Nitrogen and silicon cycling in sediment and porewater of the intertidal flat within the Changjiang (Yangtze River) Estuary (Preliminary Results)

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1. Study area

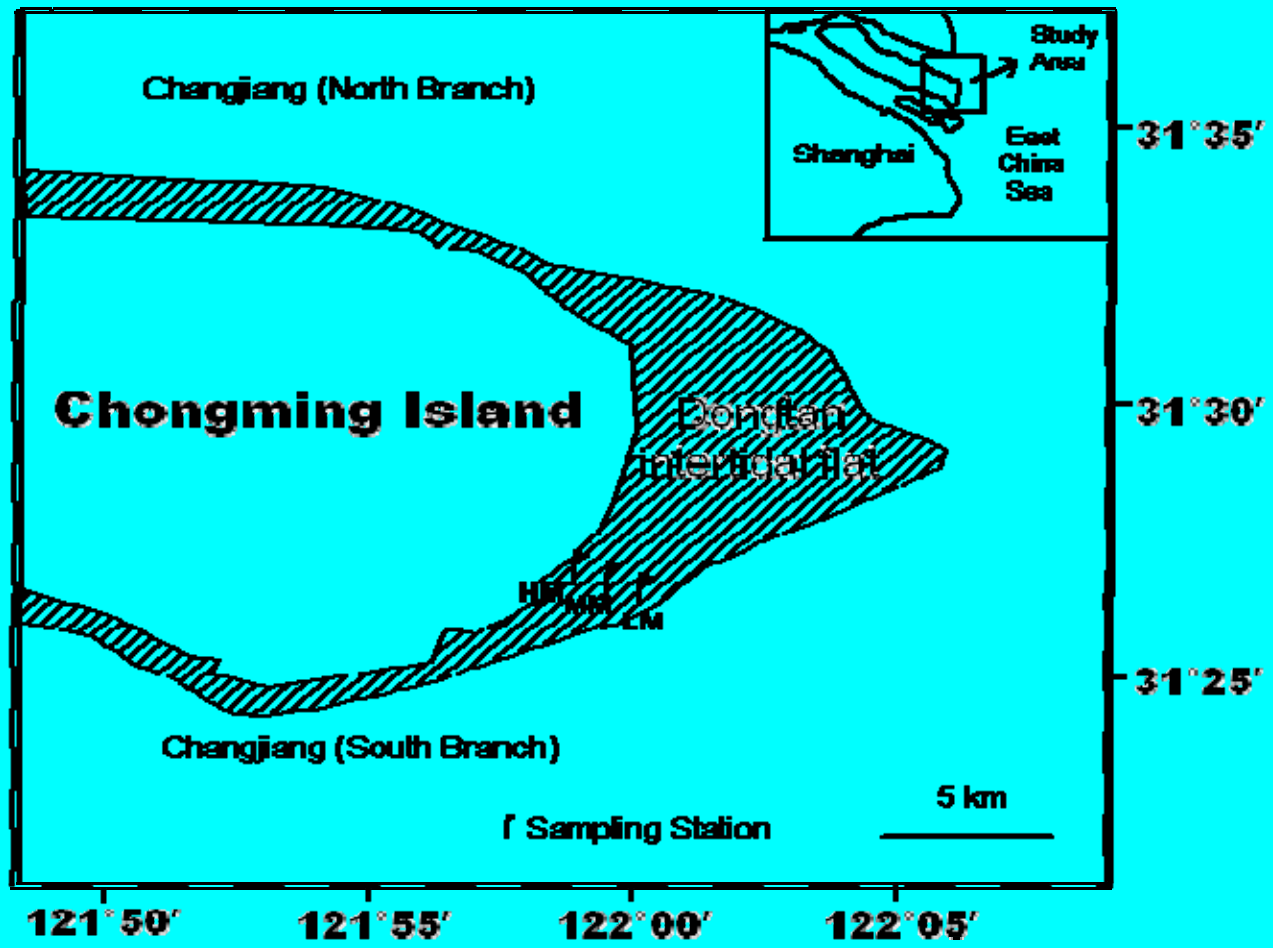

Fig.1 Study area and sampling stations
(HM: High Marsh; MM: Middle Marsh; LM: Low Marsh)

2. Sampling and Methods

2.1 Porewater sampling

sediment centrifugation

filtration by nylon membranes

added with Hg_2Cl and stored in 4 ℃

2.2 Nutrient analysis

Segmented Flow Analyzer, Sanplus System

2.3 BSi extraction

sequential chemical extraction (7 h, 2 M Na_2CO_3)

2.4 Grain size

grain-size laser meters (Model: LS100Q, COULTER Inc.)

