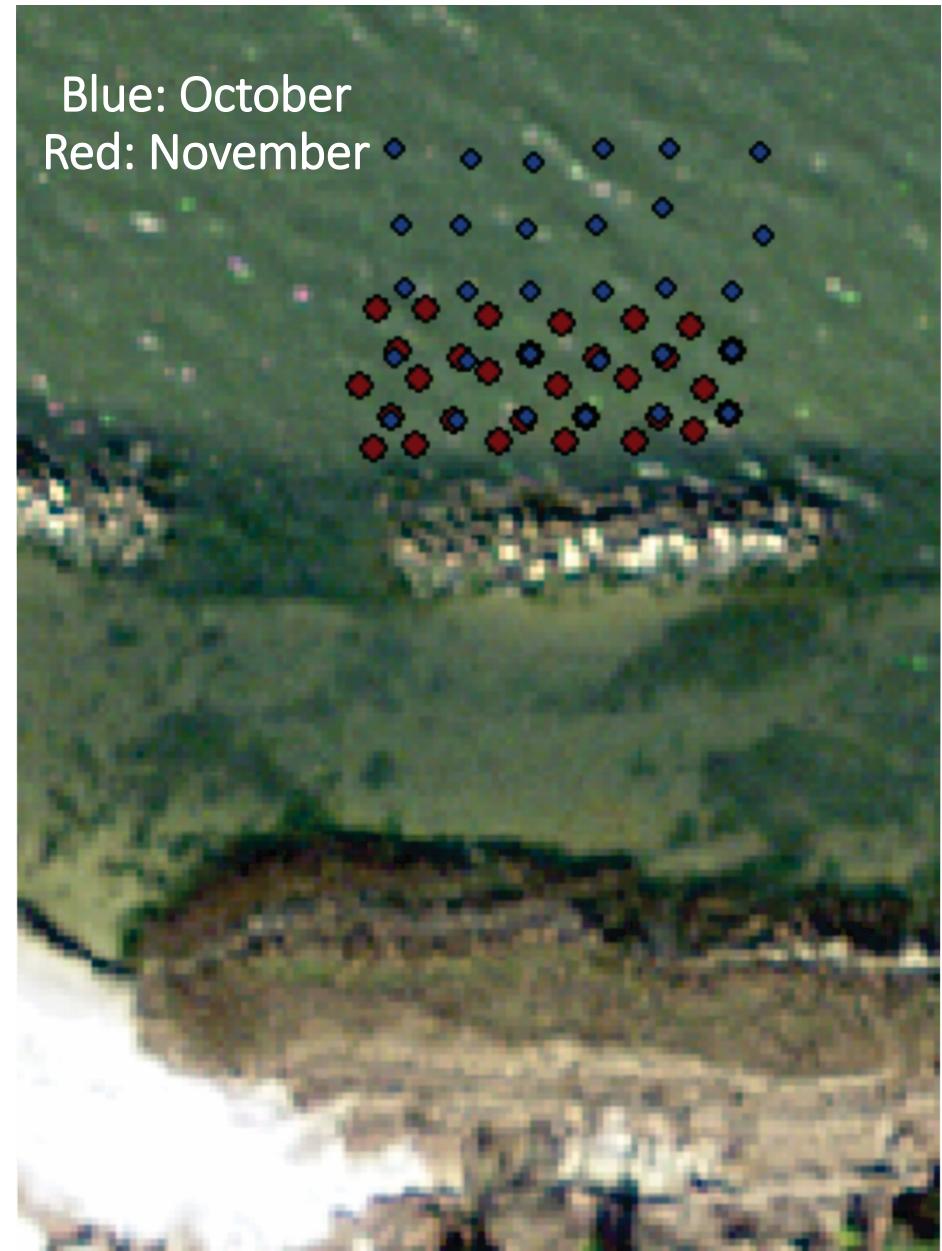
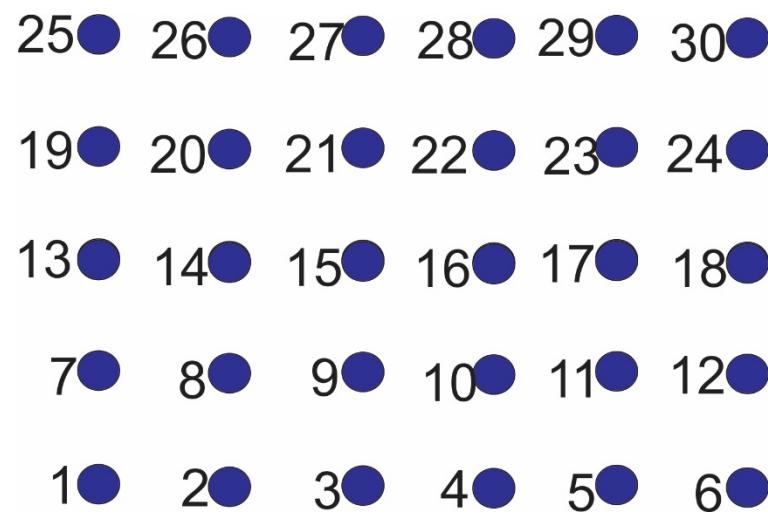
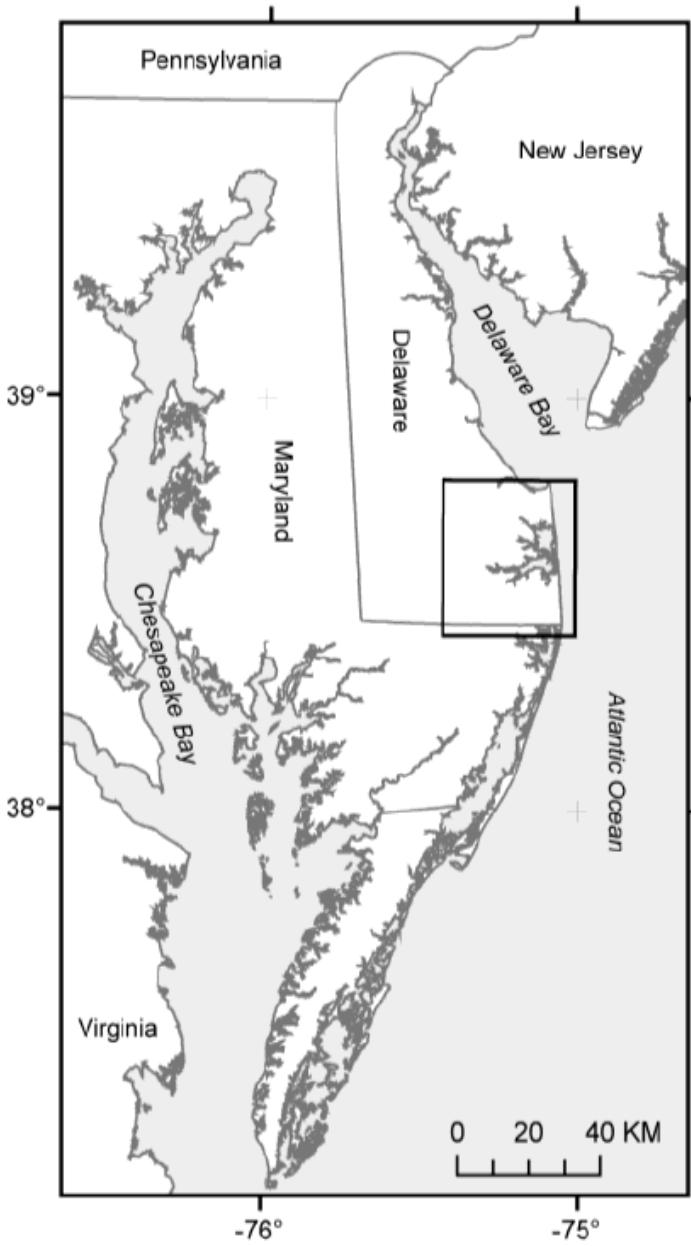


Holts Landing  
2015















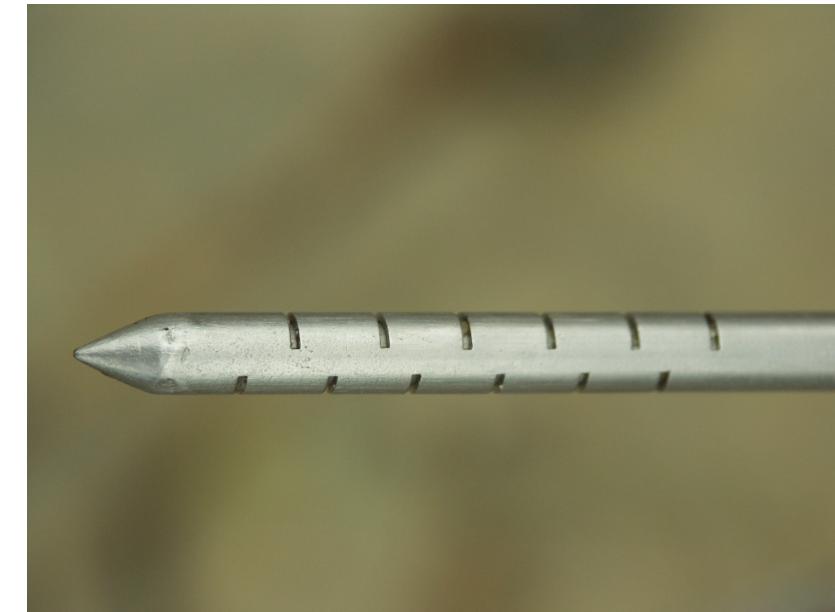




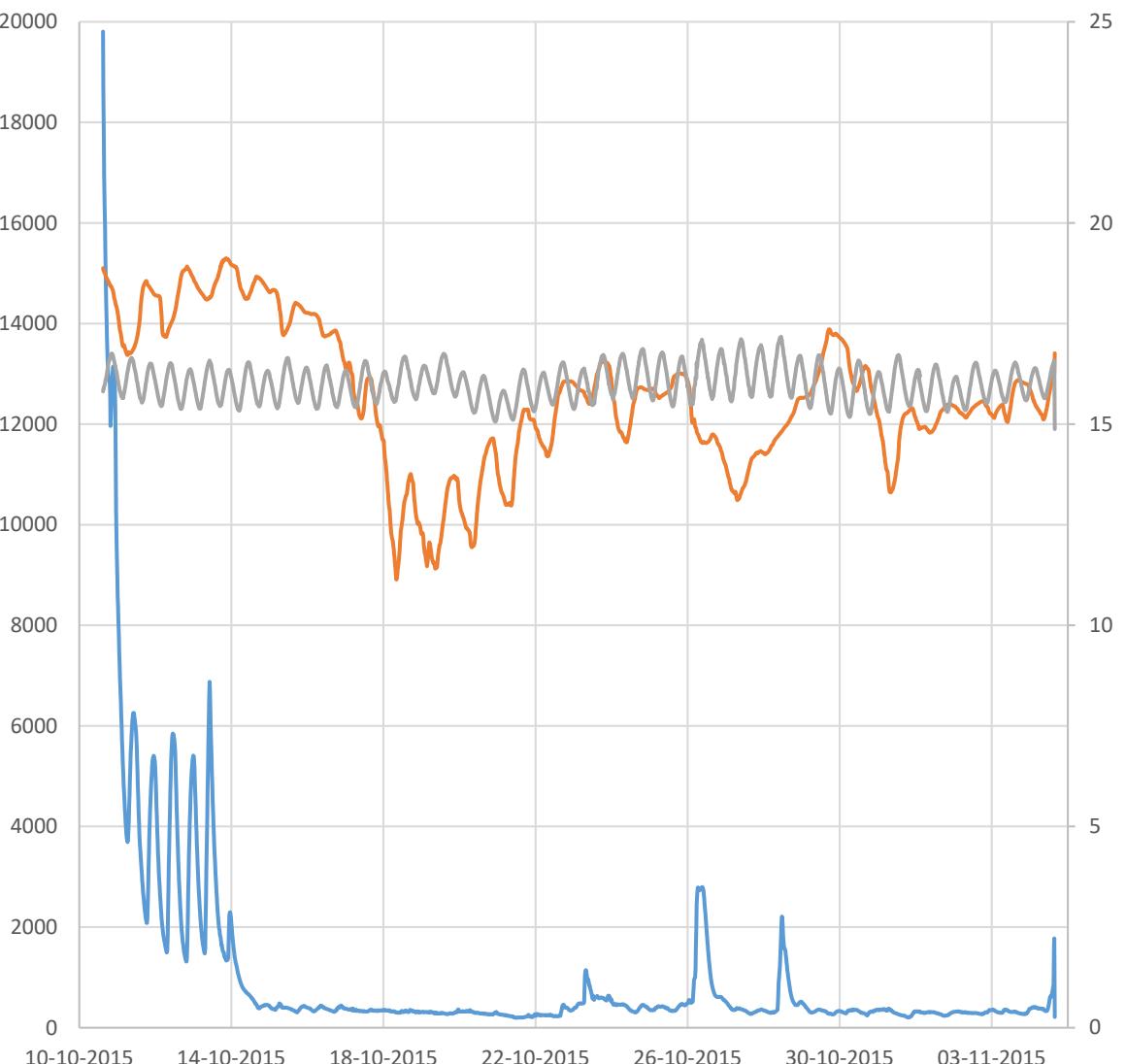
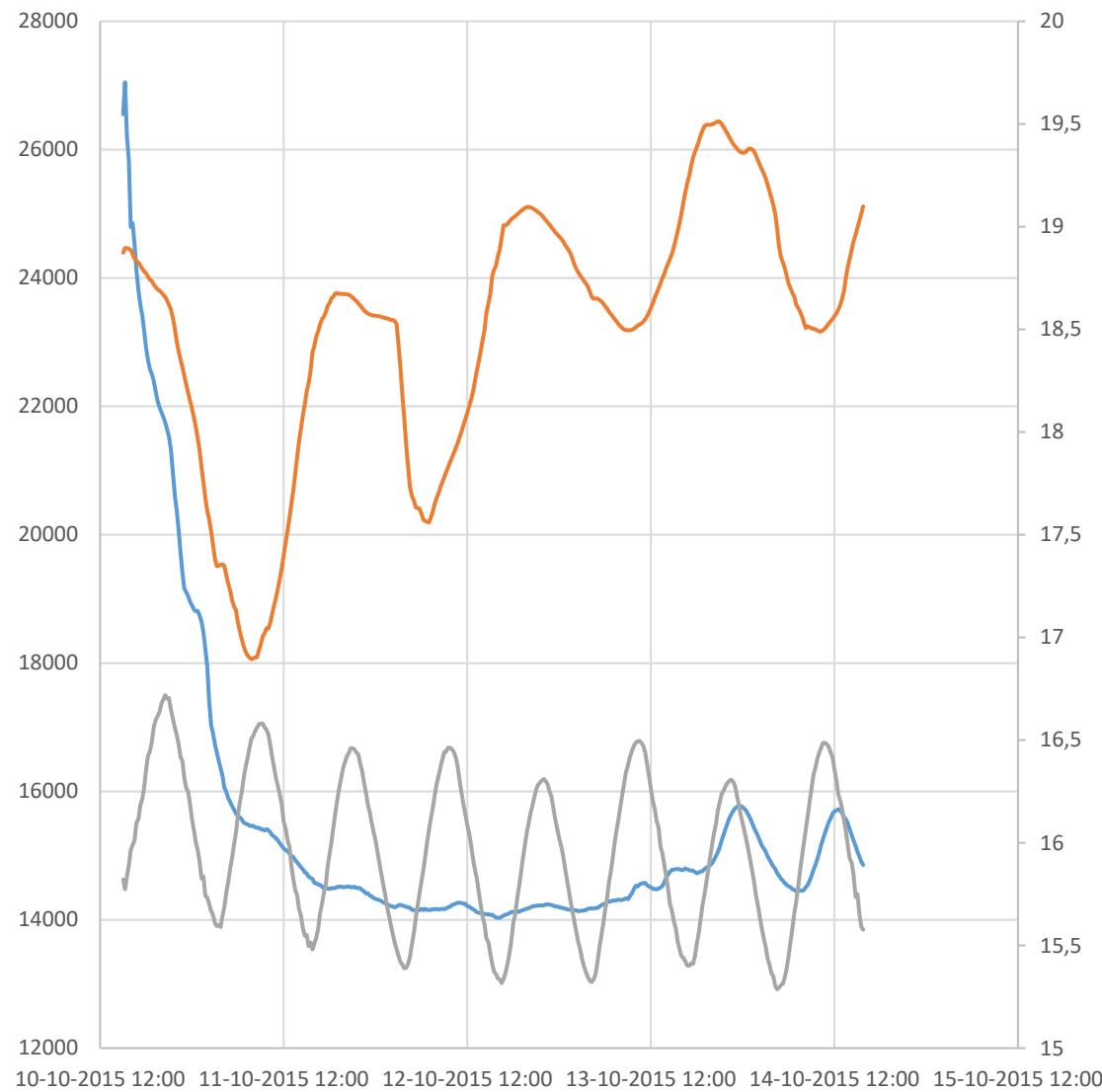


# Methods

- Seepage meters (measurements during tidal periods)
- Radium sampling in the seepage meters
- Radon sampling of pore water with a sipper
- Electrical conductivity profiles
- Sediment sampling
- Bay level oscillations
- Water table monitoring



# Monitoring the chamber space in the seepage meter



# October 13-14<sup>th</sup> campaign

Seepage

Radon

Radium

October

5

4

3

2

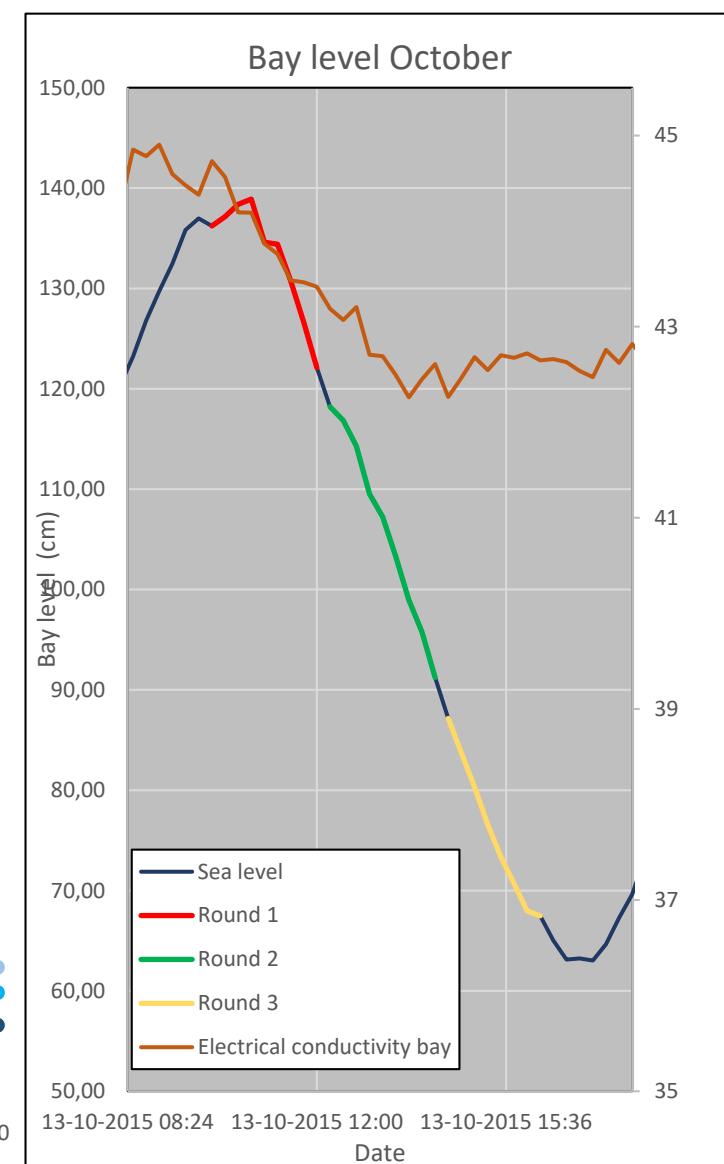
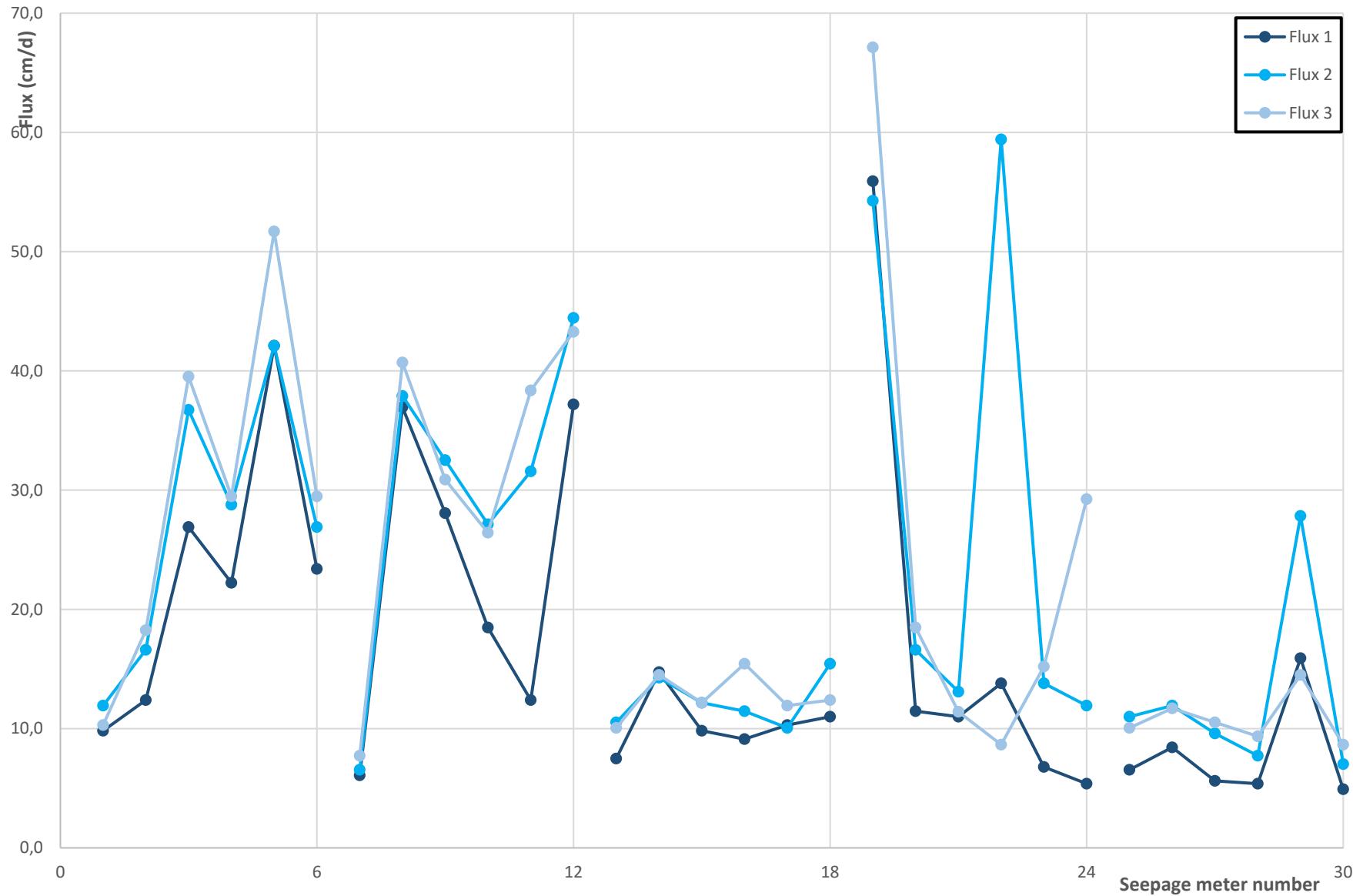
1

3m



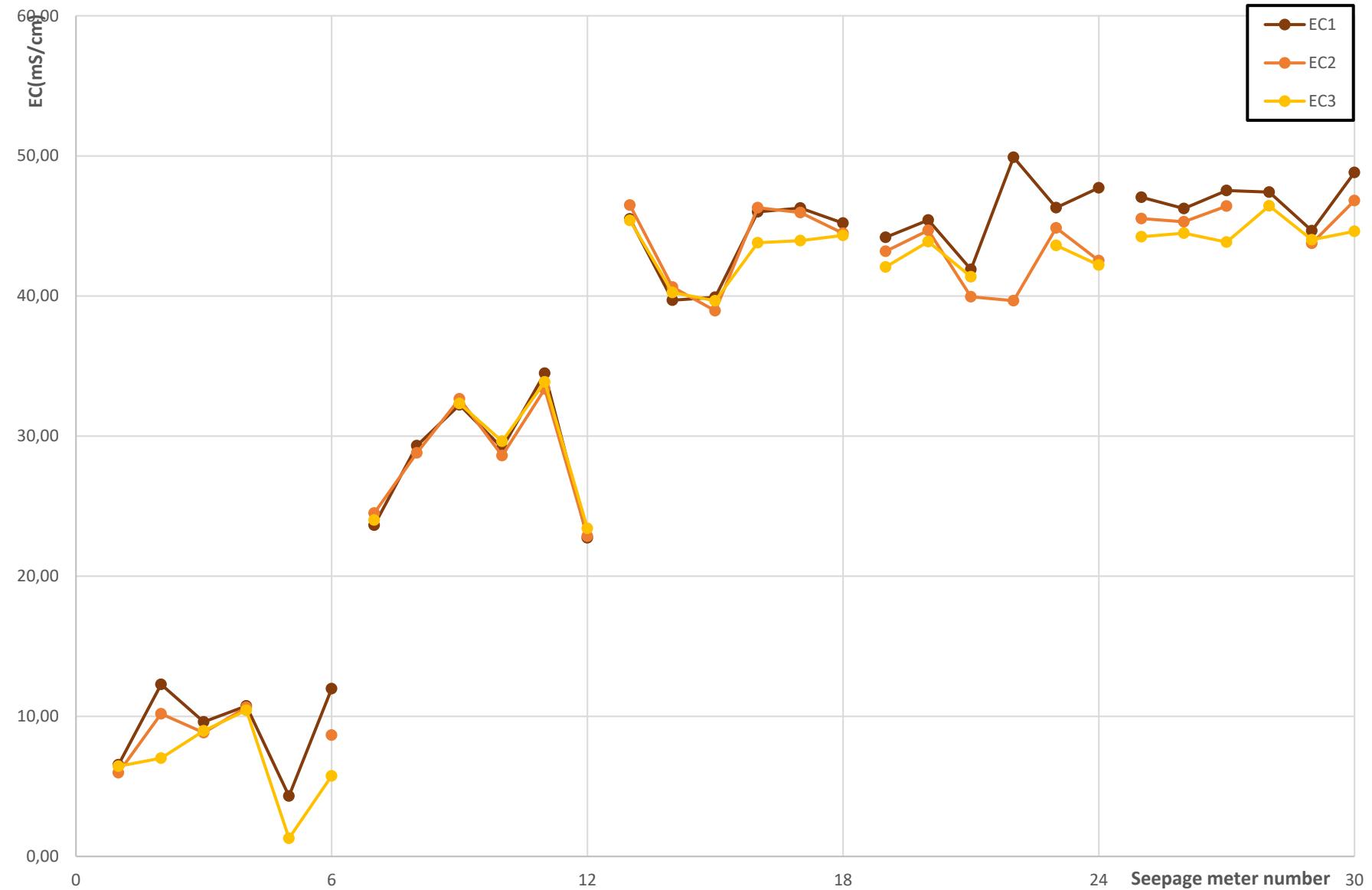
# Flux with seepage meters

## Flux

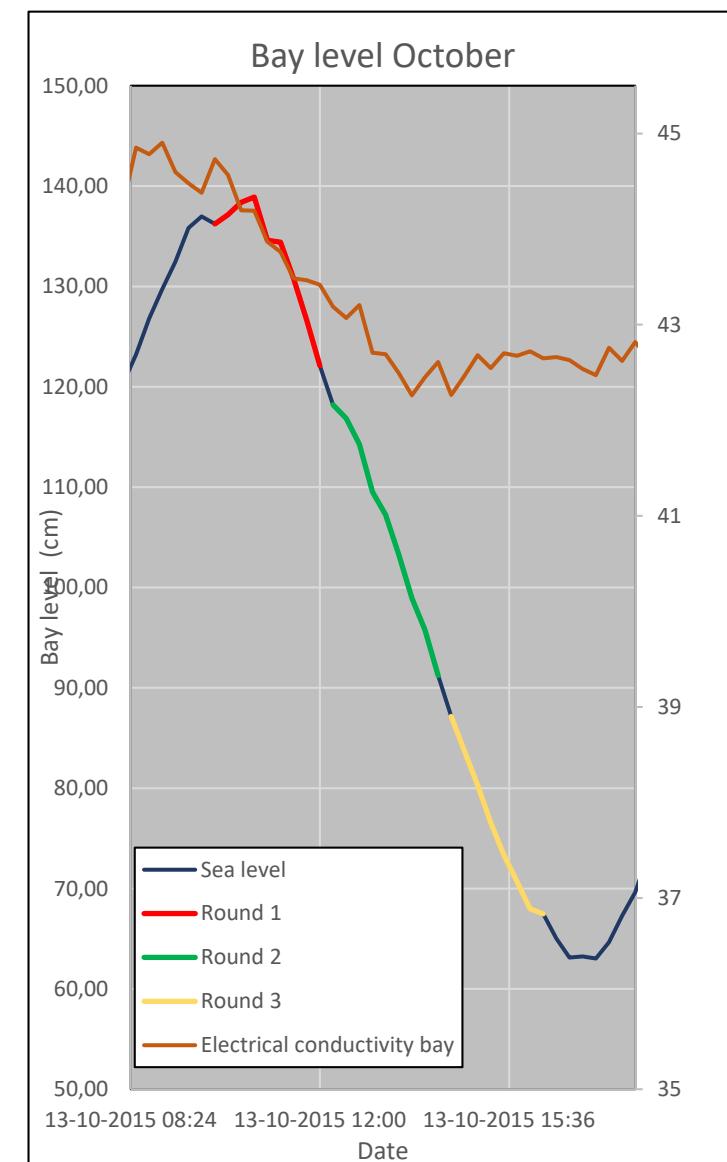


# EC with seepage meters

EC

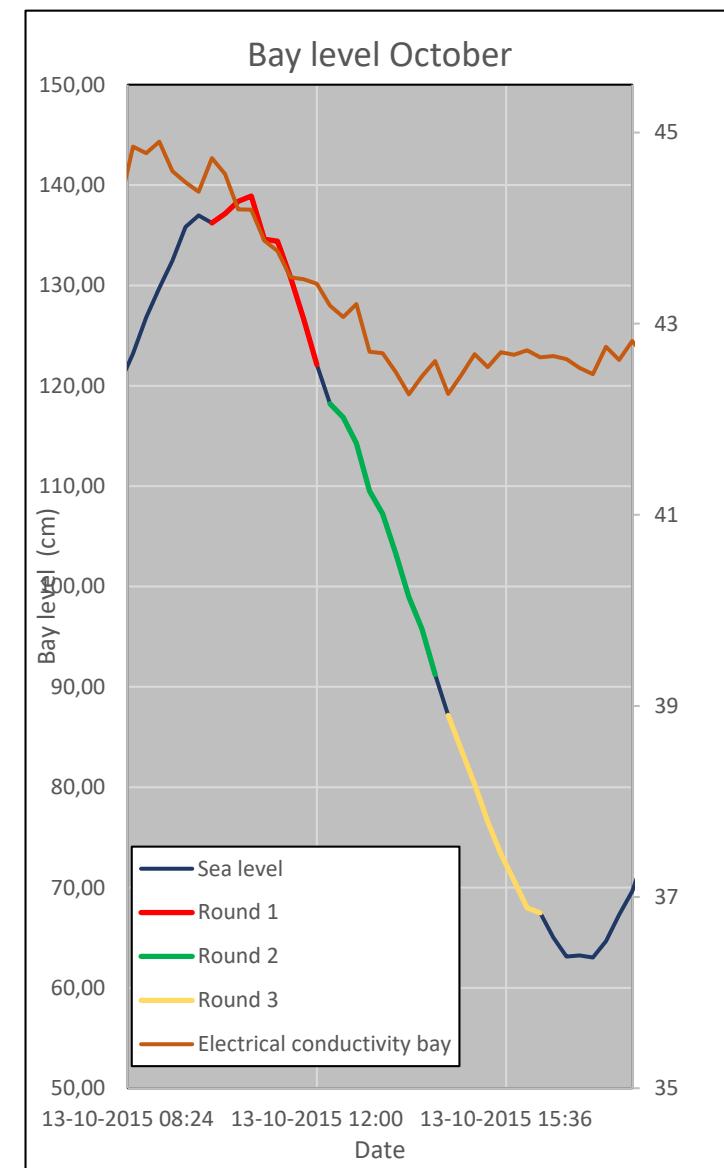
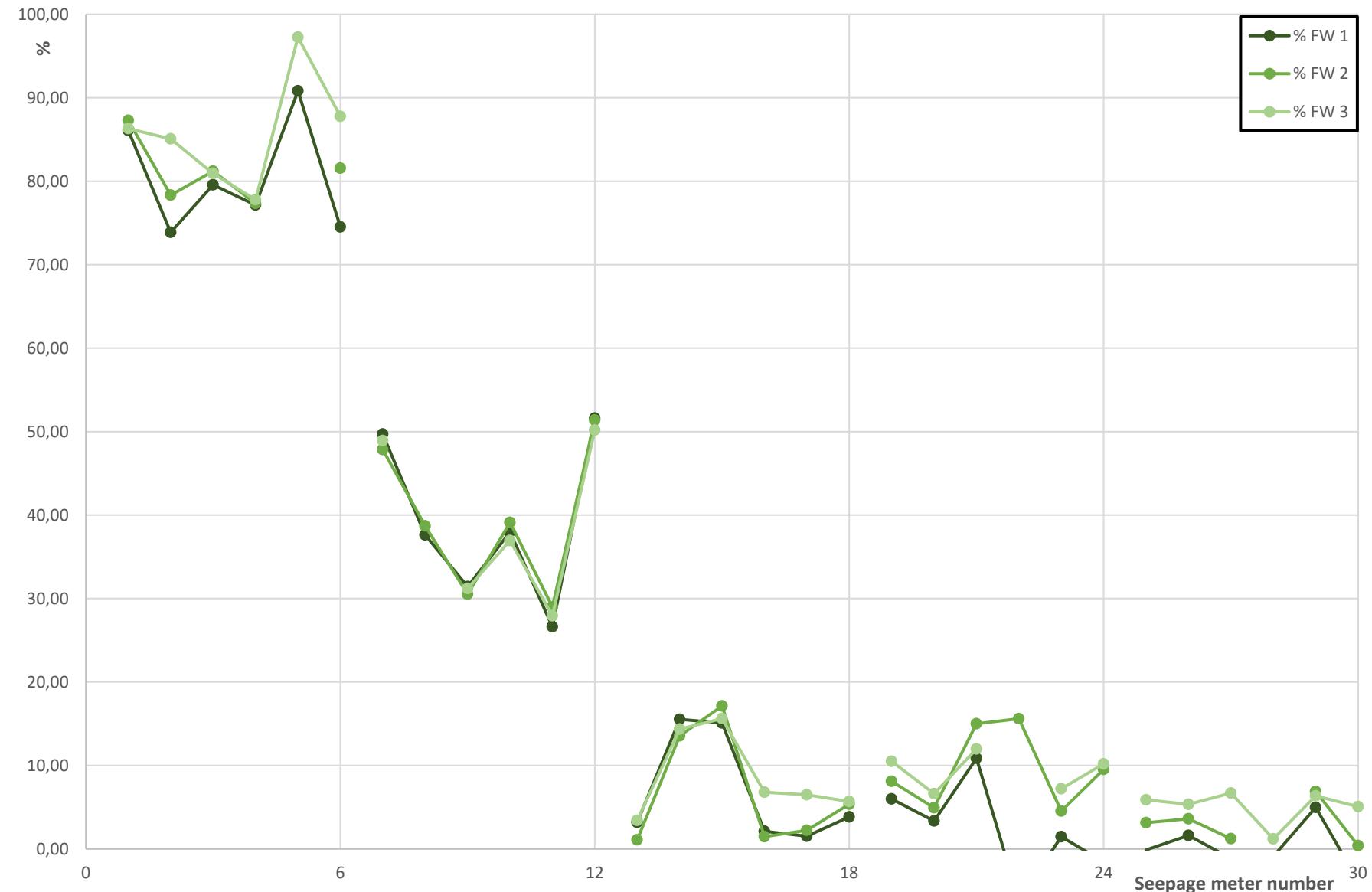


