



GAME
Global Aquatic Microbial Ecology



Microbial abundance,
biomass and productivity
in water column and sediment

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GAME

Growing of the Arctic Marine Ecosystem



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Microbial abundance,
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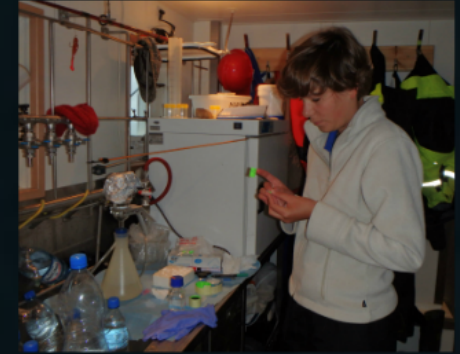


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Material and Methods



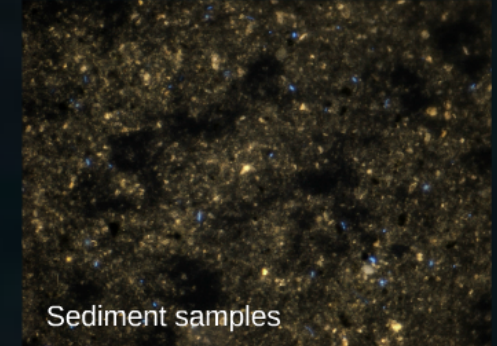
Total bacterial number (TBN),
Average cell volume (ACV)
Biomass (BBM),
Morphological form (MF)

Stained DAPI (4',6-diamidino-2-phenylindole)
for direct count method (Porter & Feig 1980).

Nikon Eclipse 80i (1000-fold magnification).
Digital camera Nikon DS-5 Mc-U2
Programs Nis-elements and MultiScan v.14.02
Macrodefinition (Świątecki, 1997).

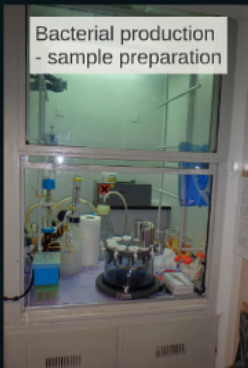


Water samples



Sediment samples

Bacterial production
- sample preparation



Bacterial production
- sample preparation

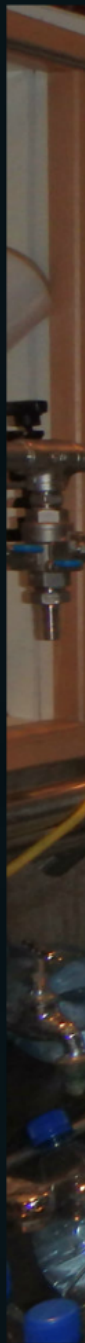


Scintillation counter Beckmann LS 6000IC



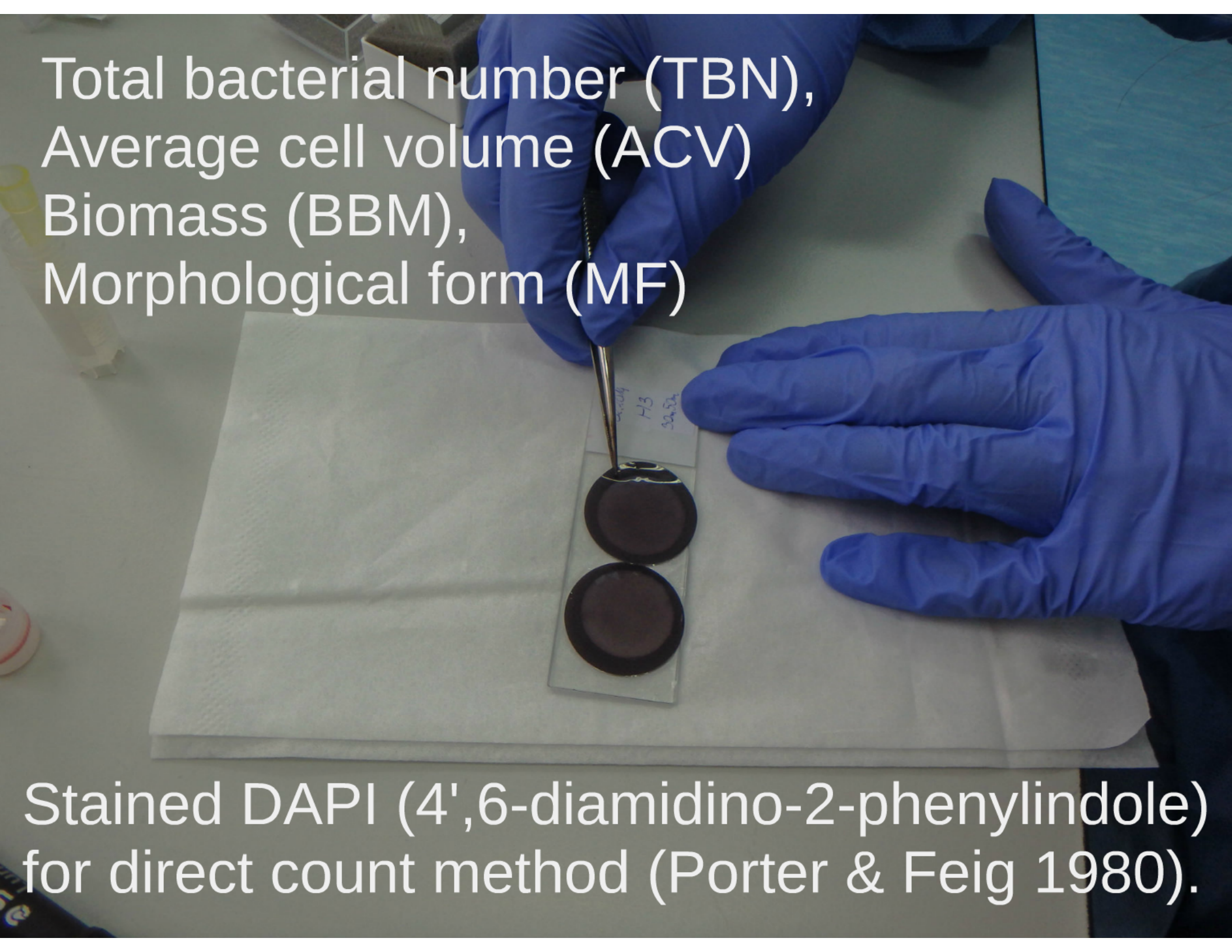


nd





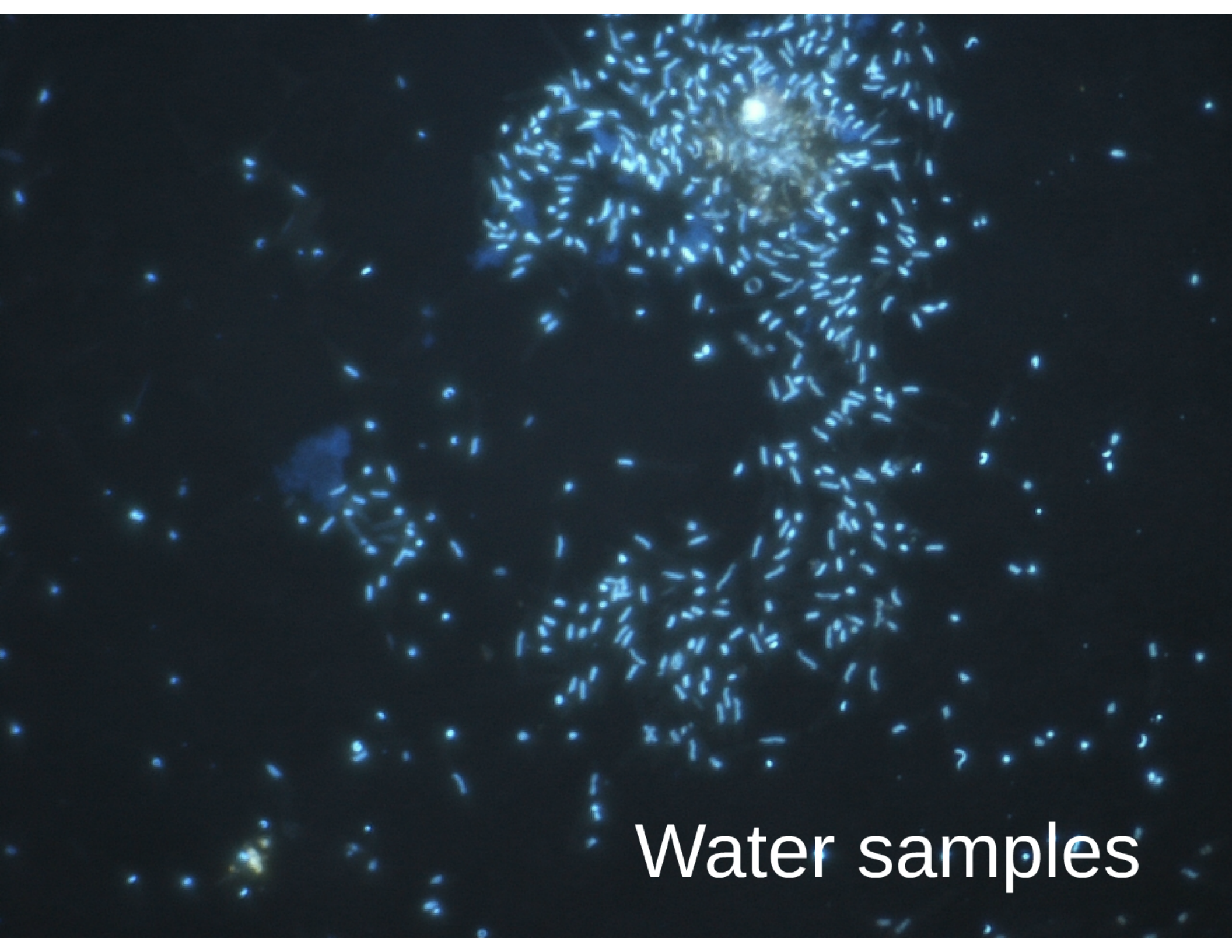
Total bacterial number (TBN),
Average cell volume (ACV)
Biomass (BBM),
Morphological form (MF)

A person wearing blue nitrile gloves is performing a laboratory procedure. They are using tweezers to hold a glass slide with two circular coverslips over a petri dish. The slide has handwritten labels 'H3' and '32.52'. The petri dish contains a dark, opaque substance. The background is a light-colored surface, possibly a lab bench, with a white paper towel and a blue folder visible.

Stained DAPI (4',6-diamidino-2-phenylindole)
for direct count method (Porter & Feig 1980).

Nikon Eclipse 80i (1000-fold magnification).
Digital camera Nikon DS-5 Mc-U2
Programs Nis -elements and MultiScan v.14.02
Macrodefinition (Świątecki, 1997).