2.5 N contents and $\delta^{15}N$ (‰)

FLASH EA 1112-CoFlo III-IR-Ms (Model: DELTAplus XP, Thermo Finnigan Corporation)

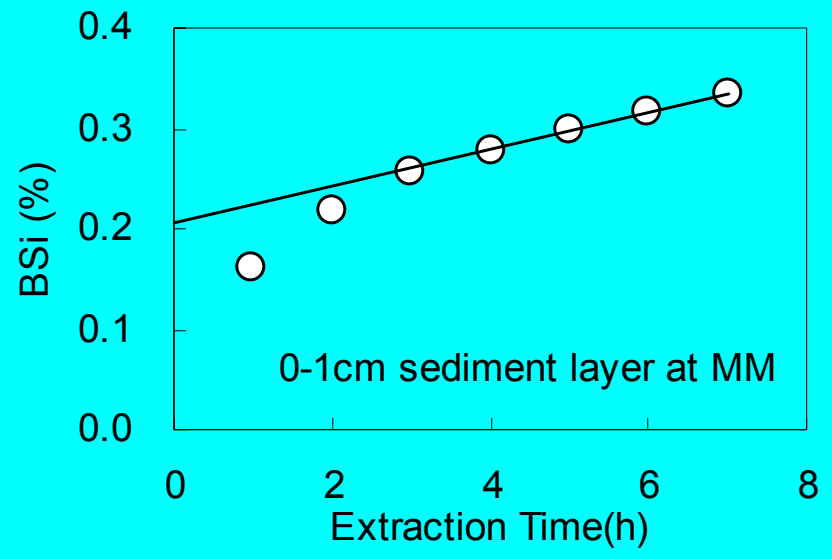

Fig. 2 An example of silica dissolution curve during extraction

3. Results

3.1 Solid phase fraction

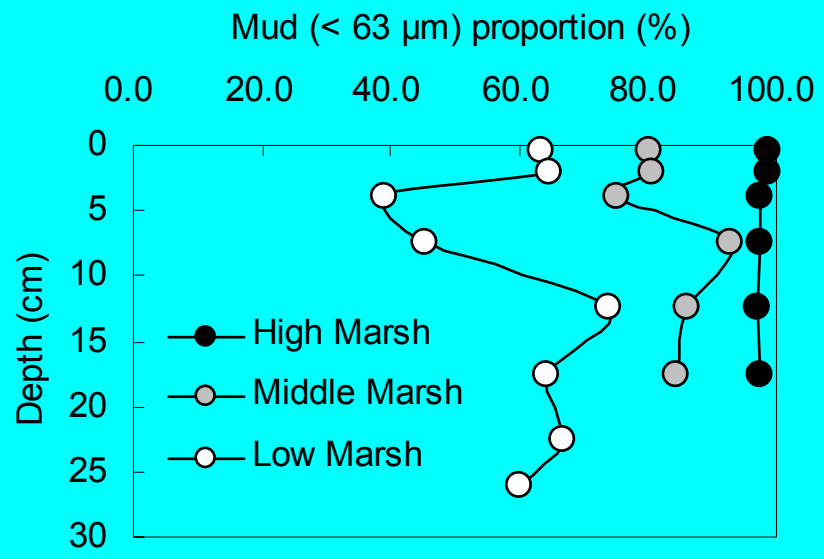

Fig. 3 Profiles of mud proportion (<63 μm) in sediments at HM, MM, and LM, respectively, sampled at March 2005

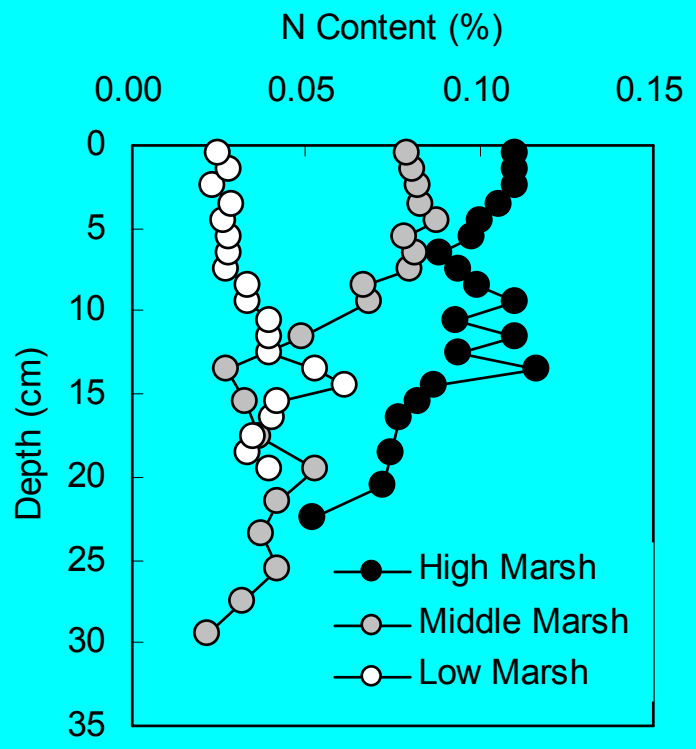

Fig. 4 Profiles of N content (%) in sediment cores at HM, MM, and LM, respectively, sampled in March 2005

