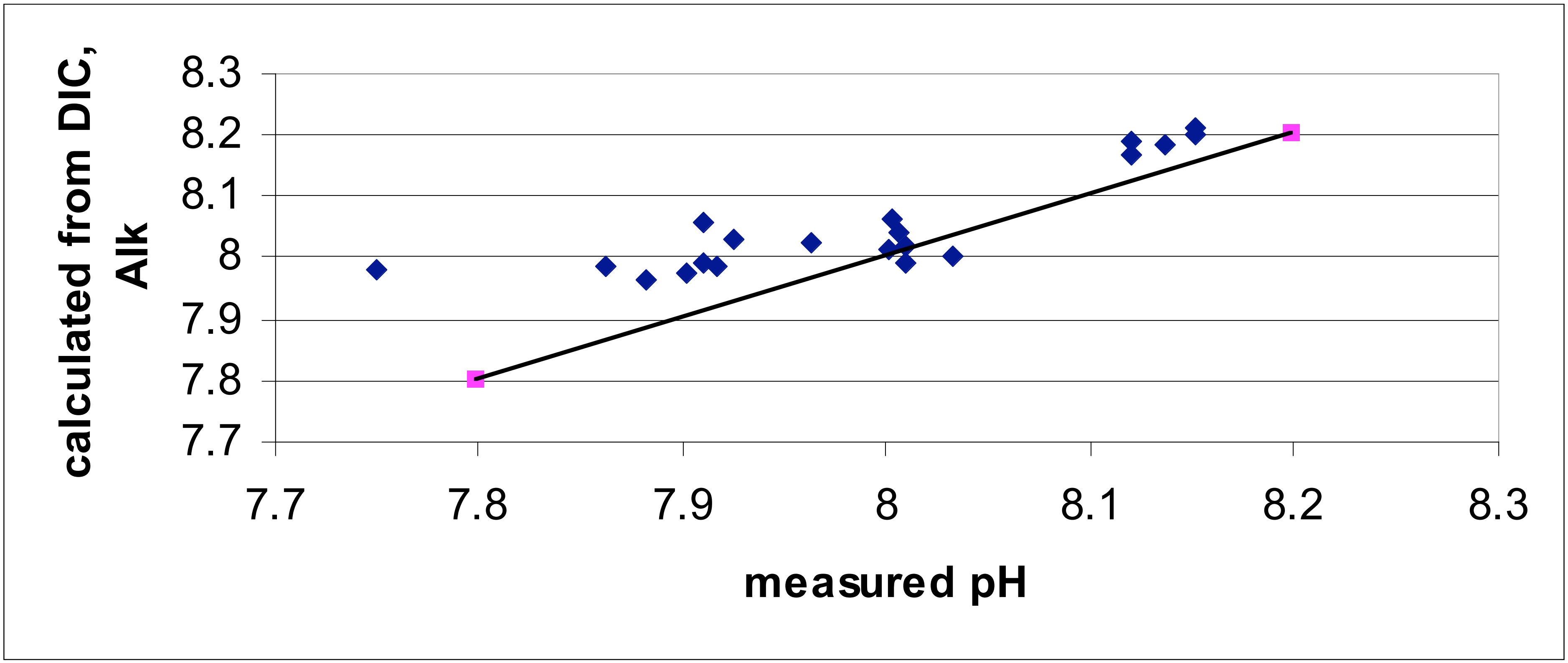