Water samples



Sediment samples

Bacterial production - sample preparation



Bacterial production - sample preparation



Scintillation counter Beckmann LS 6000IC



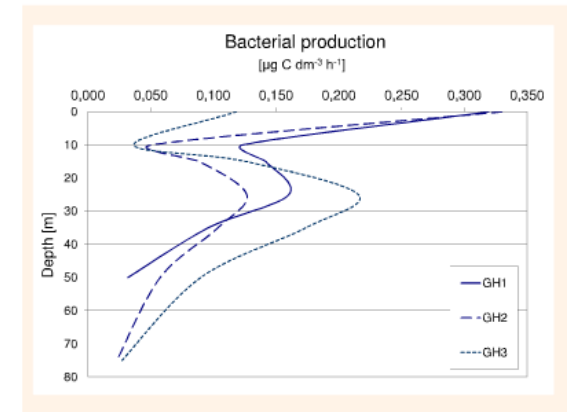
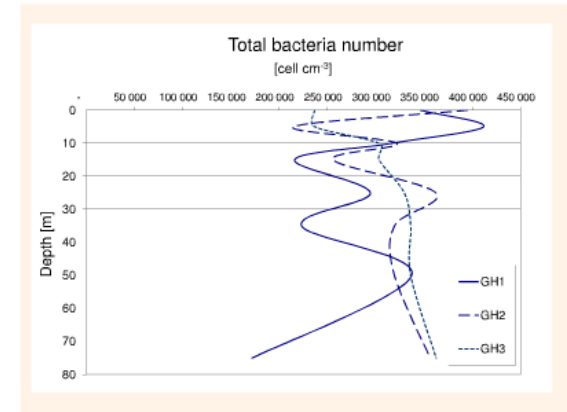
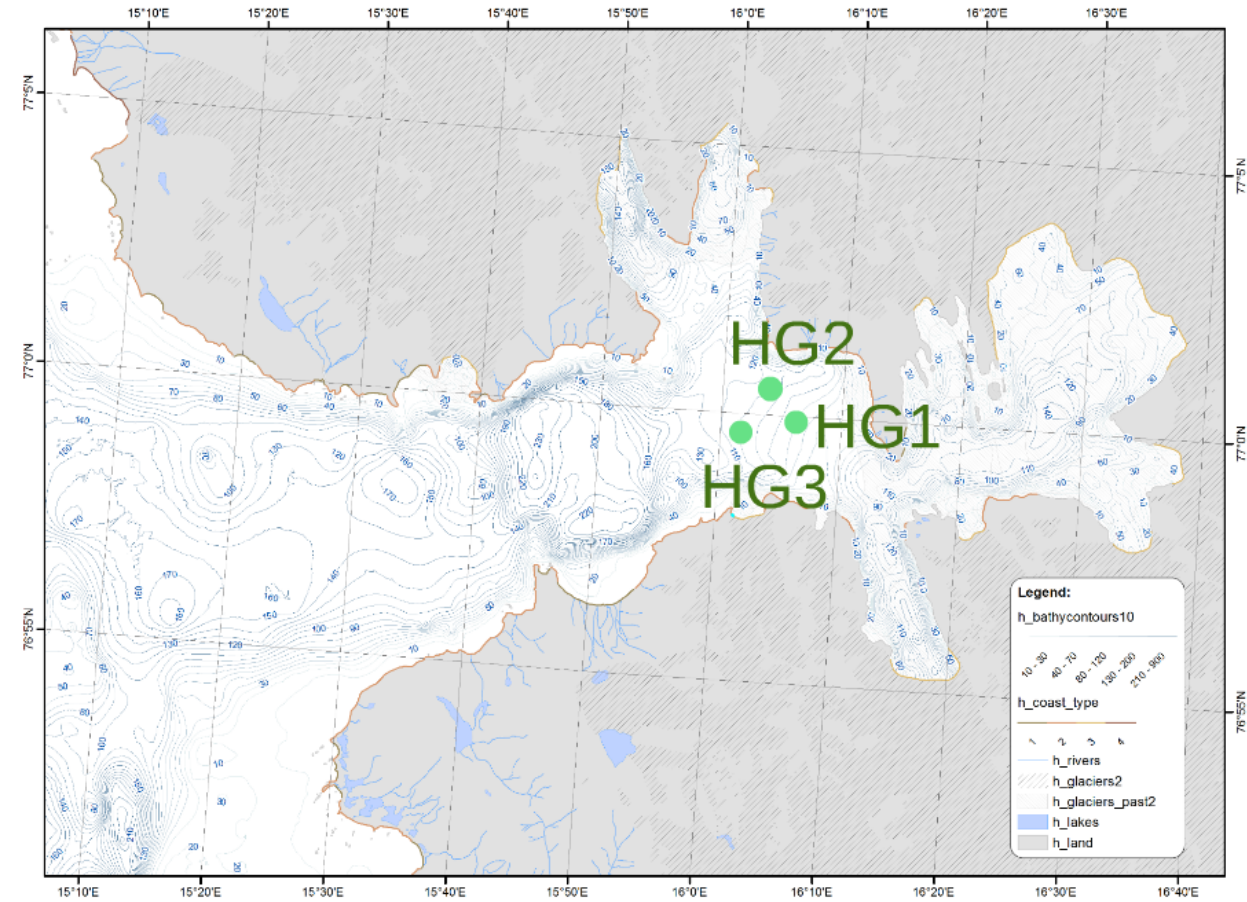


Microbial abundance,
biomass and productivity
in water column and sediment



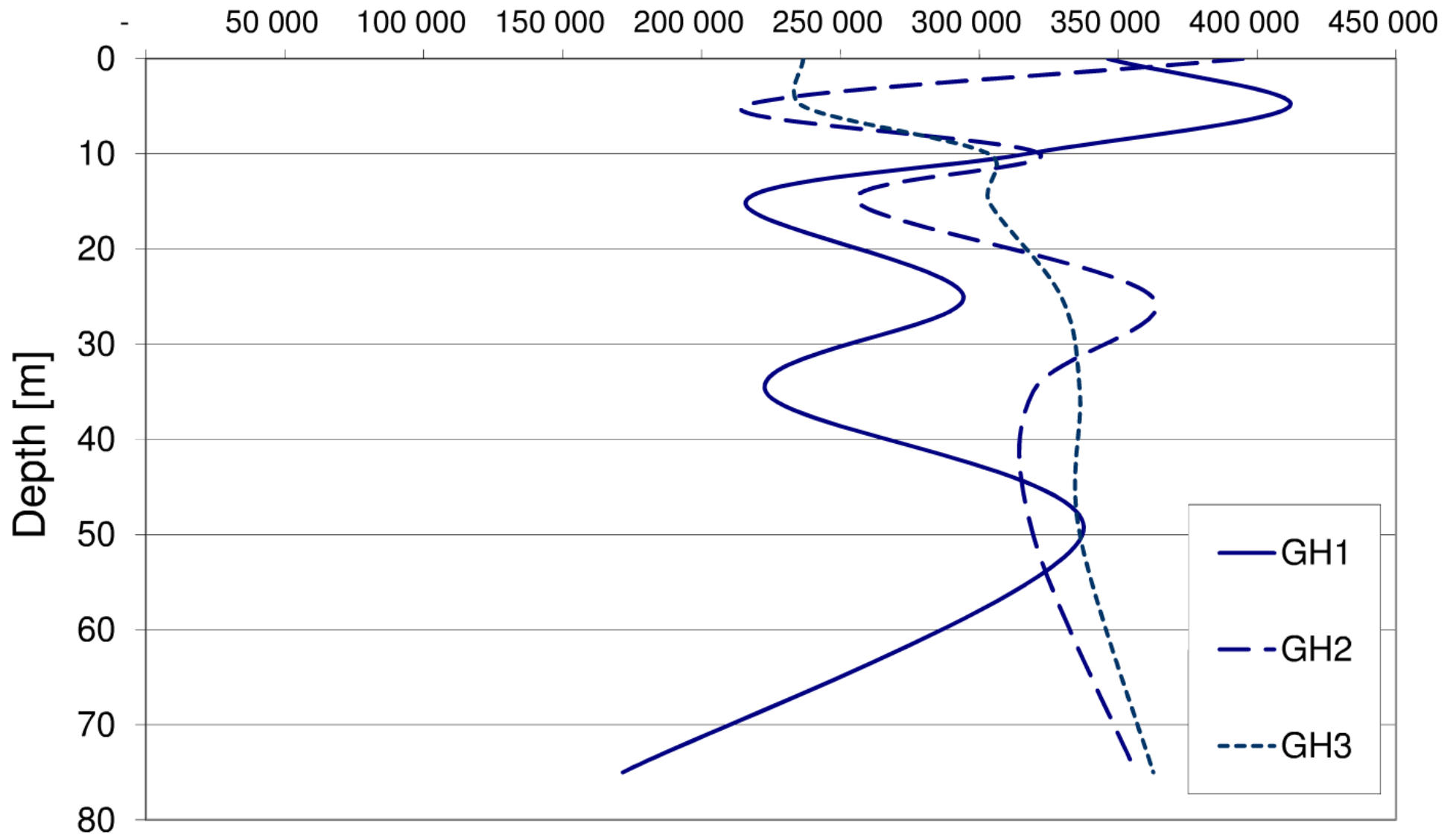
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Katarzyna Jankowska
Agnieszka Kalinowska