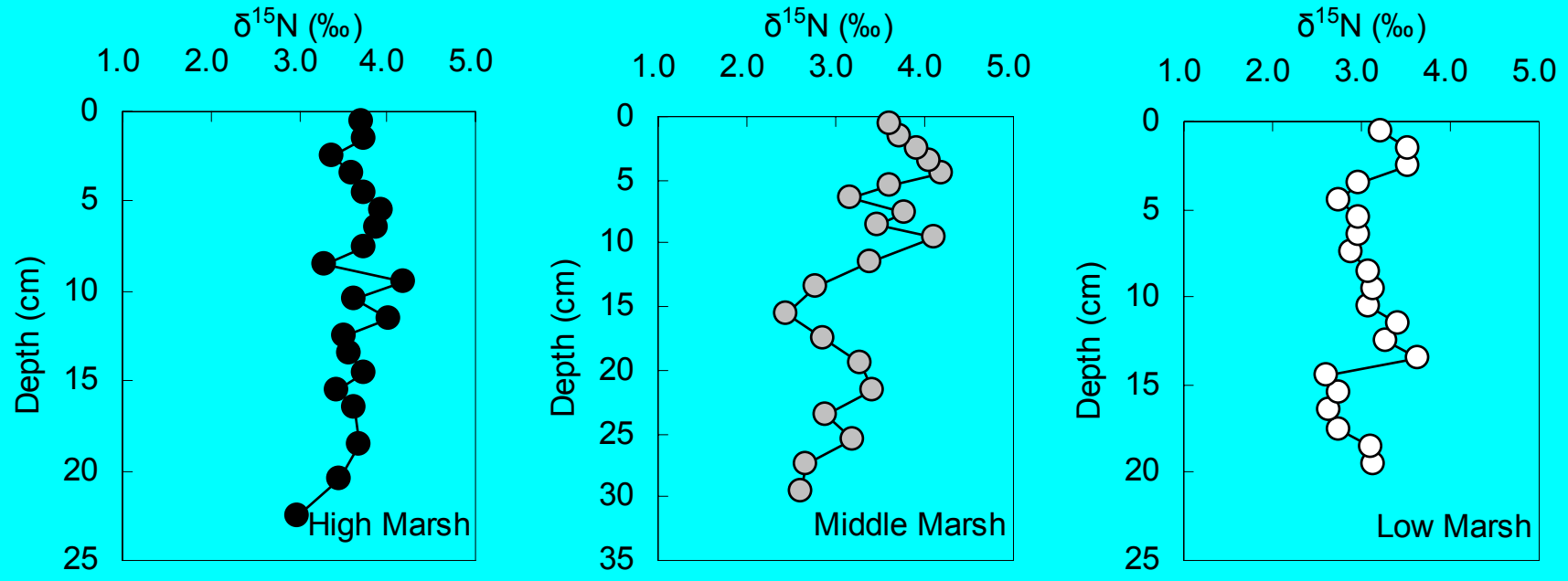

Fig. 5 Profiles of $\delta^{15}N$ (‰) in sediment cores at HM, MM, and LM, respectively, sampled in March 2005