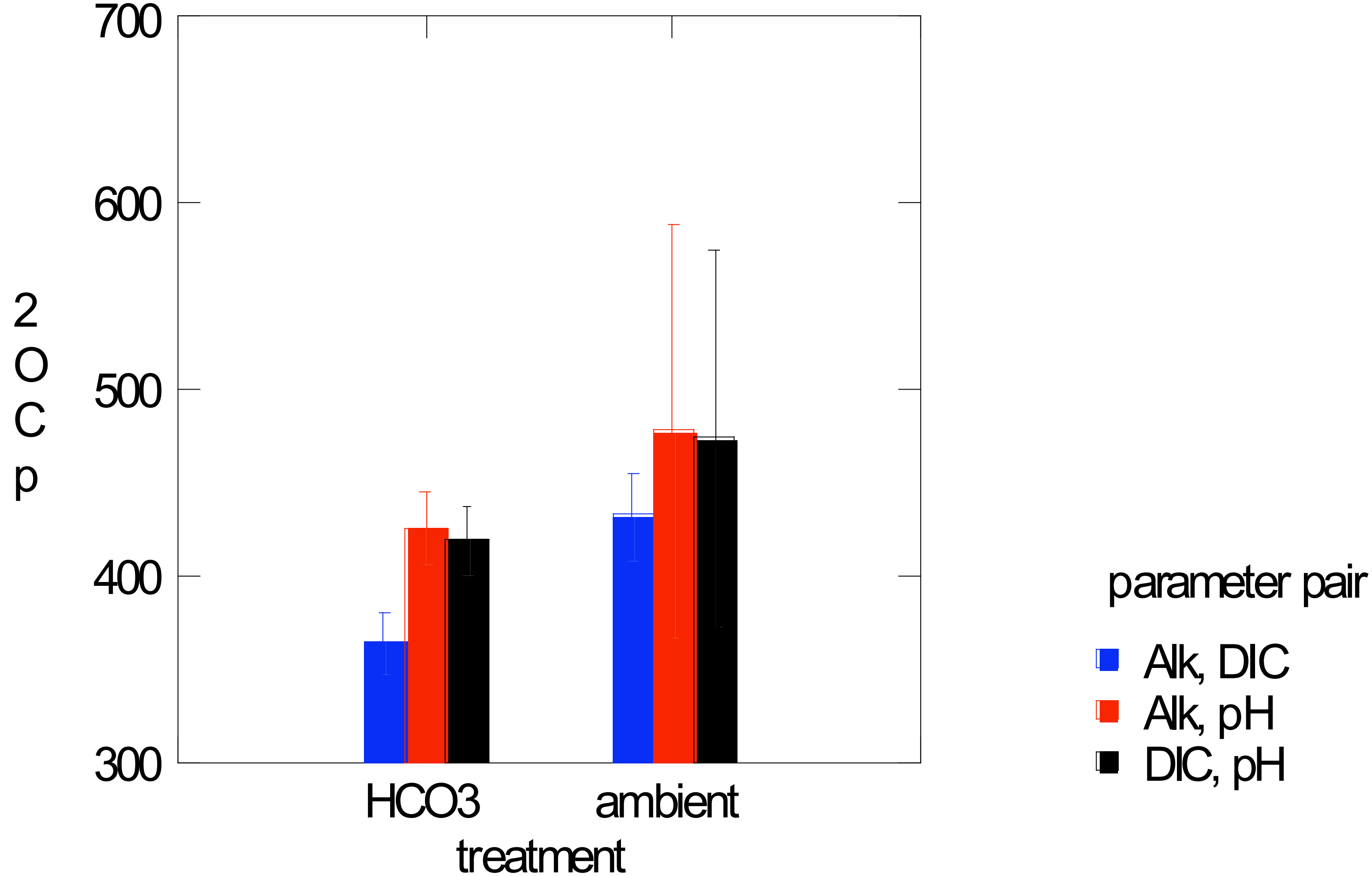
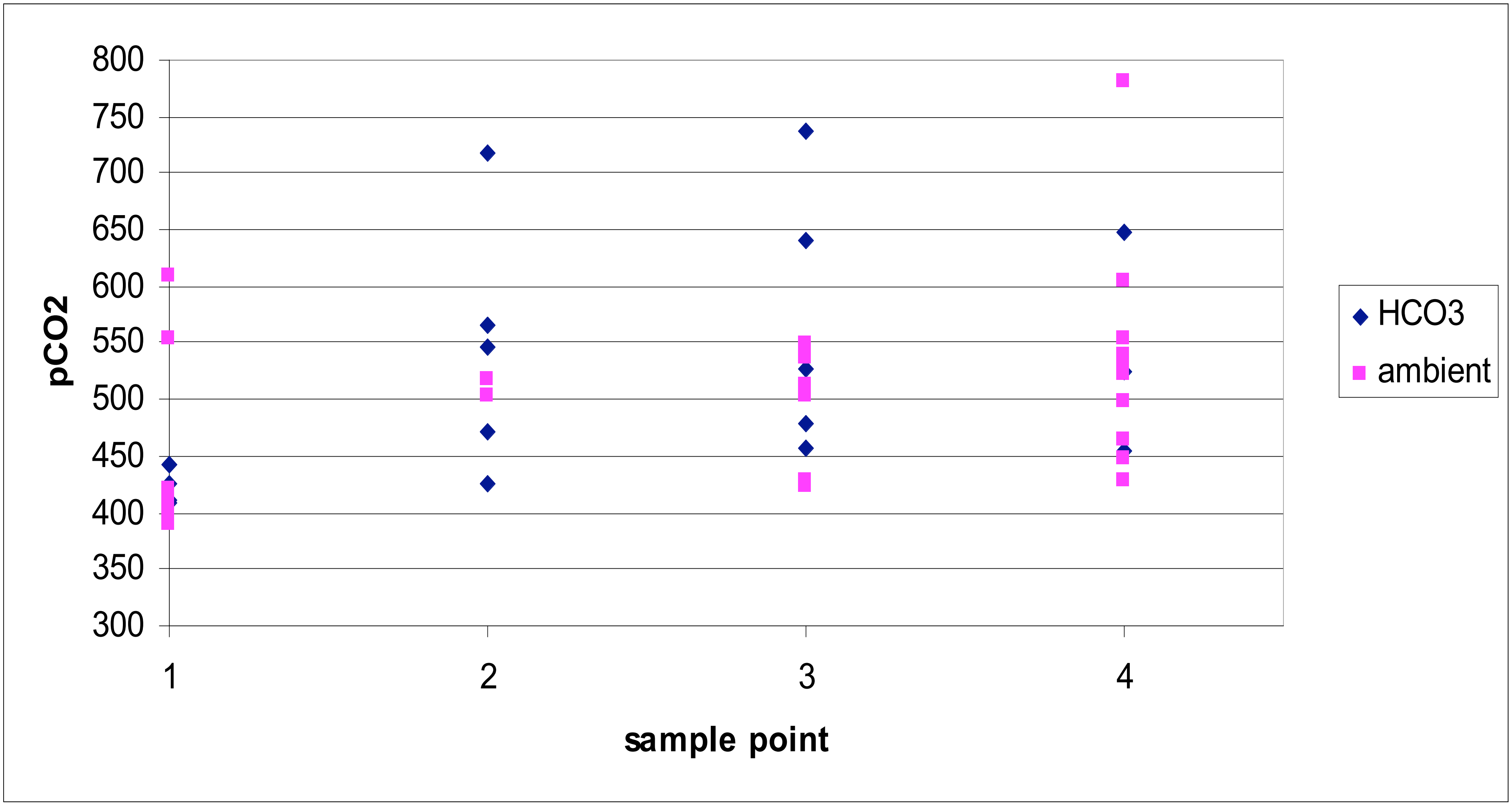