Bay level October



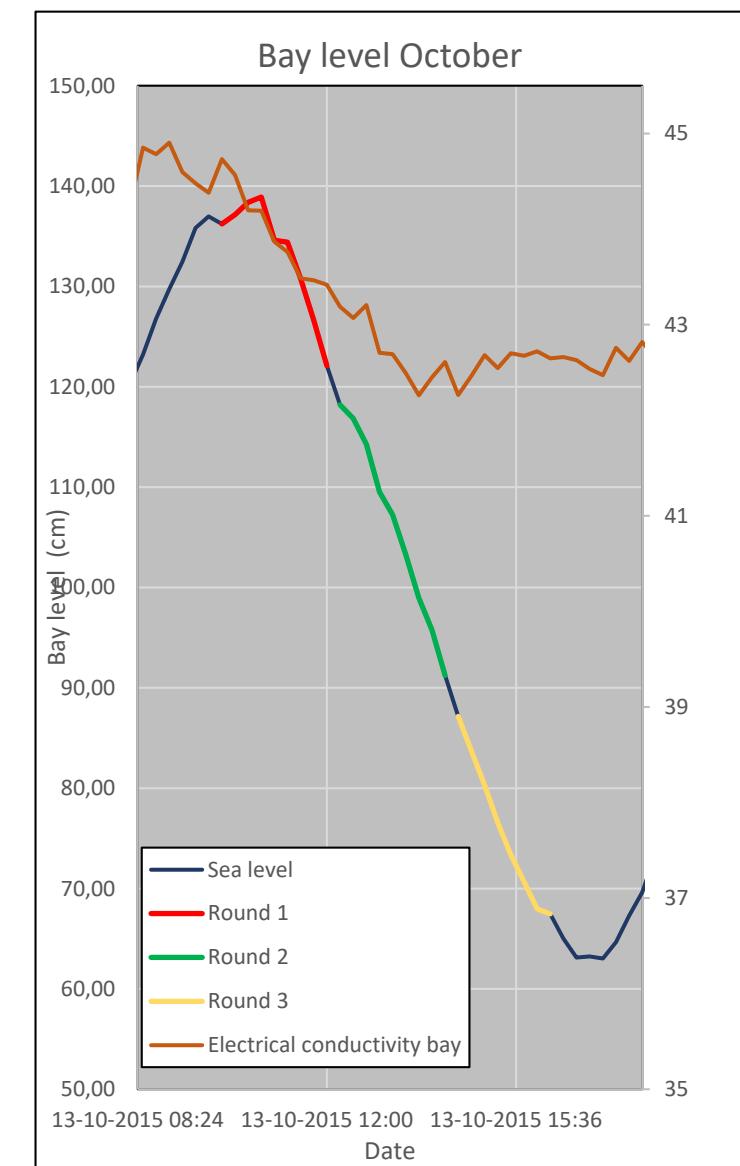
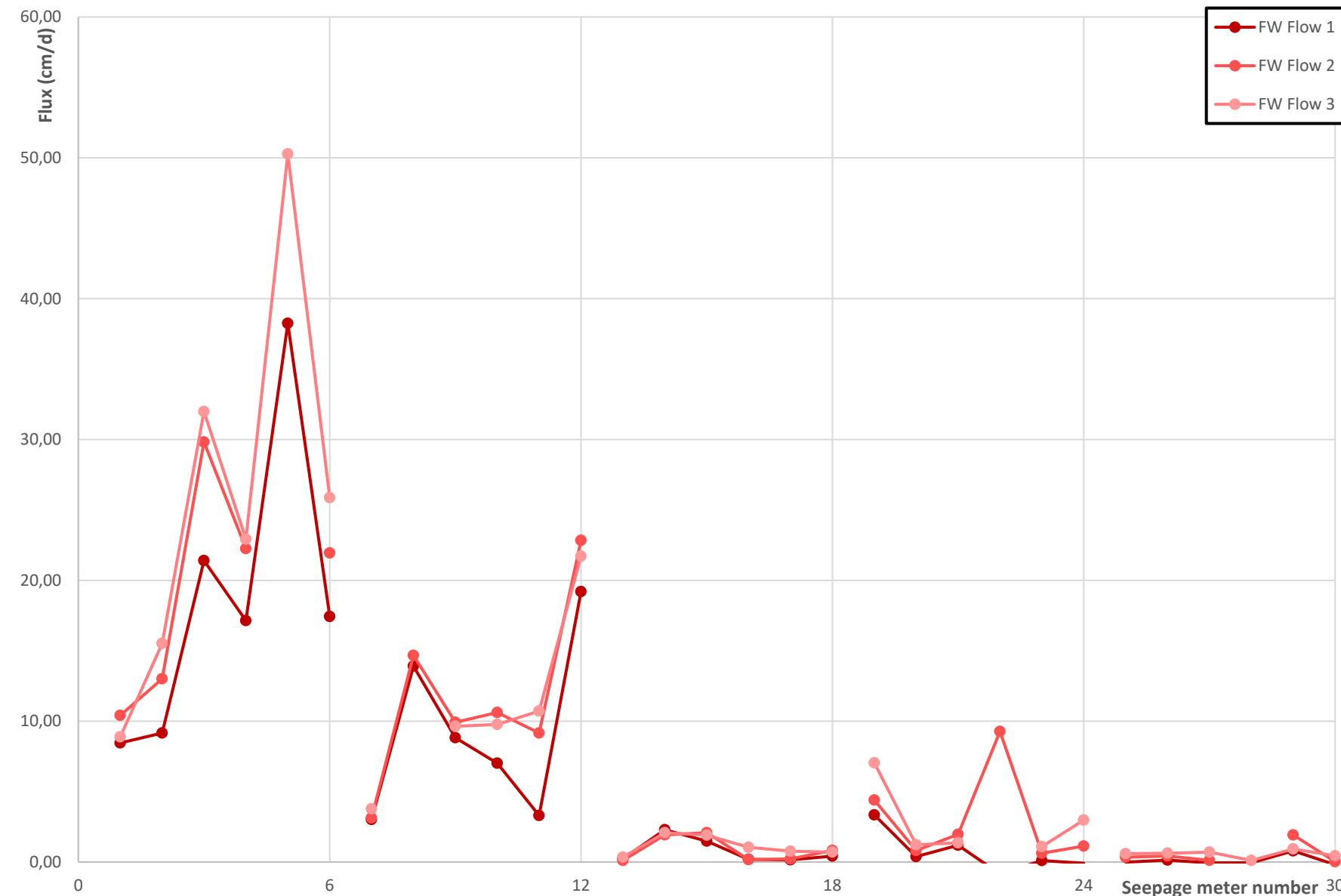
# % Freshwater in seepage meters(EC sea= 47 mS)

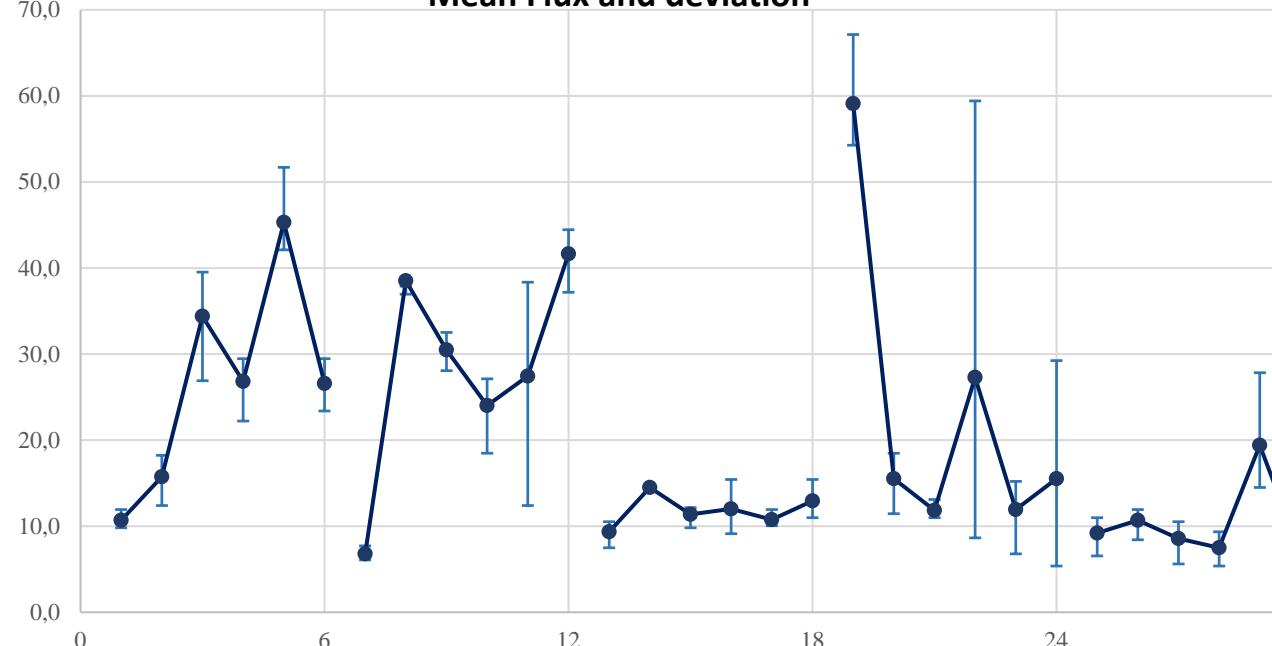
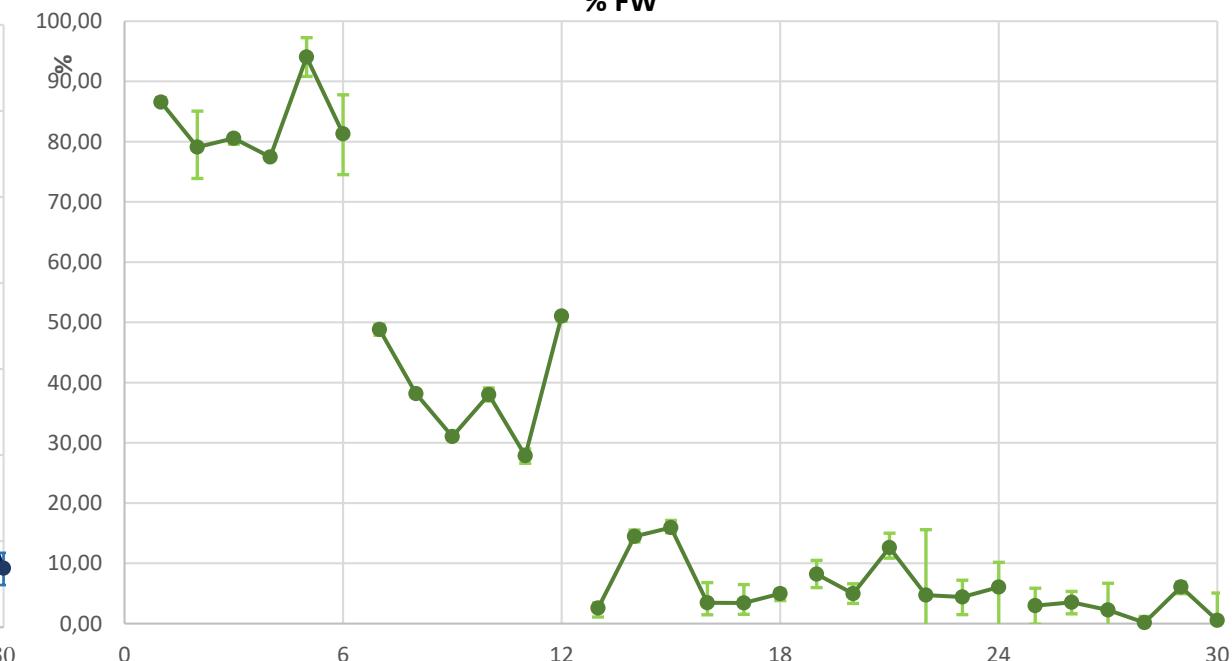
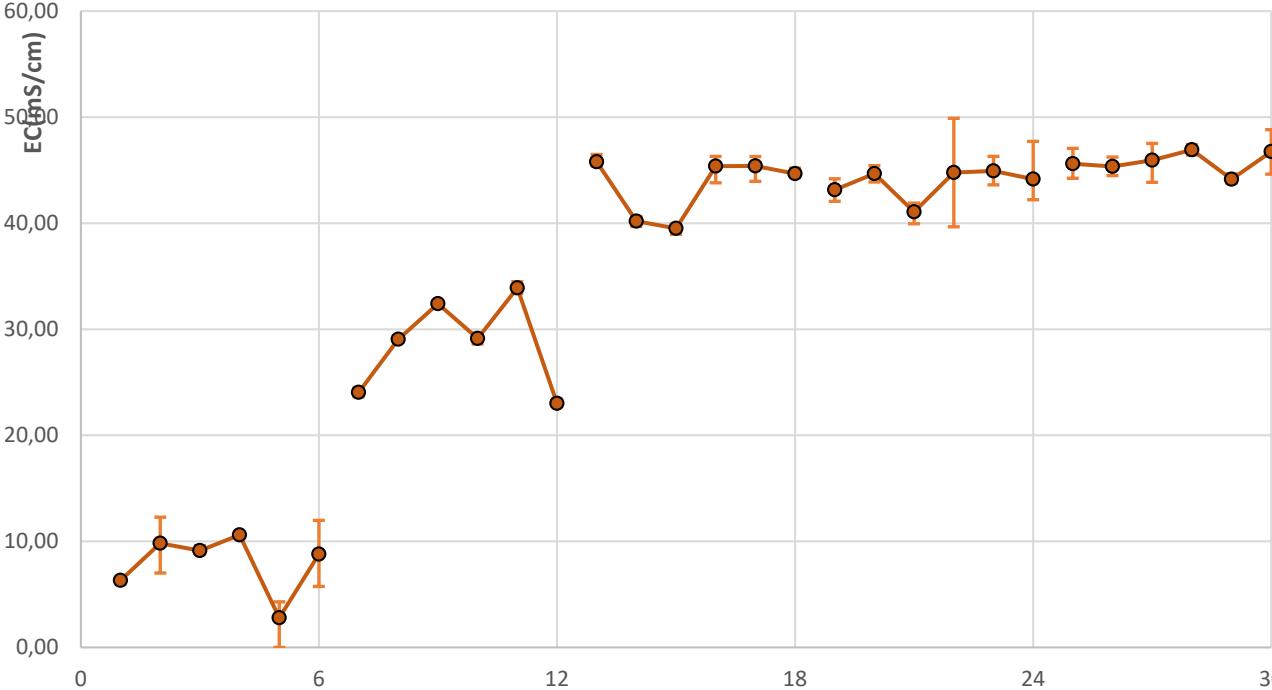
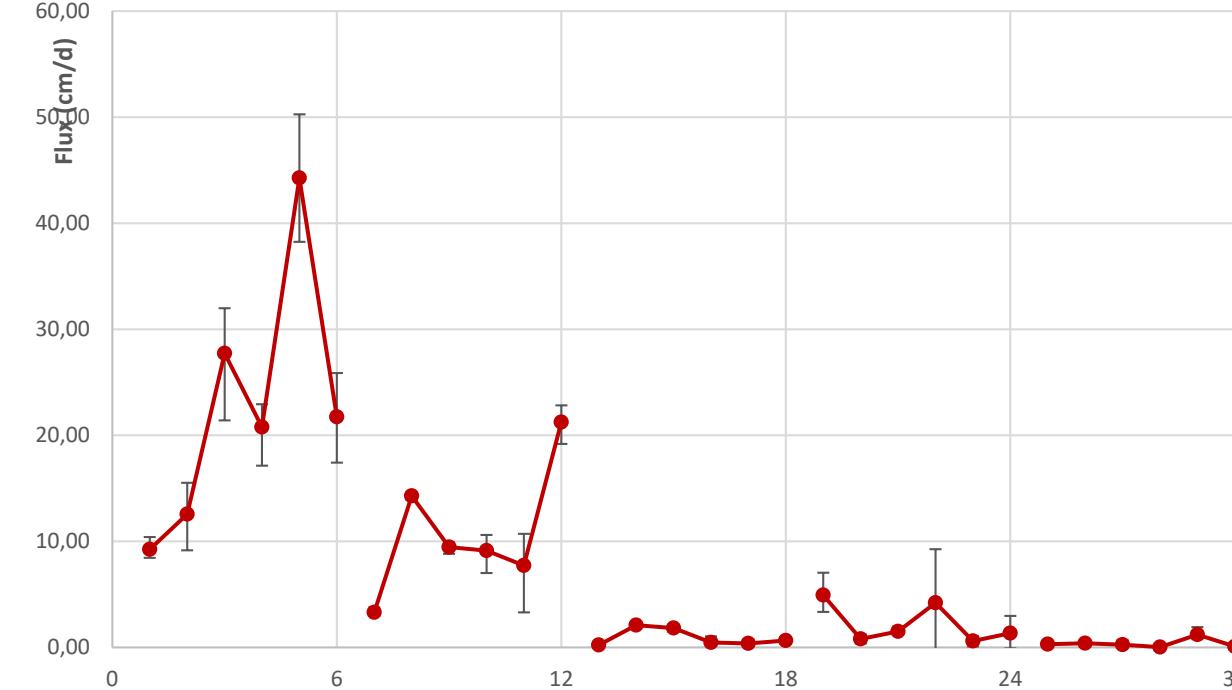
**% FW**

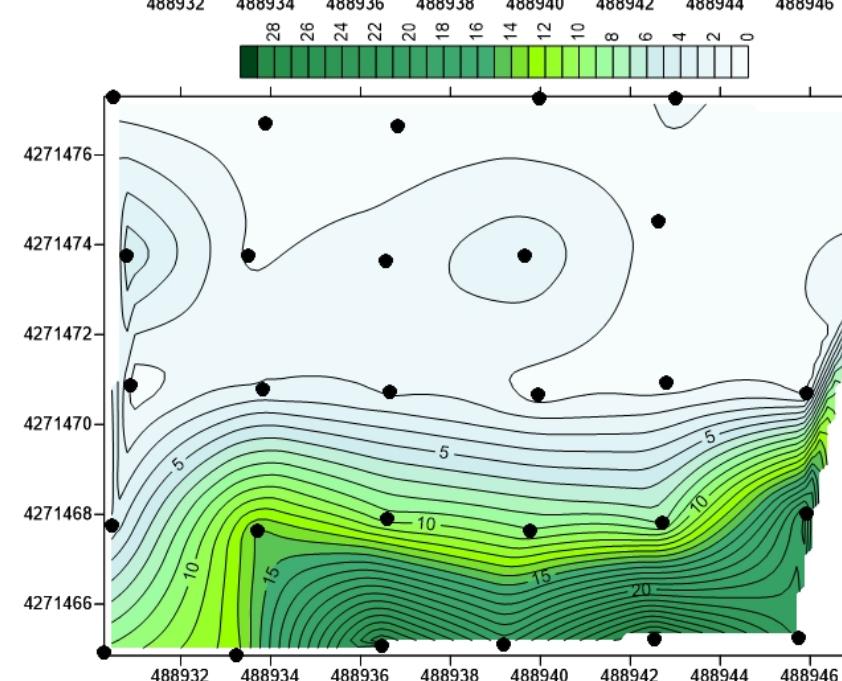
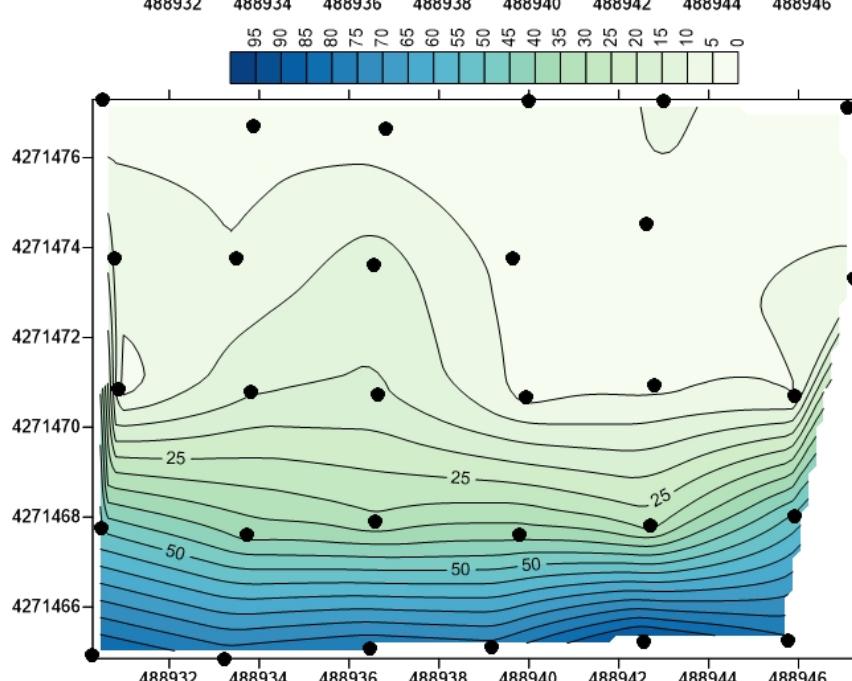
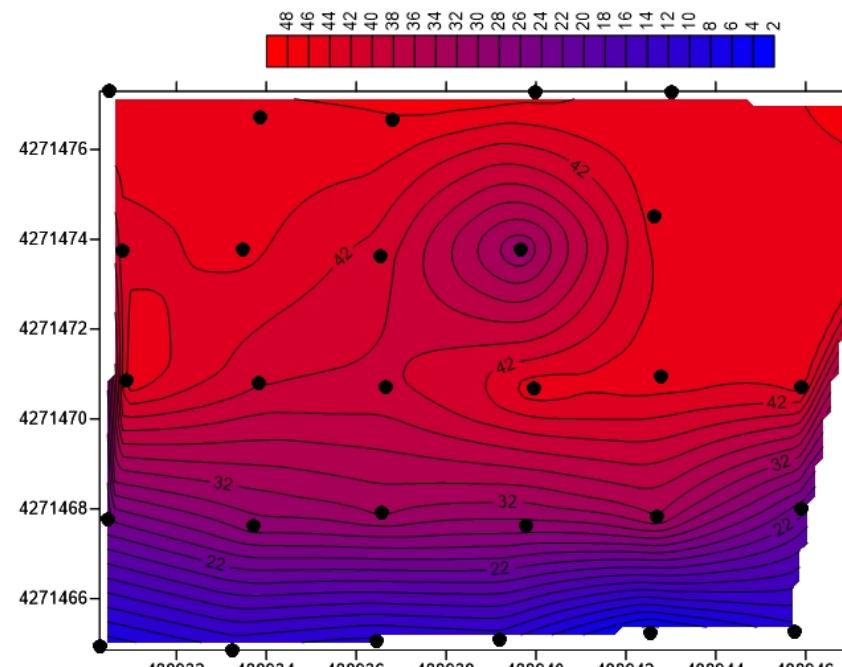
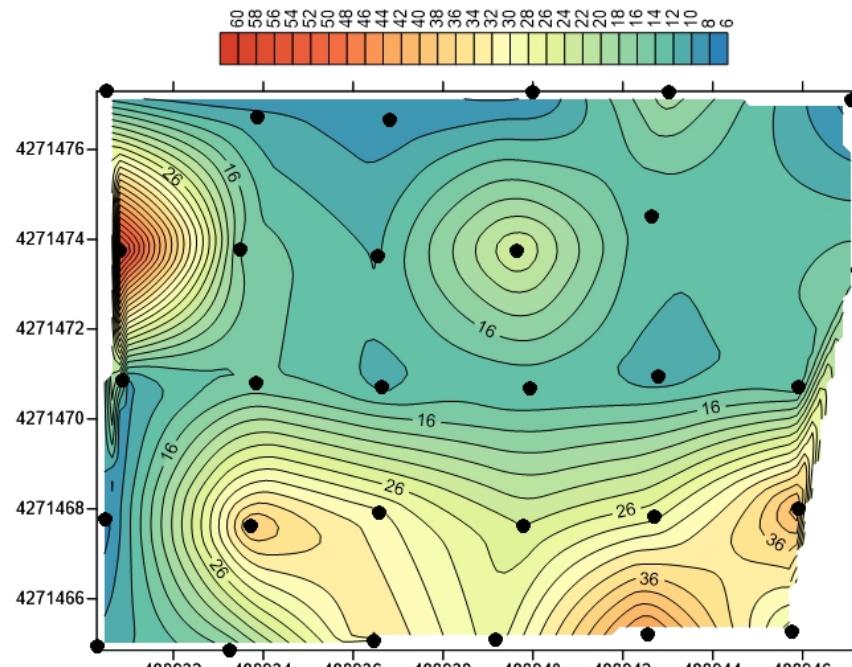


# Freshwater flow based on the % (EC sea= 47 mS)

## FW Flow



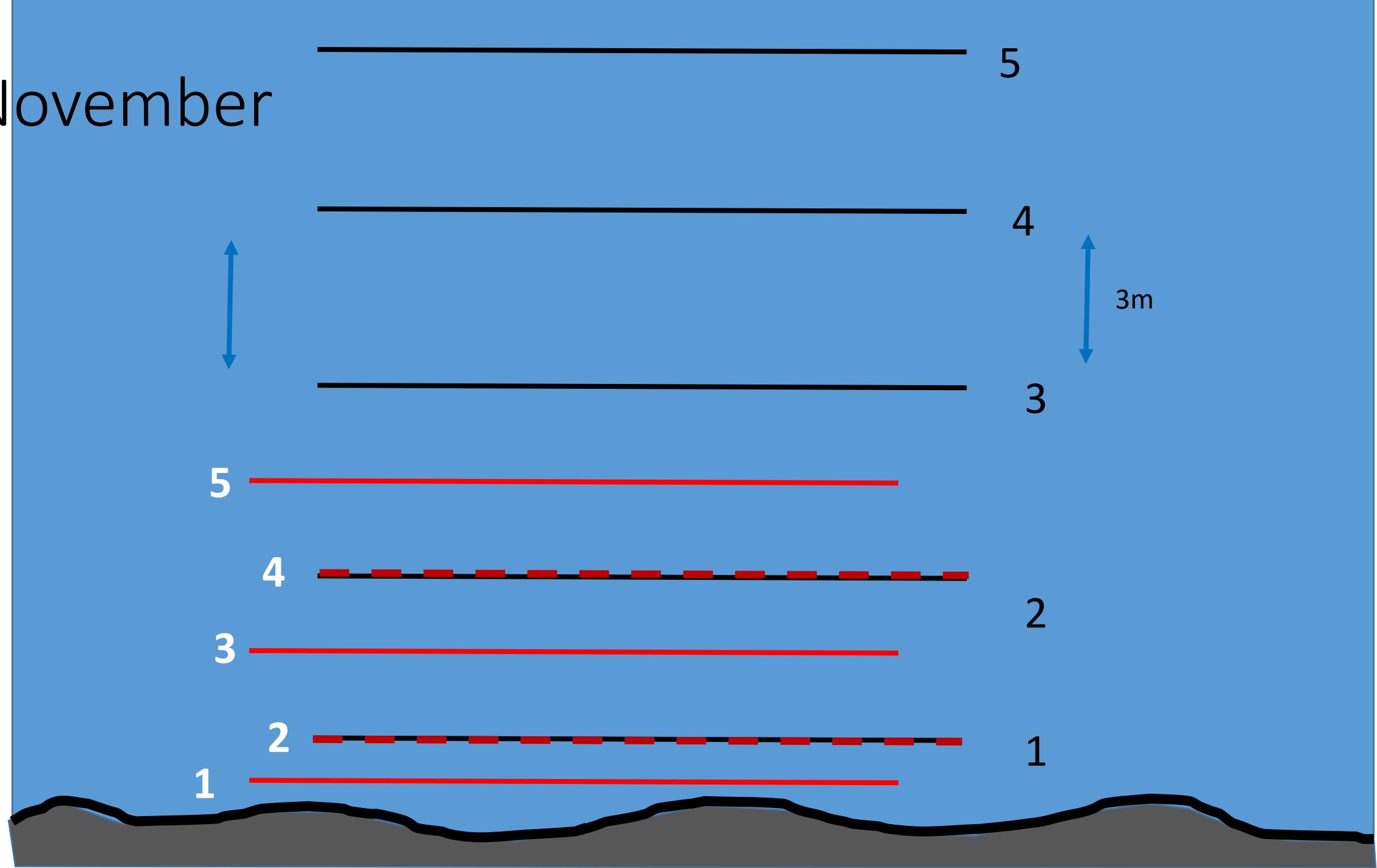
**Mean Flux and deviation****% FW****EC****FW Flow**