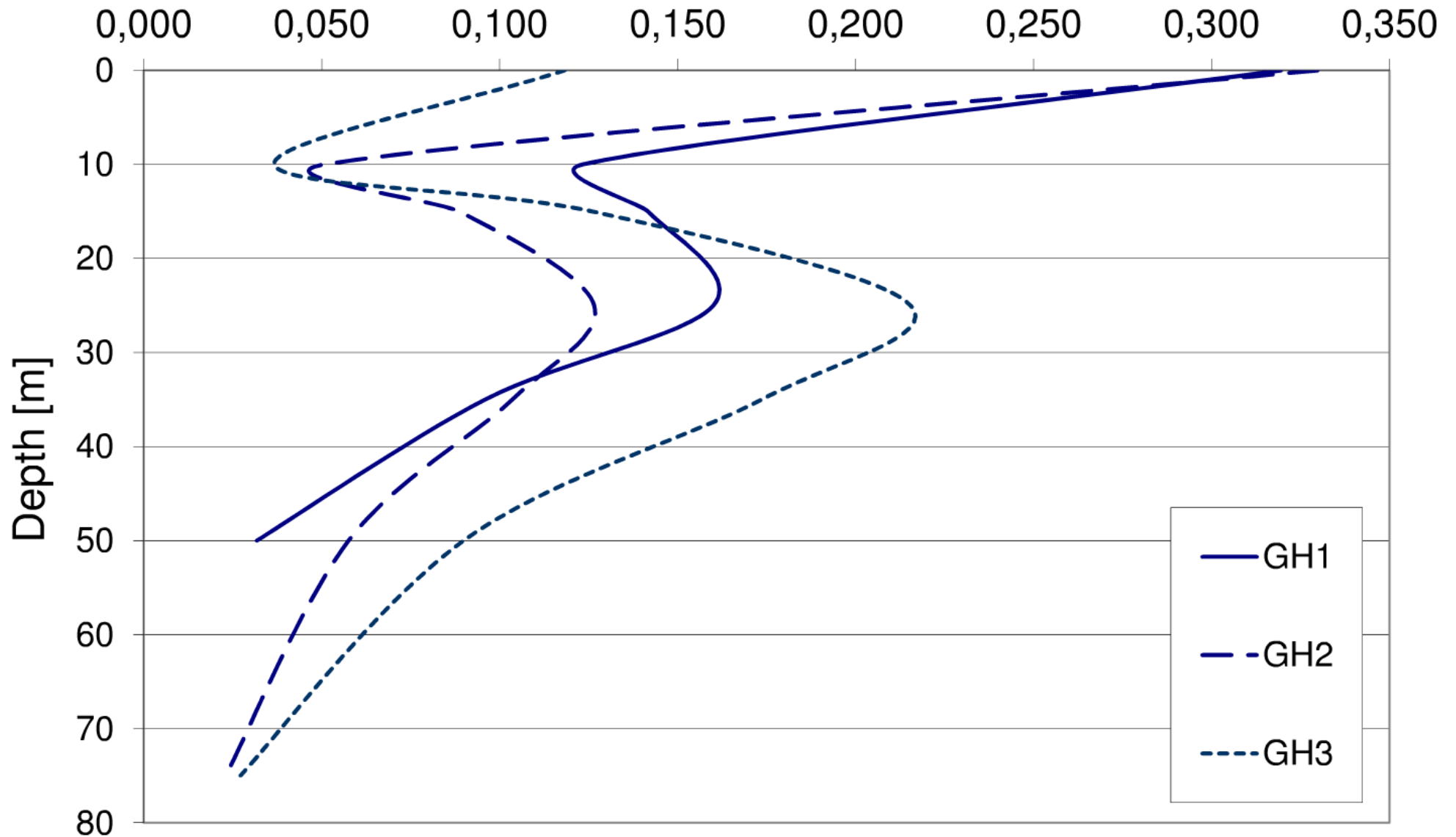
Total bacteria number

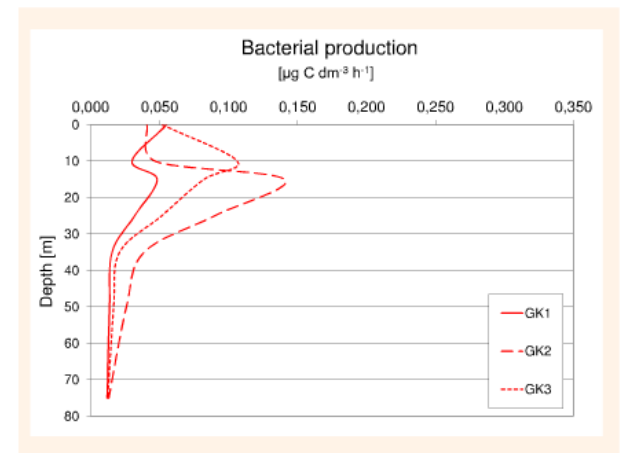
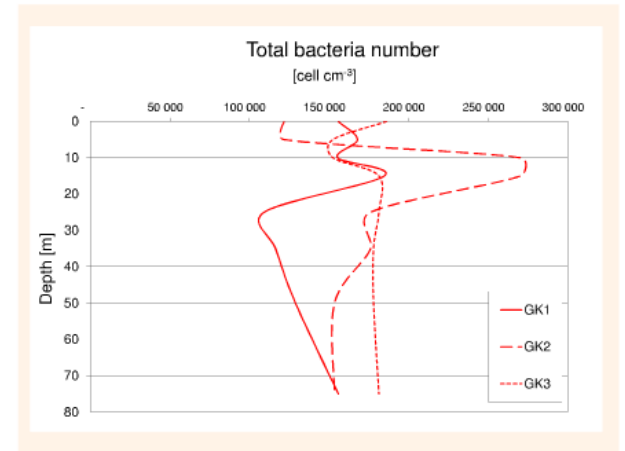
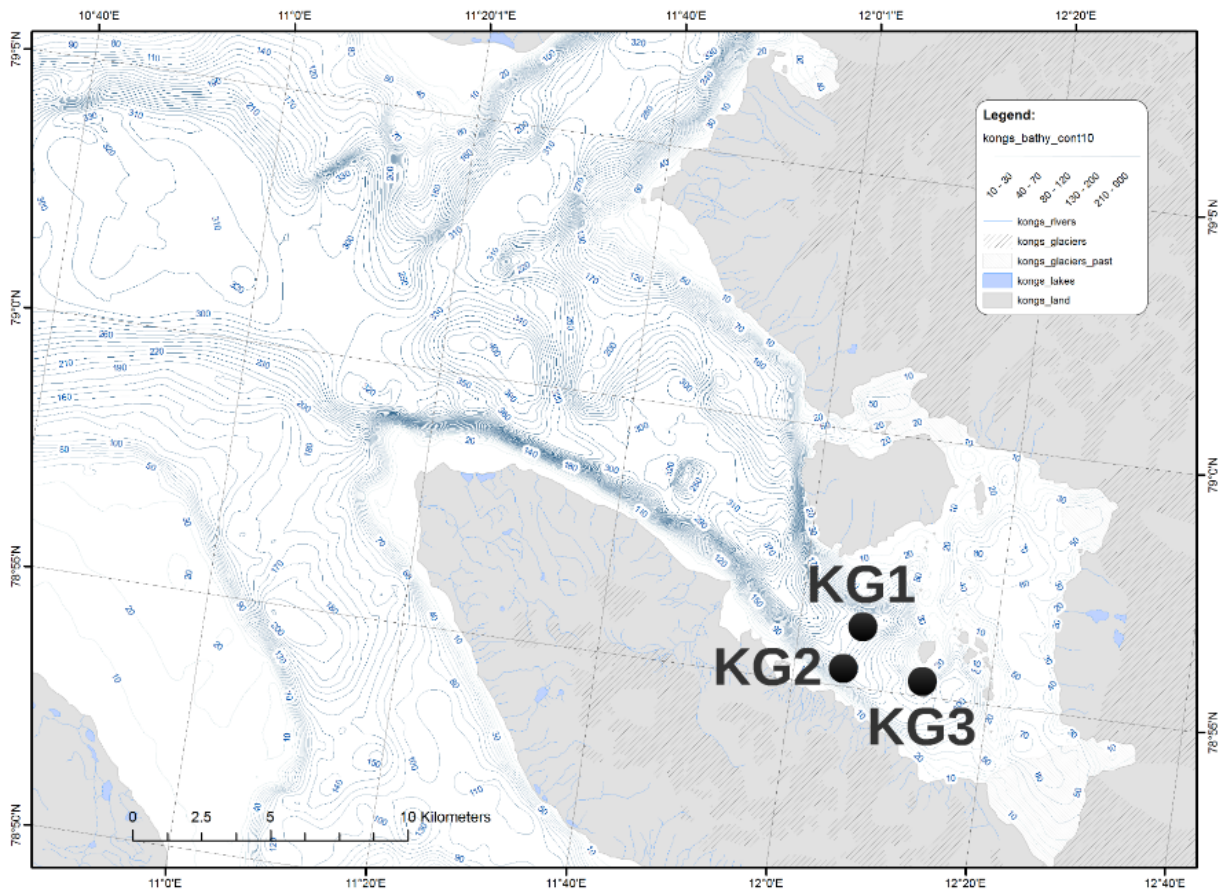
[cell cm⁻³]



Bacterial production

$[\mu\text{g C dm}^{-3} \text{ h}^{-1}]$





Total bacteria number

[cell cm⁻³]

50 000 100 000 150 000 200 000 250 000 300 000



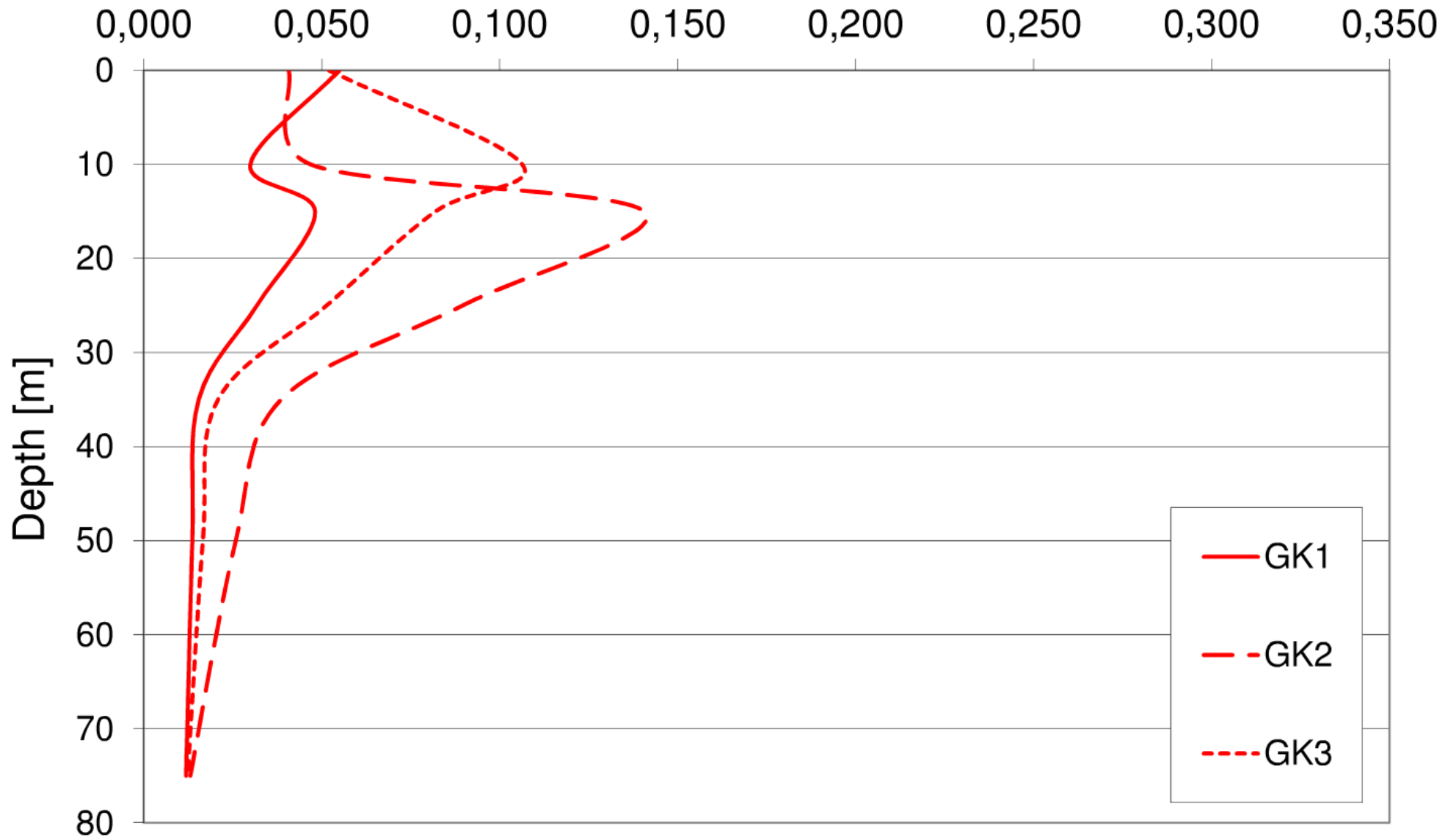
— GK1

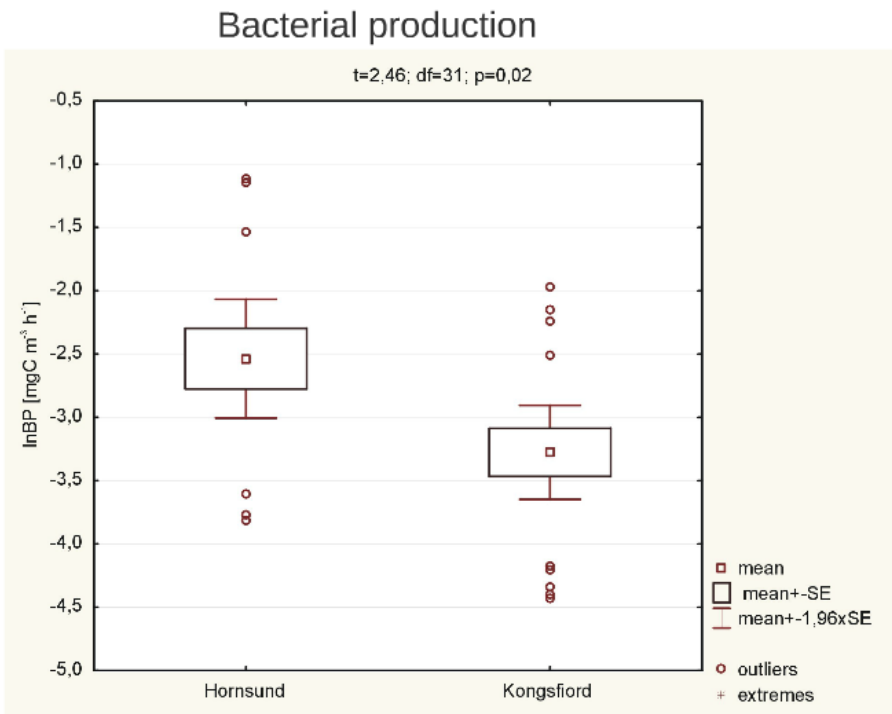
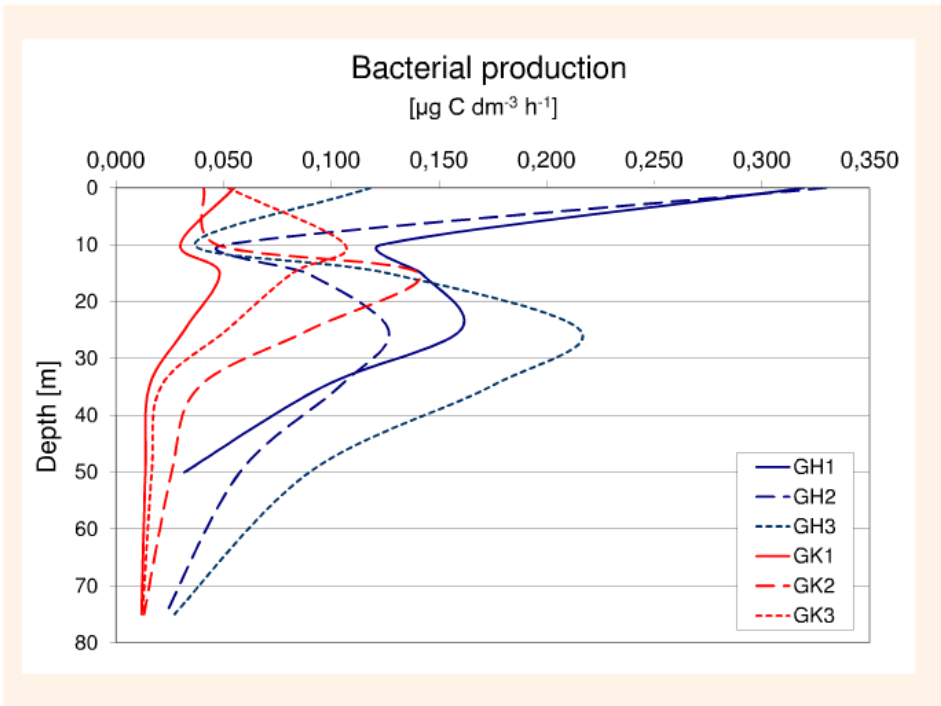
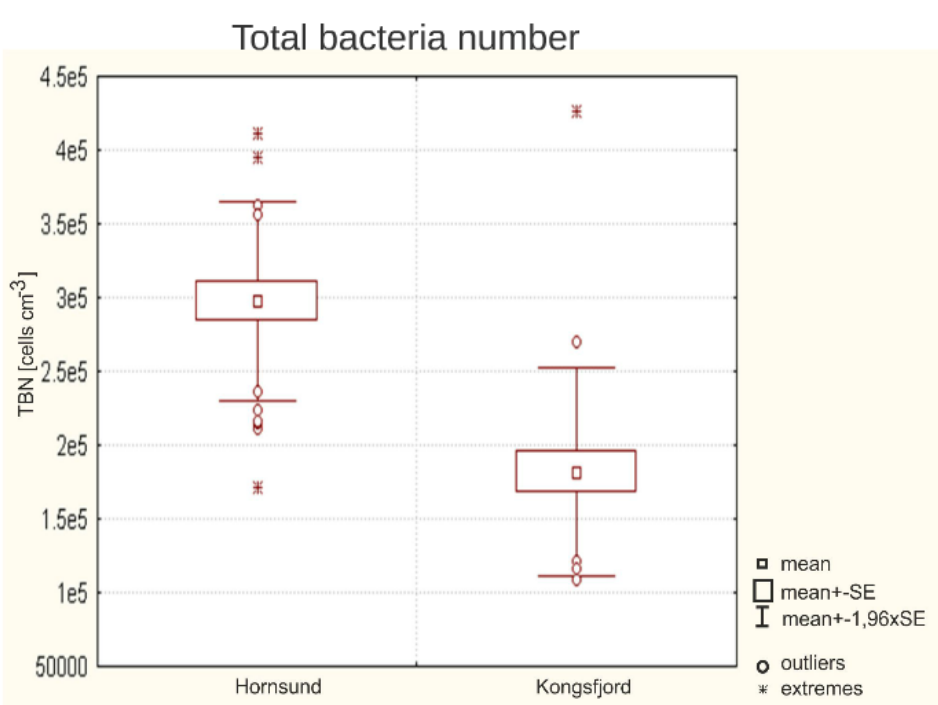
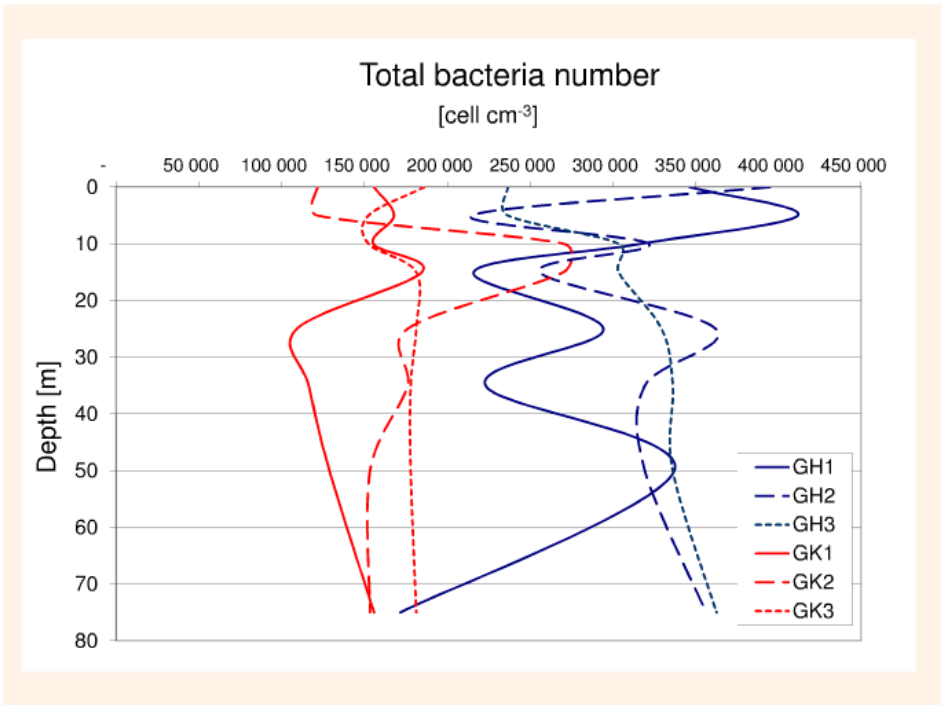
- - GK2