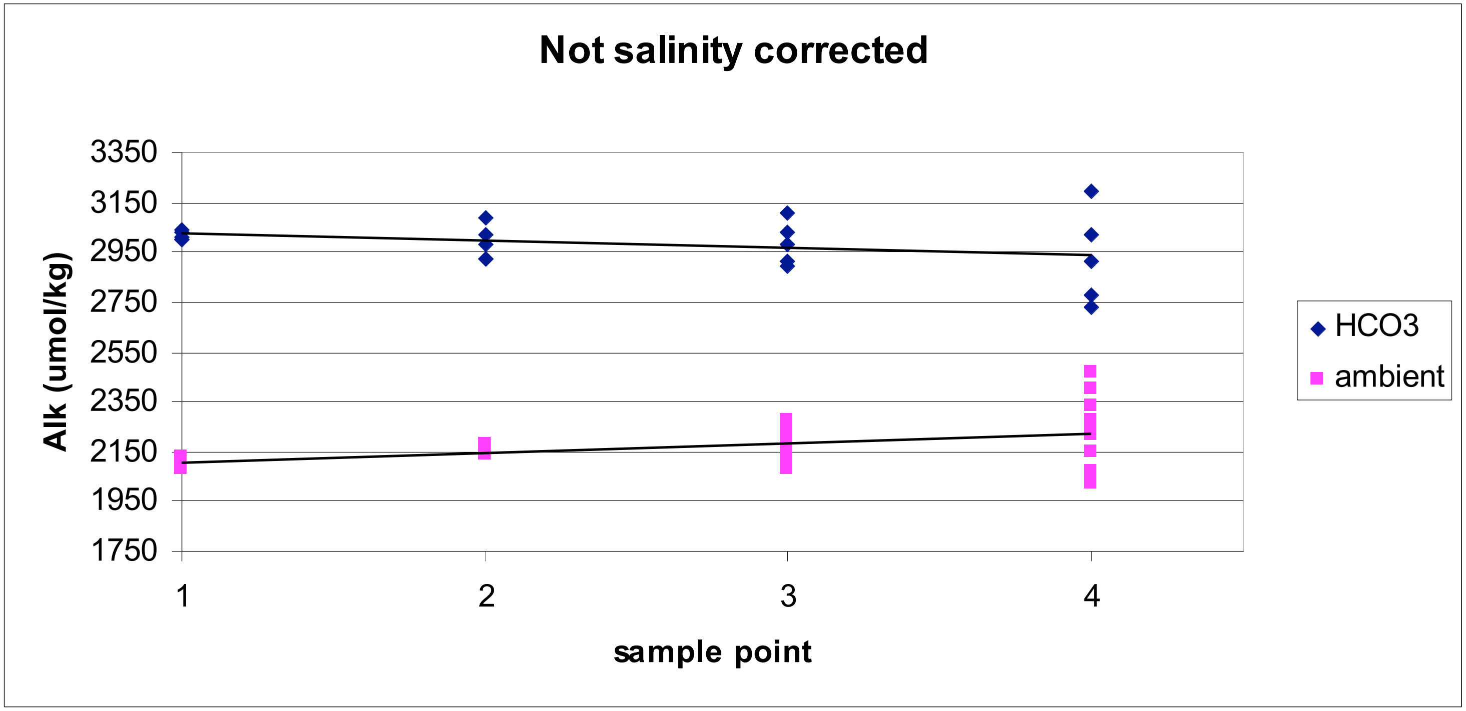

