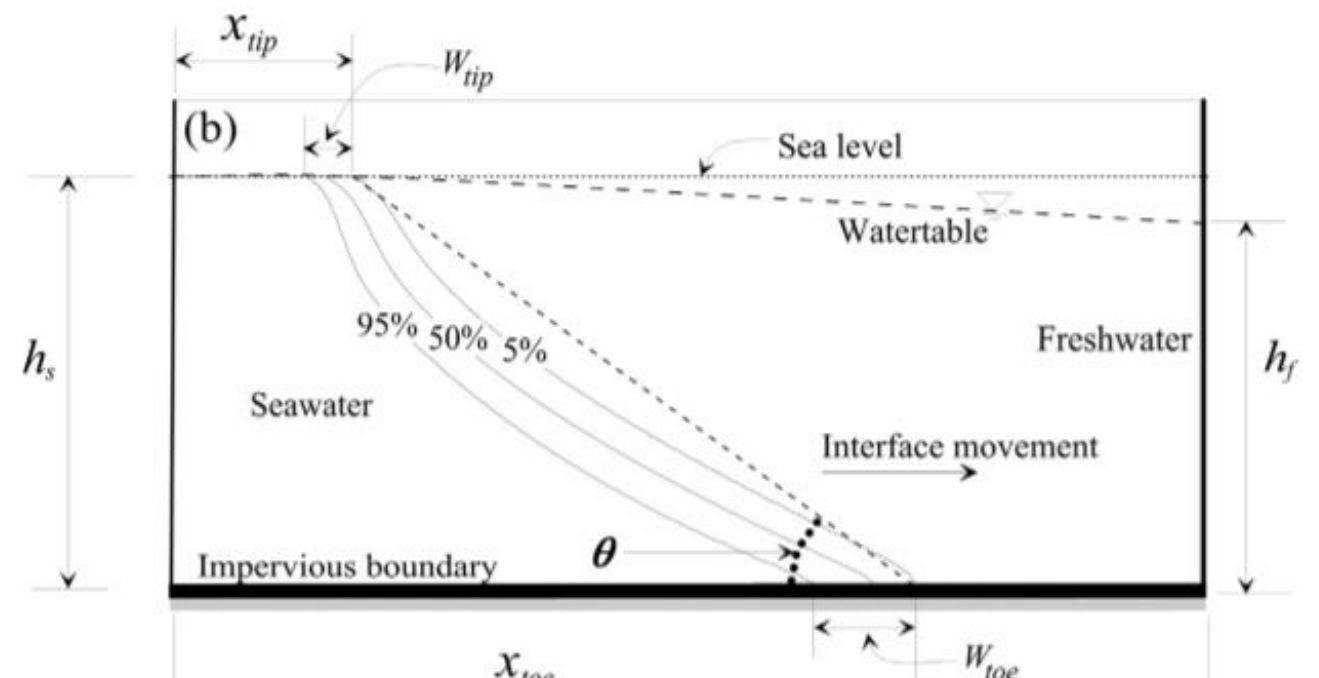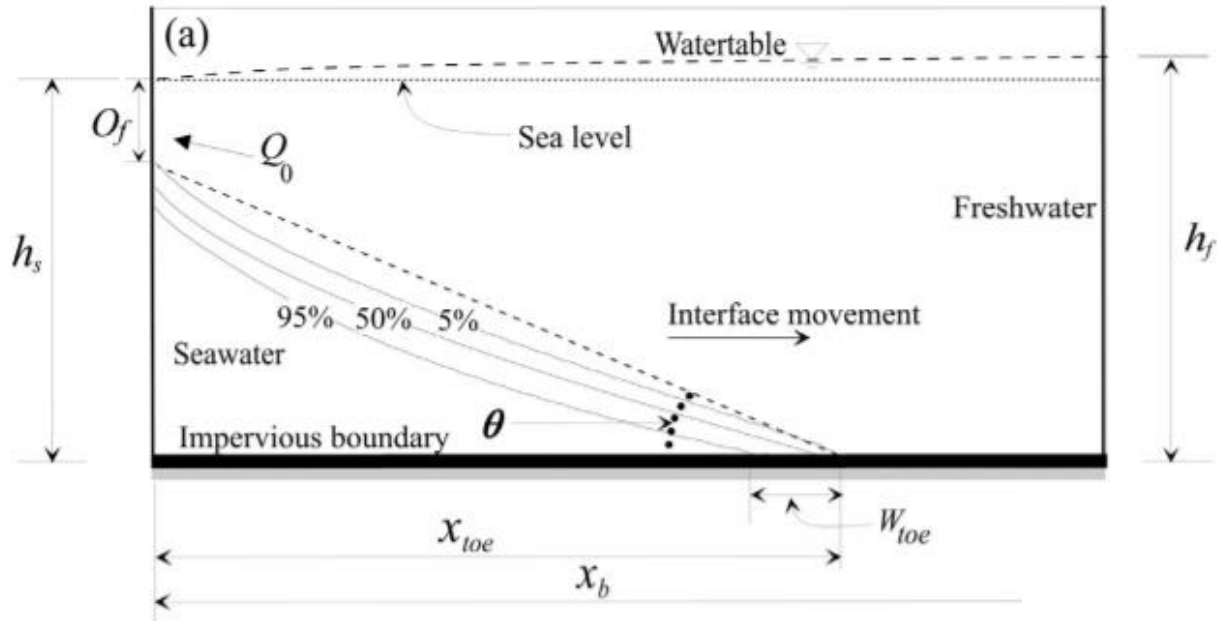
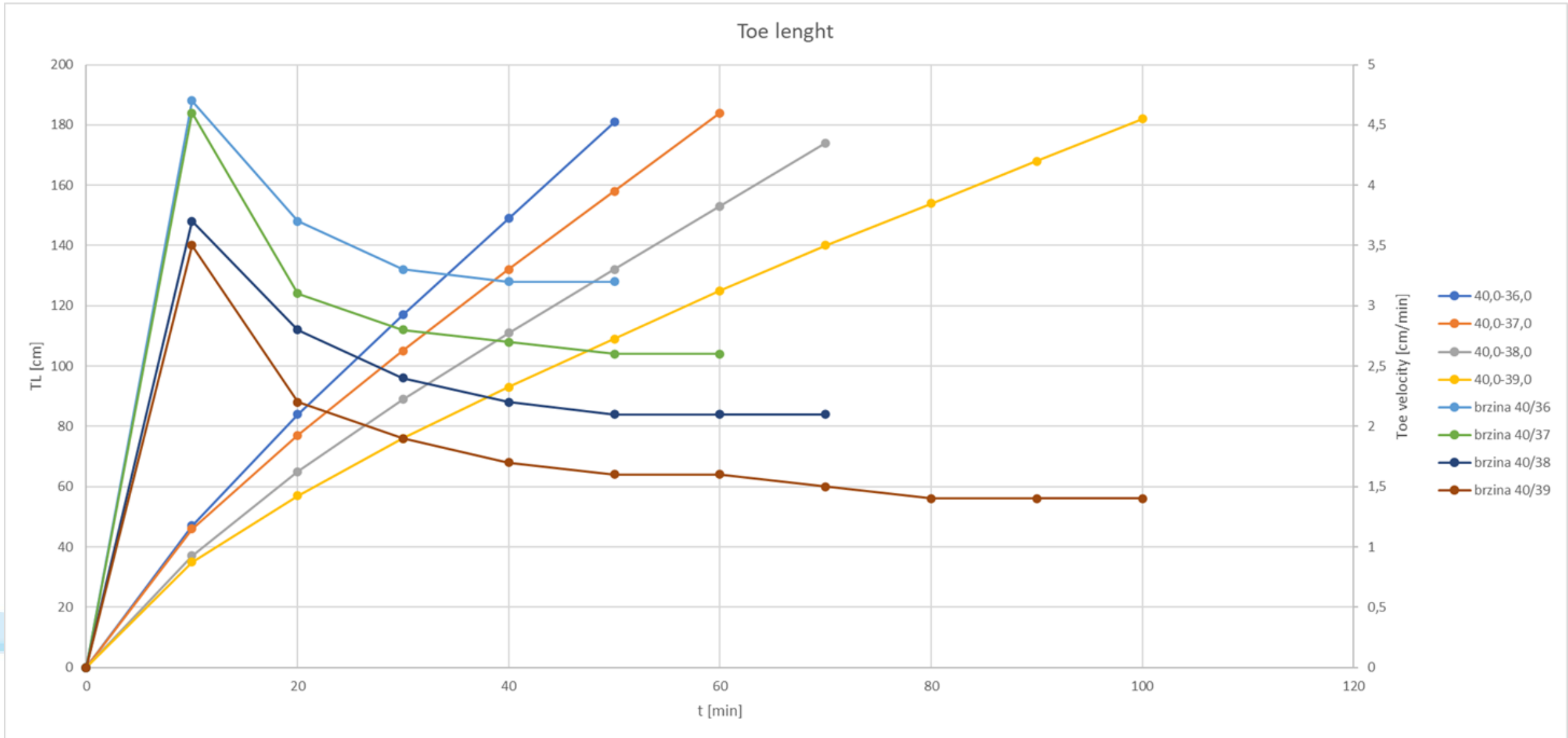# Passive and active seawater intrusion

40,0-36,0
10 min

40,0-39,0
10 min

Passive and active seawater intrusion

40,0-36,0
30 min

40,0-39,0
30 min

Passive and active seawater intrusion

Conclusions

➢ Active intrusion relevant for Neretva pilot site;
➢ SWI and SWR (passive) reaching steady state conditions;
➢ Constraints of the lab domain for the active SWI;
➢ Impermeable barrier for the Diga area – 1.80 km;
➢ Recharge channel along the left river Neretva bank;