# November 4<sup>th</sup> campaign

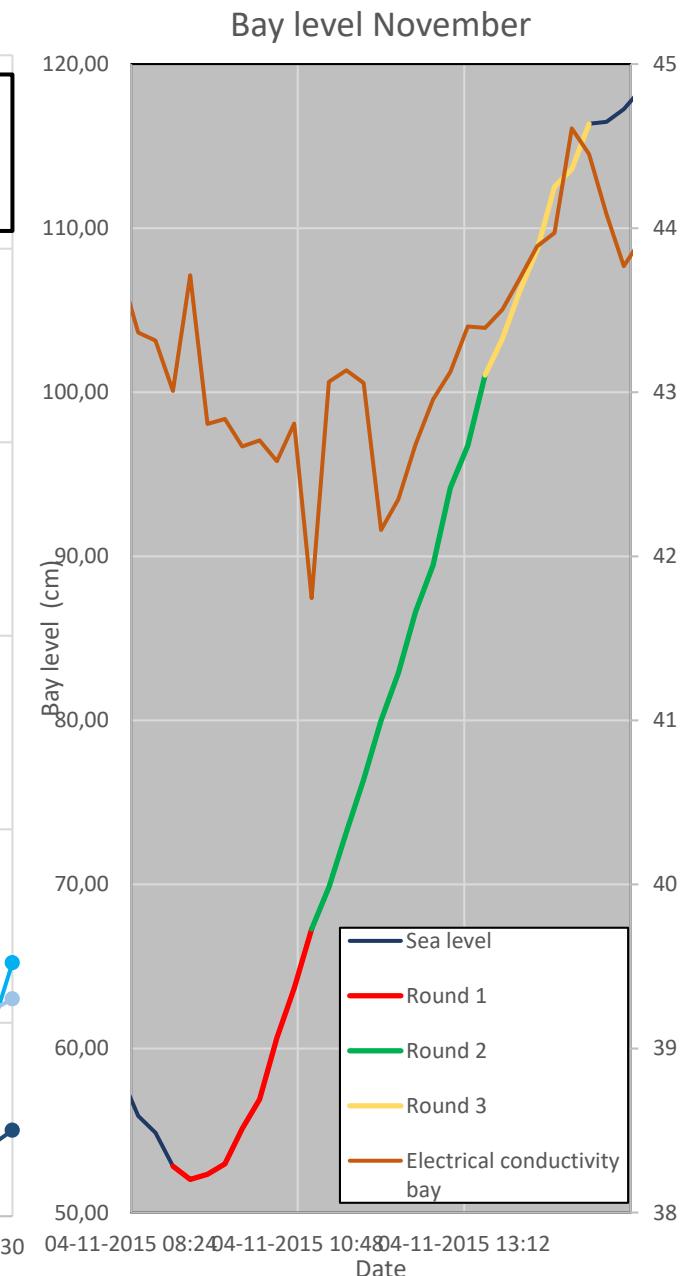
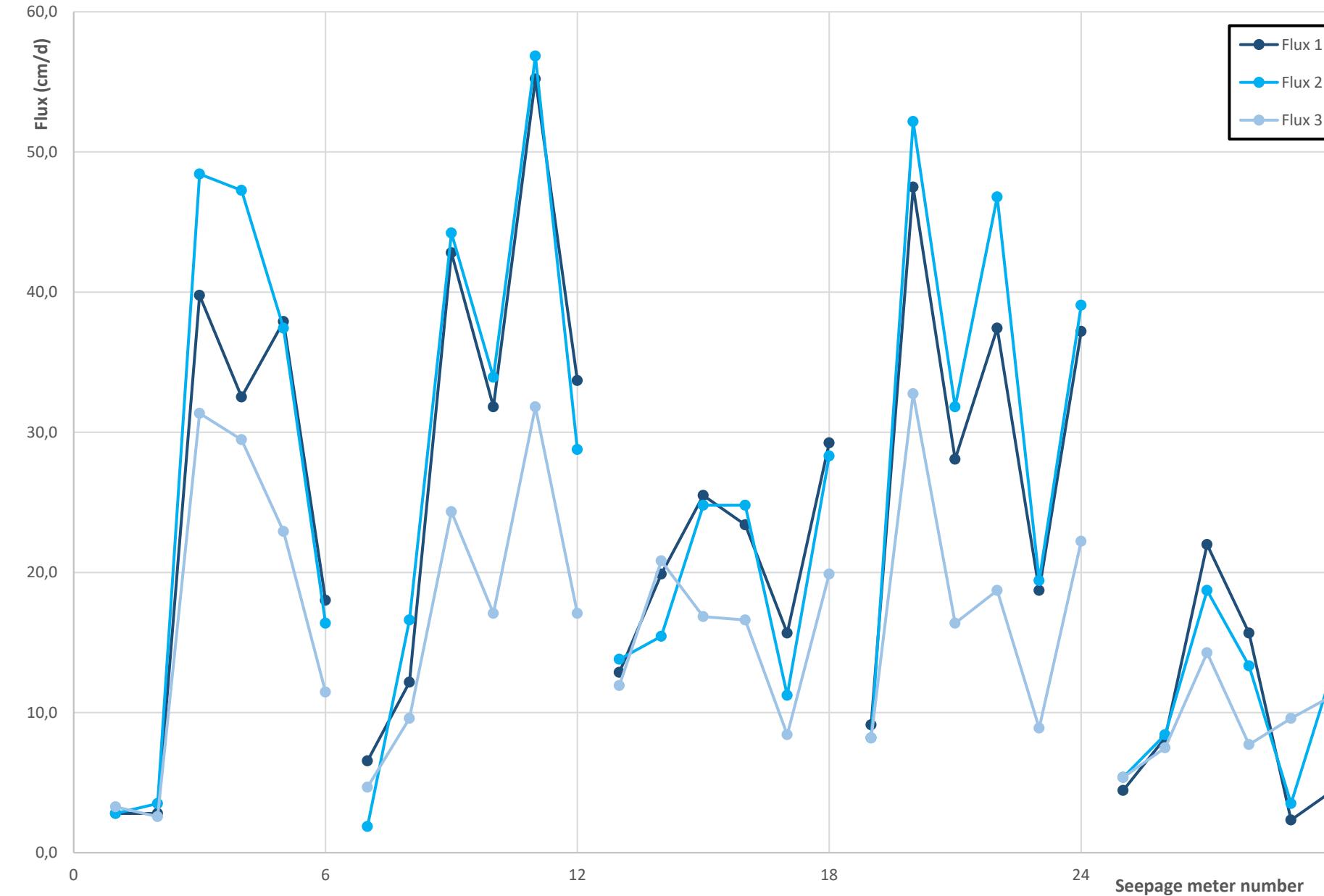
Seepage

November



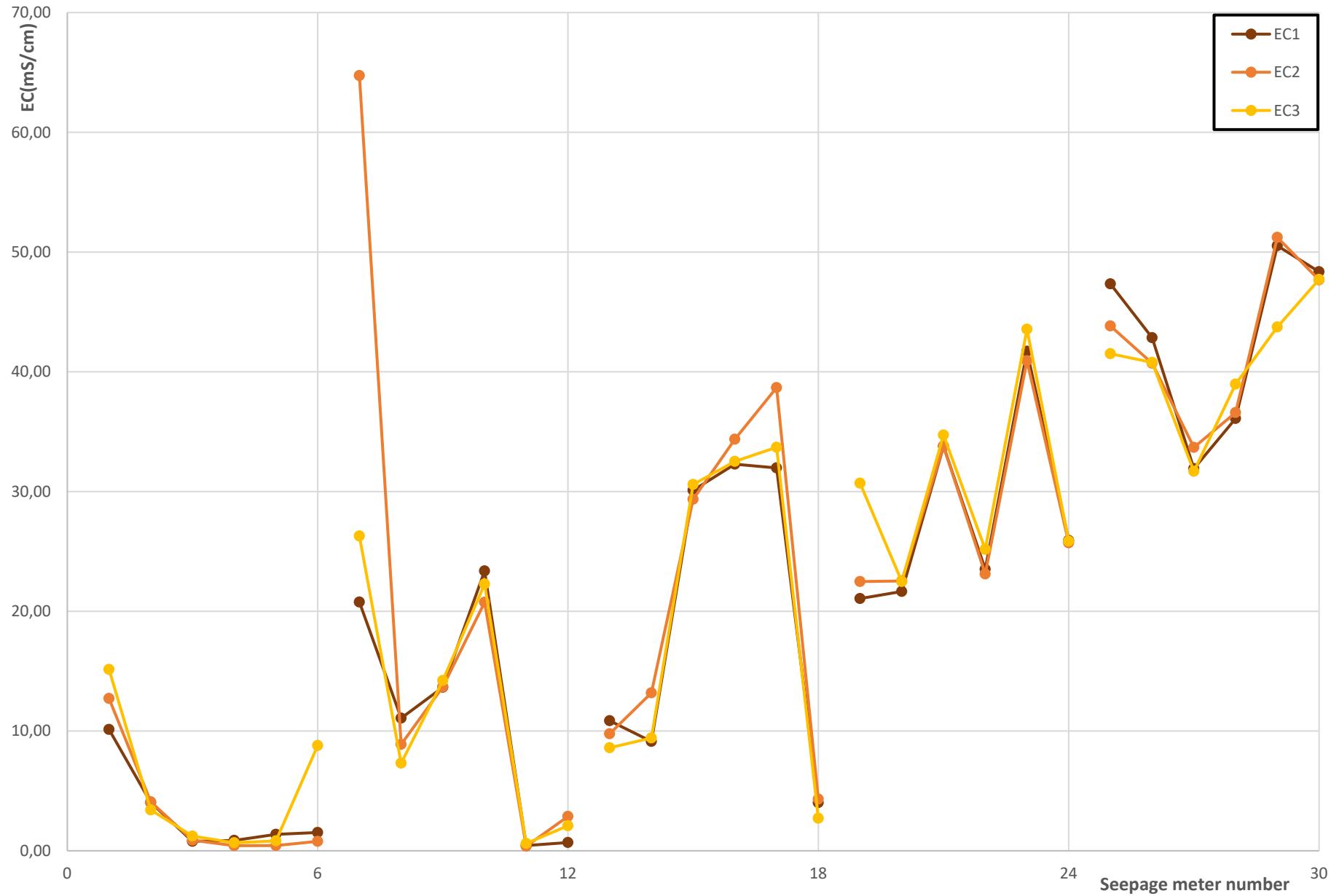
# Flux with seepage meters

## Flux

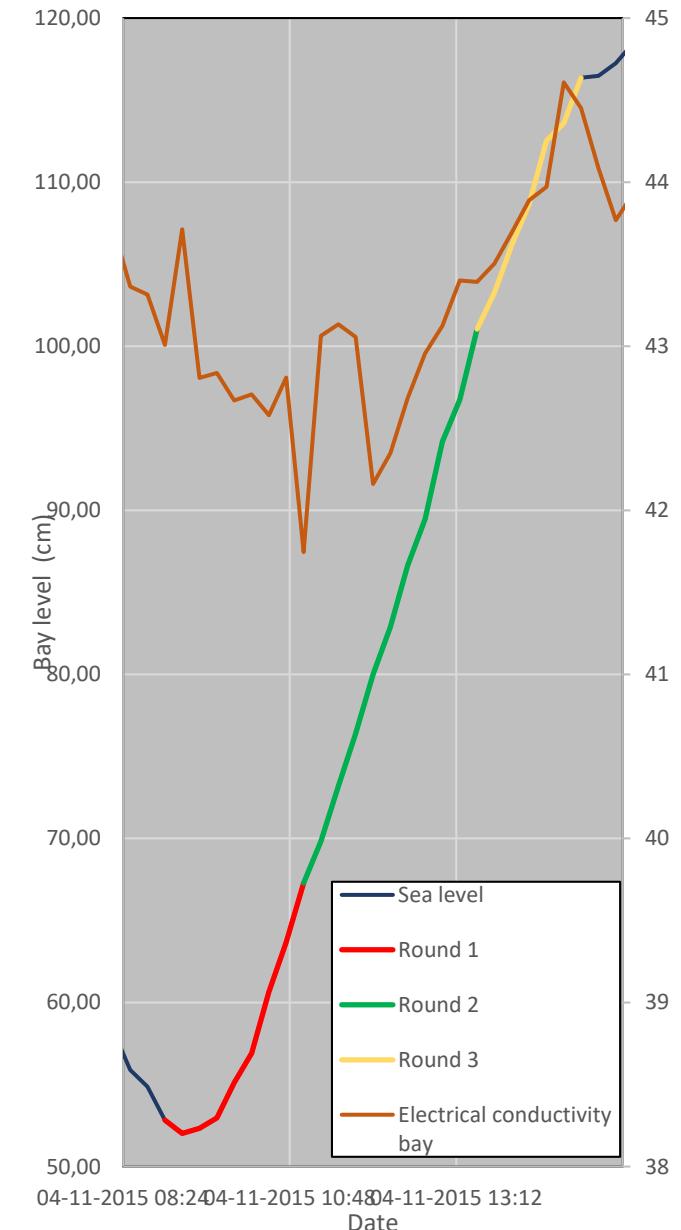


# EC with seepage meters

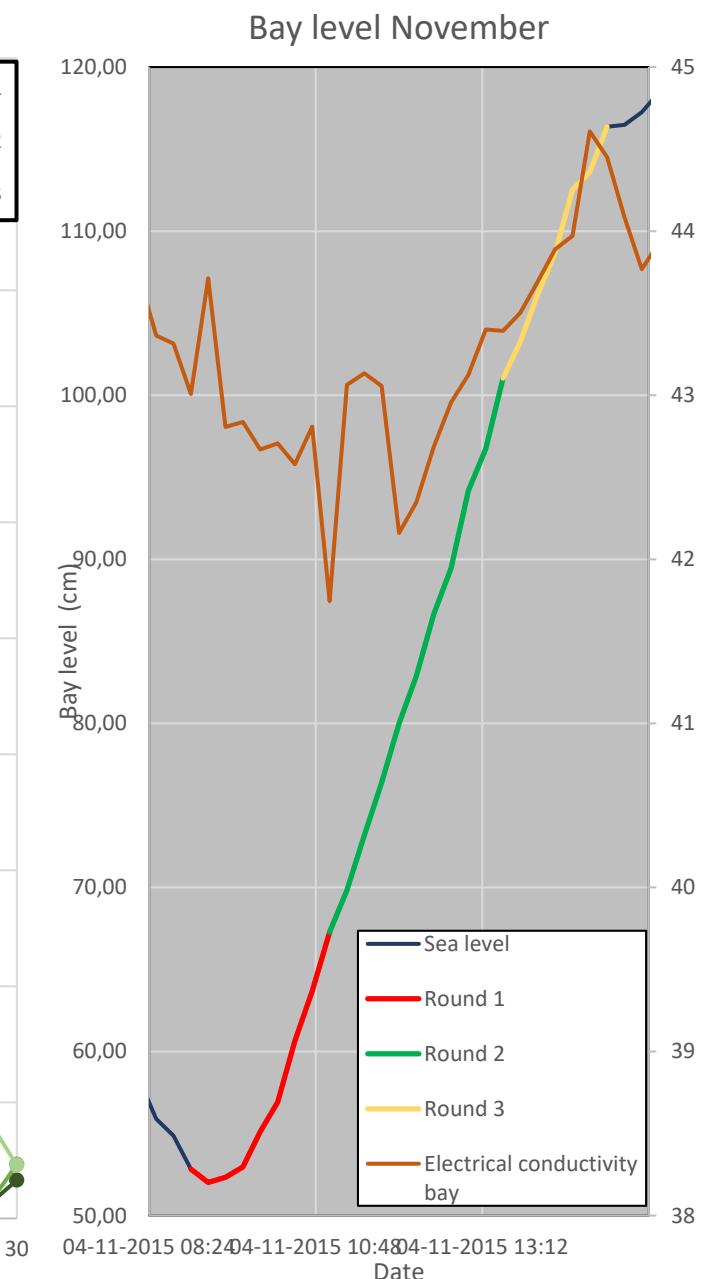
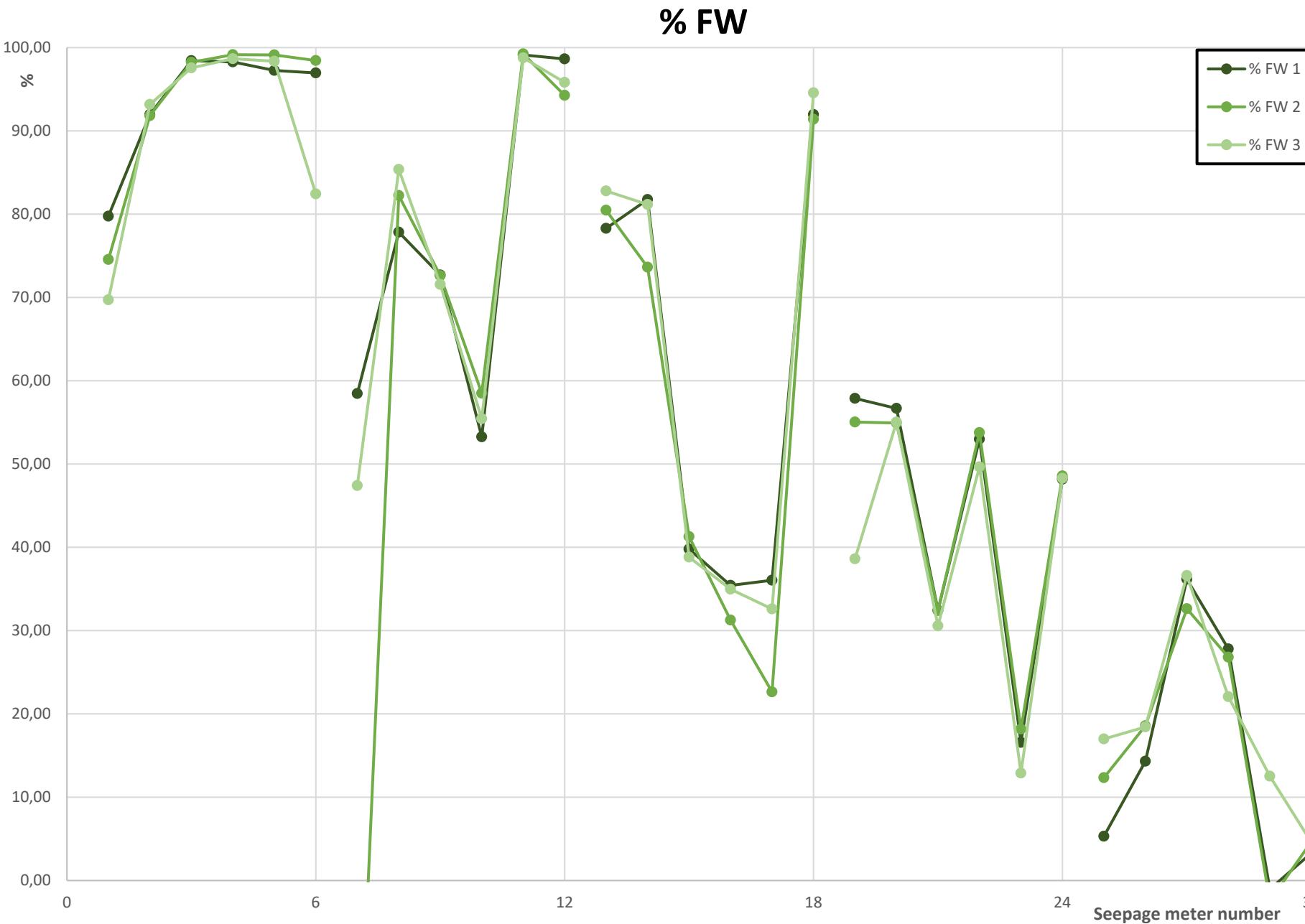
EC



Bay level November

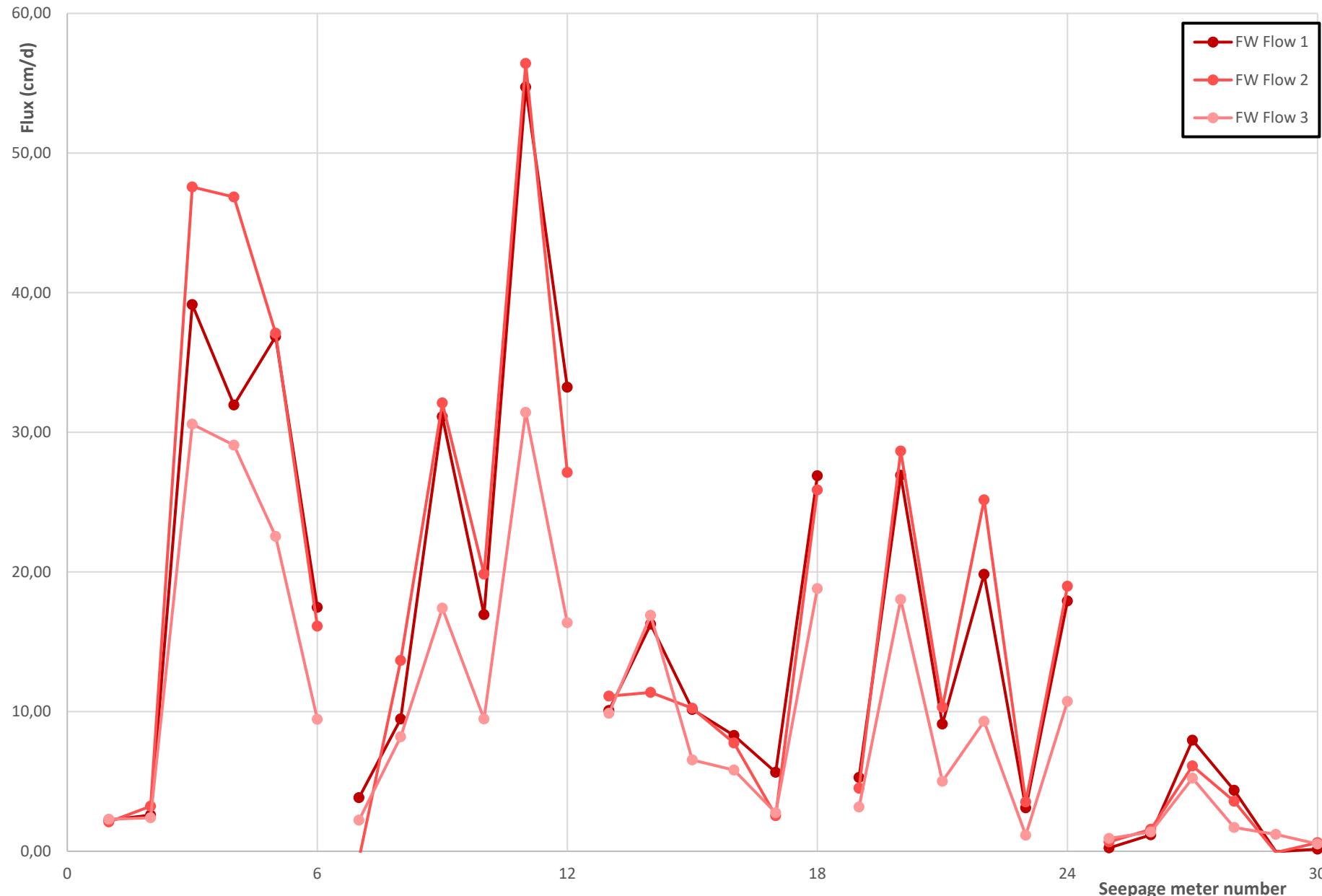


# % Freshwater with seepage meters (EC=50mS)

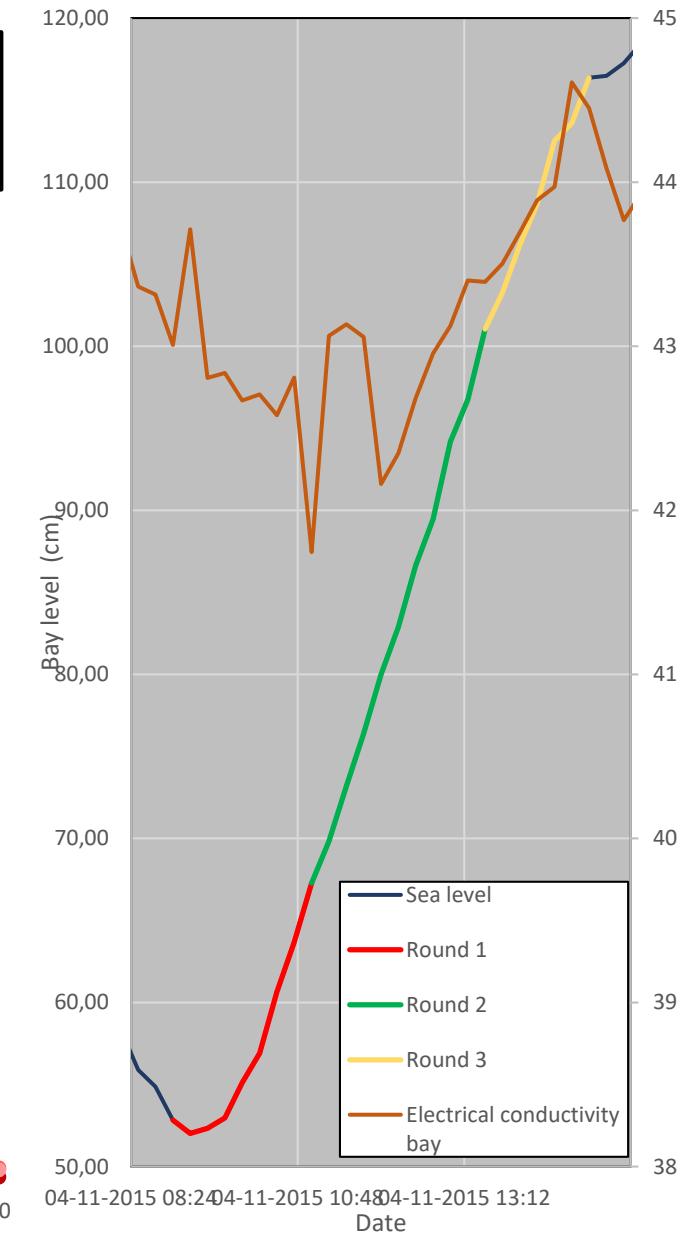


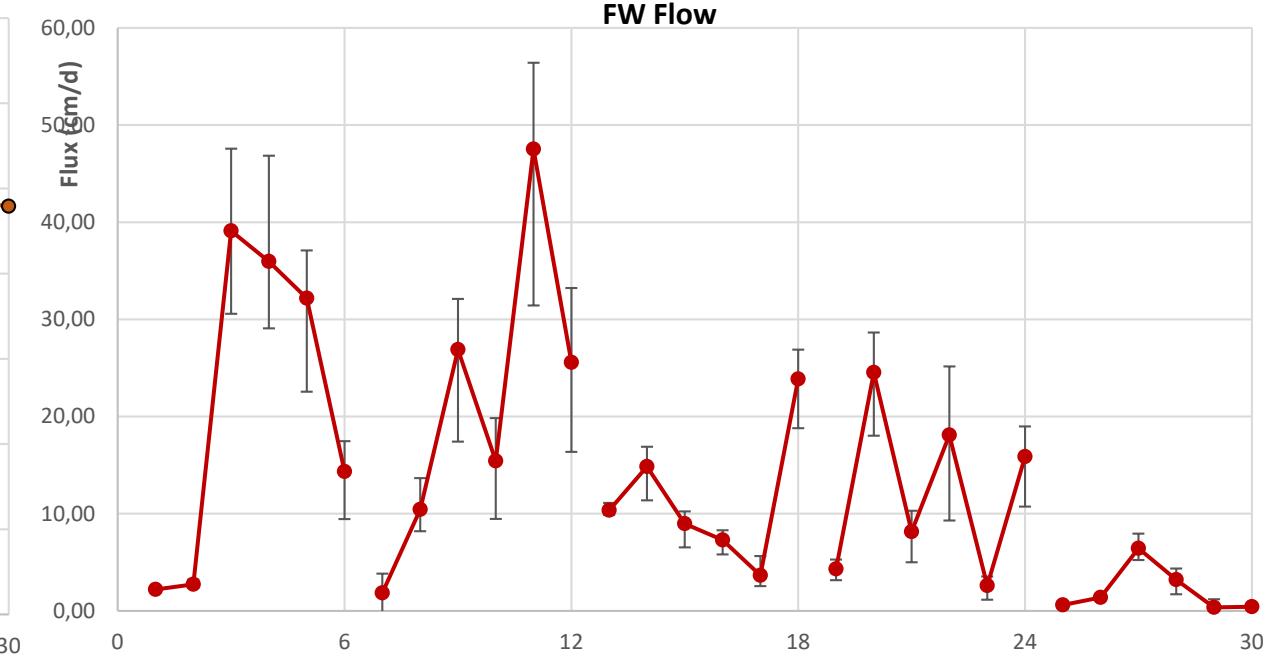
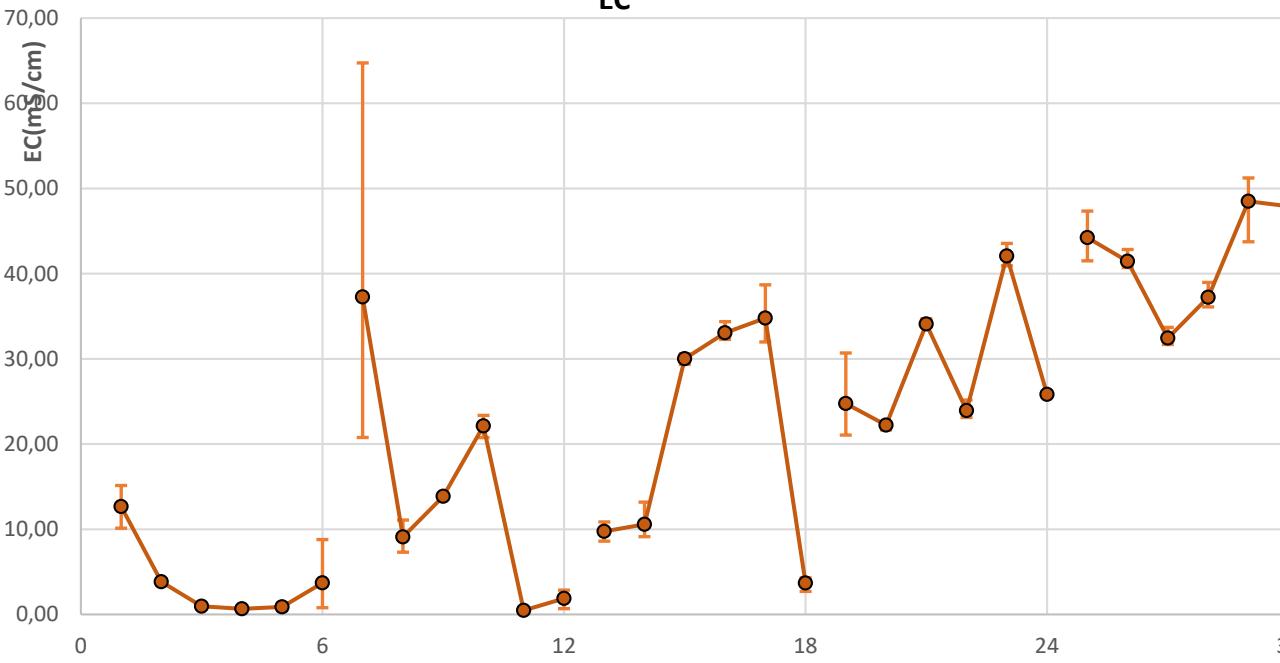
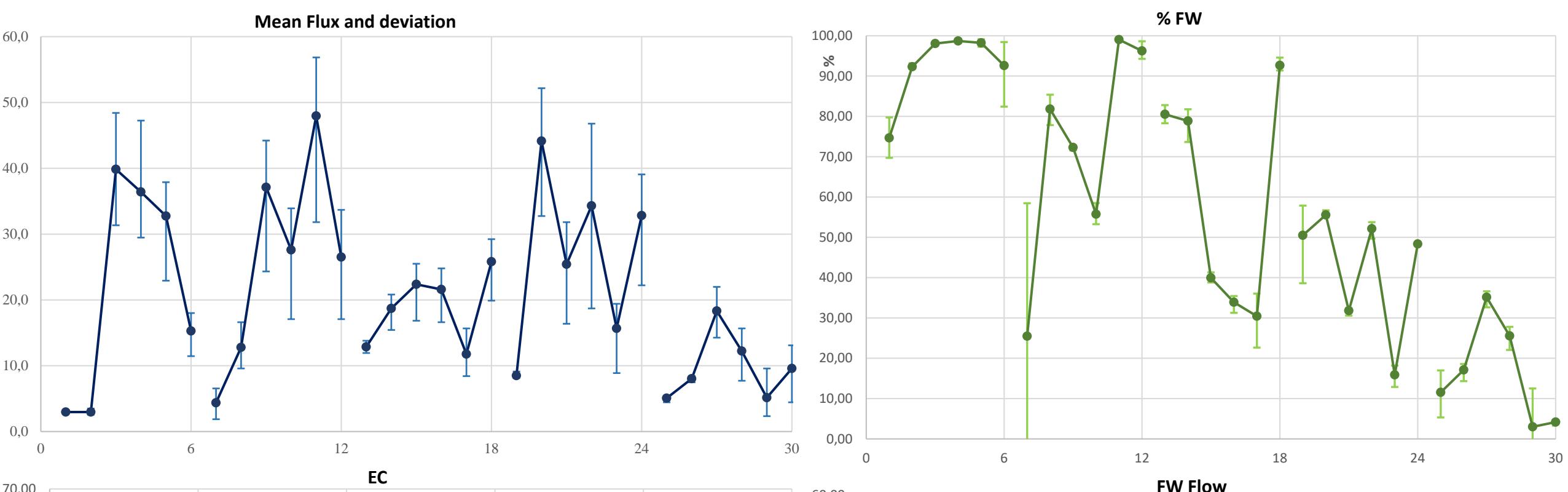
# % Freshwater with seepage meters (EC=50mS)