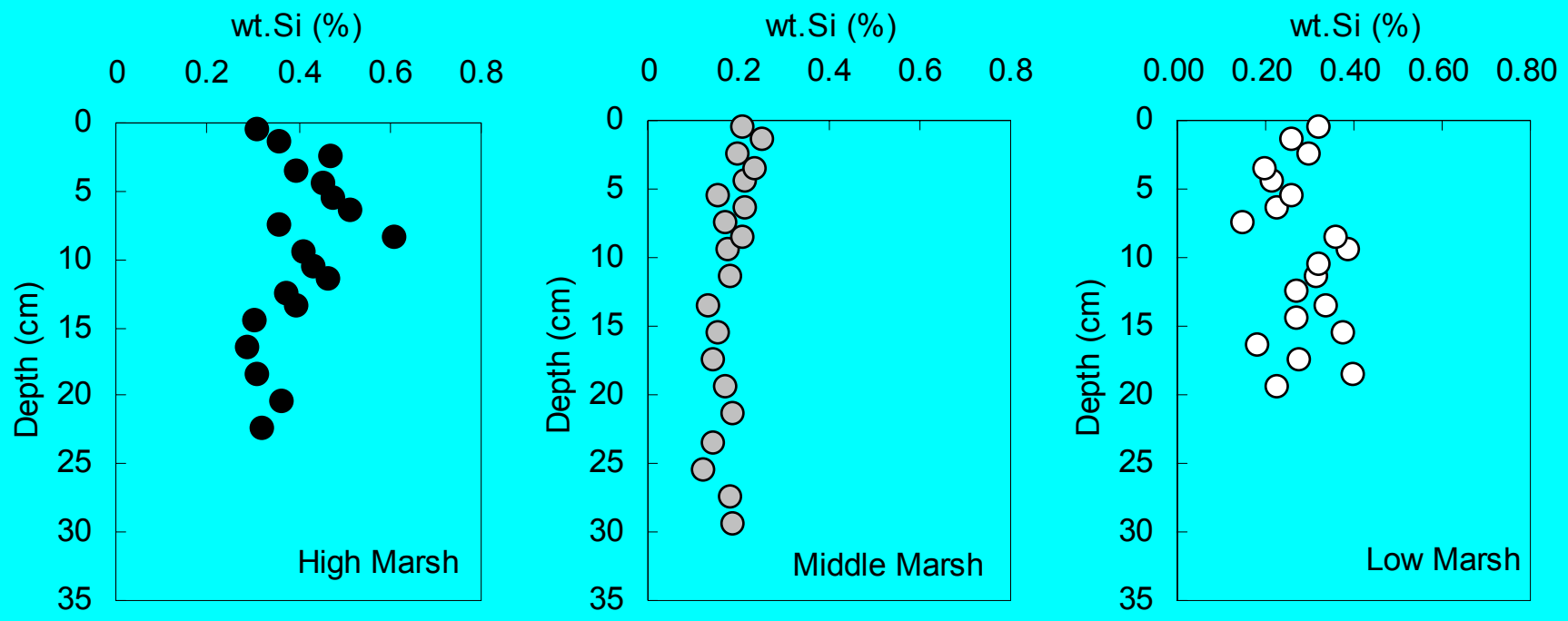

Fig. 6 Profiles of BSi (Si%) in sediment cores at HM, MM, and LM sampled in March 2005