calculated from DIC, Alk
8.3
8.2
8.1
8
7.9
7.8
7.7
7.7
7.8
7.9
8
8.1
8.2
8.3
measured pH

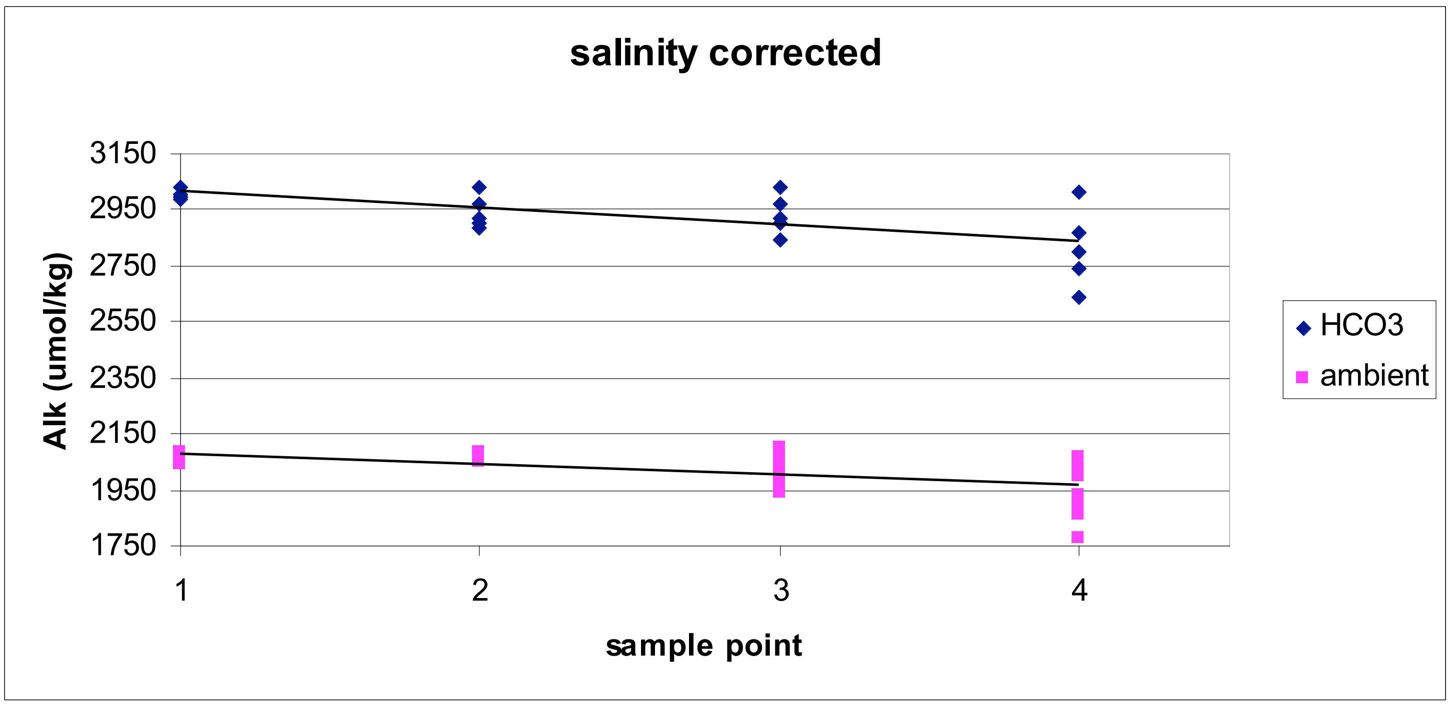