... GK3

Bacterial production

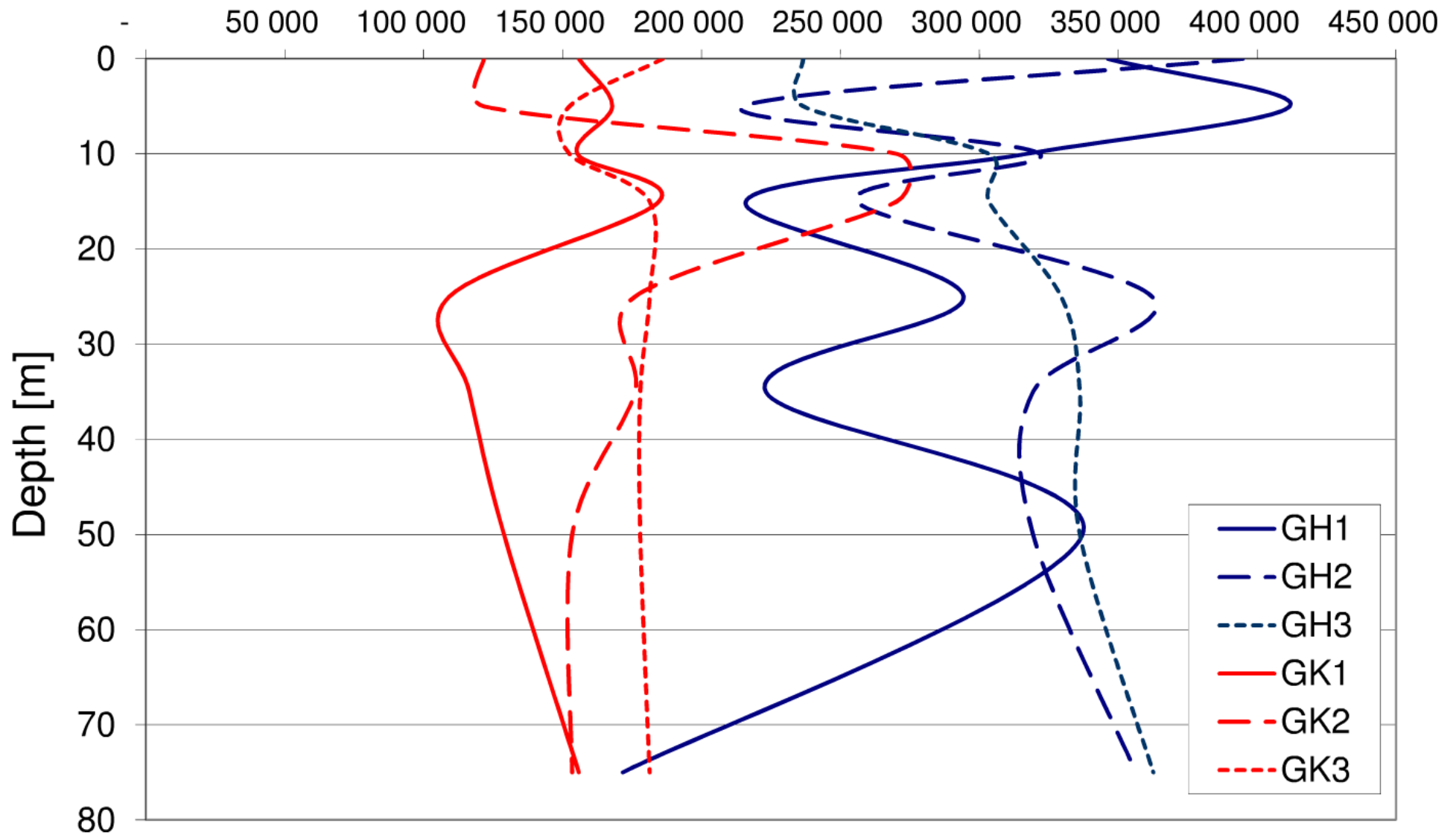
$[\mu\text{g C dm}^{-3} \text{ h}^{-1}]$



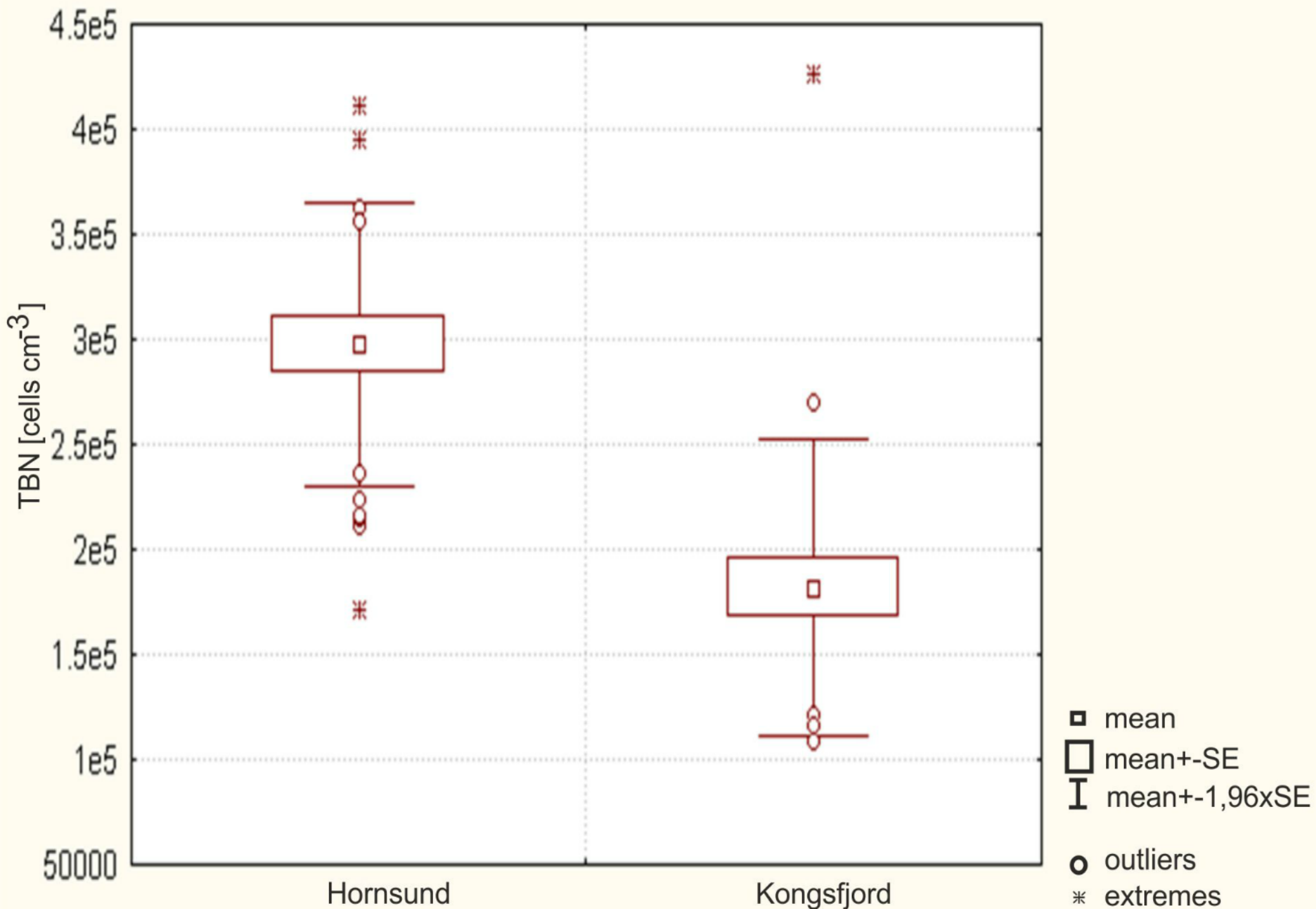


Total bacteria number

[cell cm⁻³]