3.2 NH_4^+ and SiO_3^{2-} in porewater

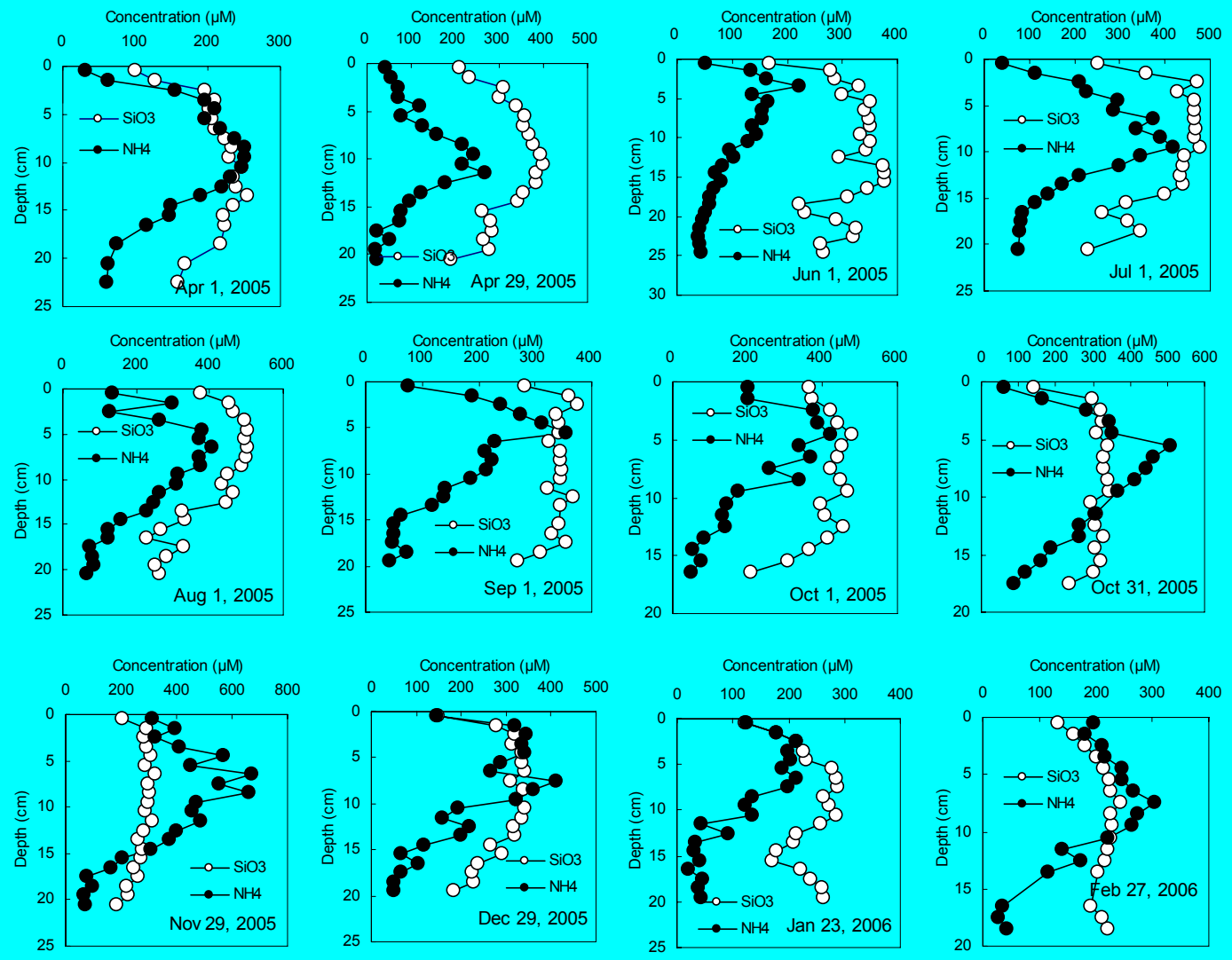

Fig. 7 NH_4^+ and SiO_3^{2-} in porewater at High Marsh station

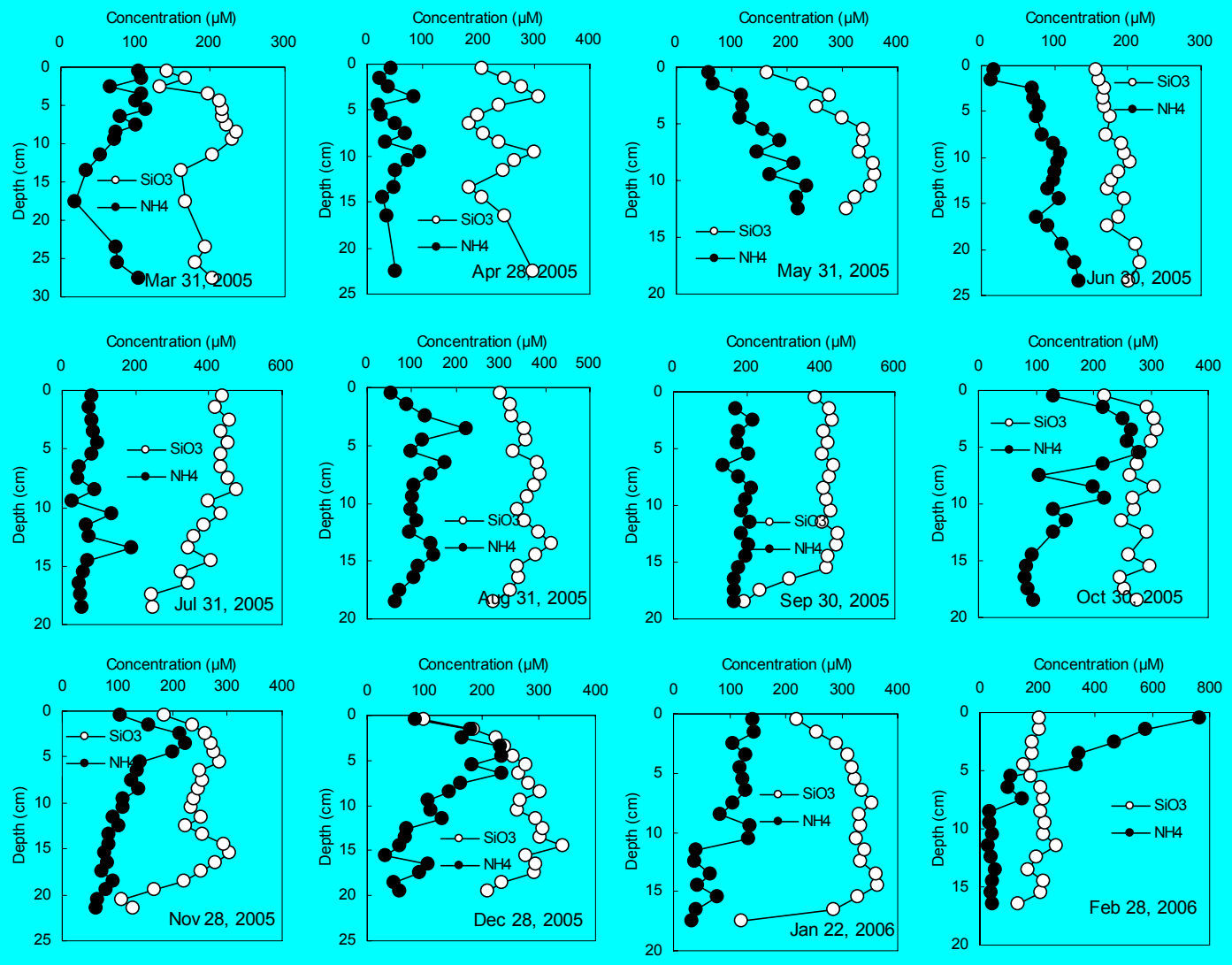