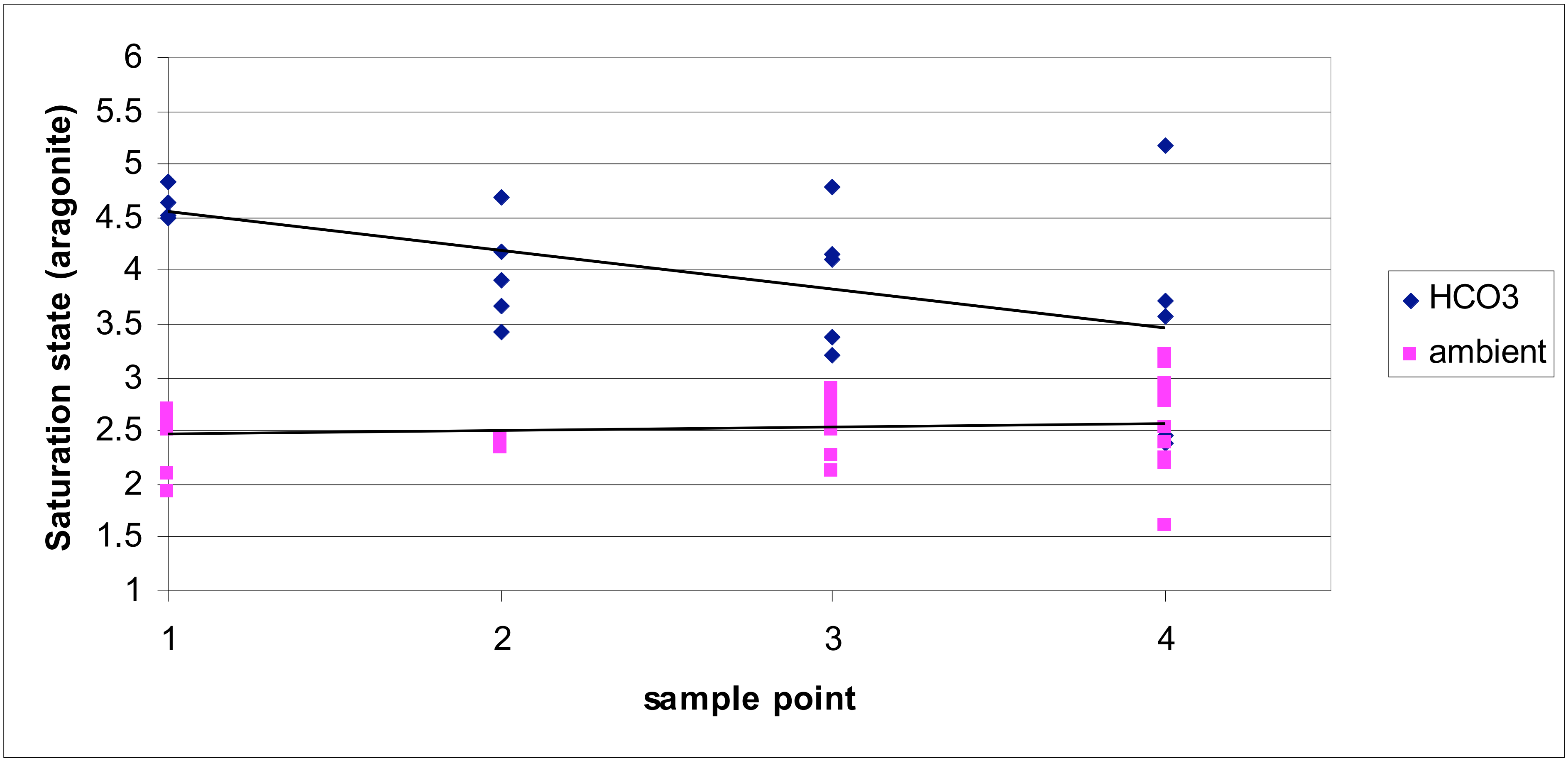
700
600
500
400
300
2
O
C
p
HCO3
ambient
treatment
parameter pair
Alk, DIC
Alk, pH
DIC, pH