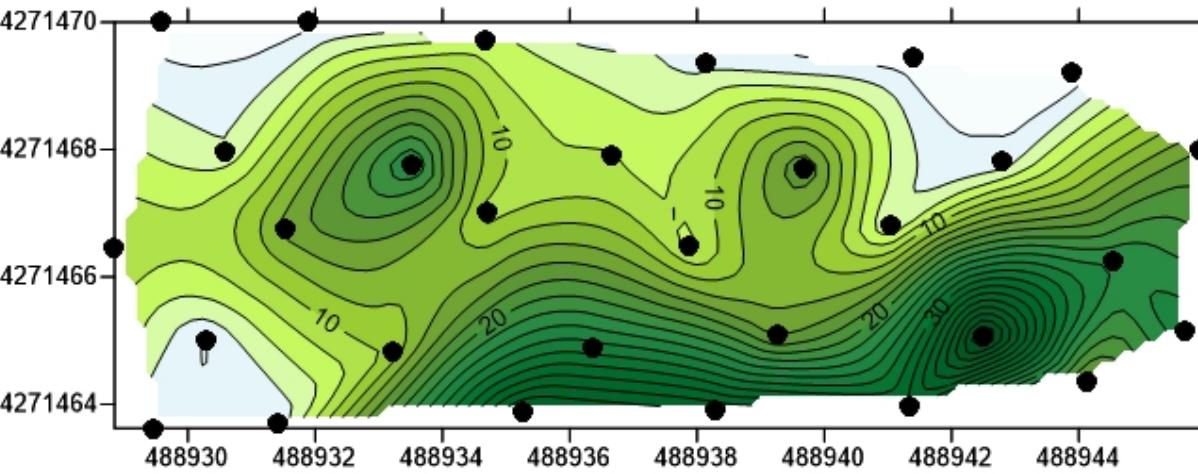
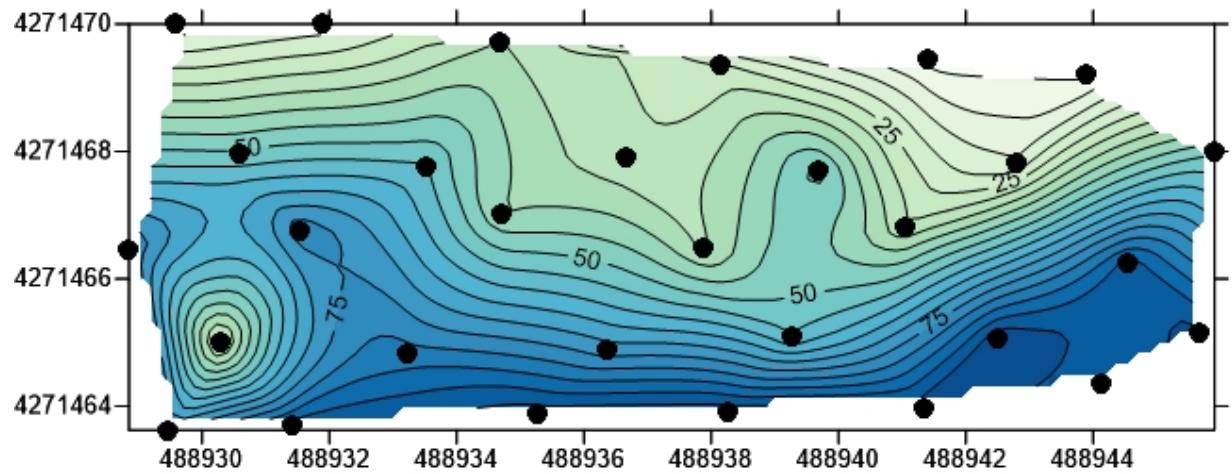
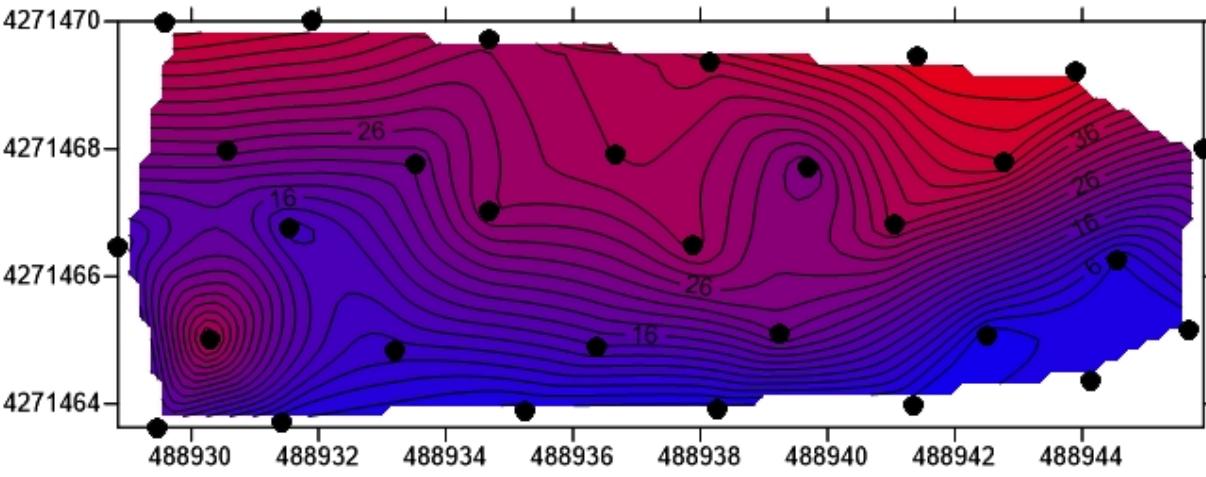
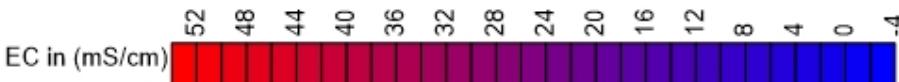
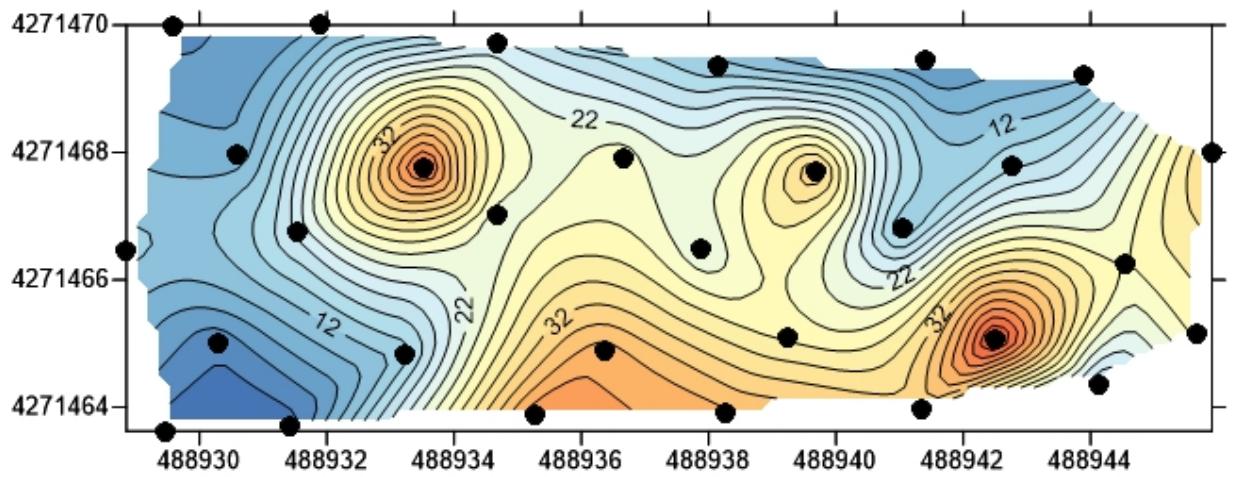
## FW Flow



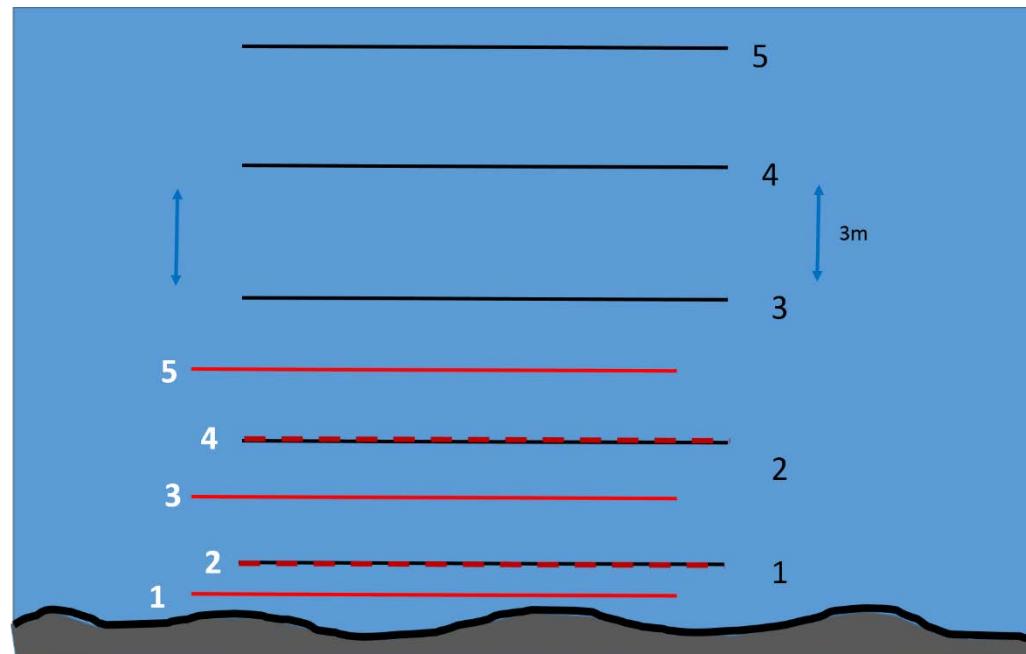
## Bay level November



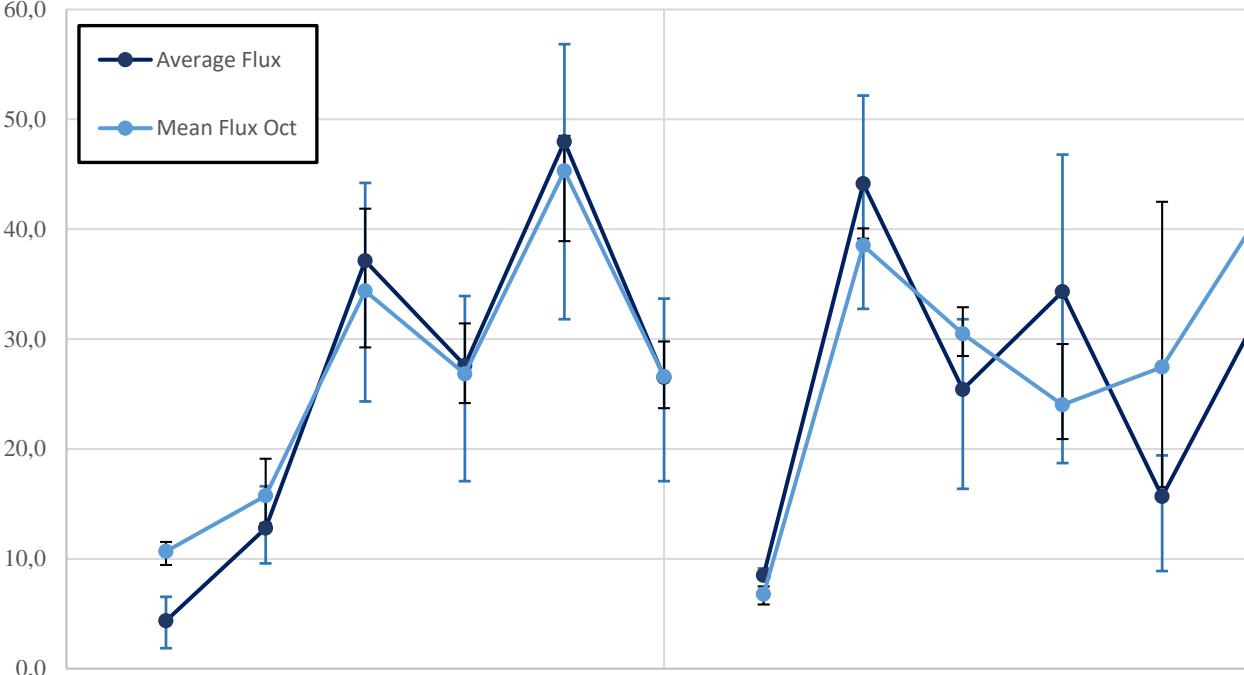




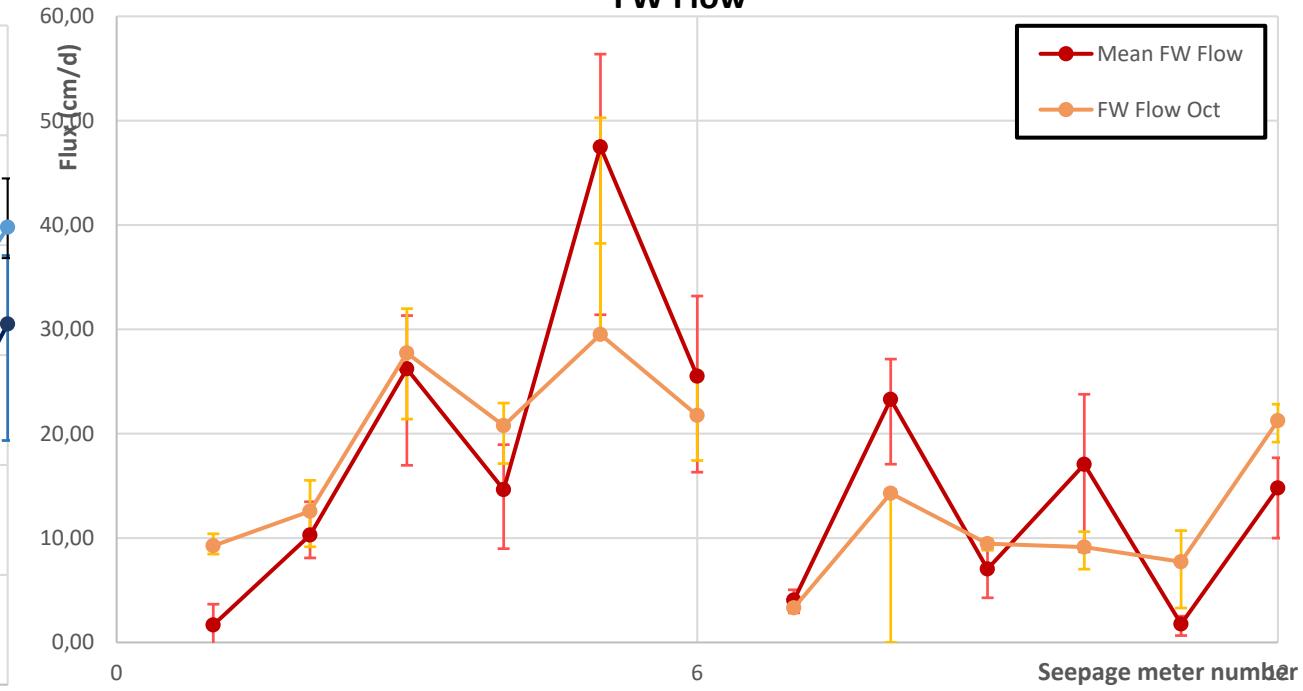
# Comparison of the 2 rows coinciding



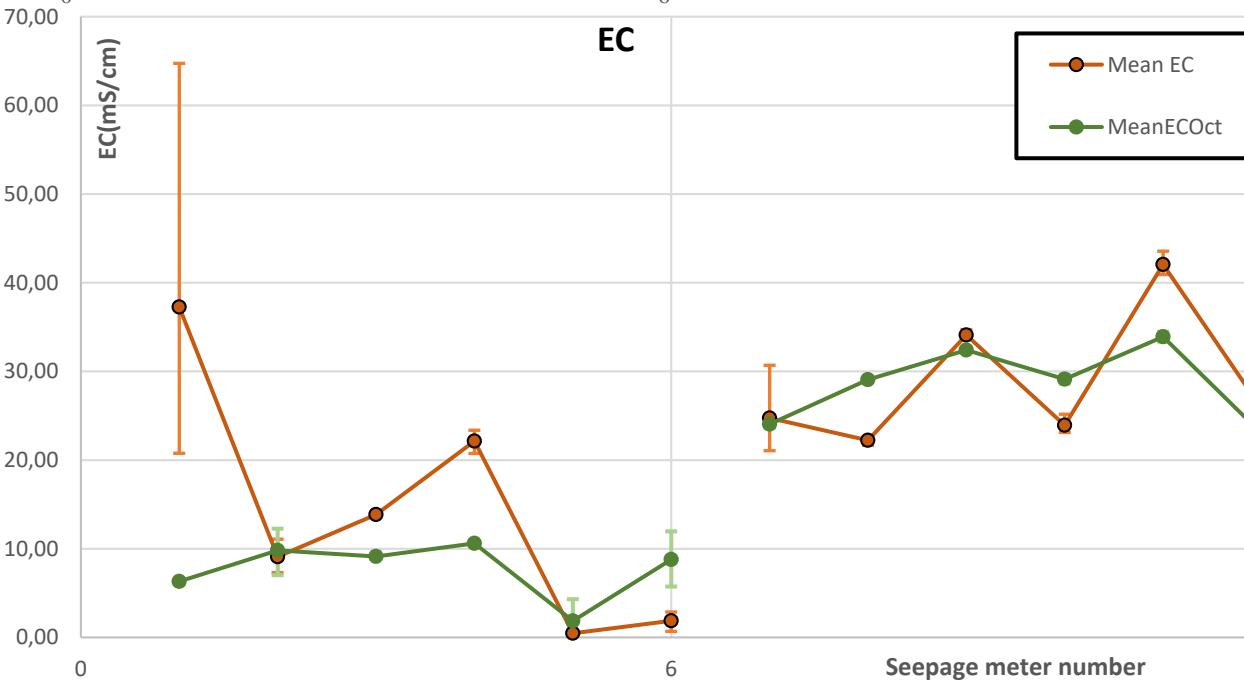
### Mean Flux and deviation



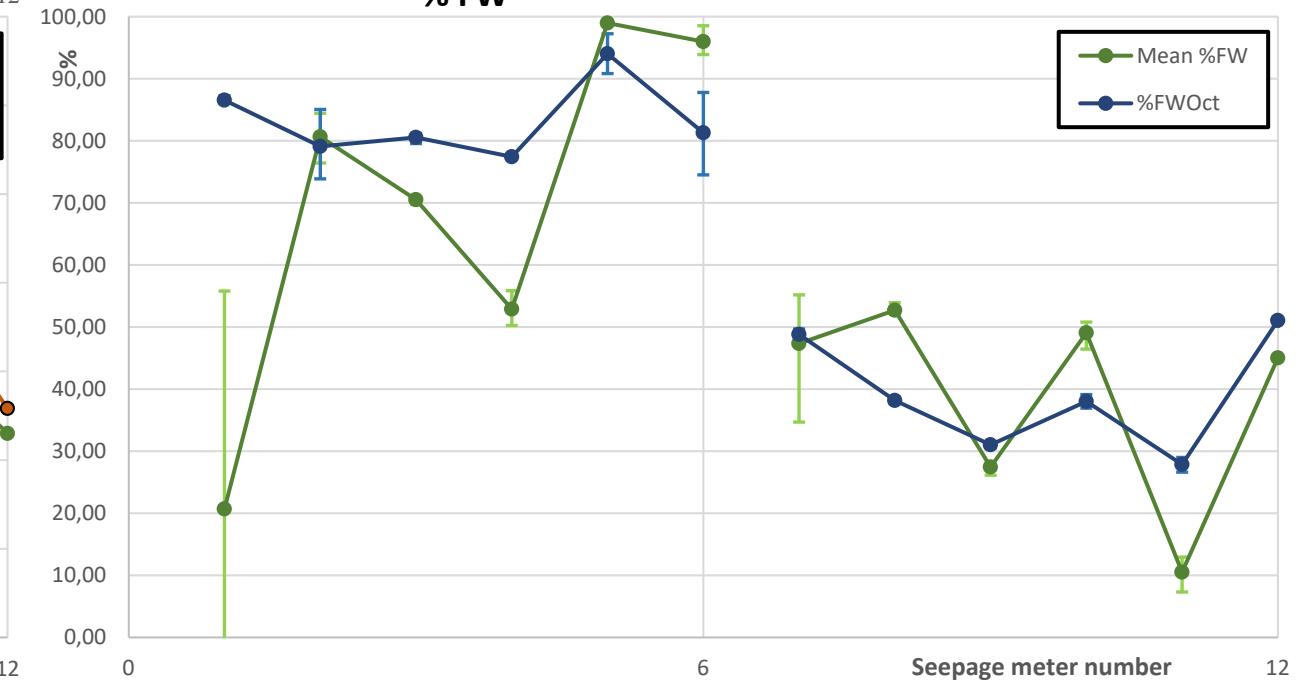
### FW Flow



### EC

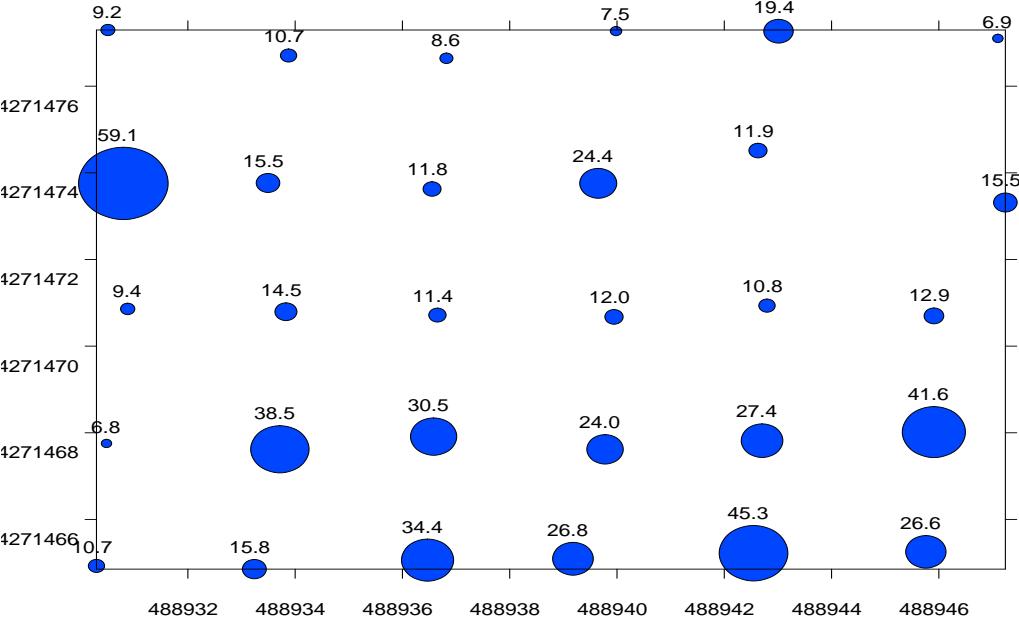


### % FW

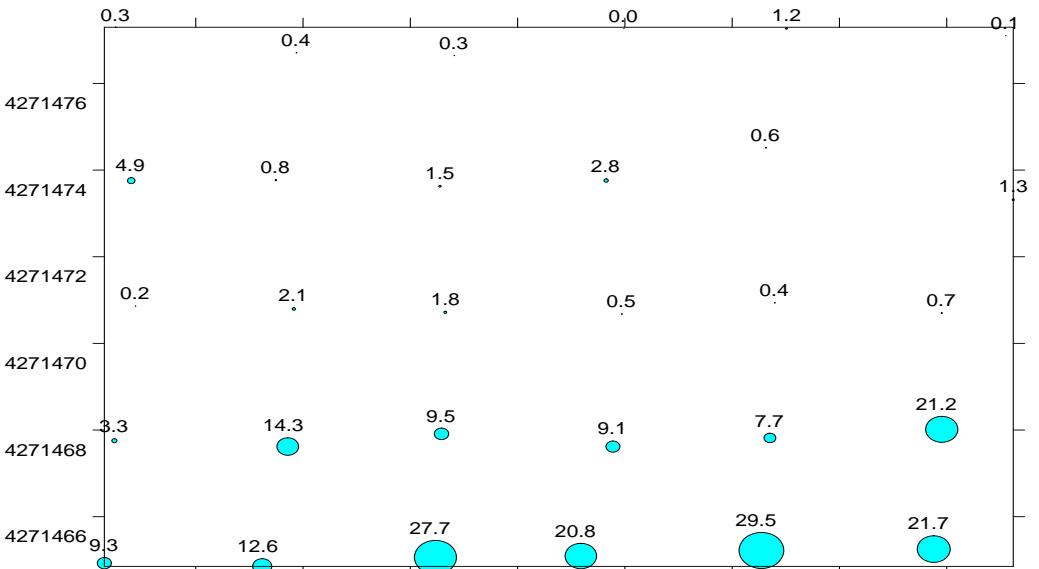


# Spatial distribution of Flow

# October

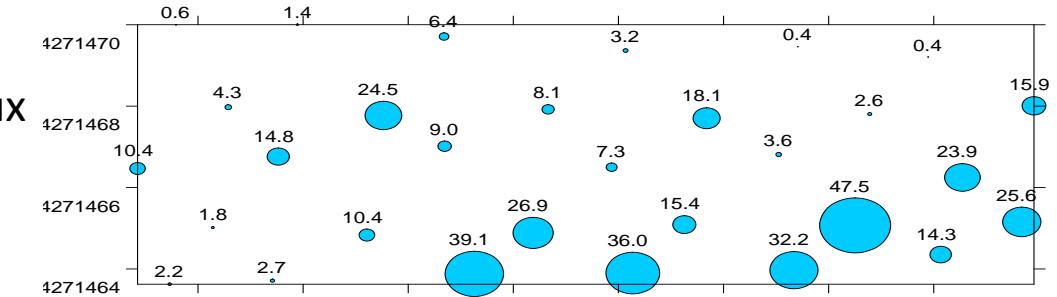
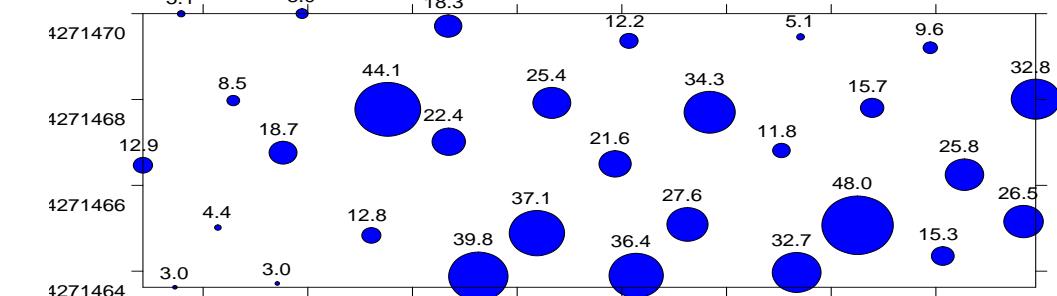


Total flux  
(cm/d)

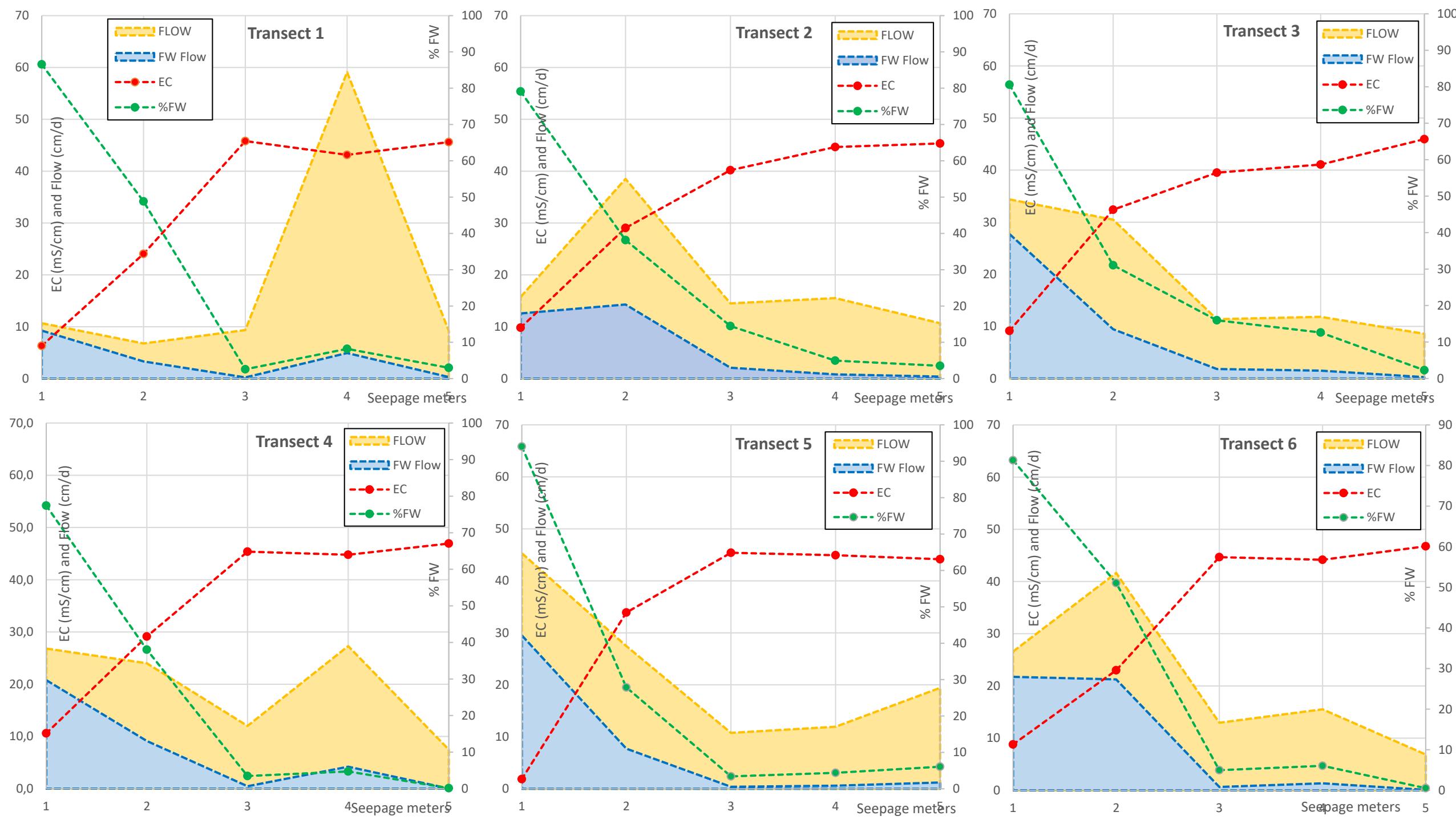


Freshwater flux  
(cm/d)