Fig. 8 NH_4^+ and SiO_3^{2-} in porewater at Middle Marsh station

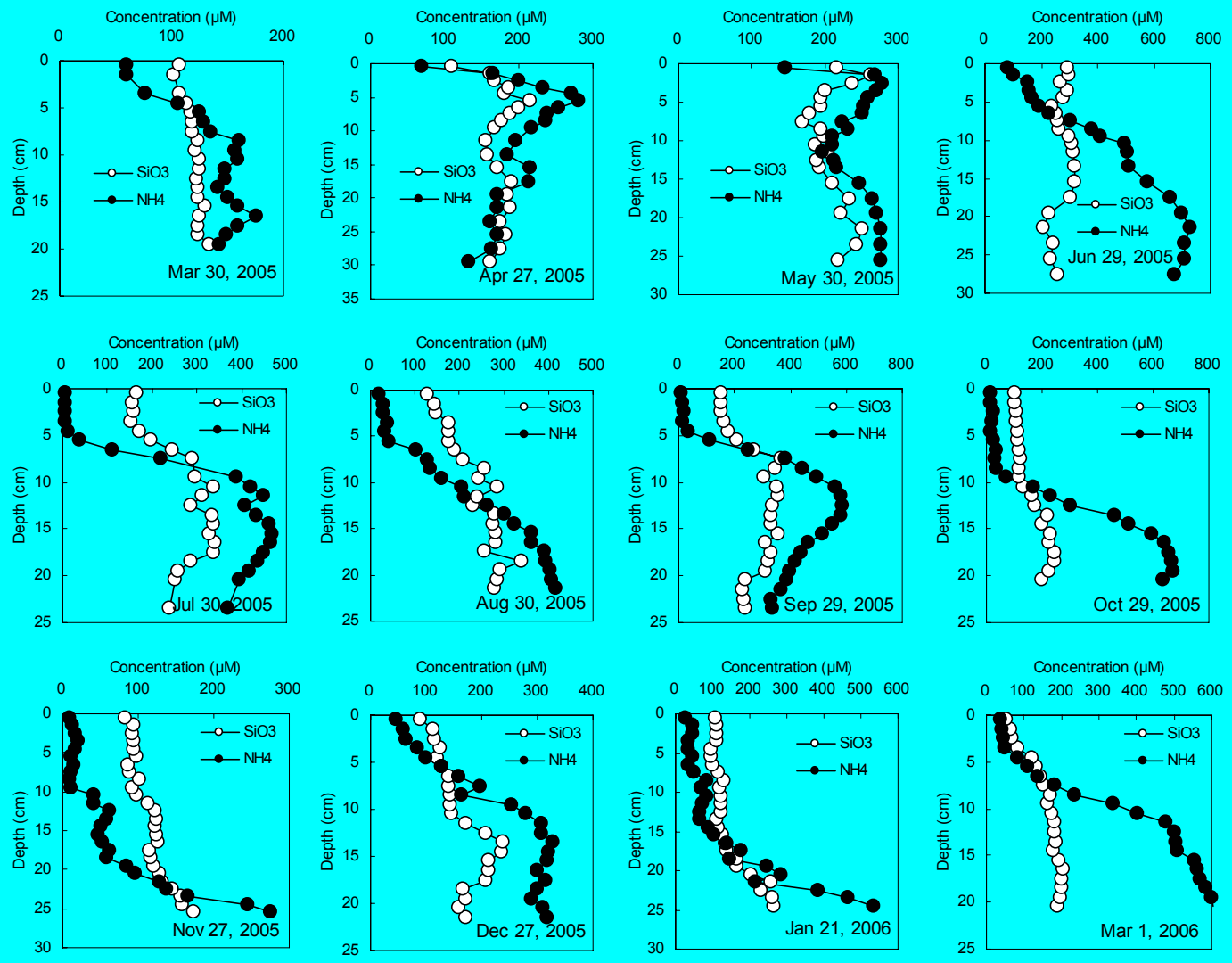

Fig. 9 NH_4^+ and SiO_3^{2-} in porewater at Low Marsh station

4. Discussion