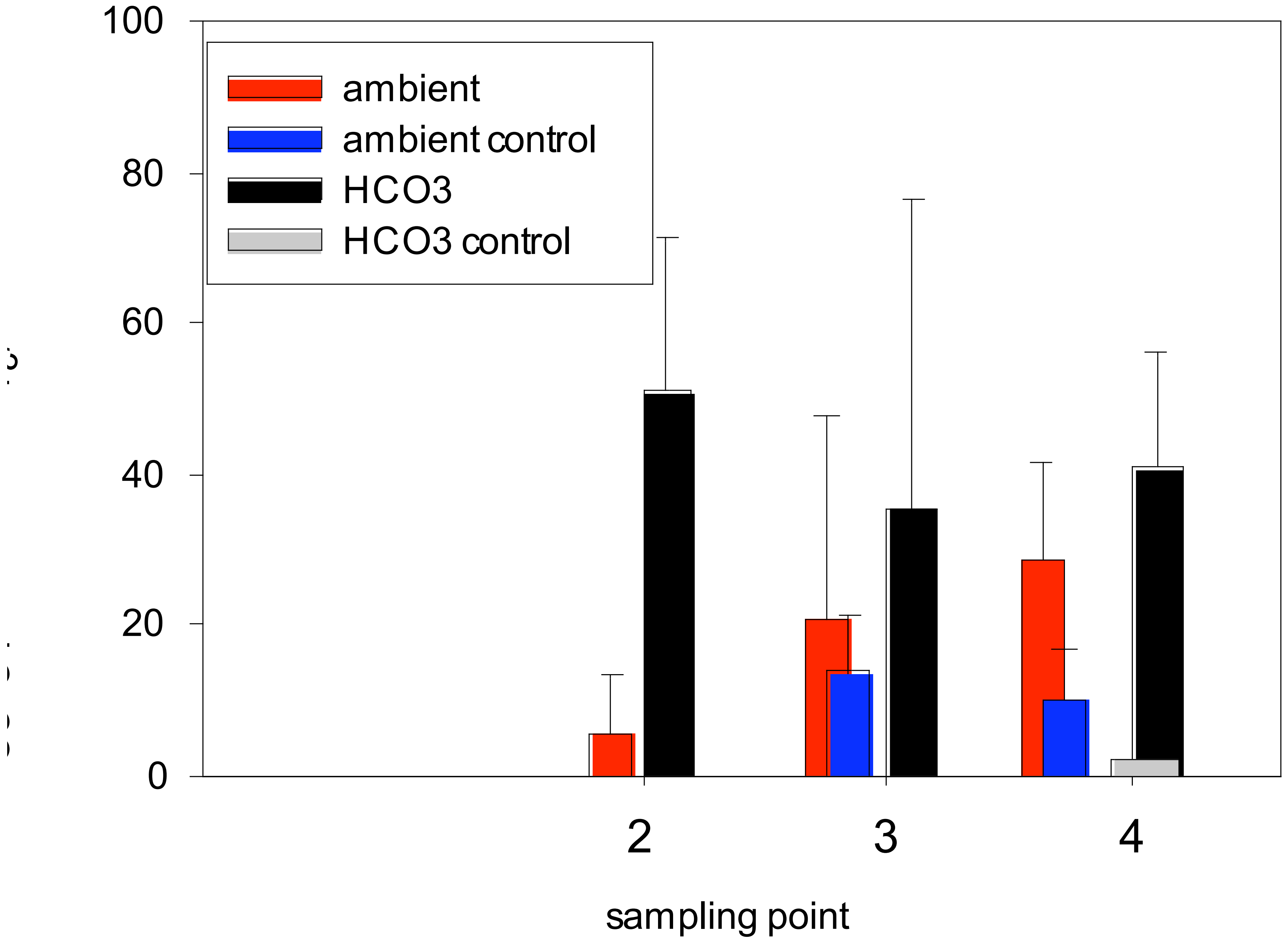
800
750
700
650
600
550
500
450
400
350
300
pCO2
1
2
3
4
sample point
HCO3
ambient


Not salinity corrected
3350
3150
2950
2750
2550
2350
2150
1950
1750
Alk (umol/kg)
1
2
3
4
sample point
HCO3
ambient


salinity corrected
3150
2950
2750
2550
2350
2150
1950
1750
Alk (umol/kg)
1
2
3
4
sample point
HCO3
ambient