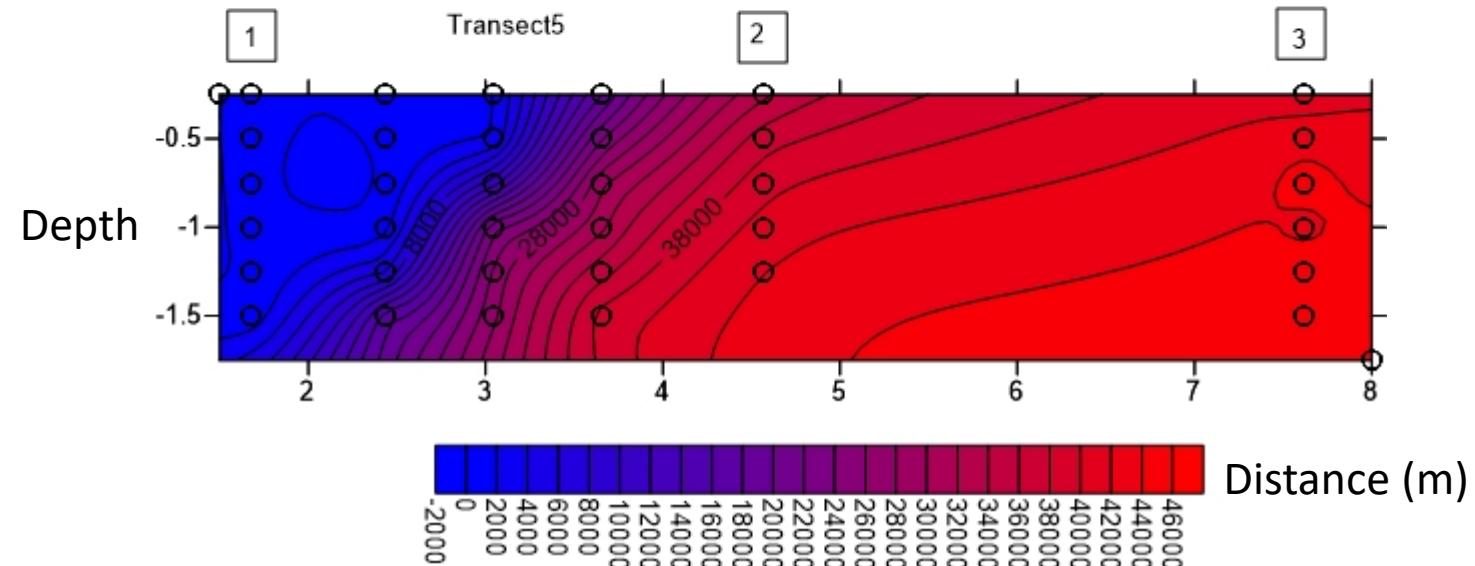
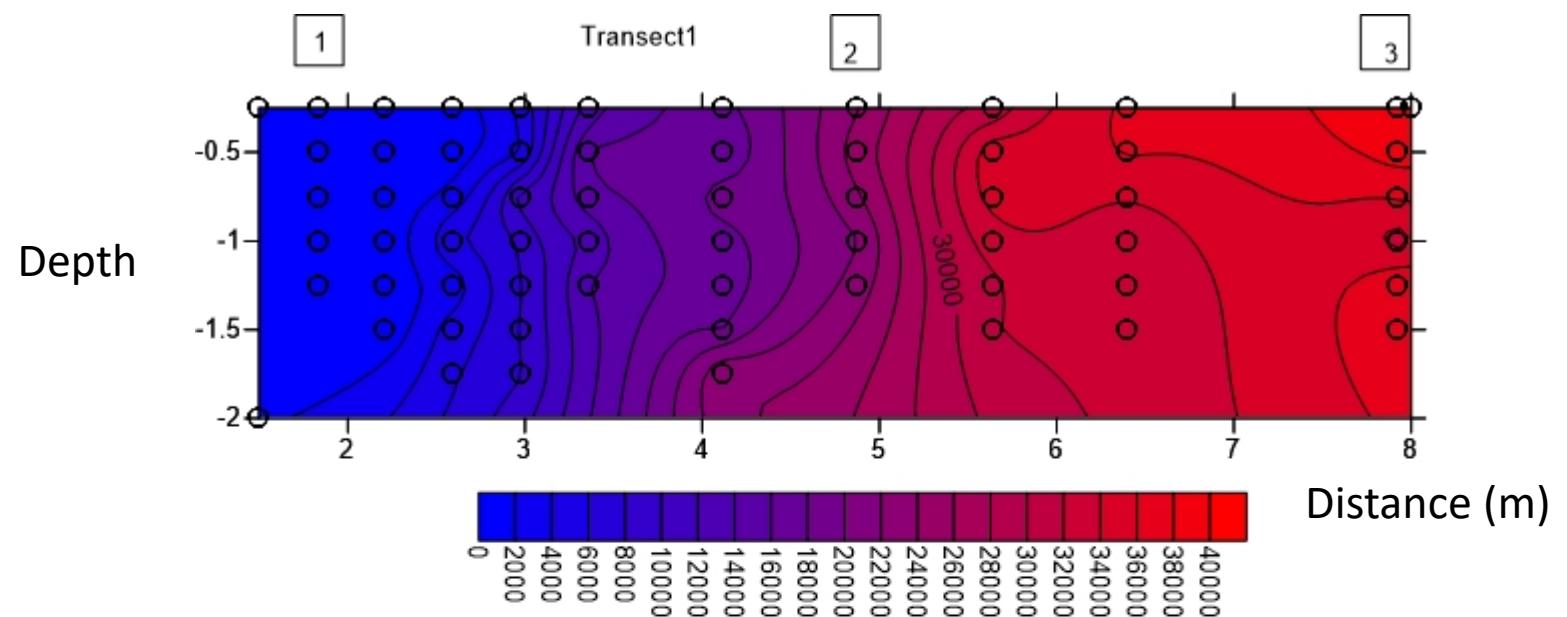
# November

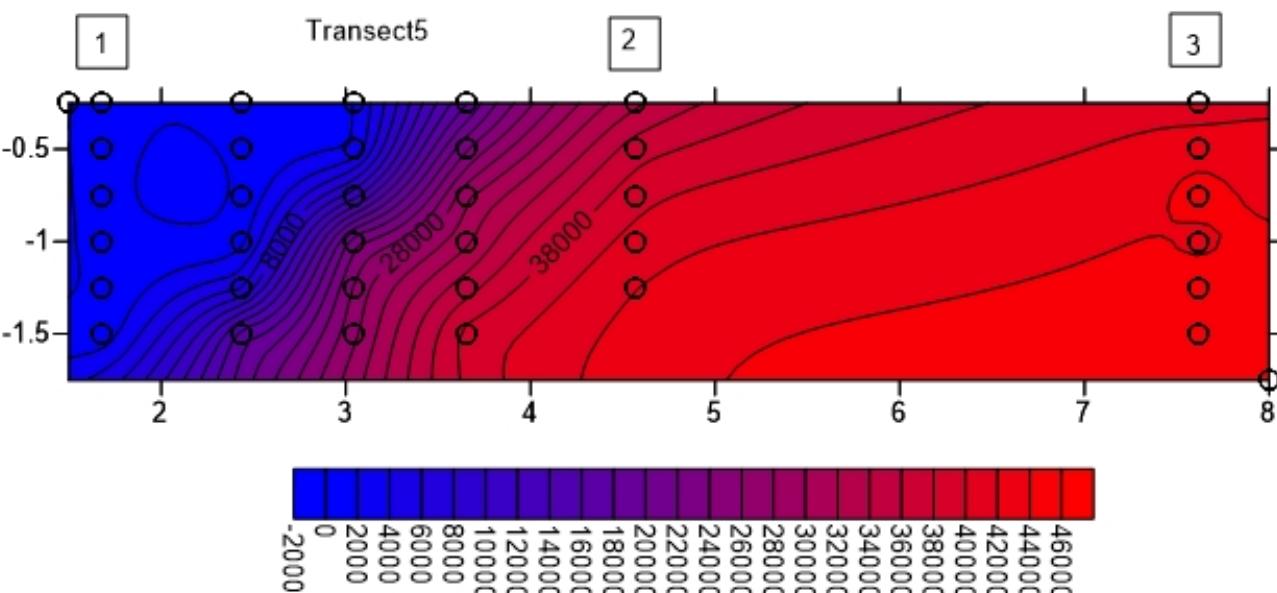
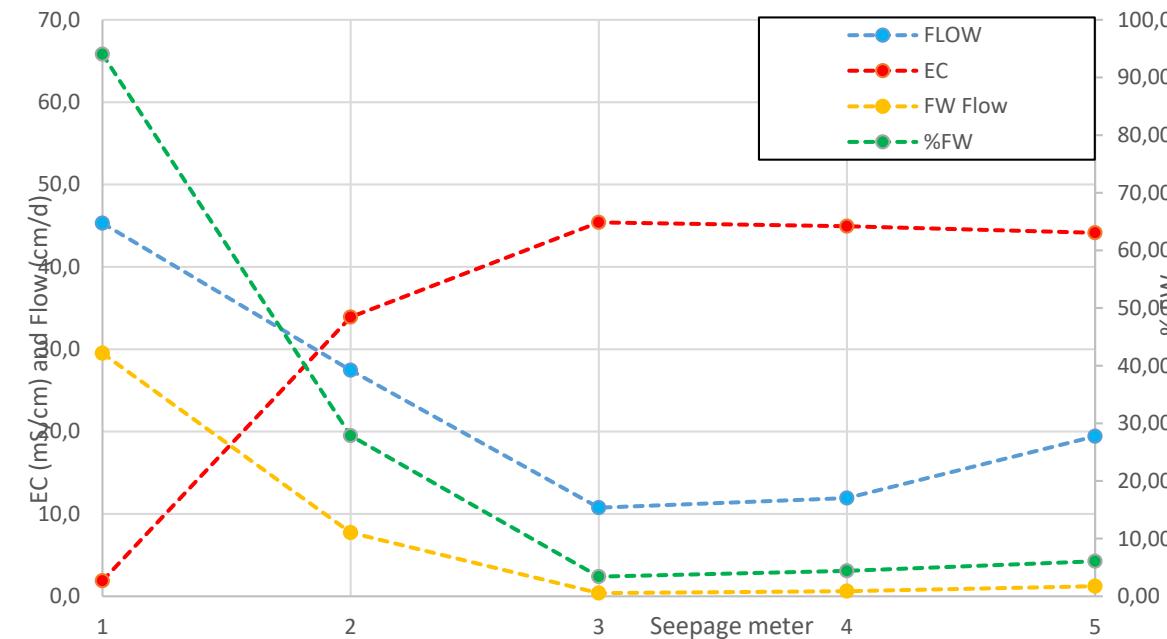
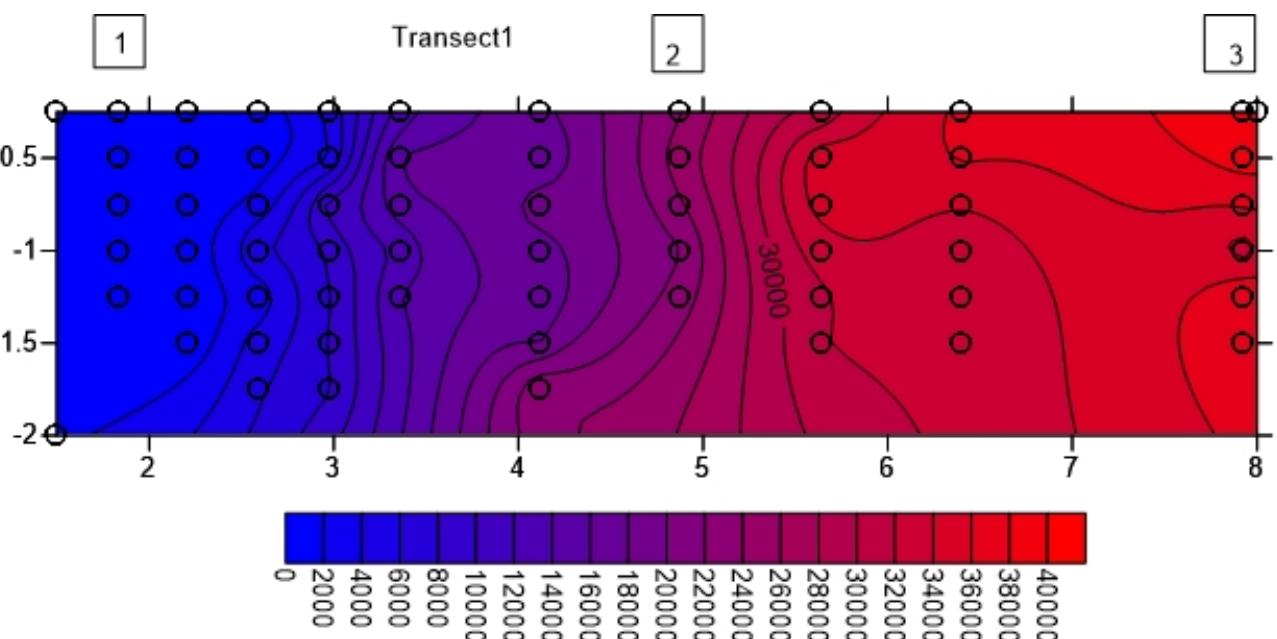
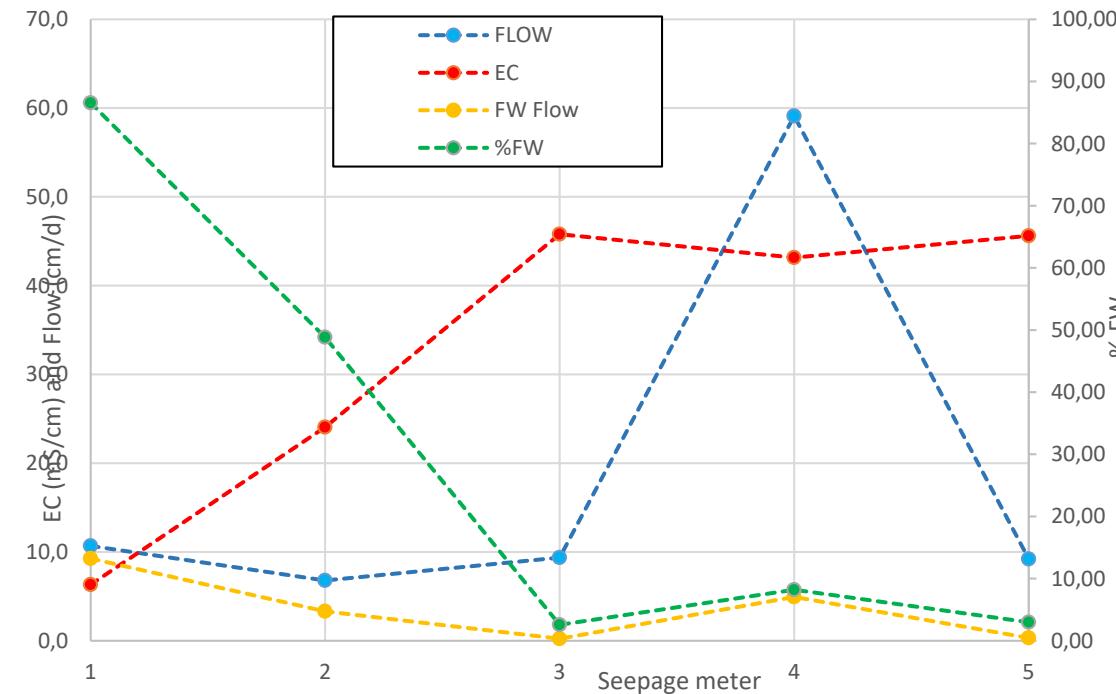


By transects perpendicular  
to the shore (October)



# Groundwater EC transects Oct 22<sup>nd</sup>

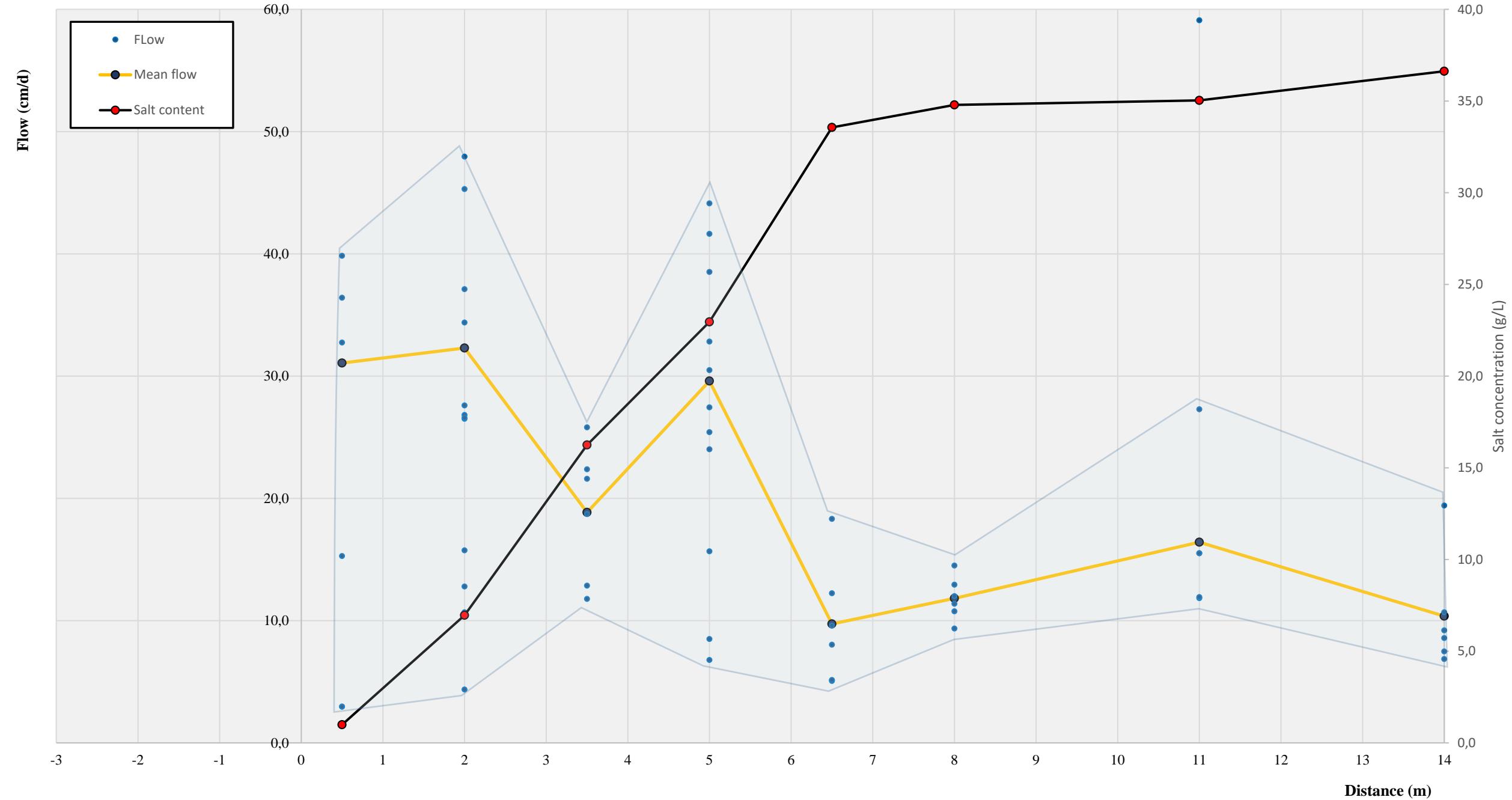




# 2D Heterogeneity modelling Radium results

Average measured  
transect

## Average flow pattern



# Model with “real” data

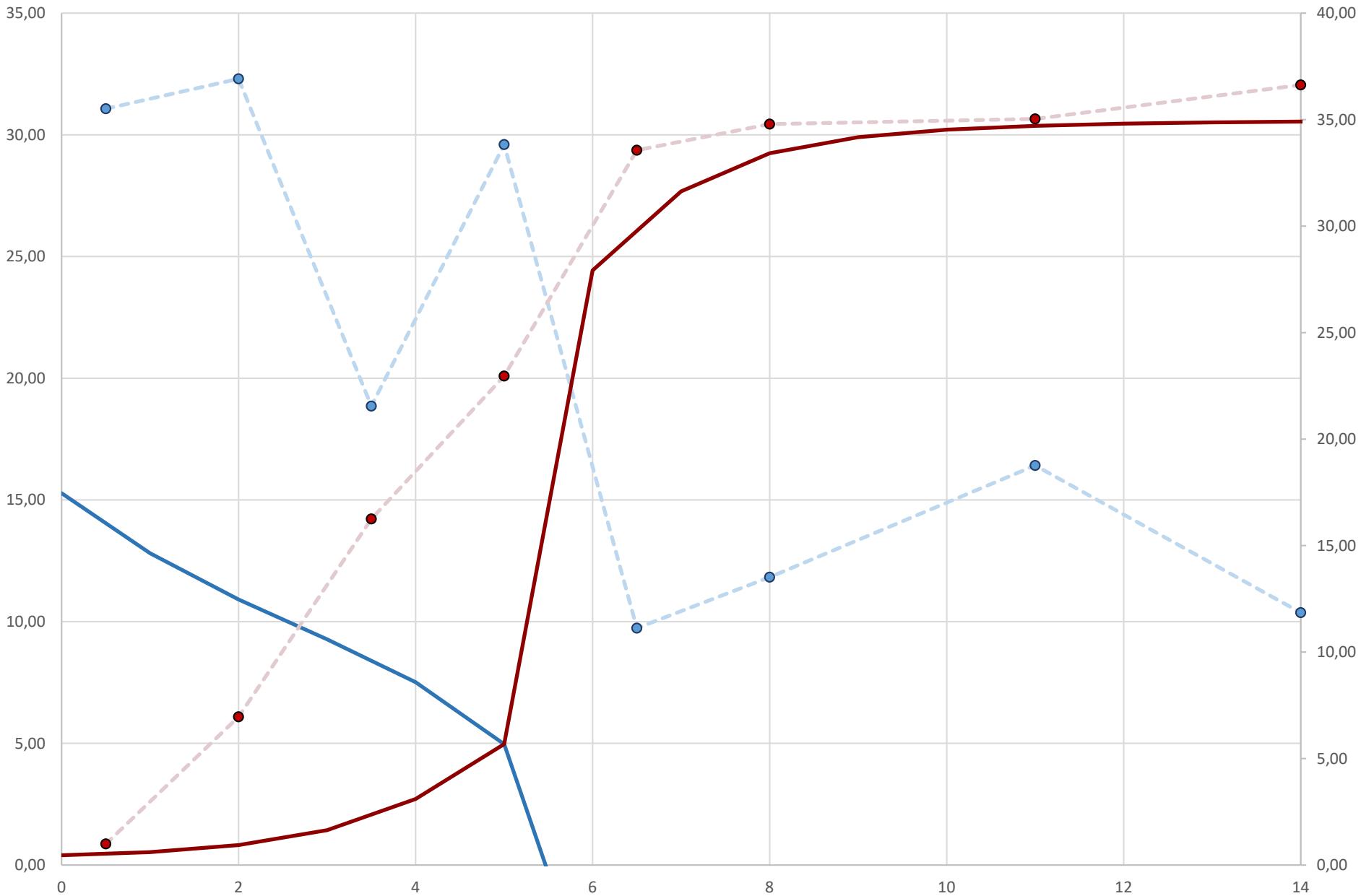
Data:

HK: 80

Gradient: 0.0028

Dispersivity: 3

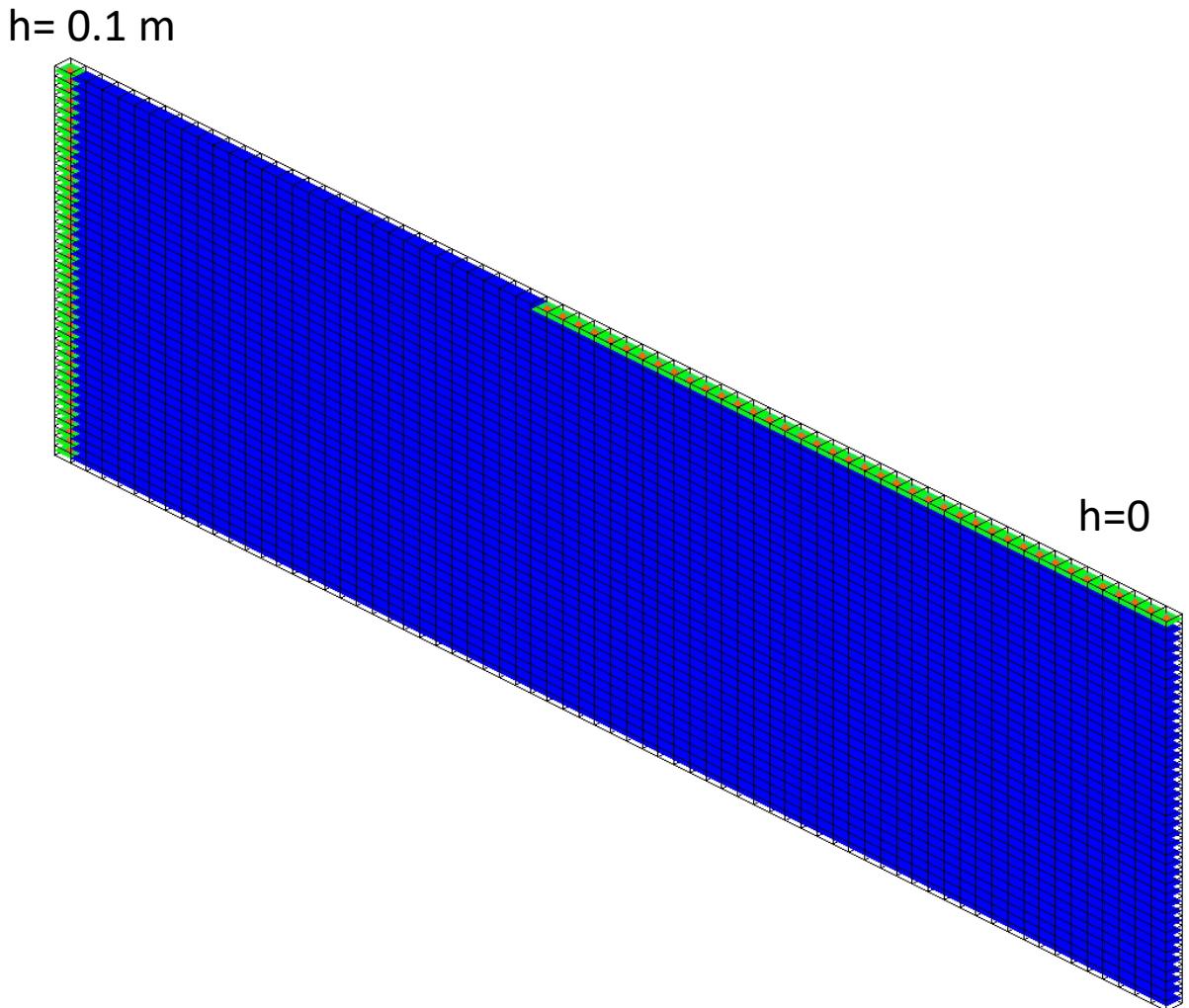
Anisotropy: 10



Modelling 1.  
Testing the effect of layers close to the bay bed

# Boundary conditions

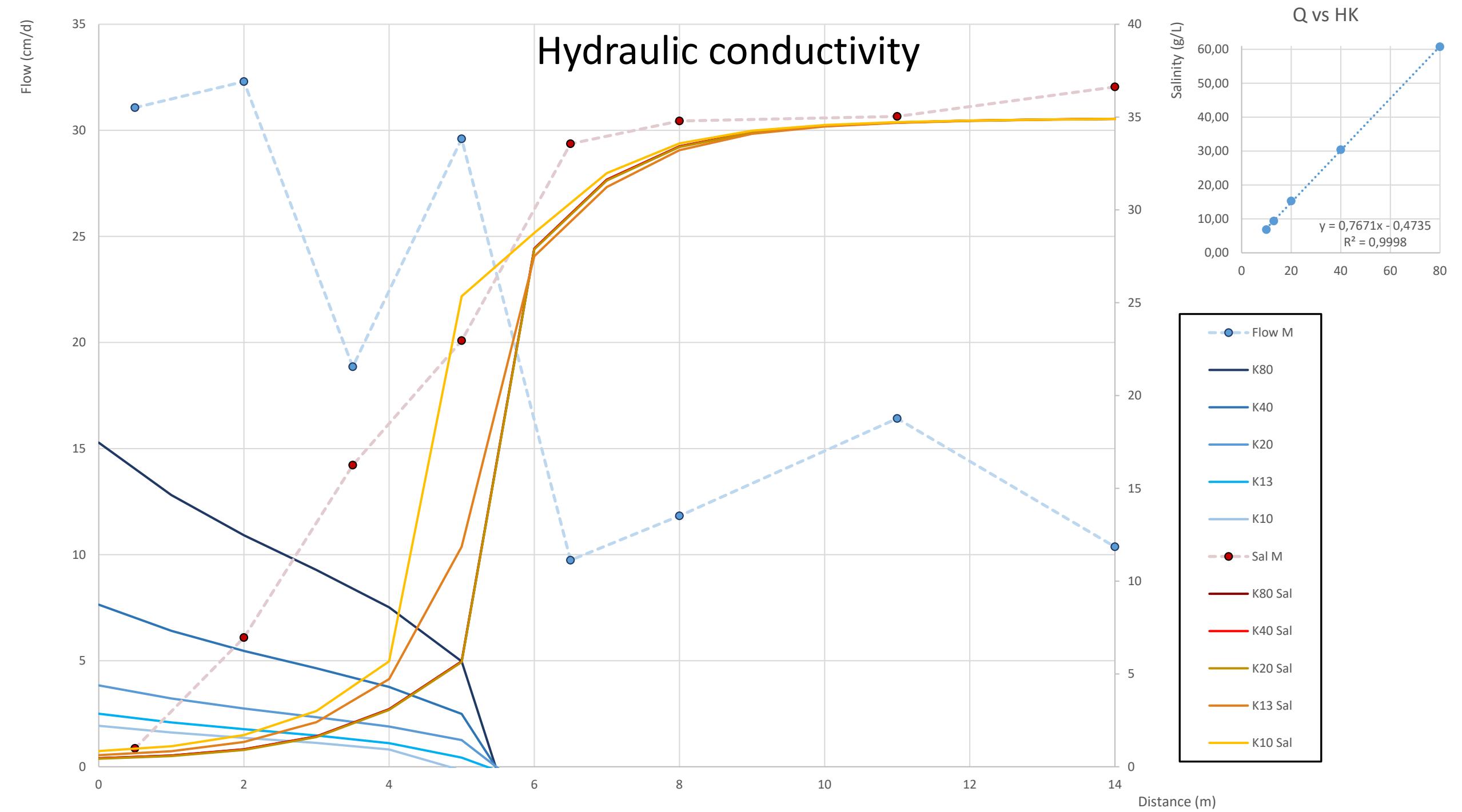
- Hydraulic gradient: 0.0033
- Anisotropy: 10
- HK: 80 m/d
- HK<sub>lowK</sub>: 1 m/d
- Dispersivity: 3
- Porosity: 0.2
- S<sub>y</sub>: 0.15
- S<sub>s</sub>: 0.00005
- Grid: 0.5 \*1\*1m
- Size: 70 m \*20 m