4.1 Solid phase fraction

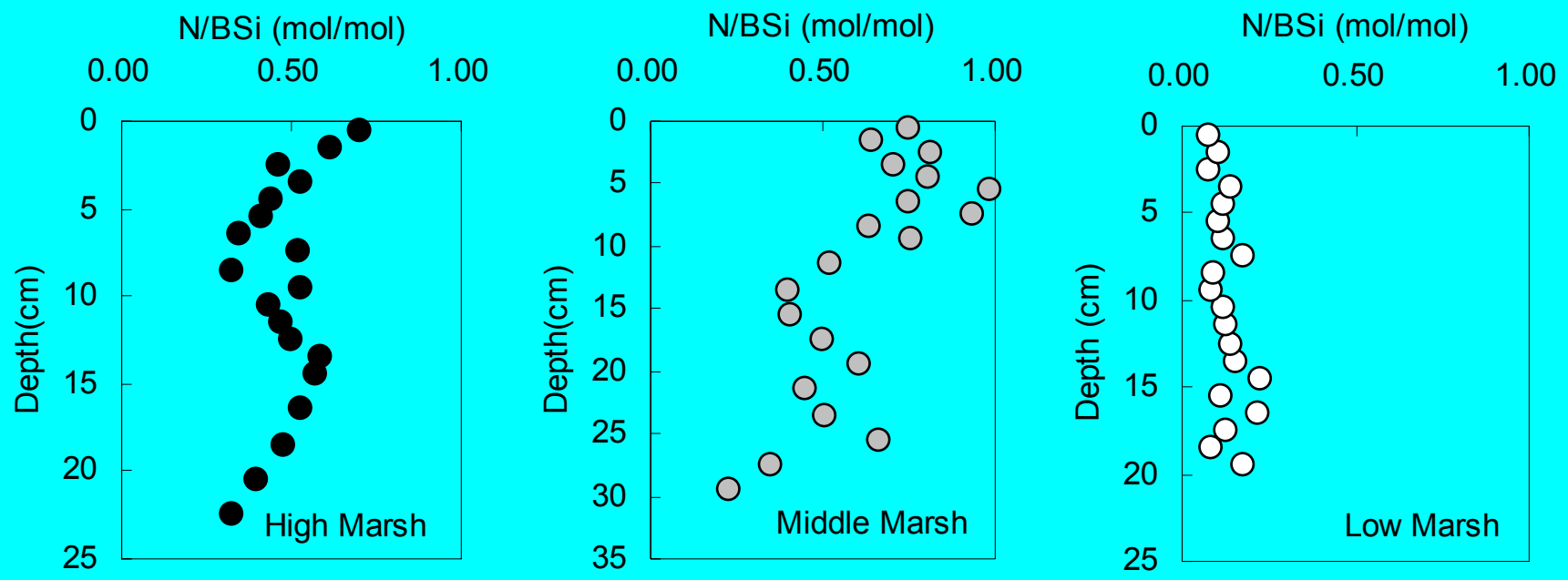

Fig. 10 Profiles of calculated N/BSi molecule ratio in sediment cores at HM, MM, and LM sampled in March 2005