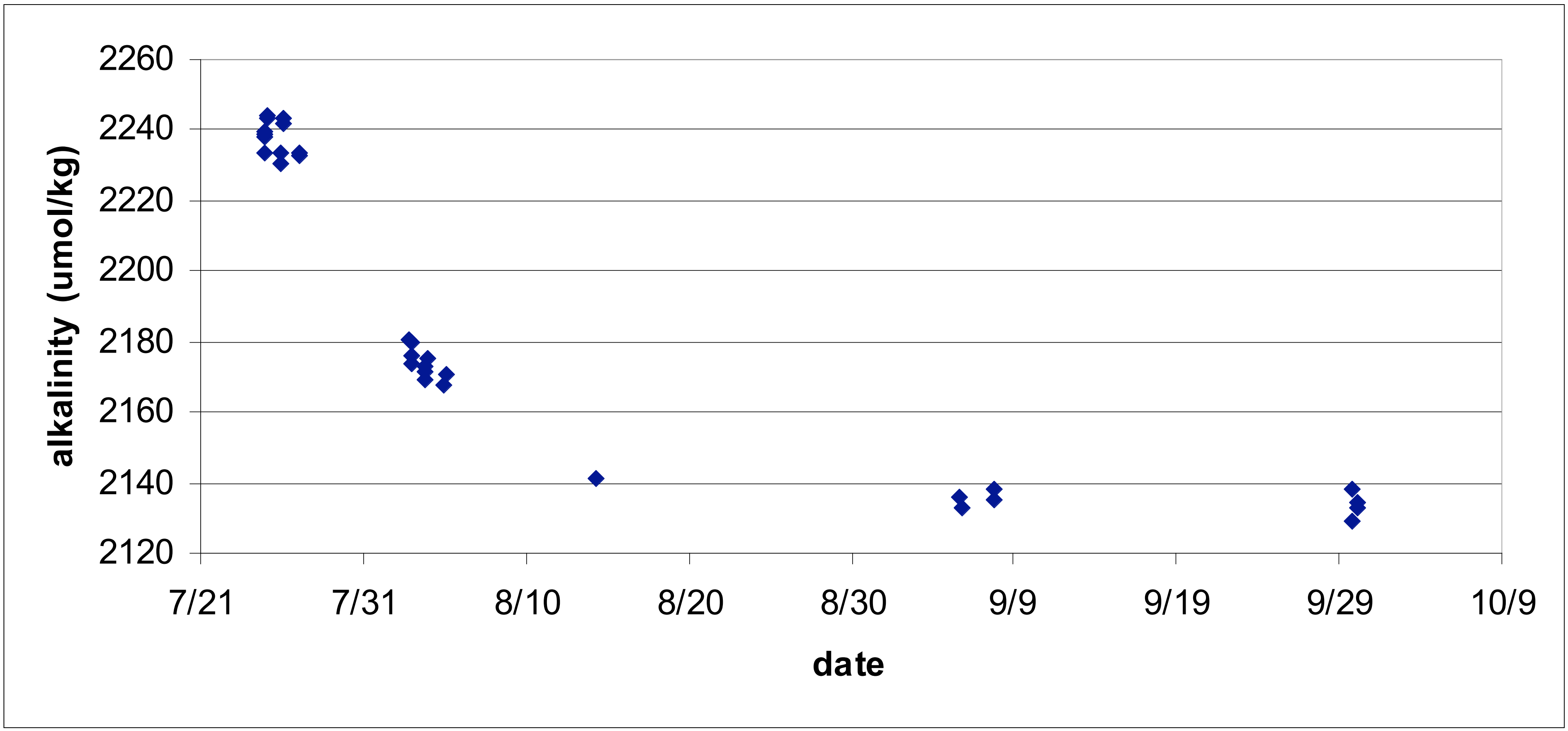


Saturation state (aragonite)
6
5.5
5
4.5
4
3.5
3
2.5
2
1.5
1
1
2
3
4
sample point
HCO3
ambient