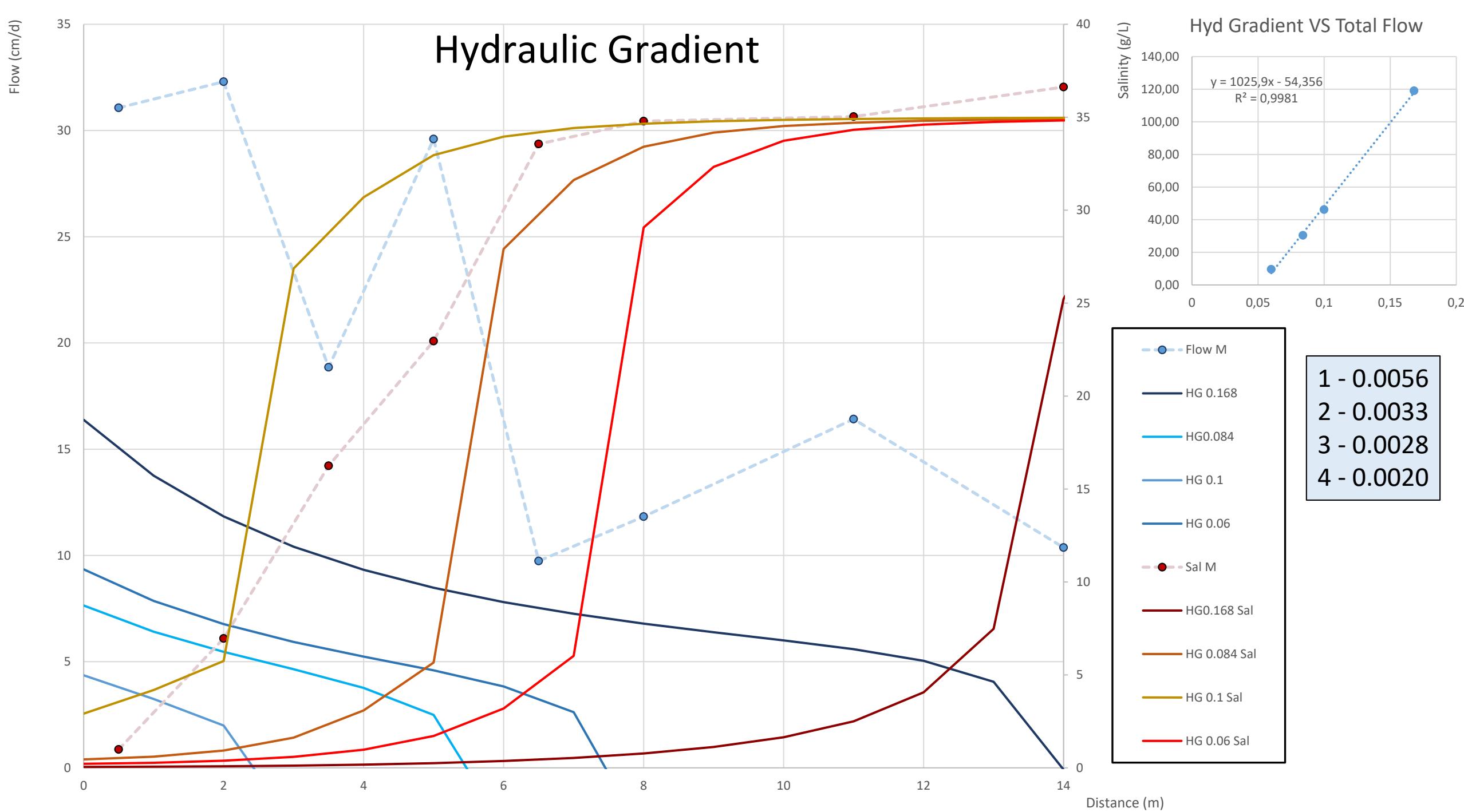
# Sensitivity Analysis:

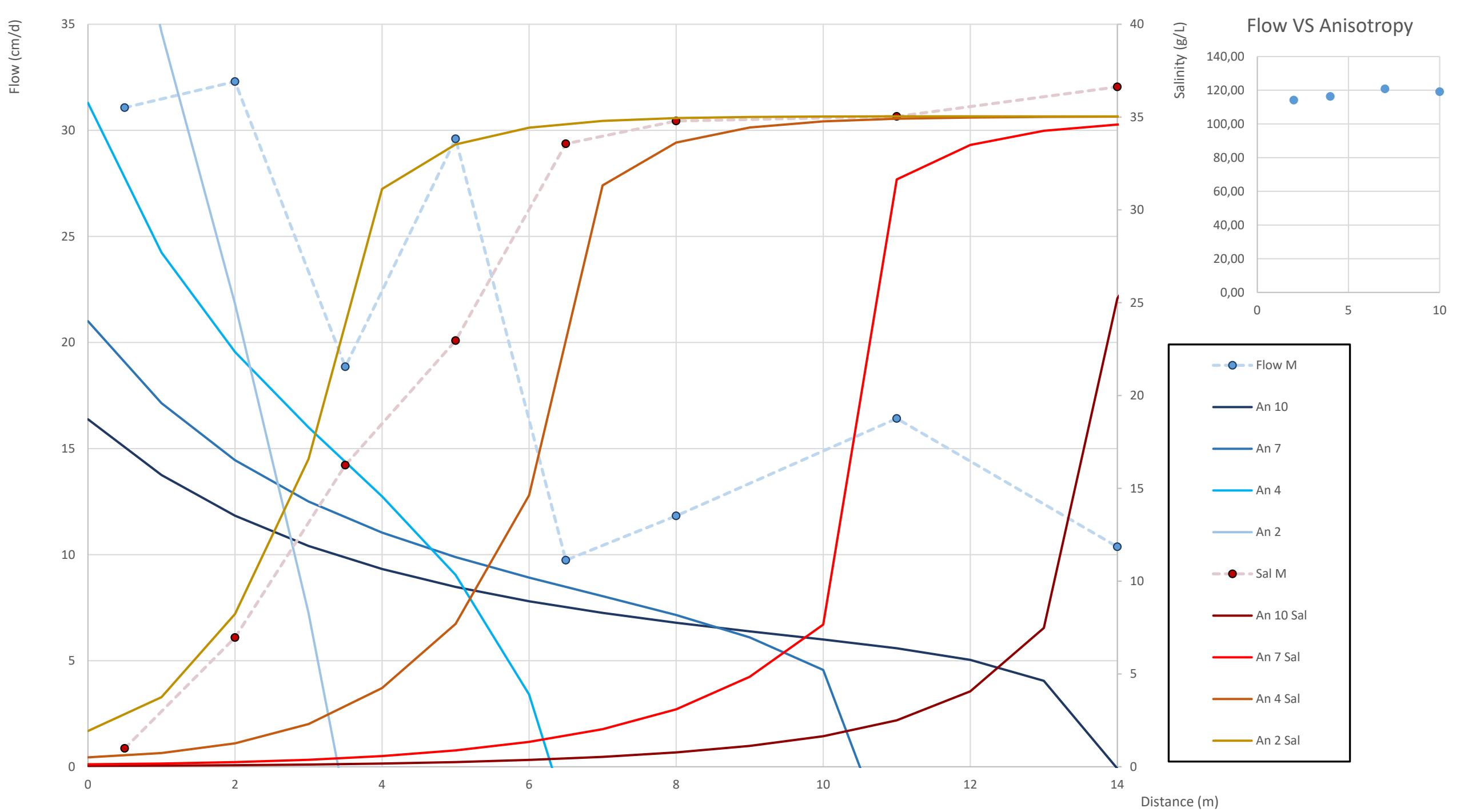
- K
- Hyd-Grad
- Disp
- Anisotropy

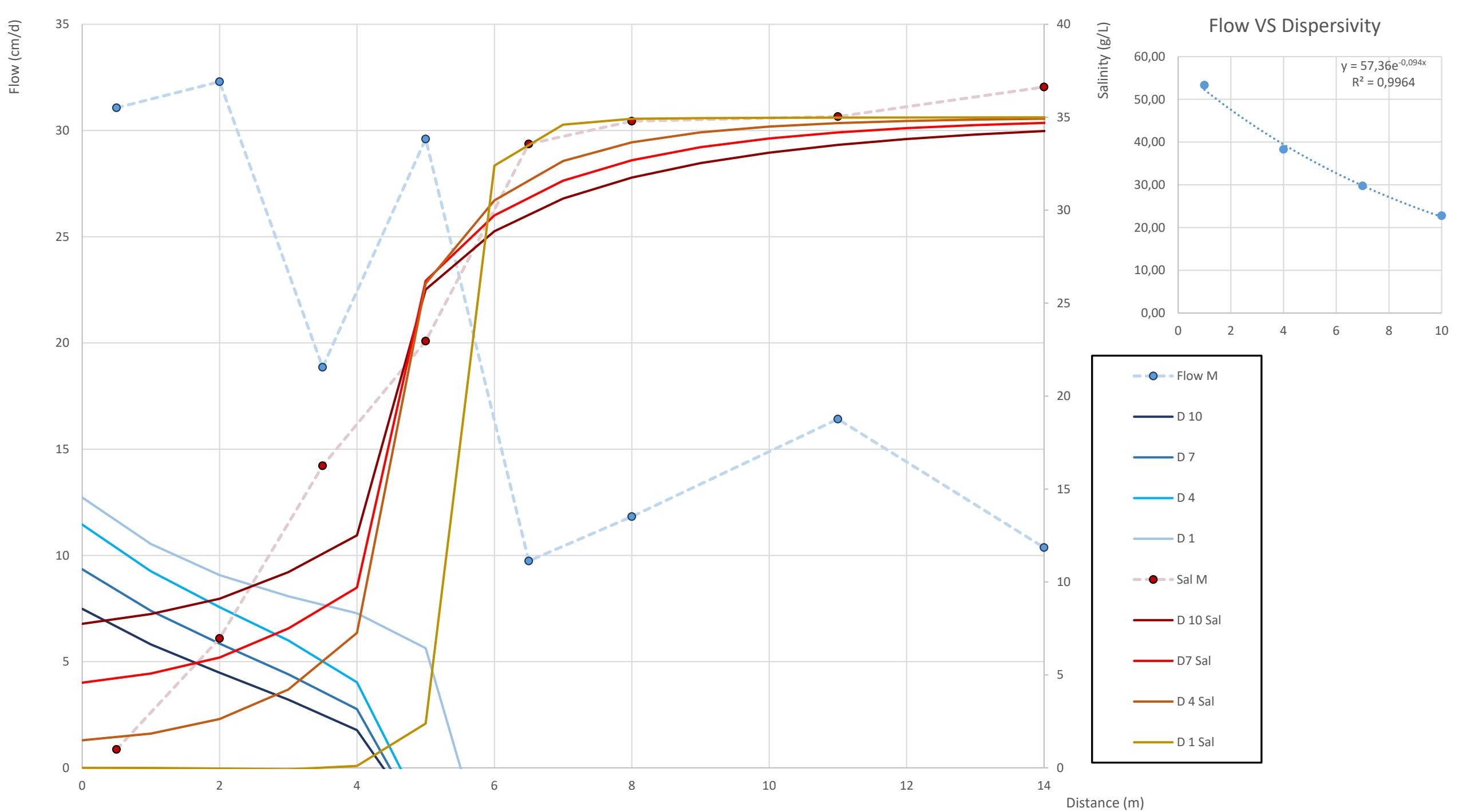
# Hydraulic conductivity



# Hydraulic Gradient

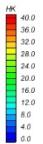




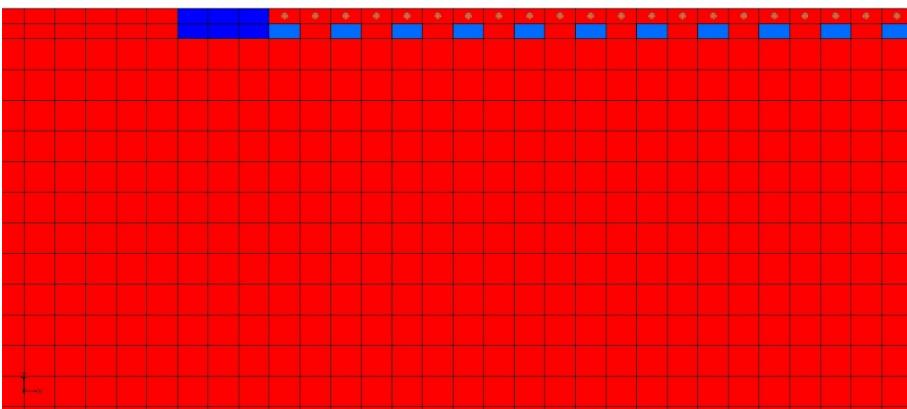


# Simple heterogeneity

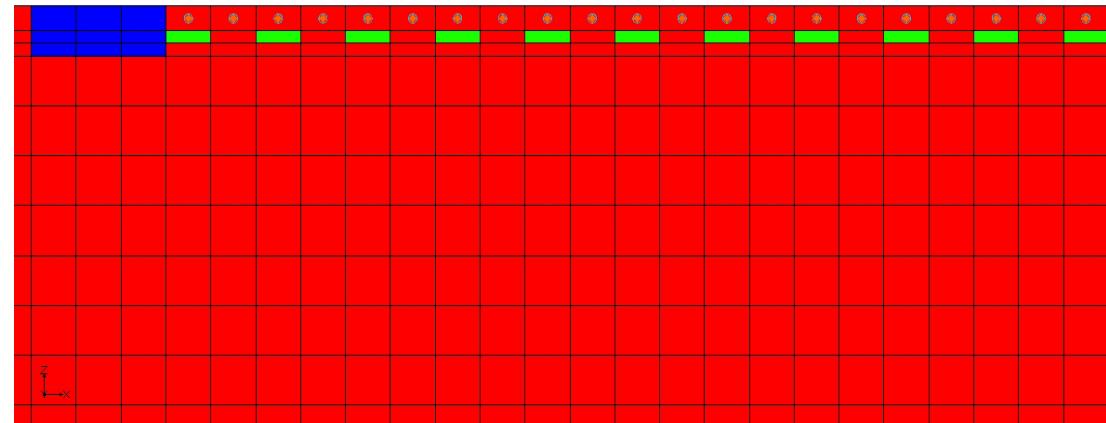
# Shallow (just below the constant head)



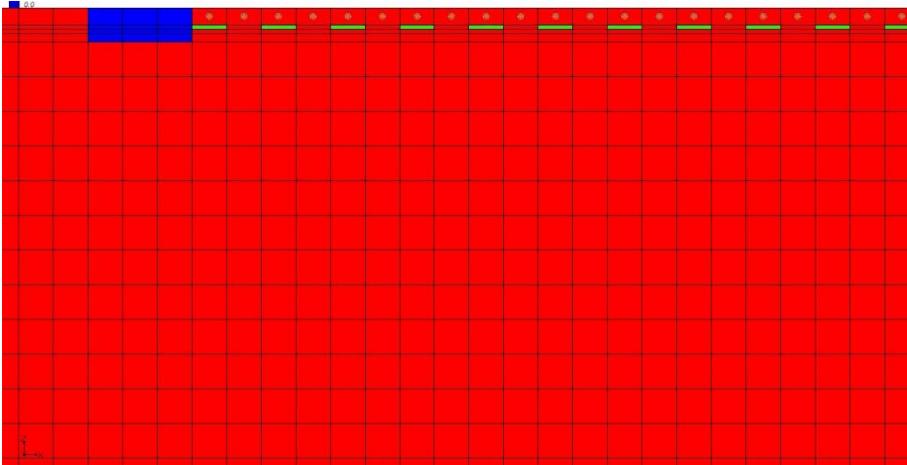
**50 cm**



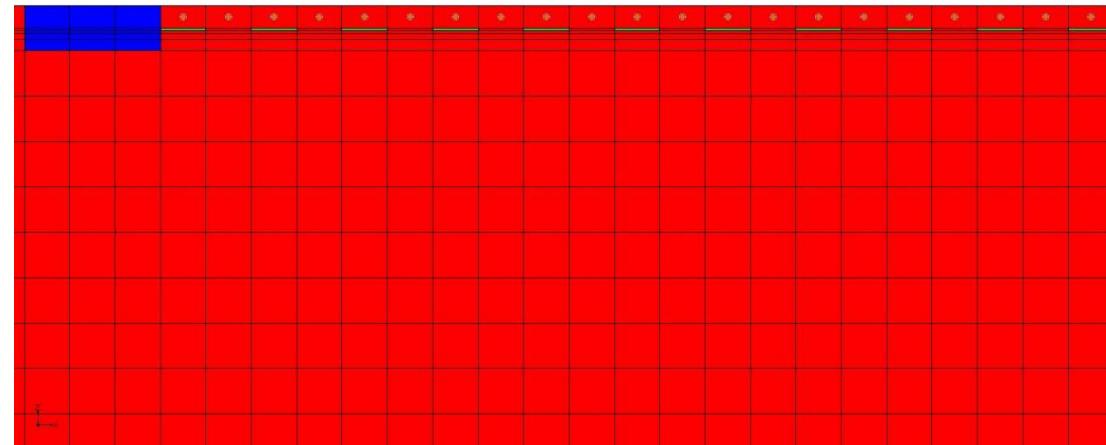
**25 cm**



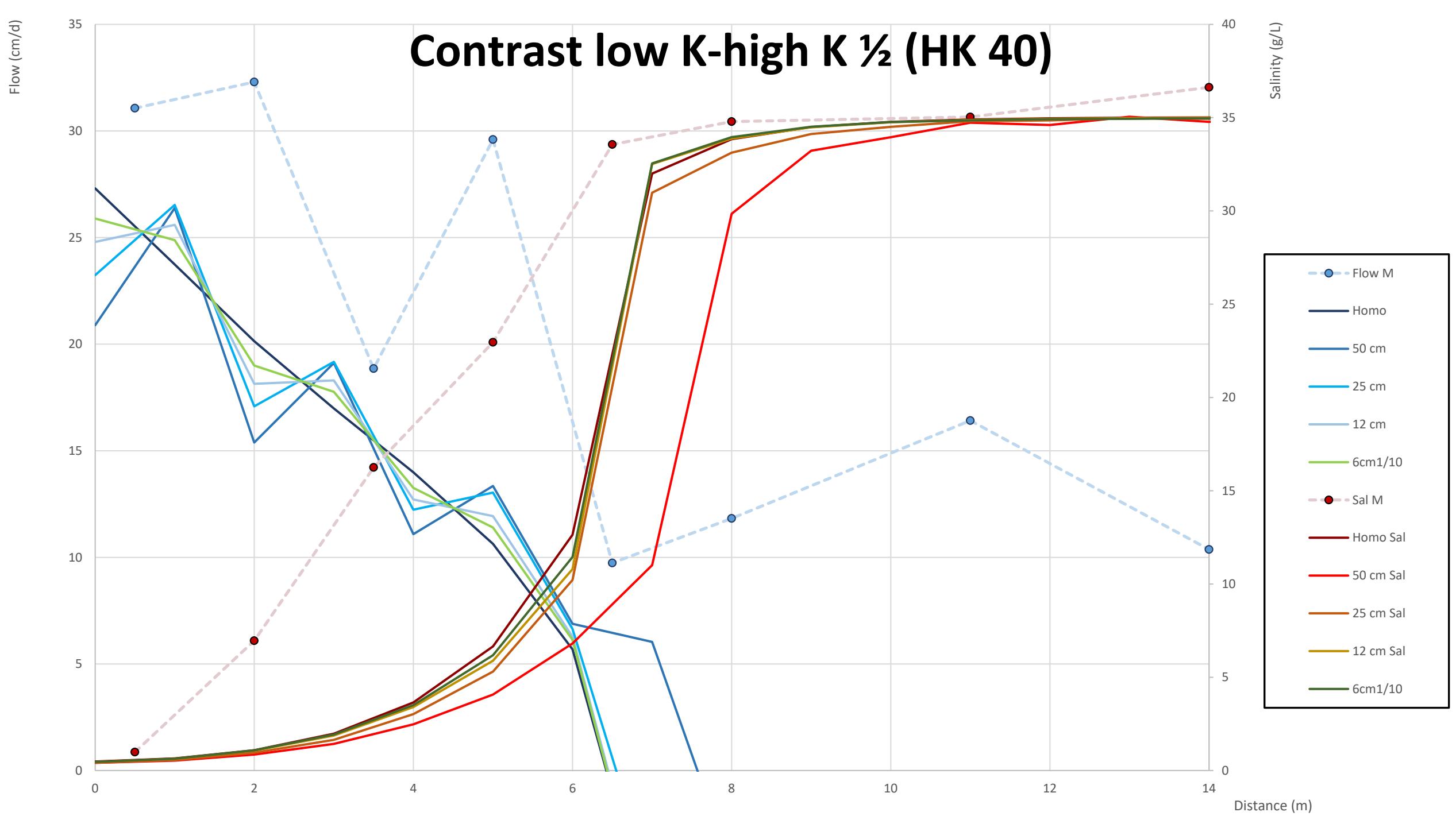
**12 cm**



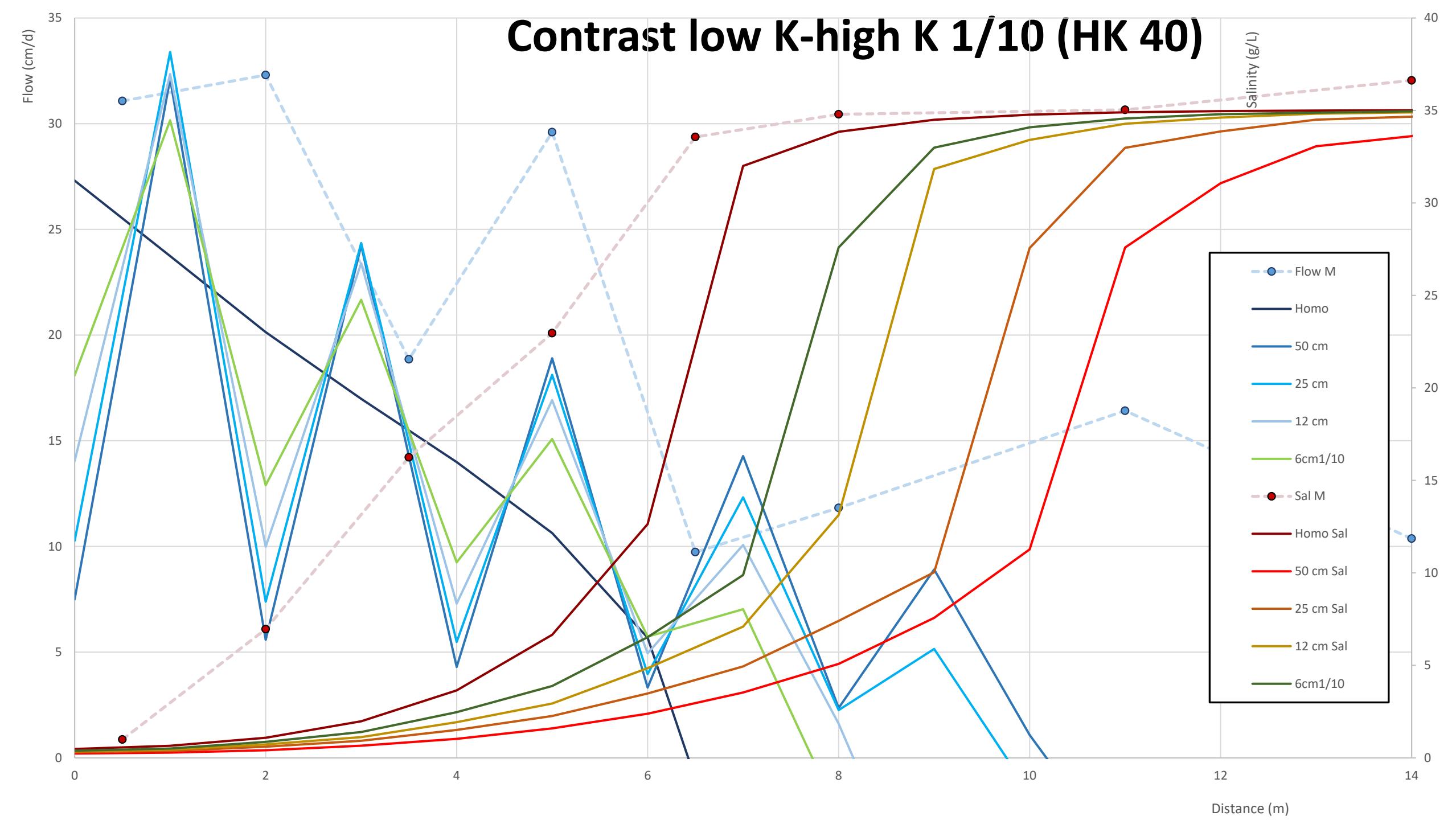
**6 cm**



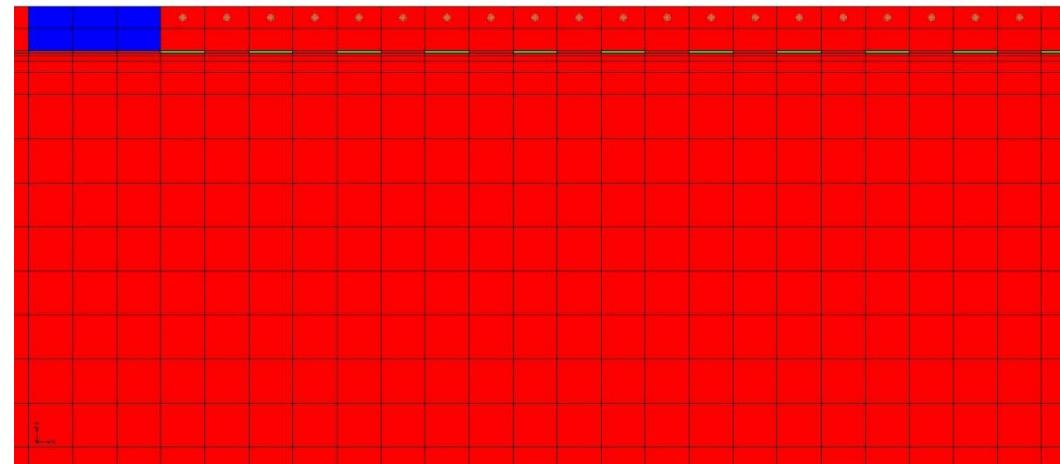
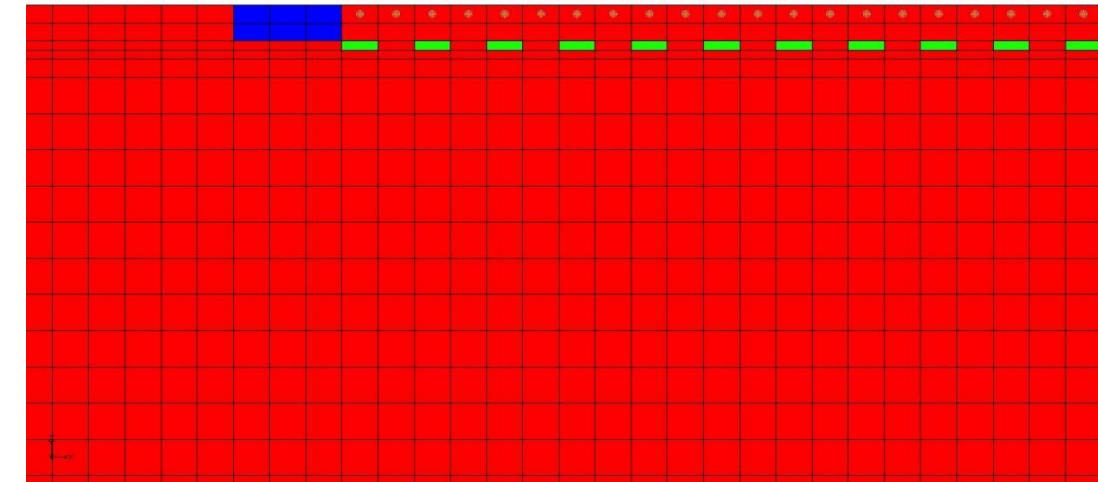
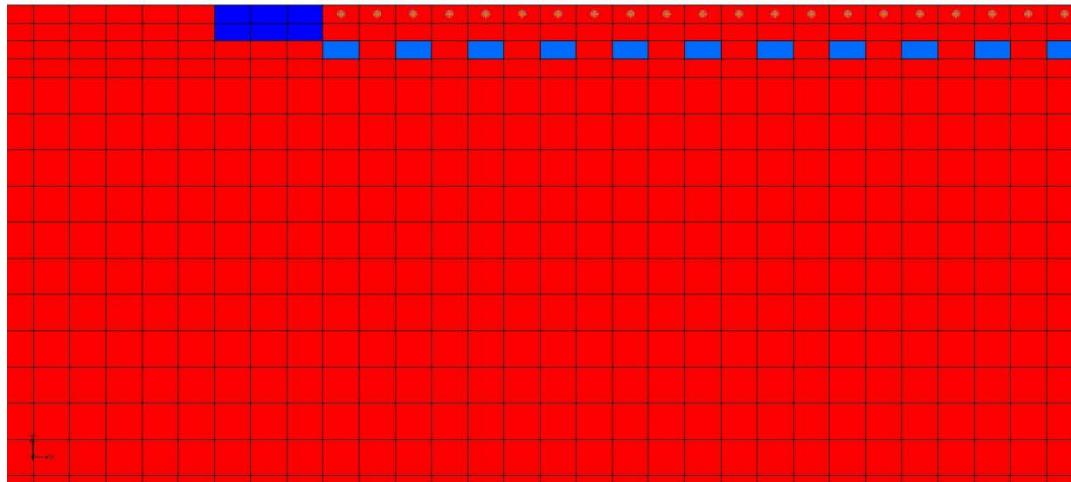
# Contrast low K-high K ½ (HK 40)