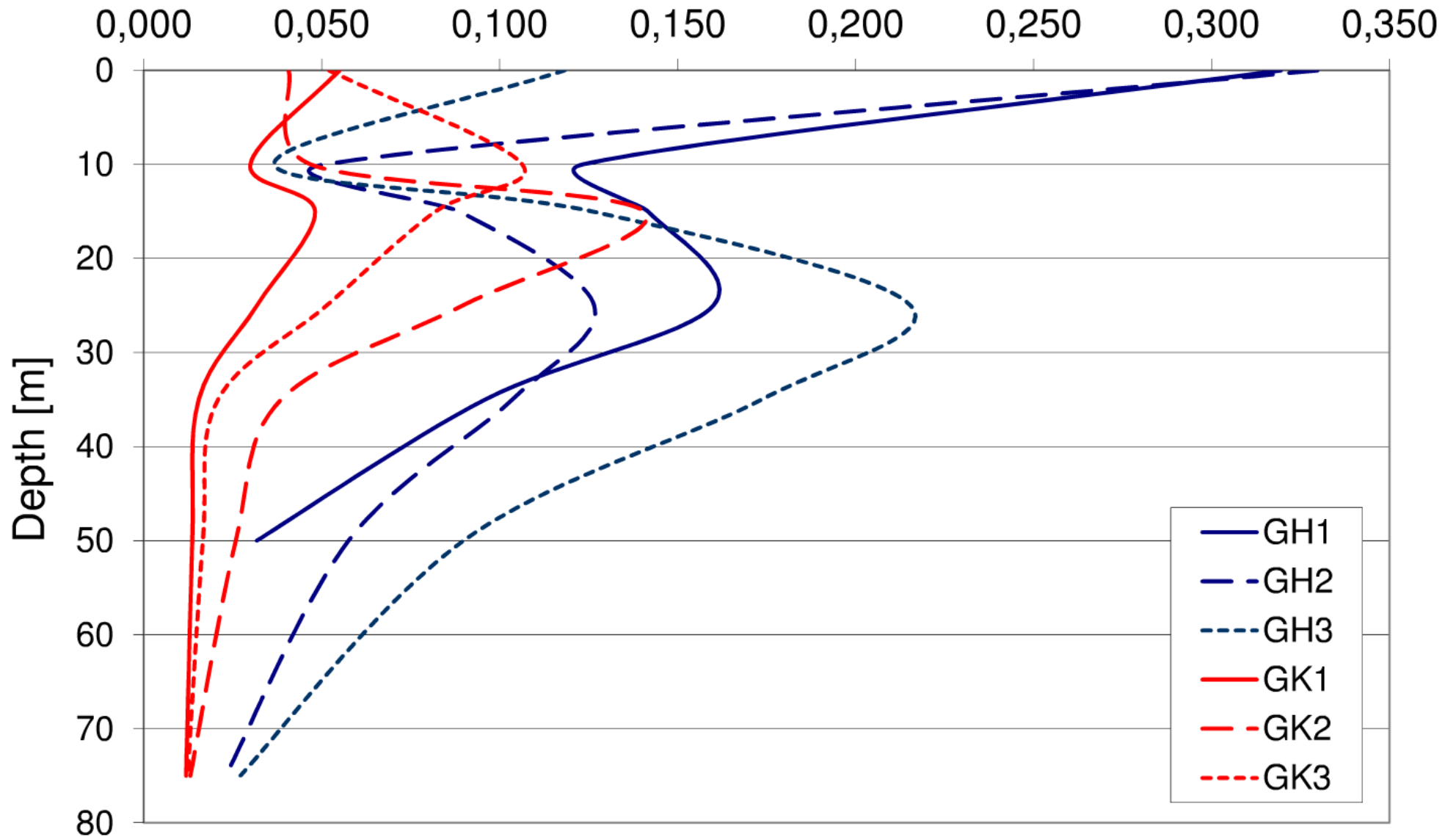


Total bacteria number



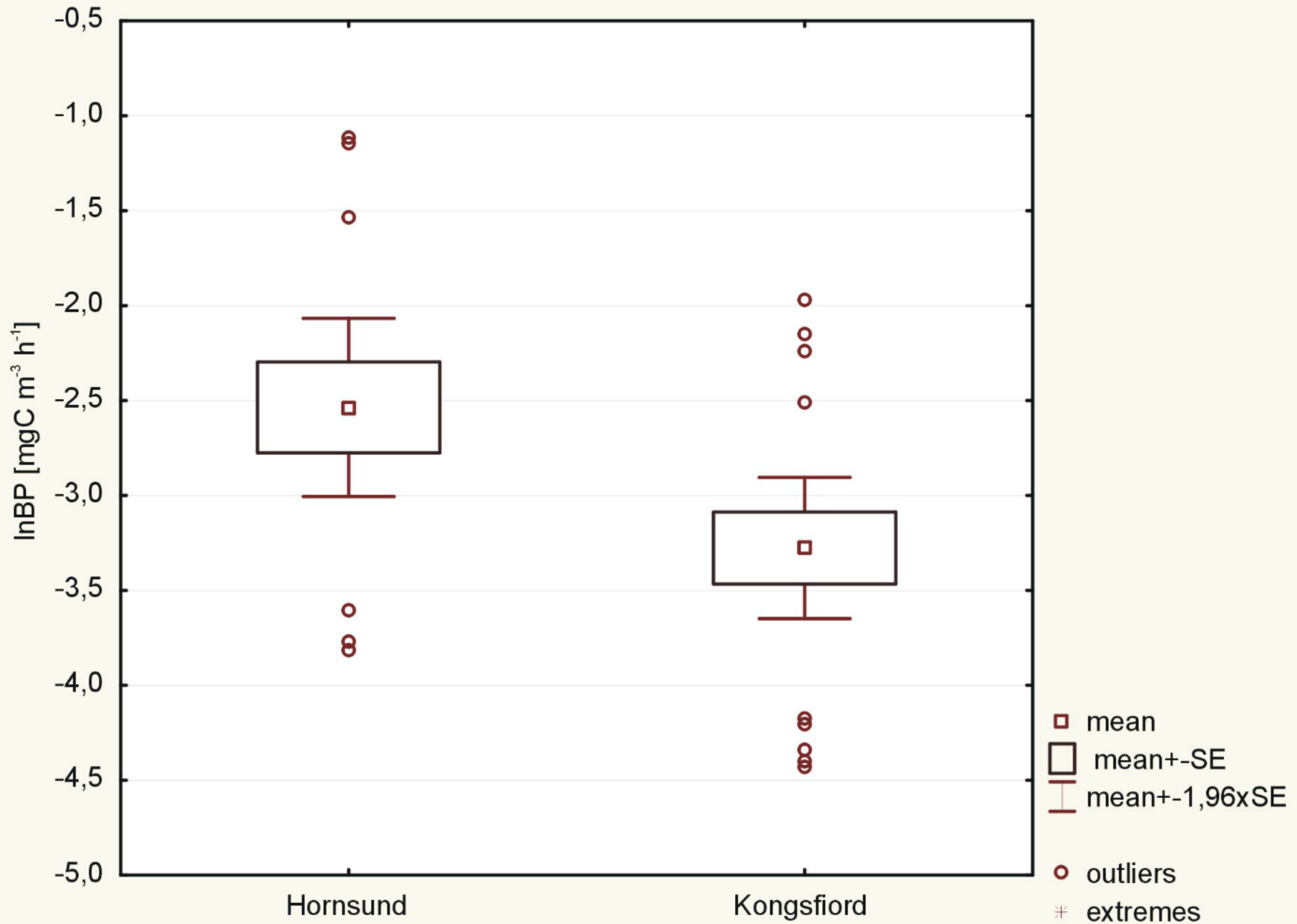
Bacterial production

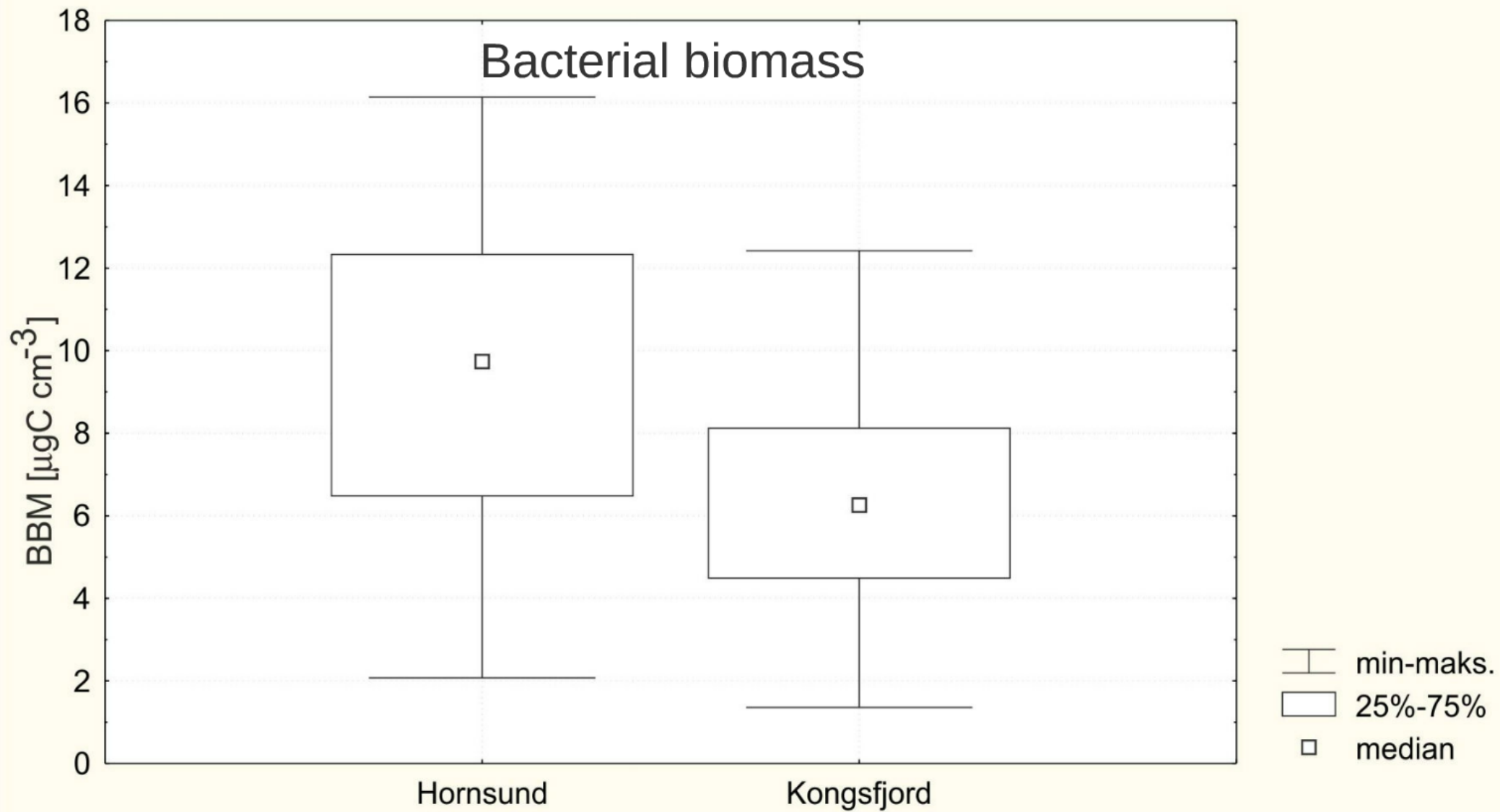
$[\mu\text{g C dm}^{-3} \text{ h}^{-1}]$