100
80
60
40
20
0
ambient
ambient control
HCO3
HCO3 control
2
3
4
sampling point

Container effects

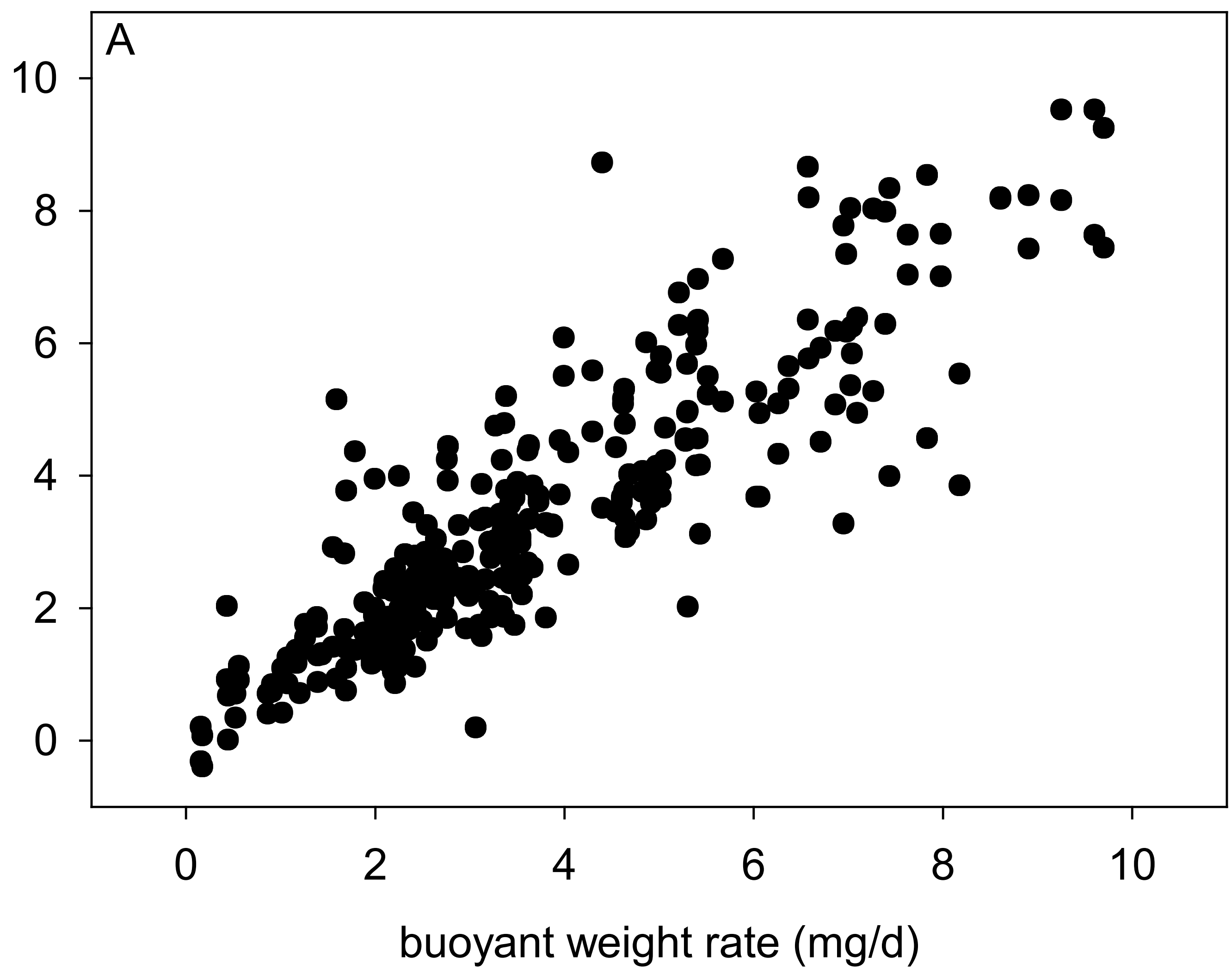


Ammonia

- At normal seawater pH values, ammonia exists predominately as NH_4^+, which does not contribute to Alk
- For example, at S=39.9, T=23.9, Alk=2468, pH=7.91
  - DIC=2209.8 if no NH_3 is present
  - DIC=2208.3 if 38 umol/kg NH_4^+ present
- More significant at higher pH

Ammonia production

- Jacques and Pilson Mar. Biol. 1980
  - $(CH_2O)_{106}(NH_3)_{16}$ + 106 O_2 => 106 CO_2 +90 H_2O +16 NH_4^+ +16 OH^- - adds alkalinity
  - Nitrification may then reduce alkalinity
- Coral example
  - Measured alkalinity uptake 50umol/d
  - Ammonia increase 18umol/d
  - 25% of total rate


A
10
8
6
4
2
0
0
2
4
6
8
10
buoyant weight rate (mg/d)