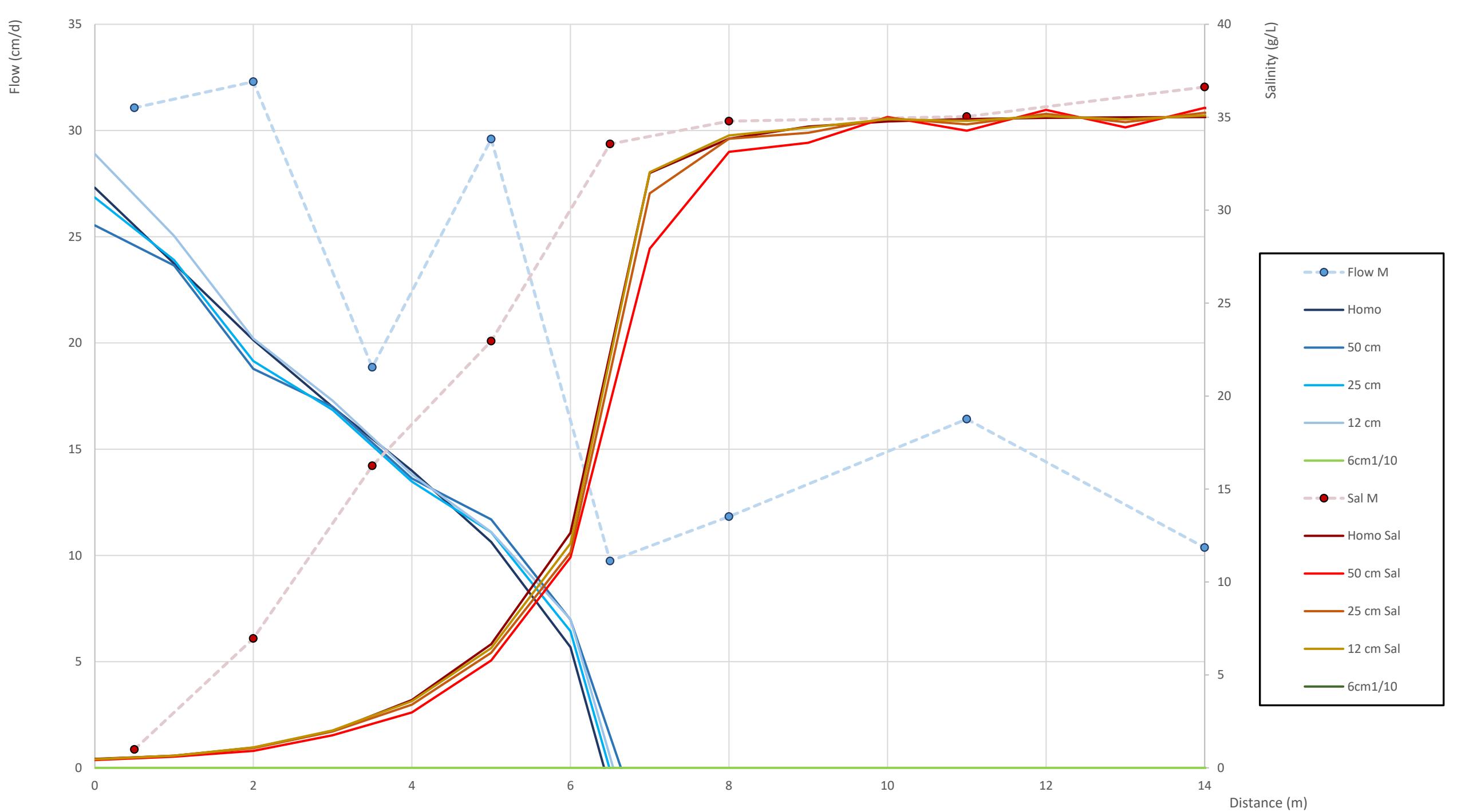


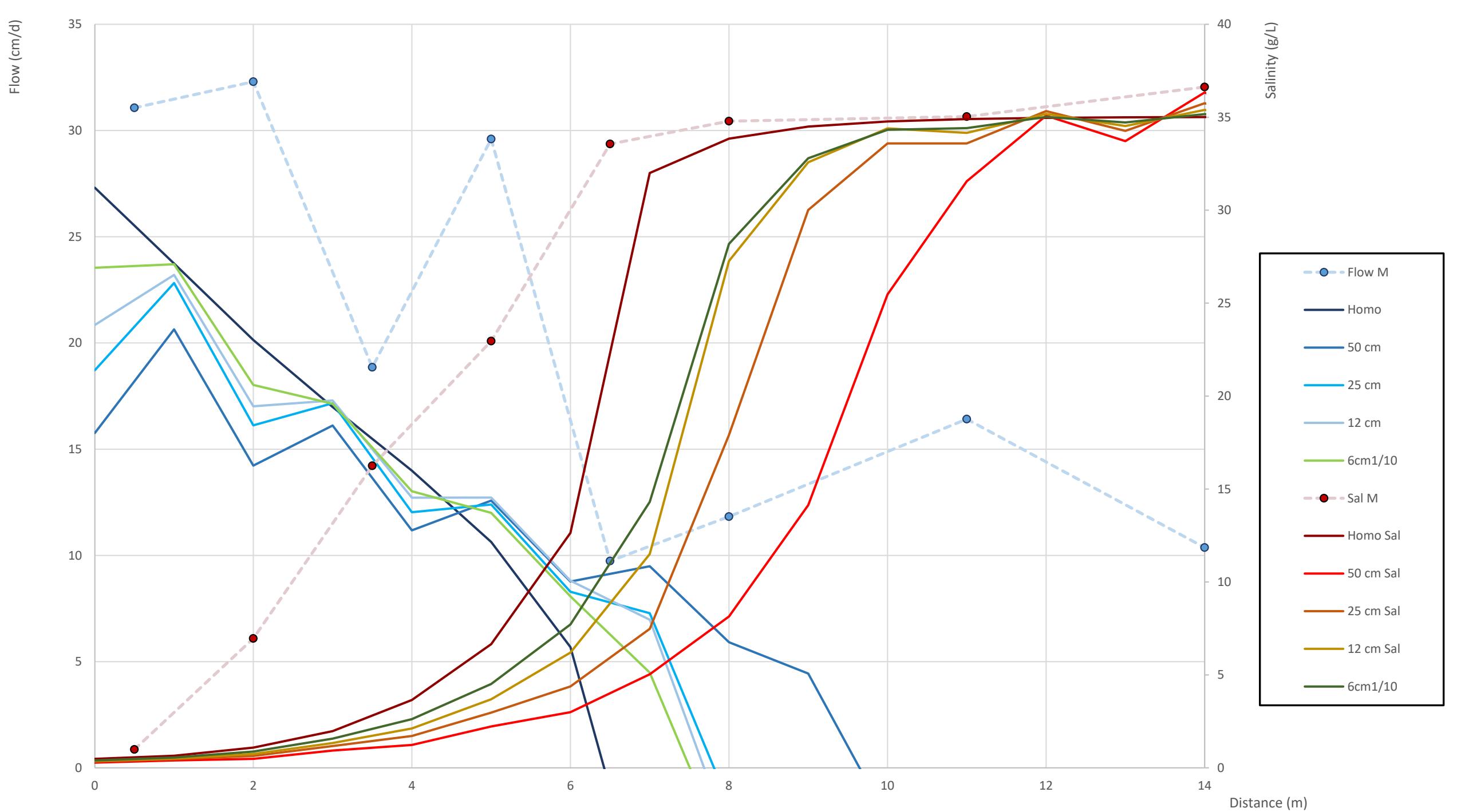
# Contrast low K-high K 1/10 (HK 40)



50 cm deeper below the constant head



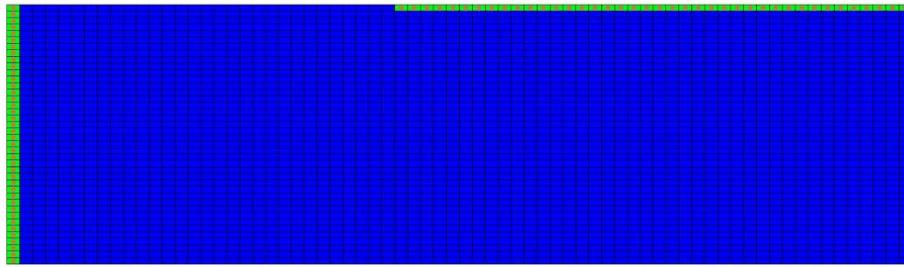




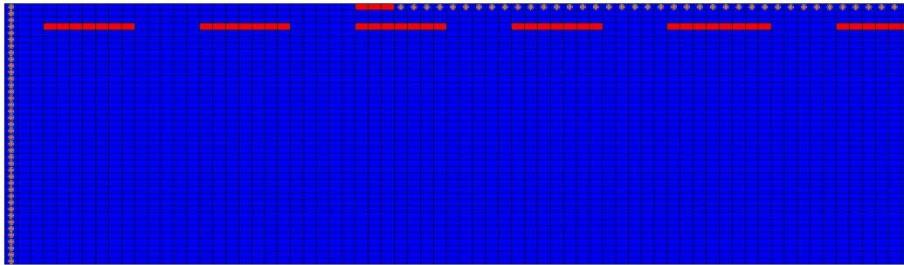
Modelling 2.  
Testing the effect of heterogeneity in all the  
aquifer

# Heterogeneity

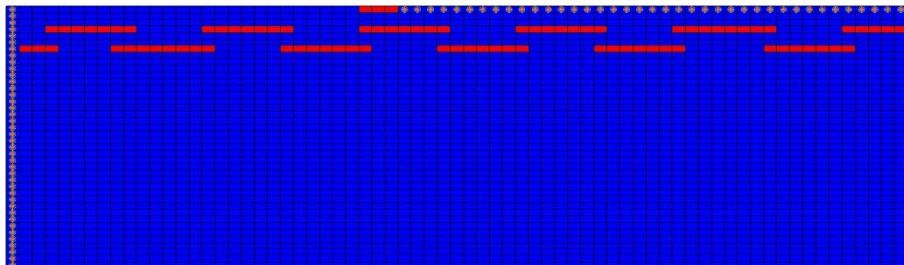
Homogeneous



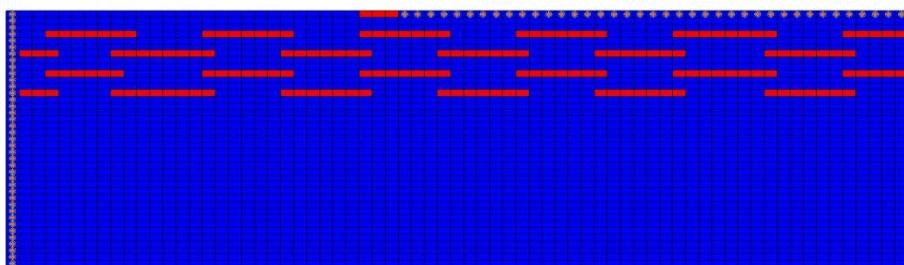
H1



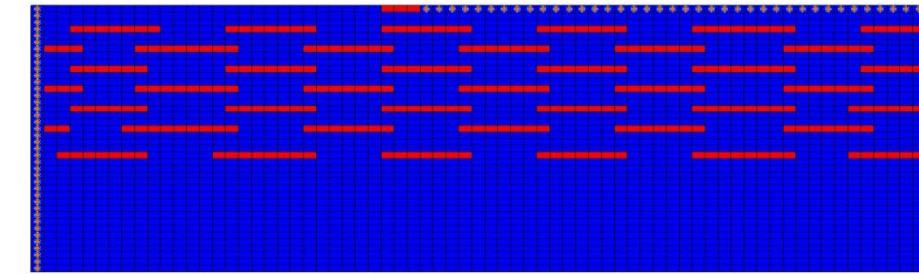
H2



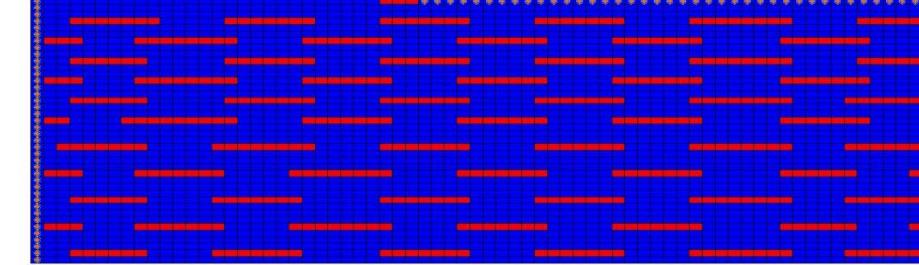
H3



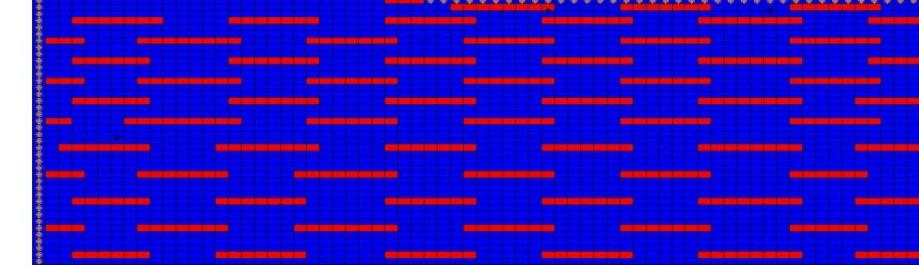
H4



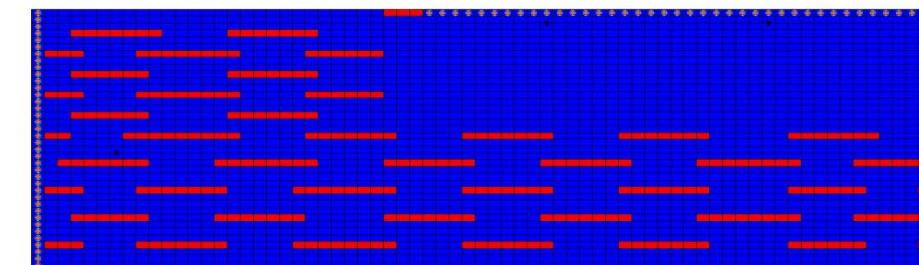
H5

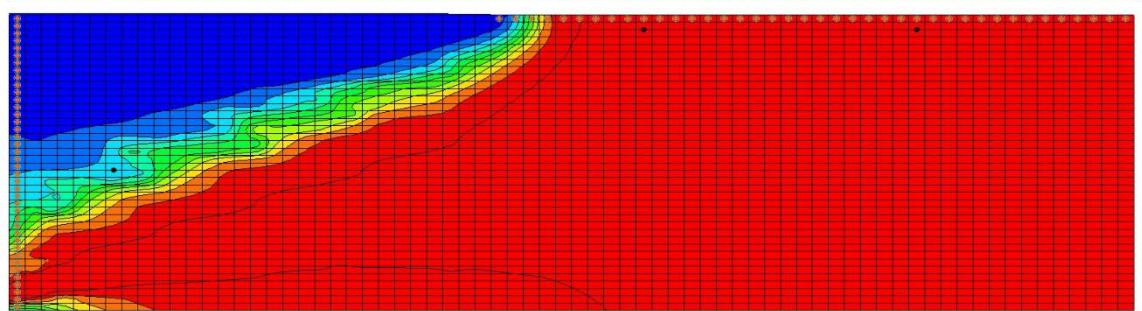
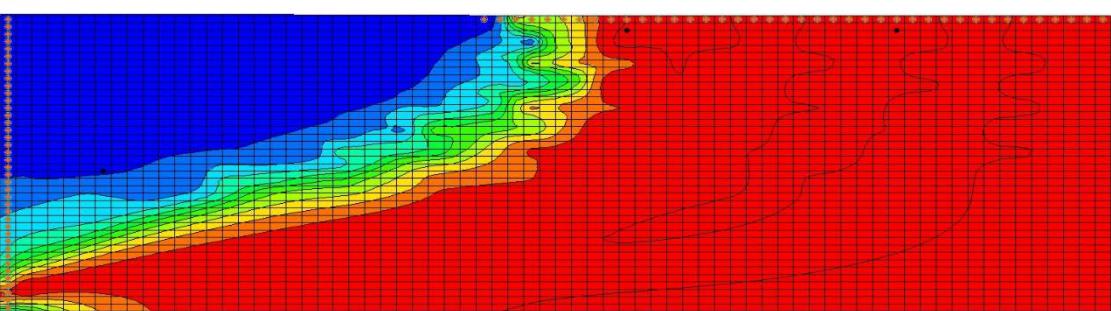
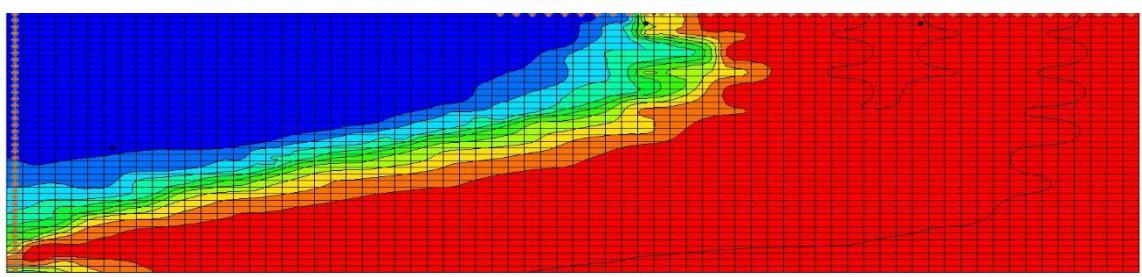
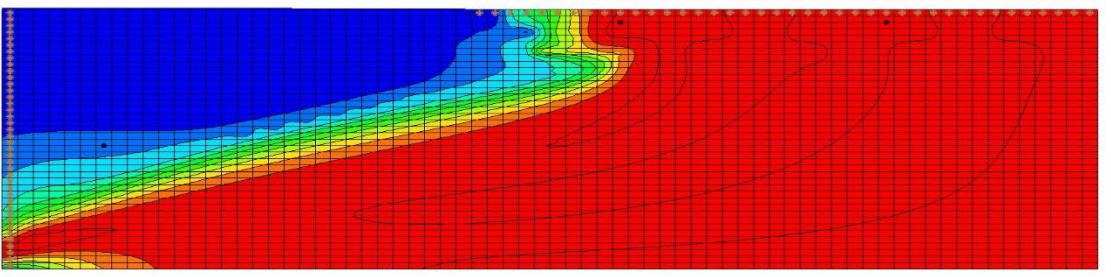
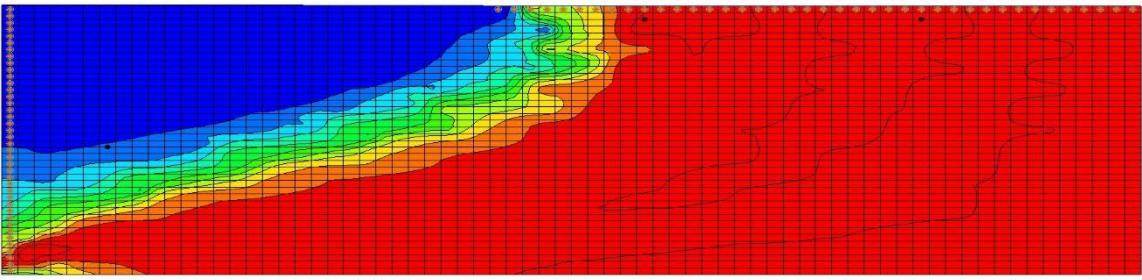
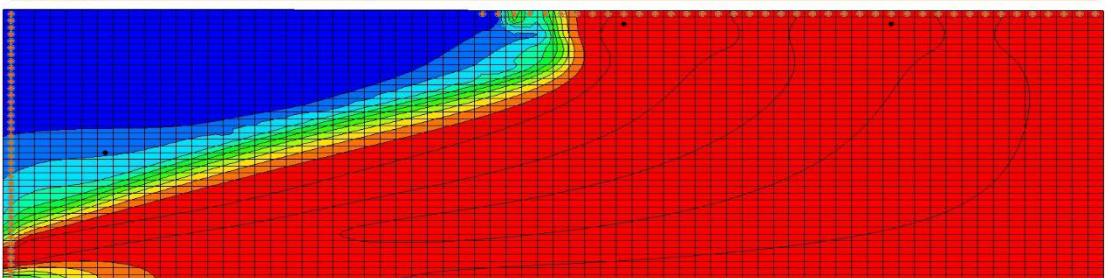
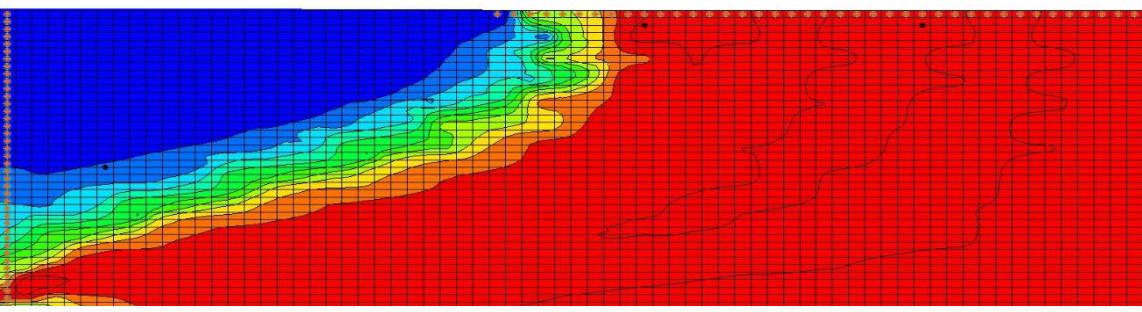
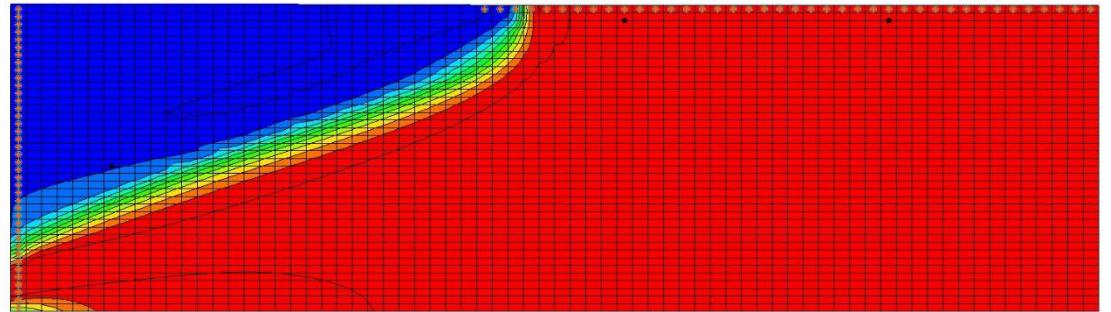