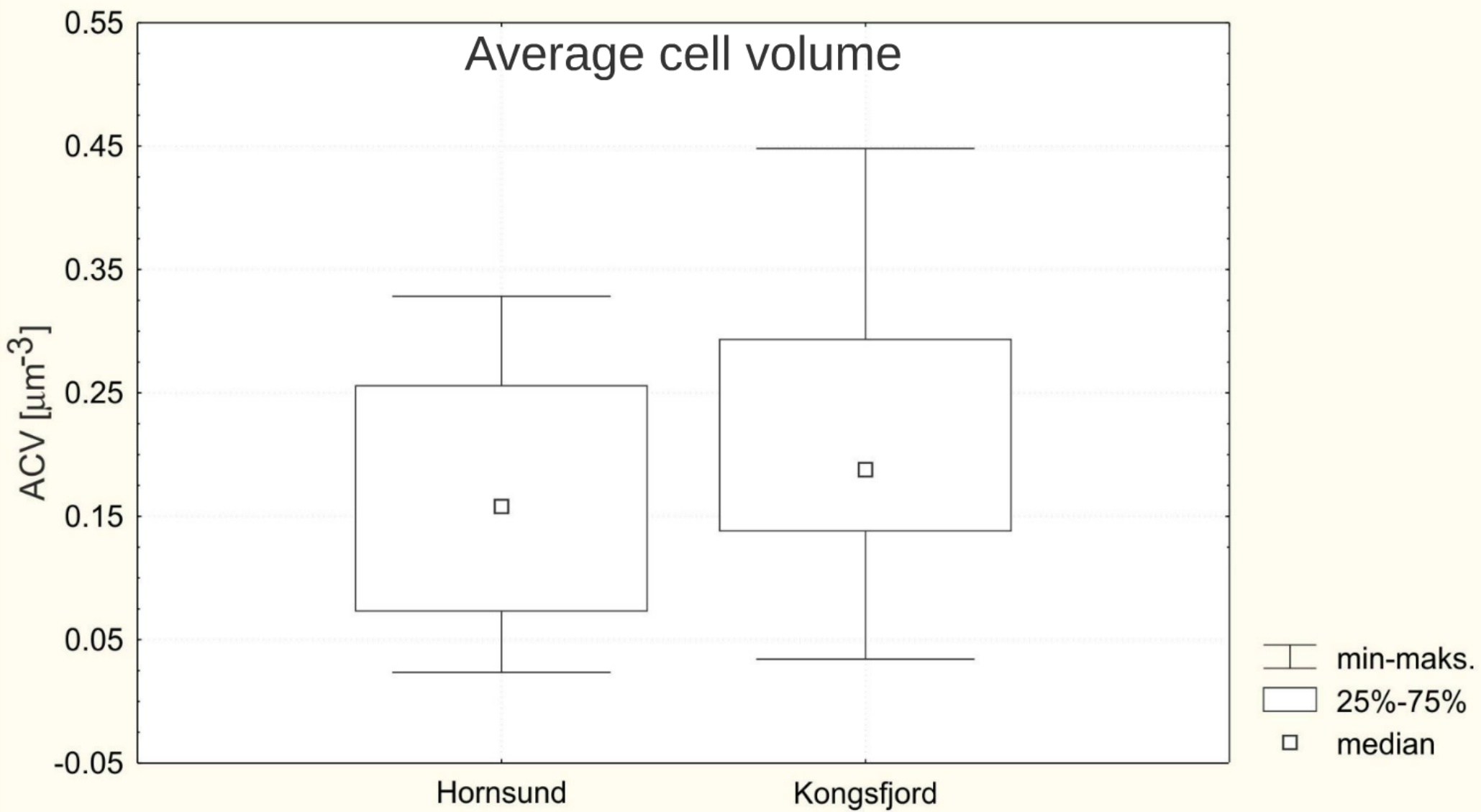


Bacterial production

t=2,46; df=31; p=0,02



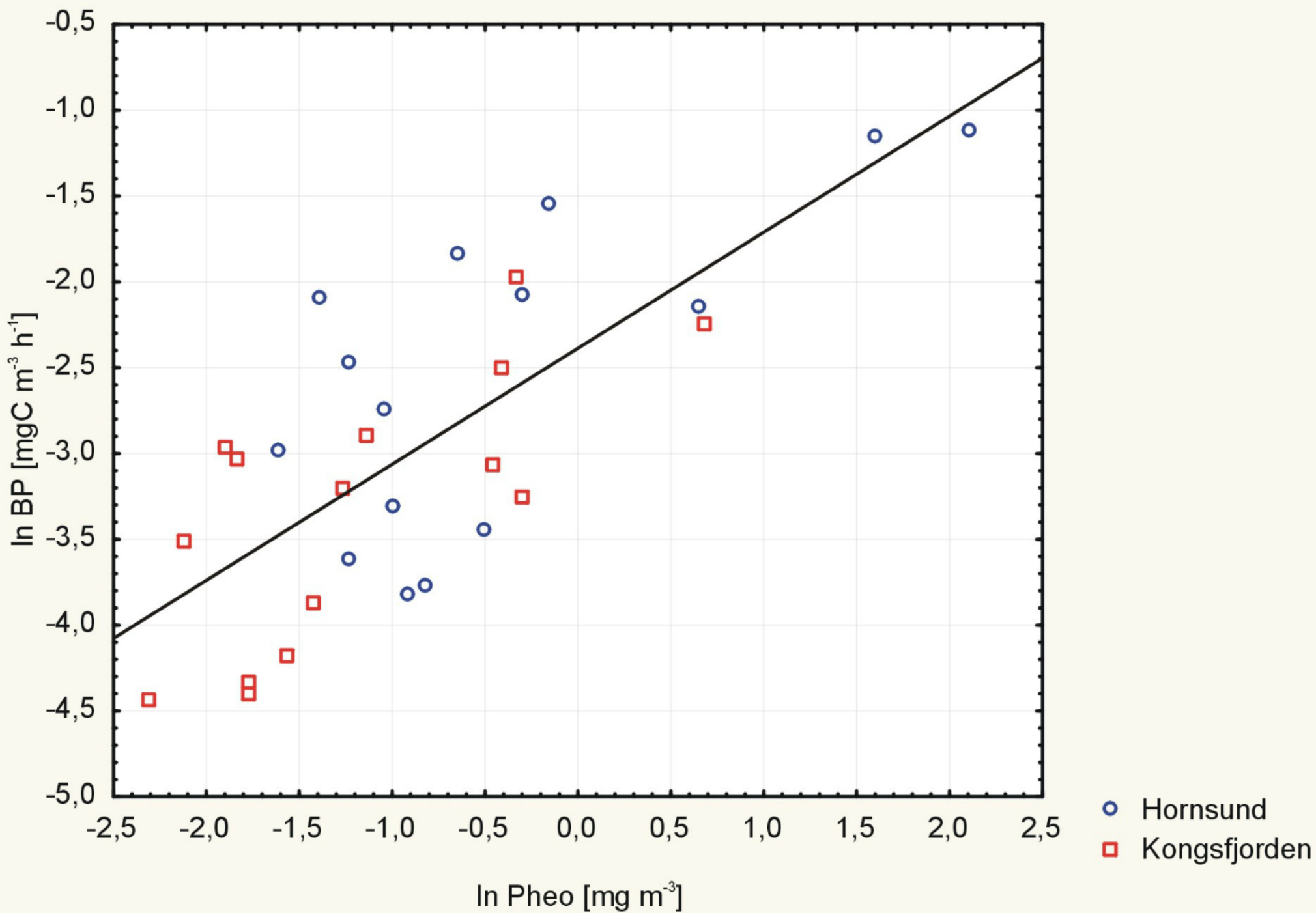




Single regression in separate fjords and in all material bacterial production versus different variables.

Parameter	Hornsund N=15		Kongsfjorden N=18		Both fjords N=33	
	R ² /R ² adj	p	R ² /R ² adj	p	R ² /R ² adj	p
logPheoph	0,47/0,43	0,005	0,52/0,48	0,002	0,56/0,54	<0,001
eDIC	0,52/0,48	0,002	0,33/0,28	0,01	0,45/0,43	<0,001
logChlor		ns		ns	0,20/0,17	0,024
temperature	0,57/0,54	0,001		ns	0,13/0,10	0,037
salinity	0,37/0,32	0,016		ns	0,30/0,27	0,001
logDOC		ns		ns	0,14/0,11	0,034
logPO4	0,32/0,27	0,03		ns		ns
logNO3	0,55/0,52	0,001		ns		ns
logNH4	0,55/0,52	0,001		ns		ns
logTBN		ns		ns	0,30/0,27	0,002
logBBM		ns	0,39/0,35	0,009	0,37/0,35	<0,001

In Pheo:ln BP: $y = -2,3784 + 0,6756*x$;
 $p = 0,00000$; $r^2 = 0,5577$; $N=30$

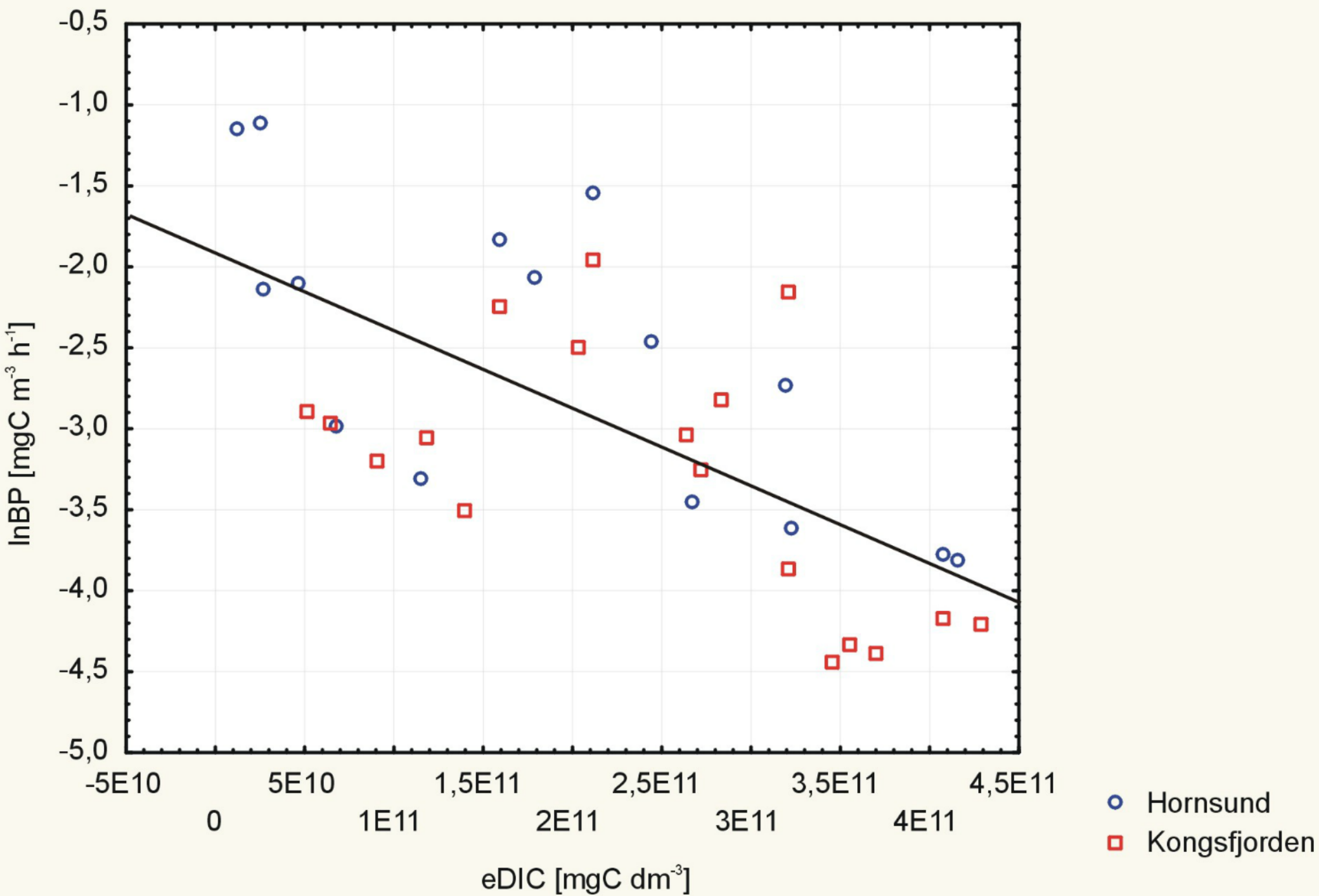


Single regression in separate fjords and in all material bacterial production versus different variables.

Parameter	Hornsund N=15		Kongsfjorden N=18		Both fjords N=33	
	R ² /R ² adj	p	R ² /R ² adj	p	R ² /R ² adj	p
logPheoph	0,47/0,43	0,005	0,52/0,48	0,002	0,56/0,54	<0,001
eDIC	0,52/0,48	0,002	0,33/0,28	0,01	0,45/0,43	<0,001
logChlor		ns		ns	0,20/0,17	0,024
temperature	0,57/0,54	0,001		ns	0,13/0,10	0,037
salinity	0,37/0,32	0,016		ns	0,30/0,27	0,001
logDOC		ns		ns	0,14/0,11	0,034
logPO4	0,32/0,27	0,03		ns		ns
logNO3	0,55/0,52	0,001		ns		ns
logNH4	0,55/0,52	0,001		ns		ns
logTBN		ns		ns	0,30/0,27	0,002
logBBM		ns	0,39/0,35	0,009	0,37/0,35	<0,001