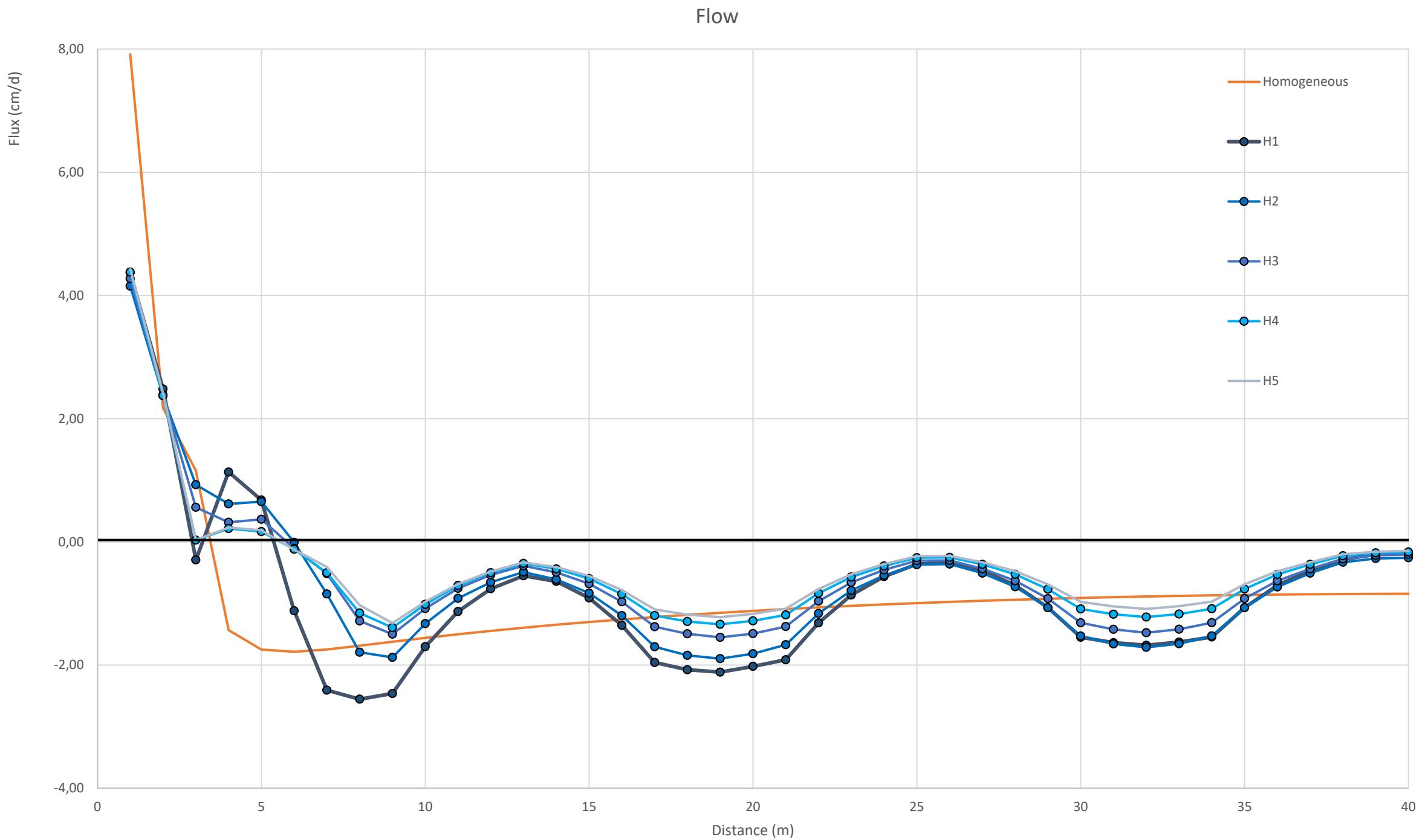
H6

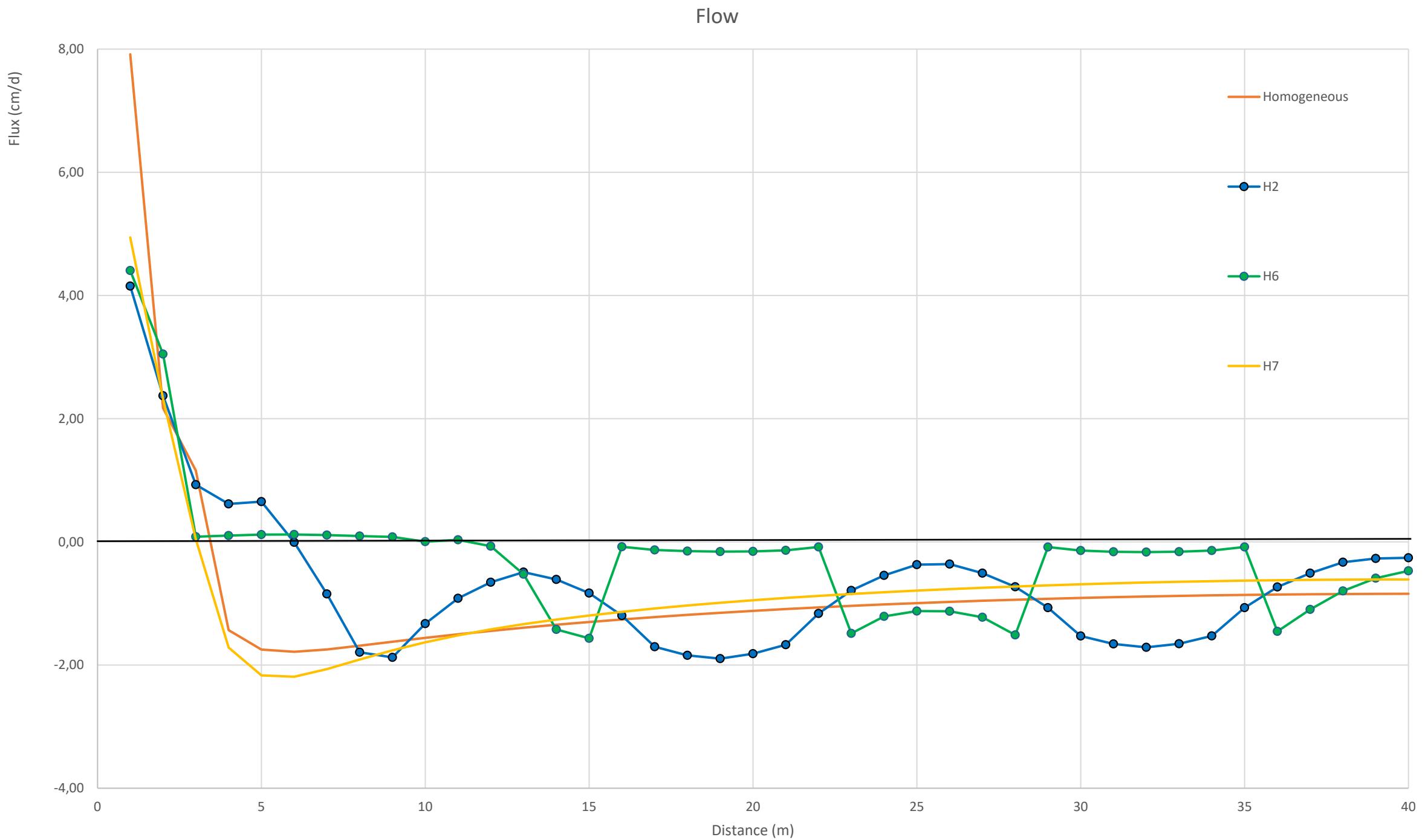


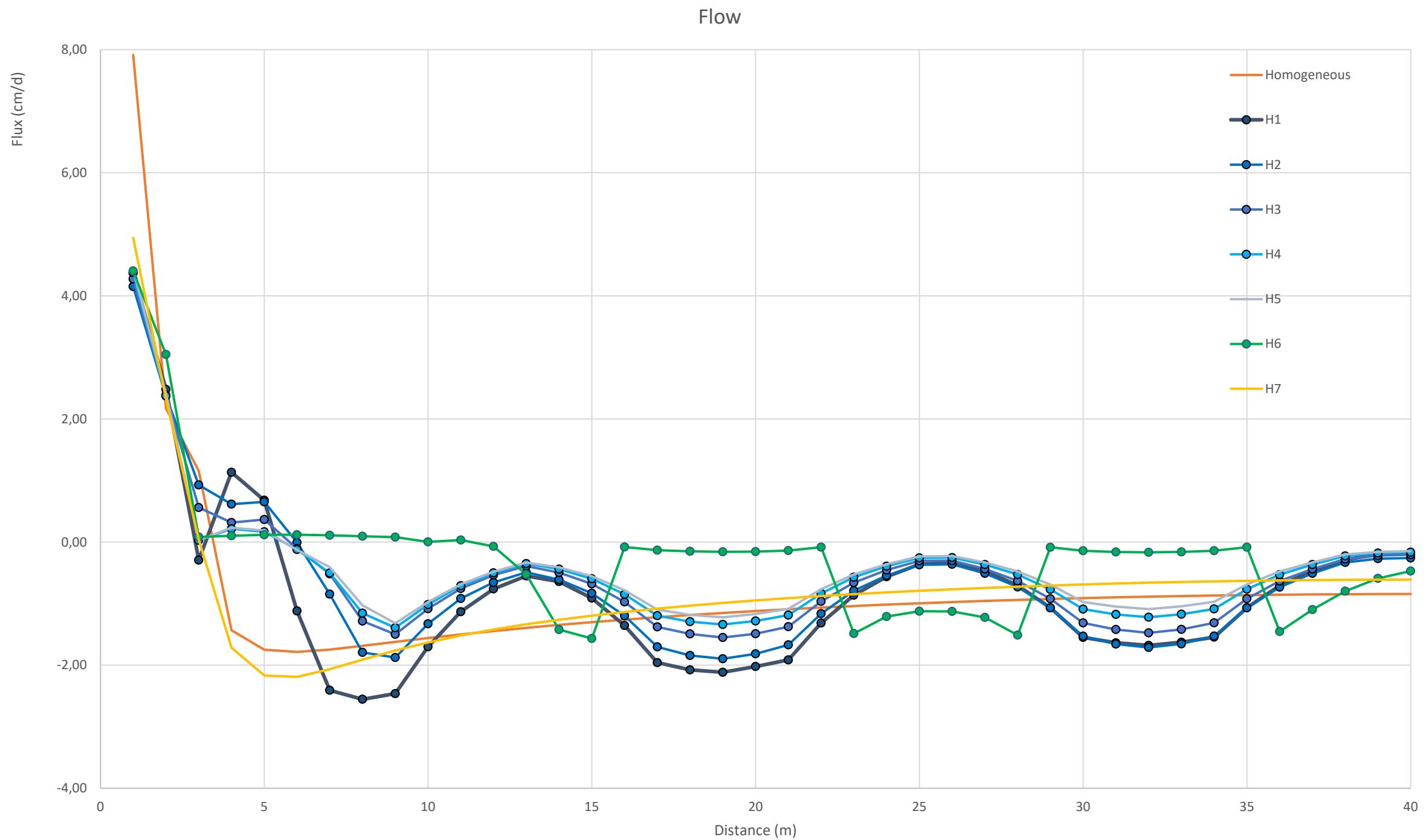
H7

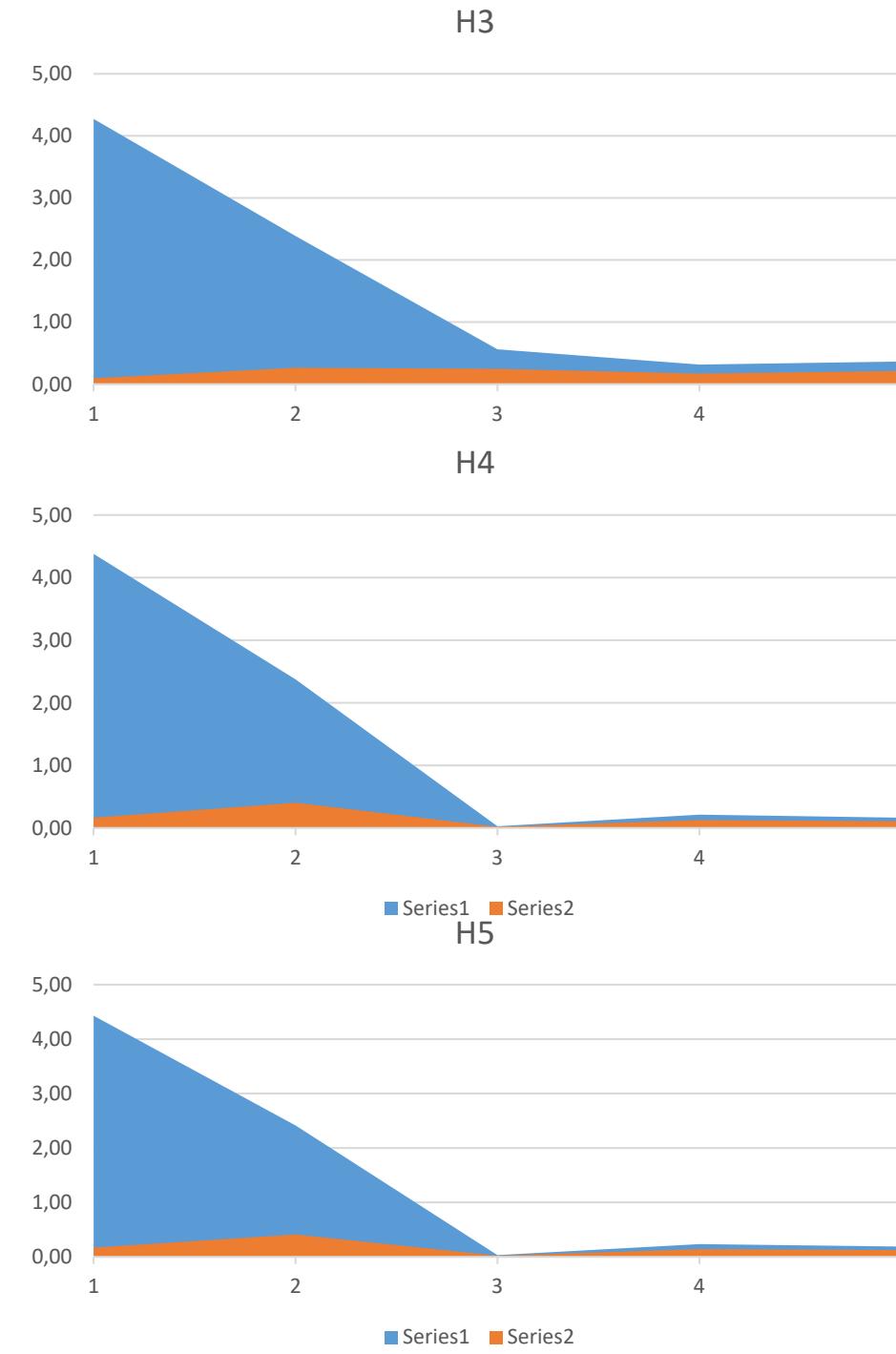
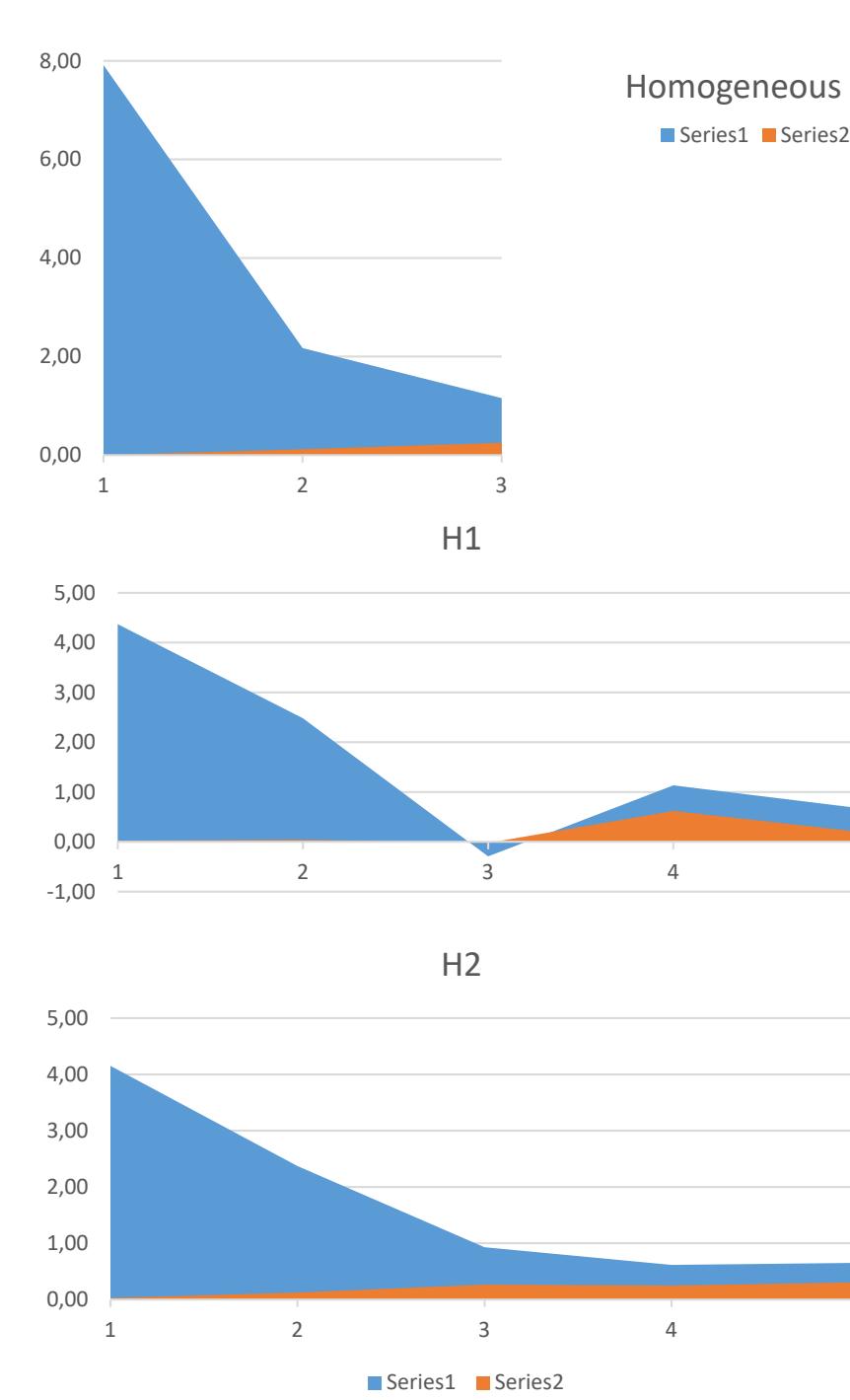


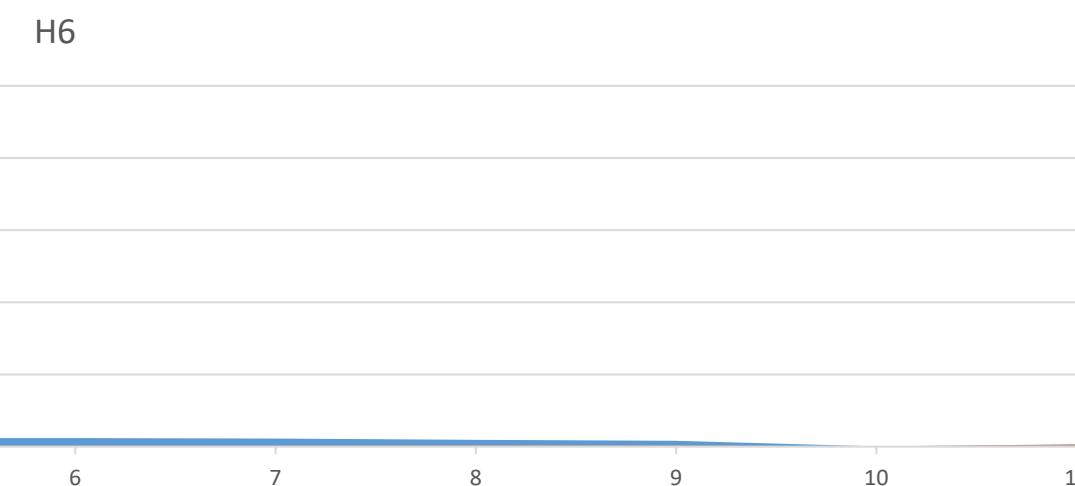
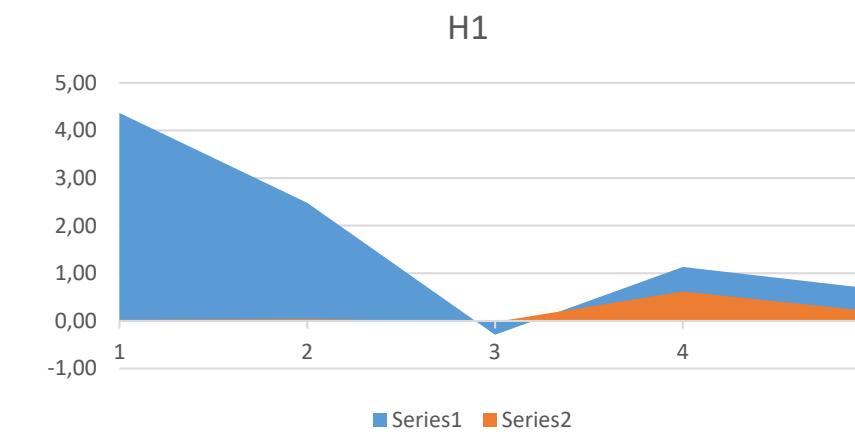
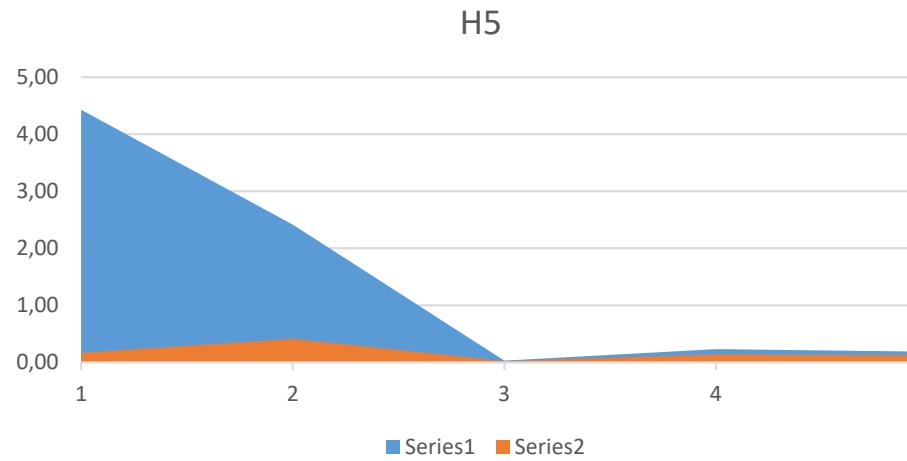
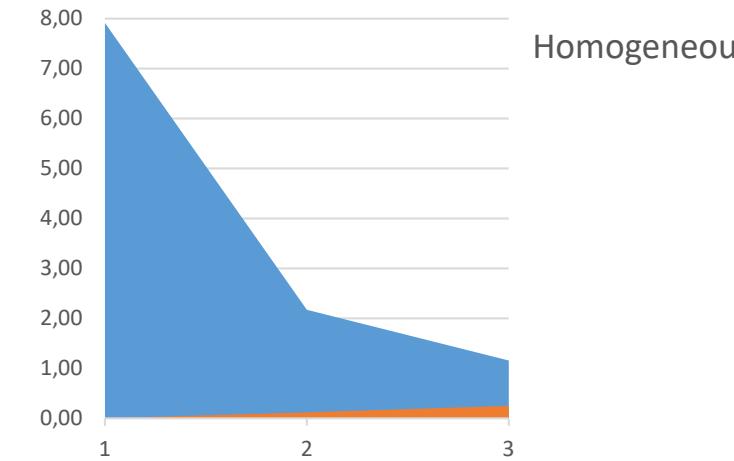


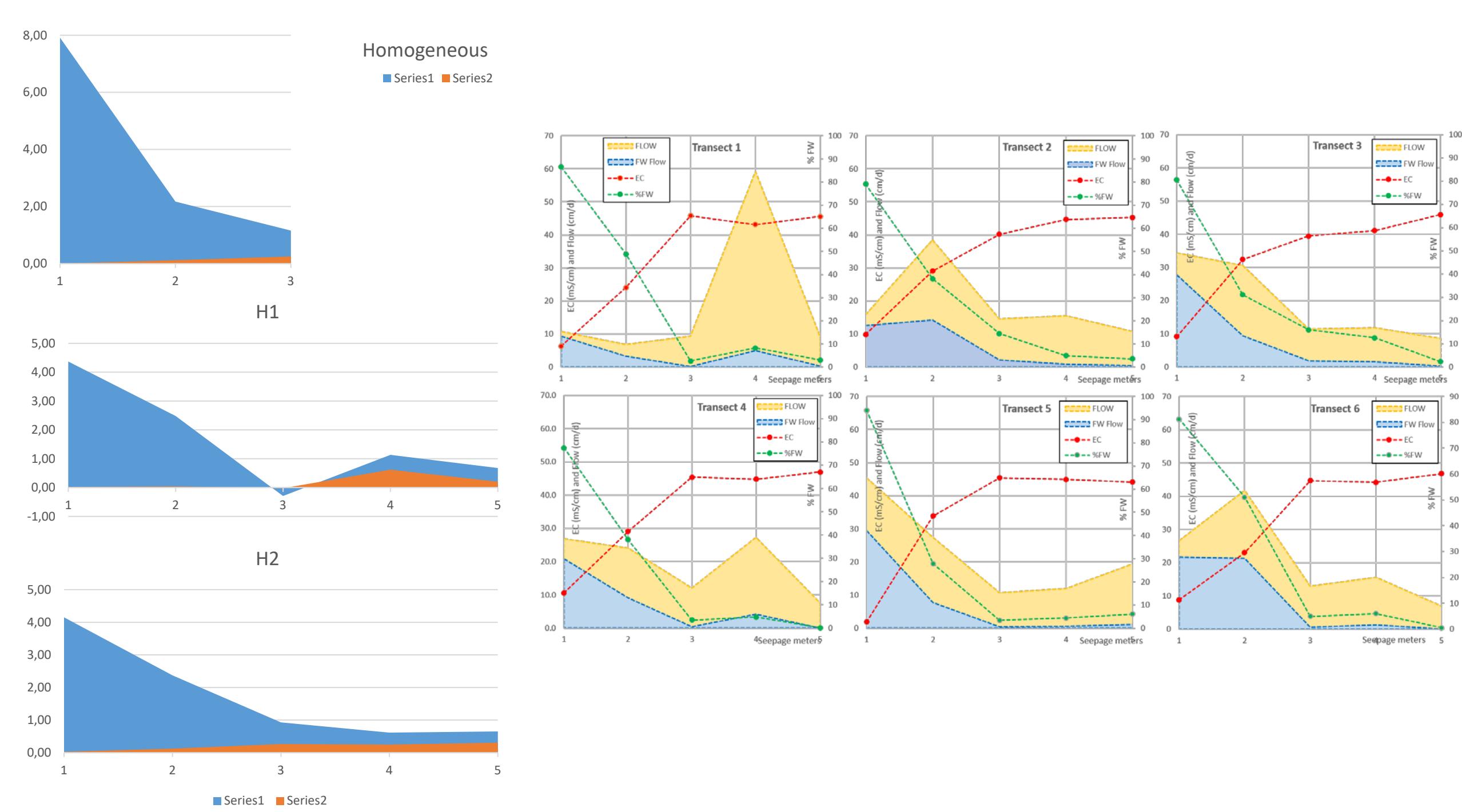


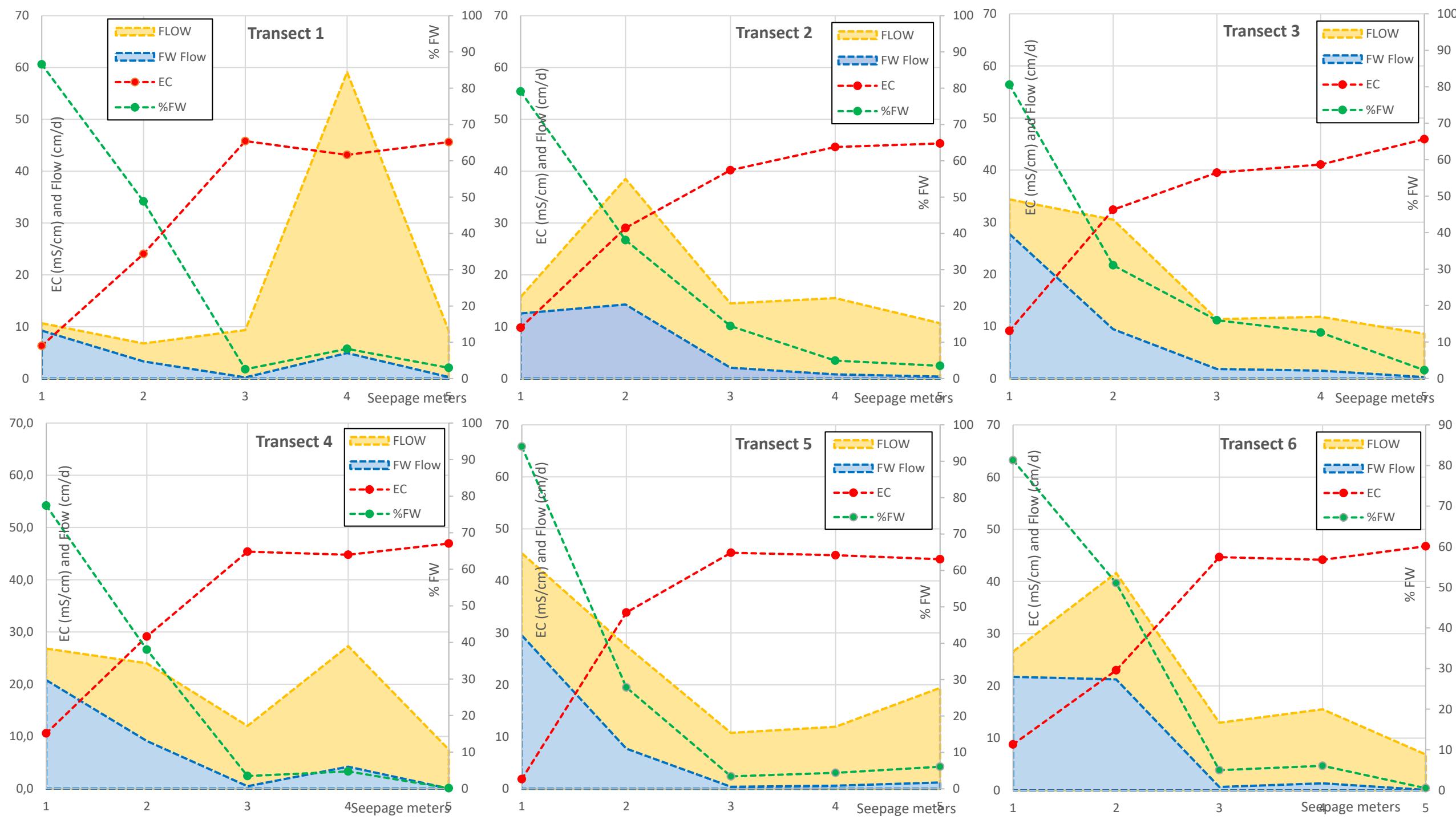




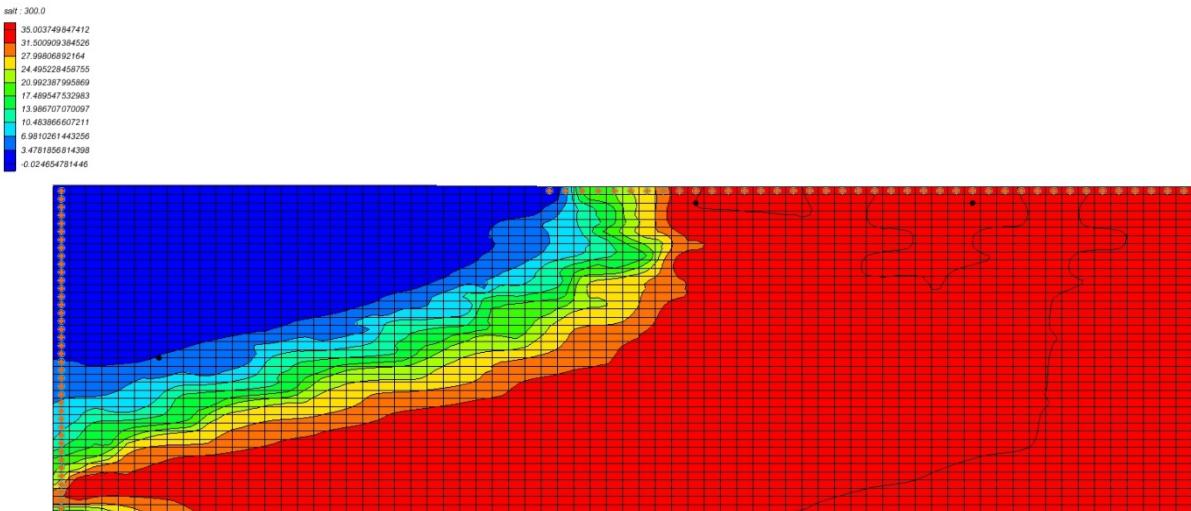




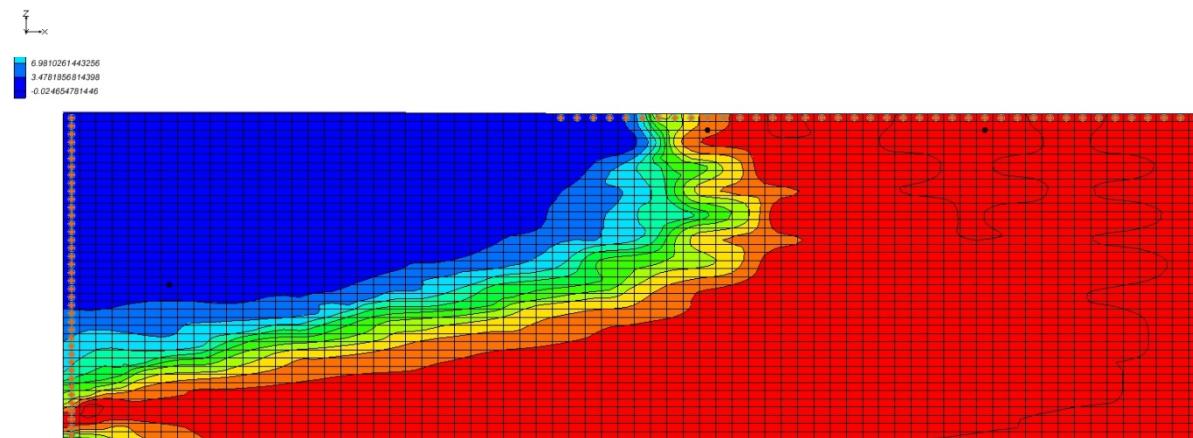
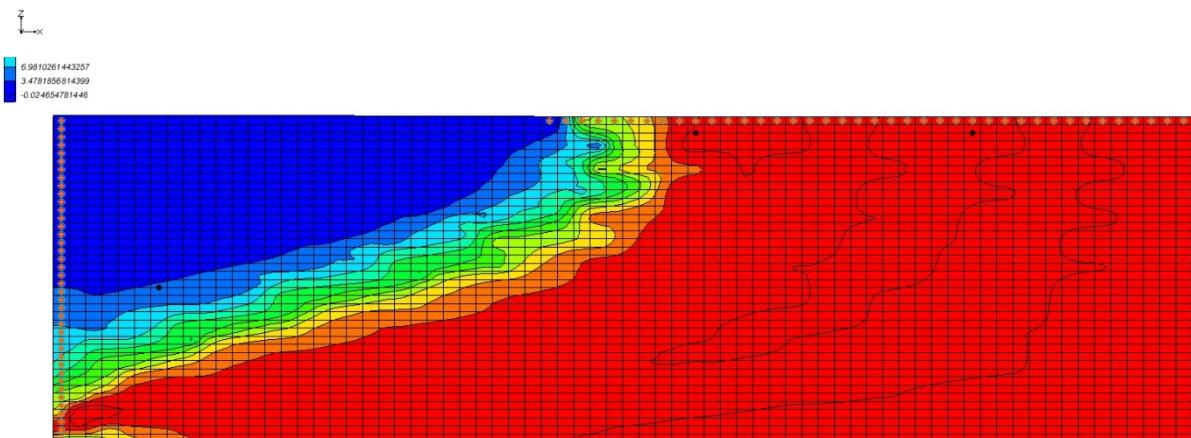
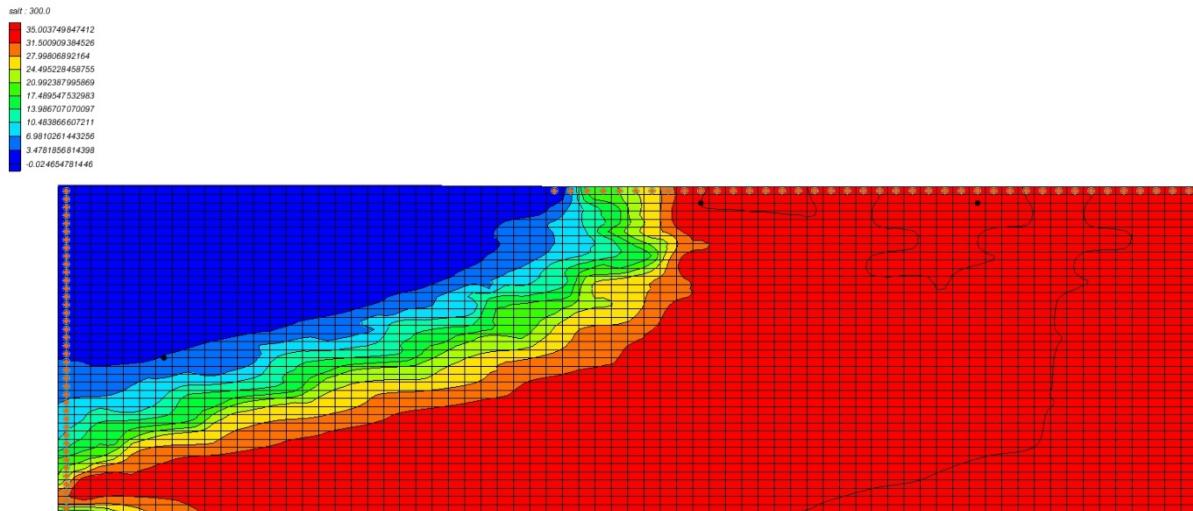




Increase of K differences (1 to 0.01 low K layers) H5



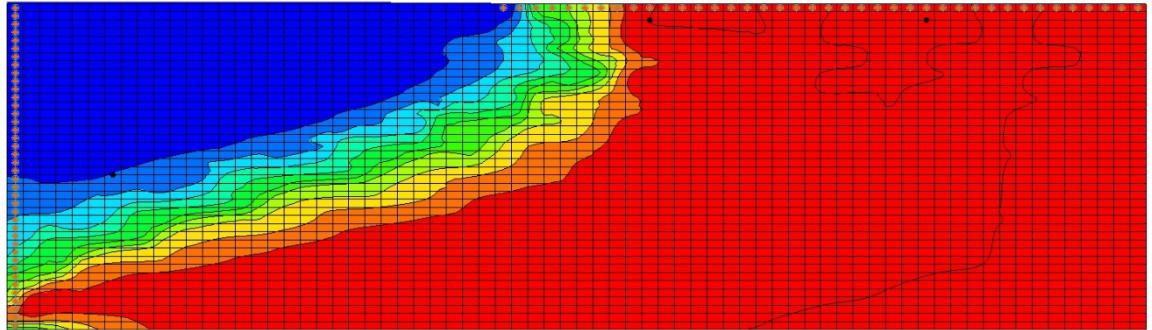
Increase anisotropy (3 to 10)



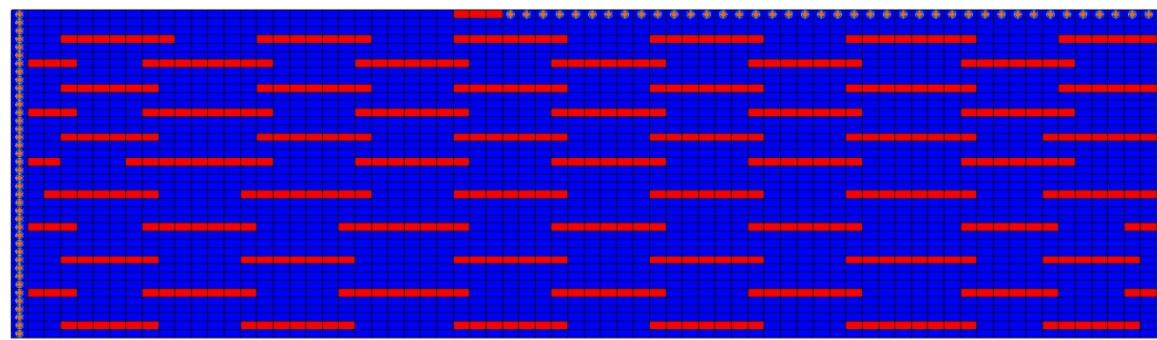
# Longer low K layers

soft : 300.0

35.003749847412  
31.500909384526  
27.9980692164  
24.495228458755  
20.992387995869  
17.489547532983  
13.986707070097  
10.483866607211  
6.981026144256  
3.4781856814398  
-0.024654781446

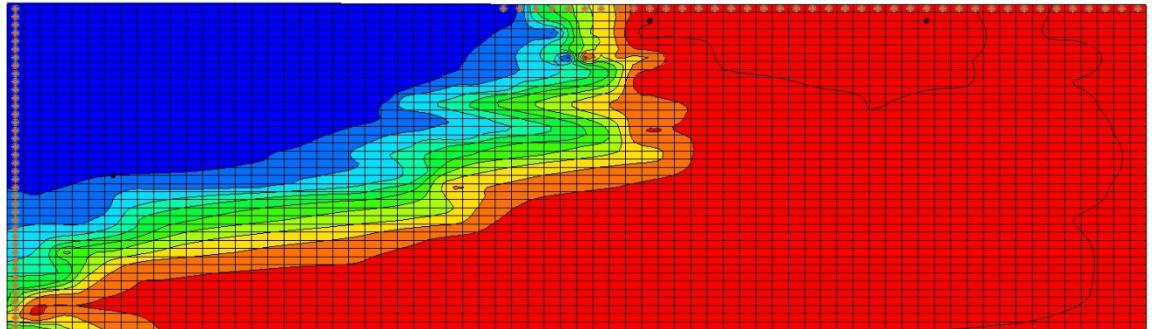


HK  
35.003749847412  
31.500909384526  
27.9980692164  
24.495228458755  
20.992387995869  
17.489547532983  
13.986707070097  
10.483866607211  
6.981026144256  
3.4781856814398  
-0.024654781446

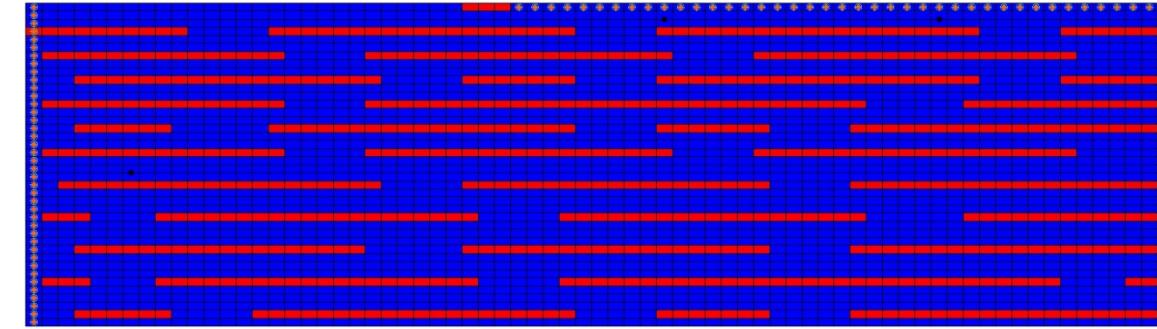


soft : 300.0

35.003749847412  
31.500909384526  
27.9980692164  
24.495228458755  
20.992387995869  
17.489547532983  
13.986707070097  
10.483866607211  
6.981026144256  
3.4781856814398  
-0.024654781446



HK  
35.003749847412  
31.500909384526  
27.9980692164  
24.495228458755  
20.992387995869  
17.489547532983  
13.986707070097  
10.483866607211  
6.981026144256  
3.4781856814398  
-0.024654781446



## Comparison EC transects measured VS modelling