eDIC:lnBP: $y = -1,8931 - 4,7821E-12*x;$

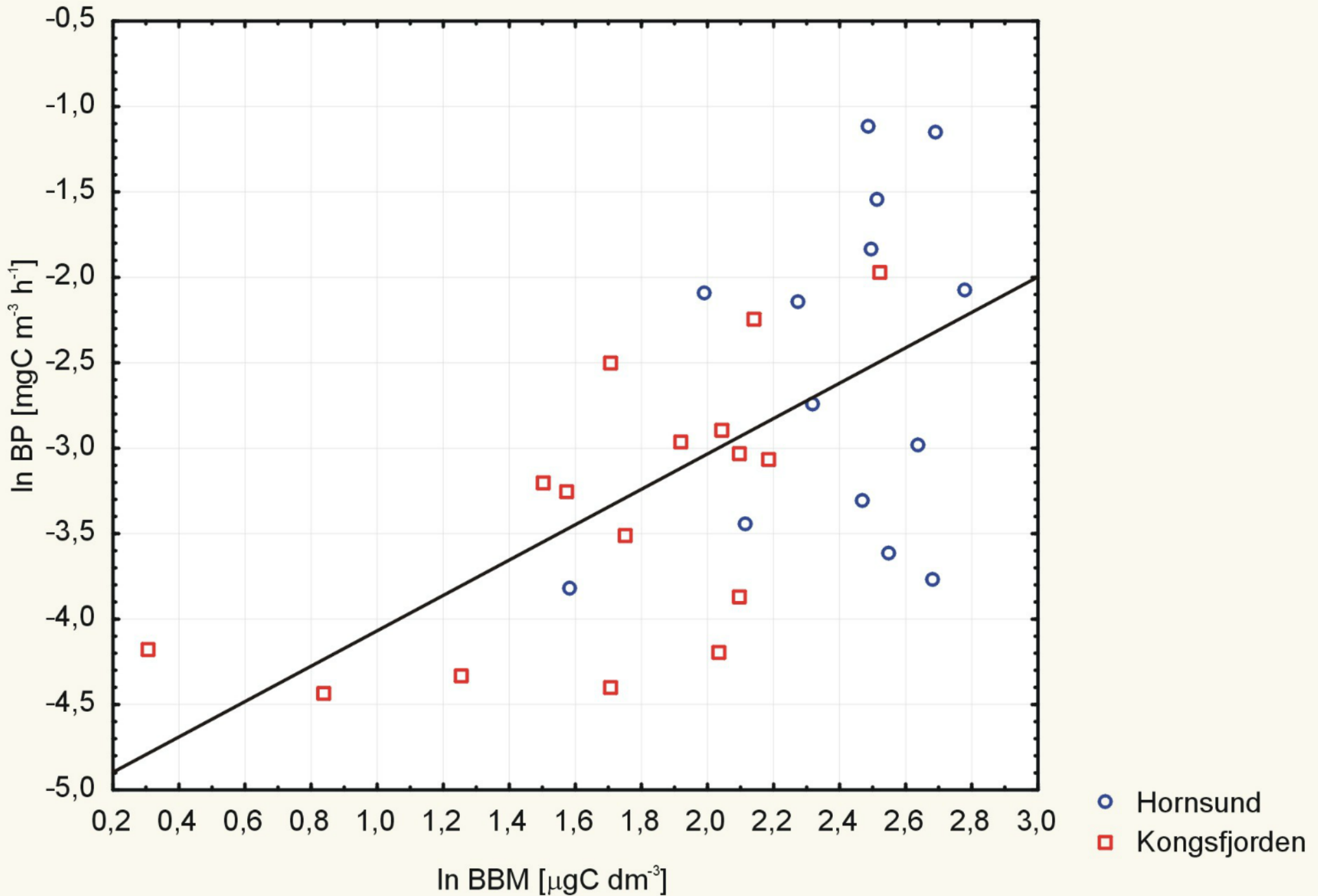
$\rho = 0,00002; R^2 = 0,4473; n=33$



Single regression in separate fjords and in all material bacterial production versus different variables.

Parameter	Hornsund N=15		Kongsfjorden N=18		Both fjords N=33	
	R ² /R ² adj	p	R ² /R ² adj	p	R ² /R ² adj	p
logPheoph	0,47/0,43	0,005	0,52/0,48	0,002	0,56/0,54	<0,001
eDIC	0,52/0,48	0,002	0,33/0,28	0,01	0,45/0,43	<0,001
logChlor		ns		ns	0,20/0,17	0,024
temperature	0,57/0,54	0,001		ns	0,13/0,10	0,037
salinity	0,37/0,32	0,016		ns	0,30/0,27	0,001
logDOC		ns		ns	0,14/0,11	0,034
logPO4	0,32/0,27	0,03		ns		ns
logNO3	0,55/0,52	0,001		ns		ns
logNH4	0,55/0,52	0,001		ns		ns
logTBN		ns		ns	0,30/0,27	0,002
logBBM		ns	0,39/0,35	0,009	0,37/0,35	<0,001

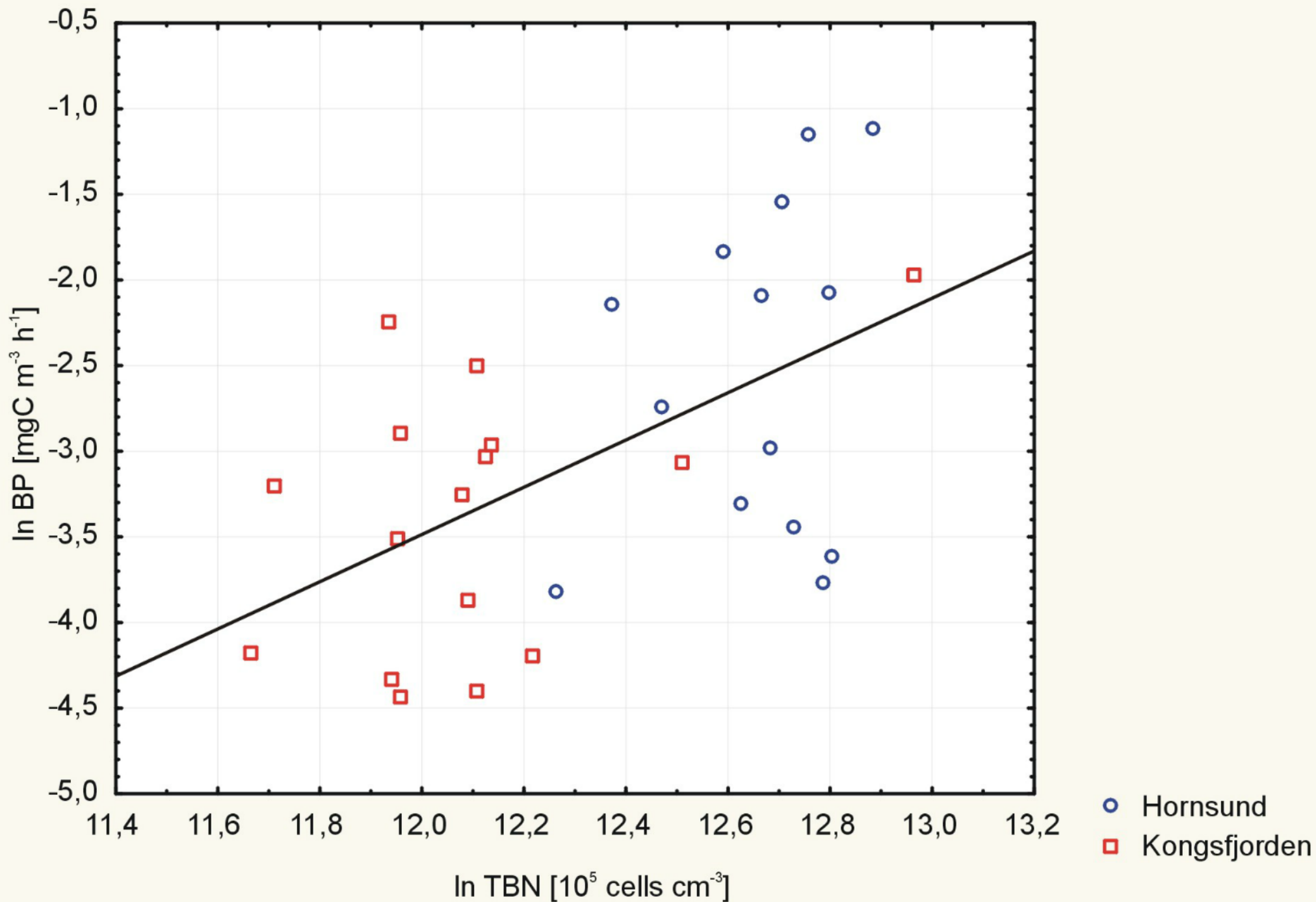
$\ln \text{BBM}:\ln \text{BP}: y = -5,0904 + 1,0303*x;$
 $p = 0,0003; r^2 = 0,3721; n=30$



Single regression in separate fjords and in all material bacterial production versus different variables.

Parameter	Hornsund N=15		Kongsfjorden N=18		Both fjords N=33	
	R ² /R ² adj	p	R ² /R ² adj	p	R ² /R ² adj	p
logPheoph	0,47/0,43	0,005	0,52/0,48	0,002	0,56/0,54	<0,001
eDIC	0,52/0,48	0,002	0,33/0,28	0,01	0,45/0,43	<0,001
logChlor		ns		ns	0,20/0,17	0,024
temperature	0,57/0,54	0,001		ns	0,13/0,10	0,037
salinity	0,37/0,32	0,016		ns	0,30/0,27	0,001
logDOC		ns		ns	0,14/0,11	0,034
logPO4	0,32/0,27	0,03		ns		ns
logNO3	0,55/0,52	0,001		ns		ns
logNH4	0,55/0,52	0,001		ns		ns
logTBN		ns		ns	0,30/0,27	0,002
logBBM		ns	0,39/0,35	0,009	0,37/0,35	<0,001

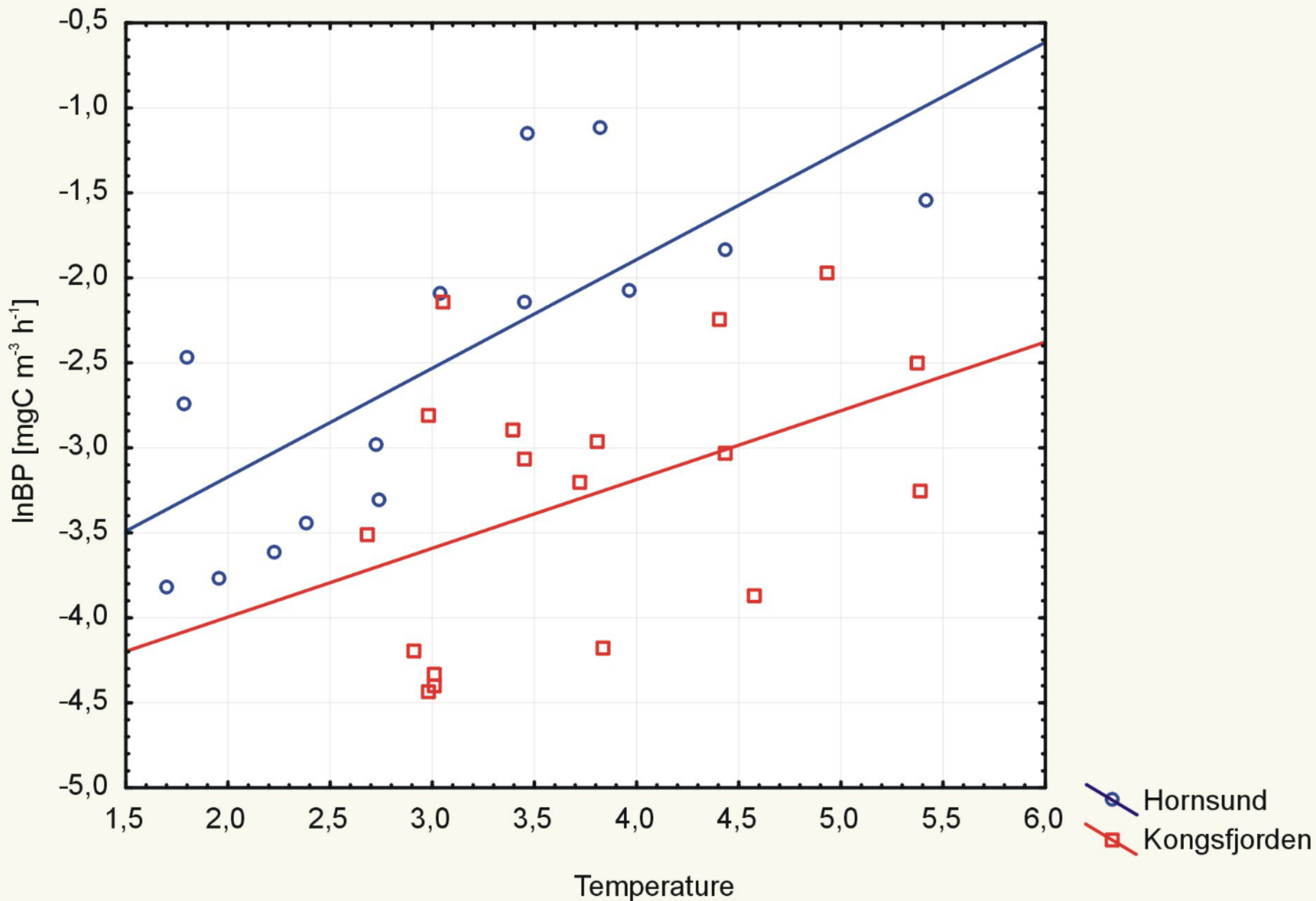
$\ln \text{TBN} : \ln \text{BP} : y = -20,0862 + 1,3843 * x;$
 $p = 0,0018; r^2 = 0,2980$



Single regression in separate fjords and in all material bacterial production versus different variables.

Parameter	Hornsund N=15		Kongsfjorden N=18		Both fjords N=33	
	R ² /R ² adj	p	R ² /R ² adj	p	R ² /R ² adj	p
logPheoph	0,47/0,43	0,005	0,52/0,48	0,002	0,56/0,54	<0,001
eDIC	0,52/0,48	0,002	0,33/0,28	0,01	0,45/0,43	<0,001
logChlor		ns		ns	0,20/0,17	0,024
temperature	0,57/0,54	0,001		ns	0,13/0,10	0,037
salinity	0,37/0,32	0,016		ns	0,30/0,27	0,001
logDOC		ns		ns	0,14/0,11	0,034
logPO4	0,32/0,27	0,03		ns		ns
logNO3	0,55/0,52	0,001		ns		ns
logNH4	0,55/0,52	0,001		ns		ns
logTBN		ns		ns	0,30/0,27	0,002
logBBM		ns	0,39/0,35	0,009	0,37/0,35	<0,001

Hornsund ln BP = $-4,4496+0,6392*x$; $p=0,001$; $r^2=0,57$; $n=15$
Kongsfjorden ln BP = $-4,8044+0,4046*x$; $p=0,067$; $r^2=0,20$; $n=18$



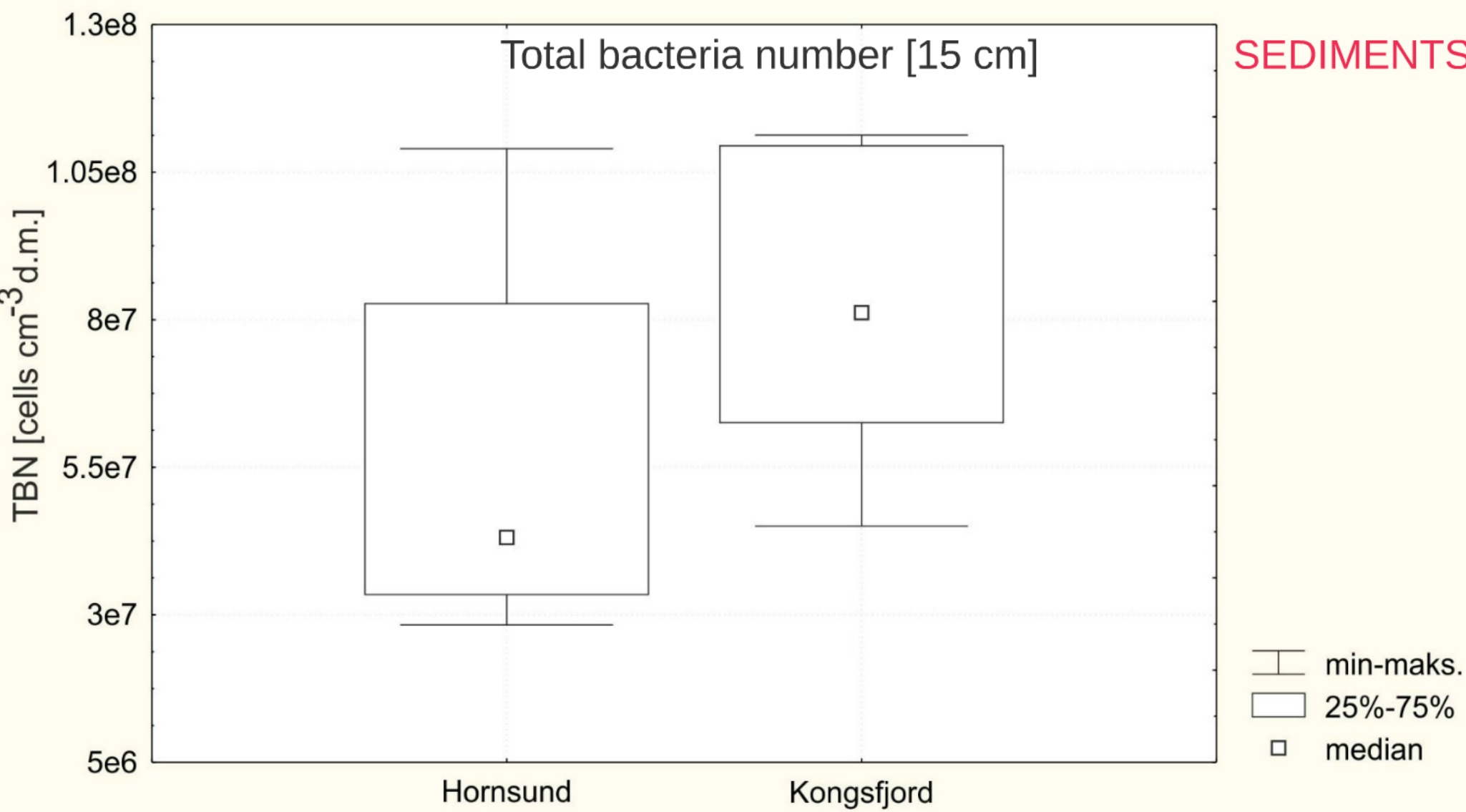
Multiple regression in both fjords

- bacterial production versus different variables.

	Term	Estim.	SE	t-Ratio	Prob >t	R ² /R ² adj	p	n
log BP	Intercept	-16,725	4,935	-3,389	0,003	0,84/0,80	<0,00001	25
	Temp	0,368	0,103	3,582	0,002			
	salinity	0,437	0,158	2,765	0,012			
	logNH4	0,190	0,067	2,847	0,010			
	eDIC	-0,001	0,001	-4,544	<0,001			
	logFeofit	0,424	0,111	3,805	0,001			

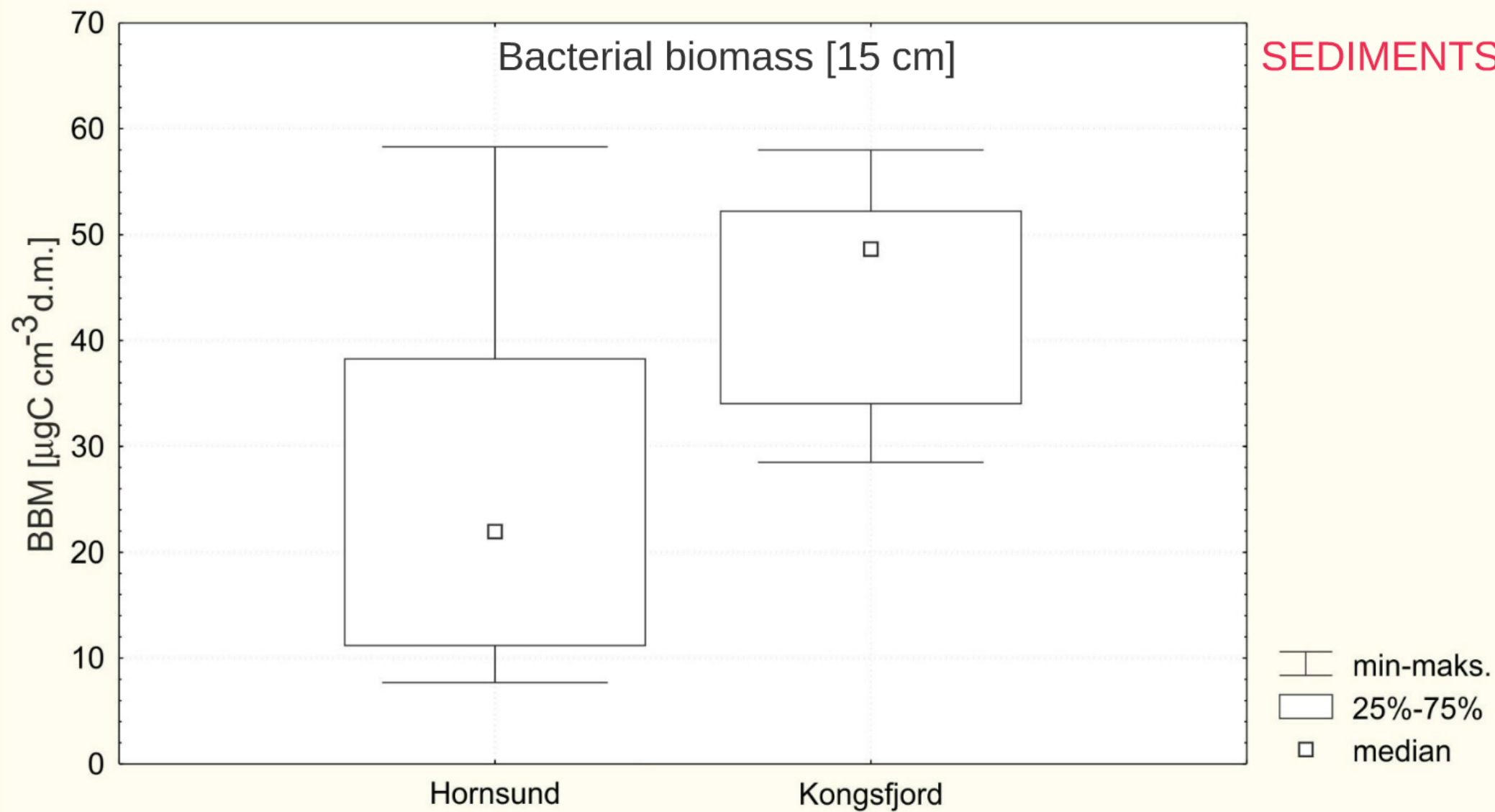
SEDIMENTS

Total bacteria number [15 cm]



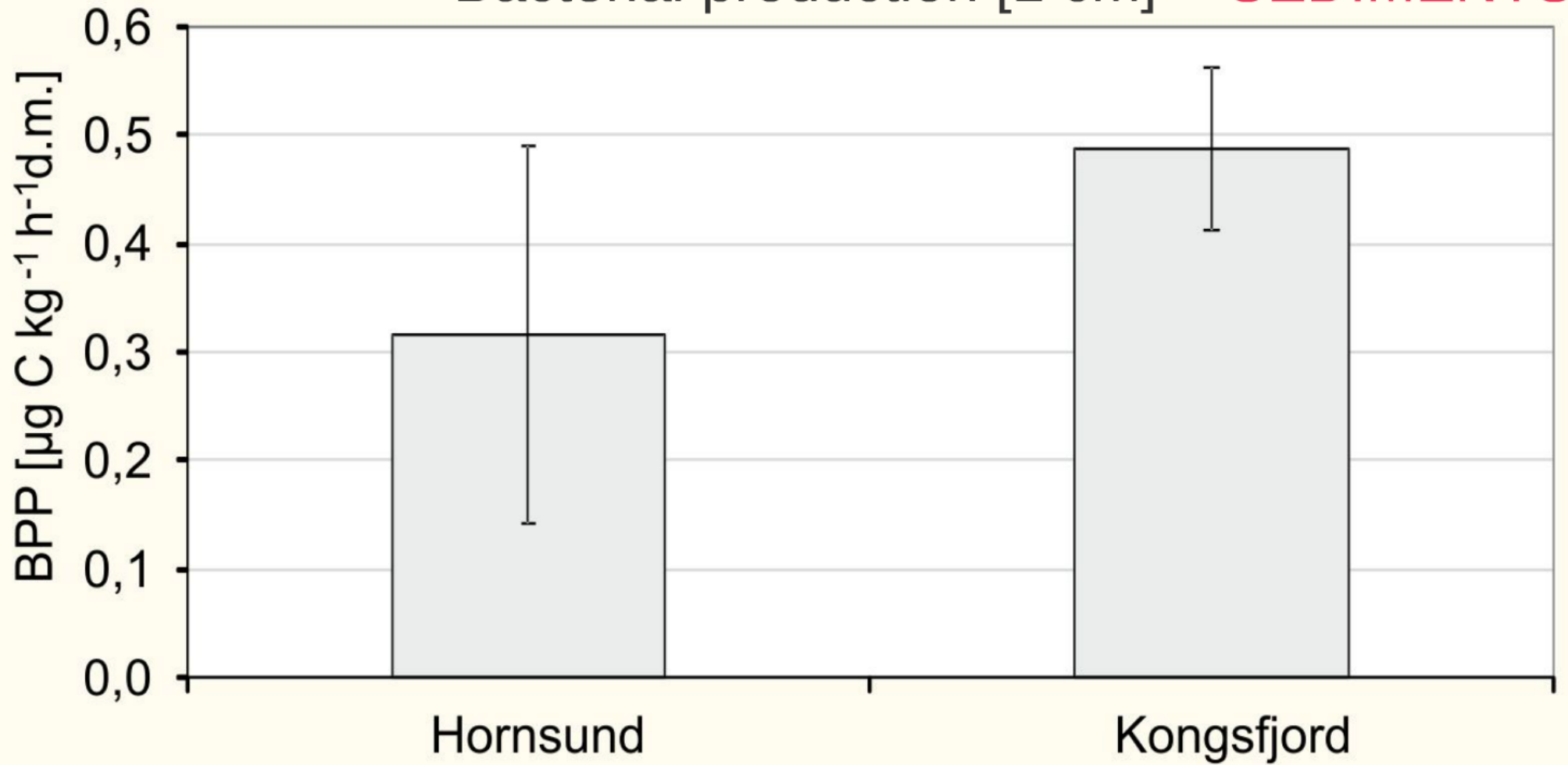
SEDIMENTS

Bacterial biomass [15 cm]



Bacterial production [1 cm]

SEDIMENTS





GAME

Growing of the Arctic Marine Ecosystem



Thank you for your attention