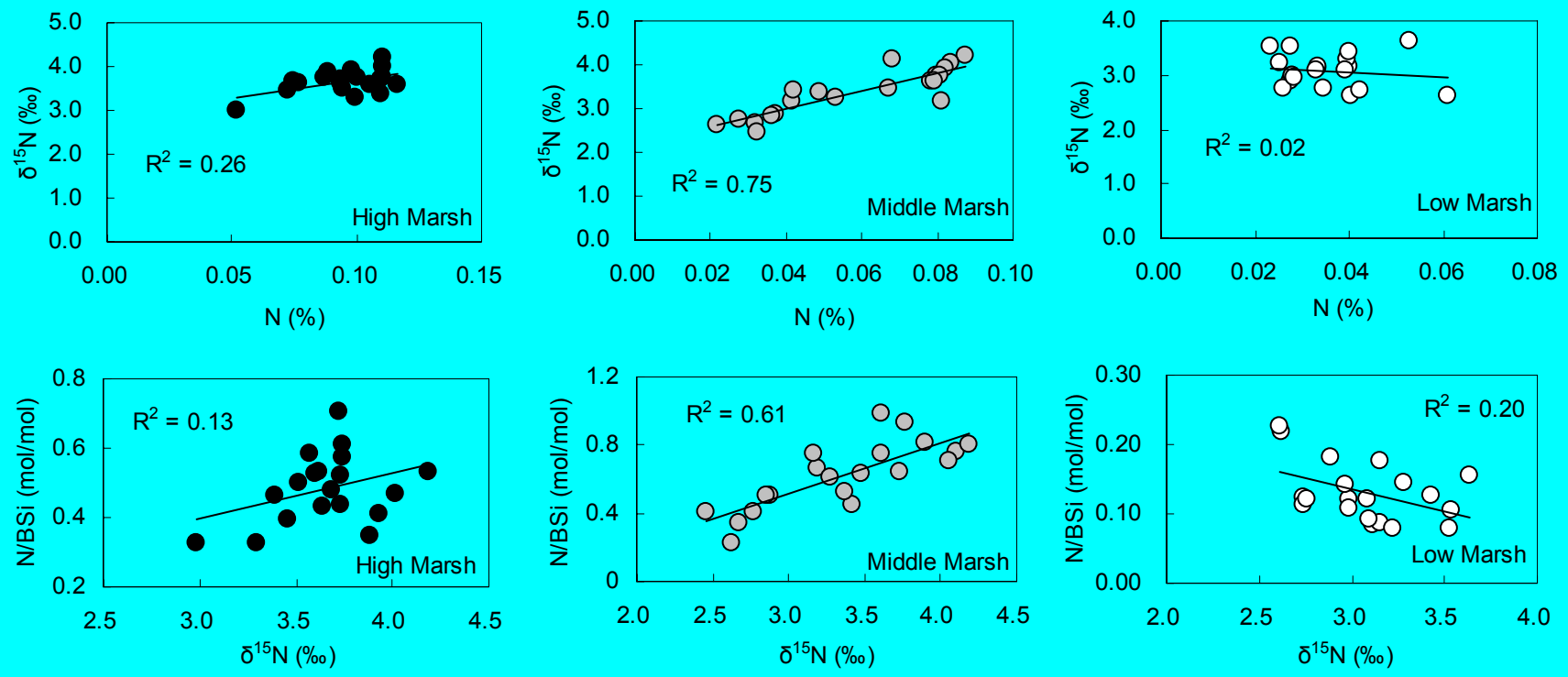

Fig. 11 Relationships between N content vs. $\delta^{15}N$ (‰) and N/BSi molecule ratio vs. $\delta^{15}N$ (‰) in sediment cores at HM, MM, and LM, respectively

4.2 Nutrient variations with time in porewater

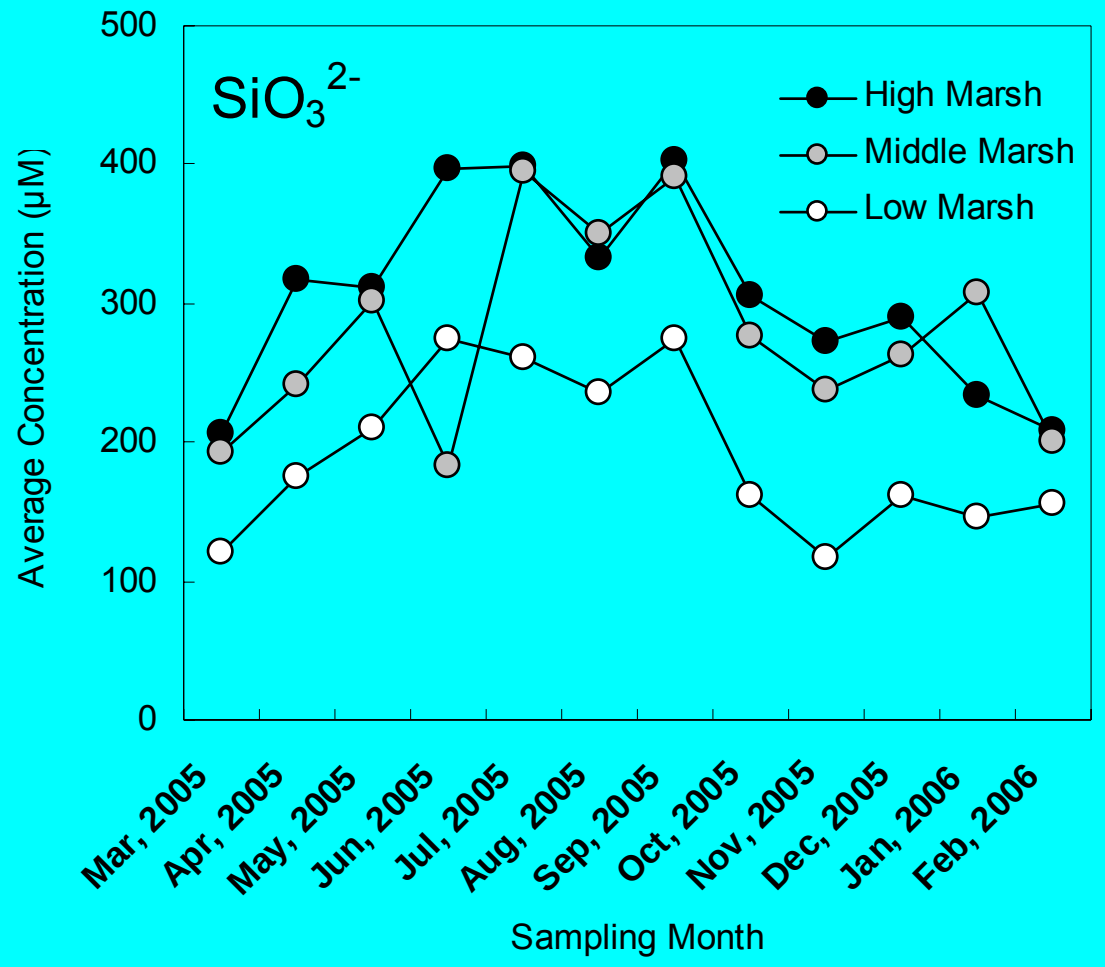

Fig. 12 Comparisons of average [SiO_3^{2-}] in sediment porewater among HM, MM, and LM cores during an annual year

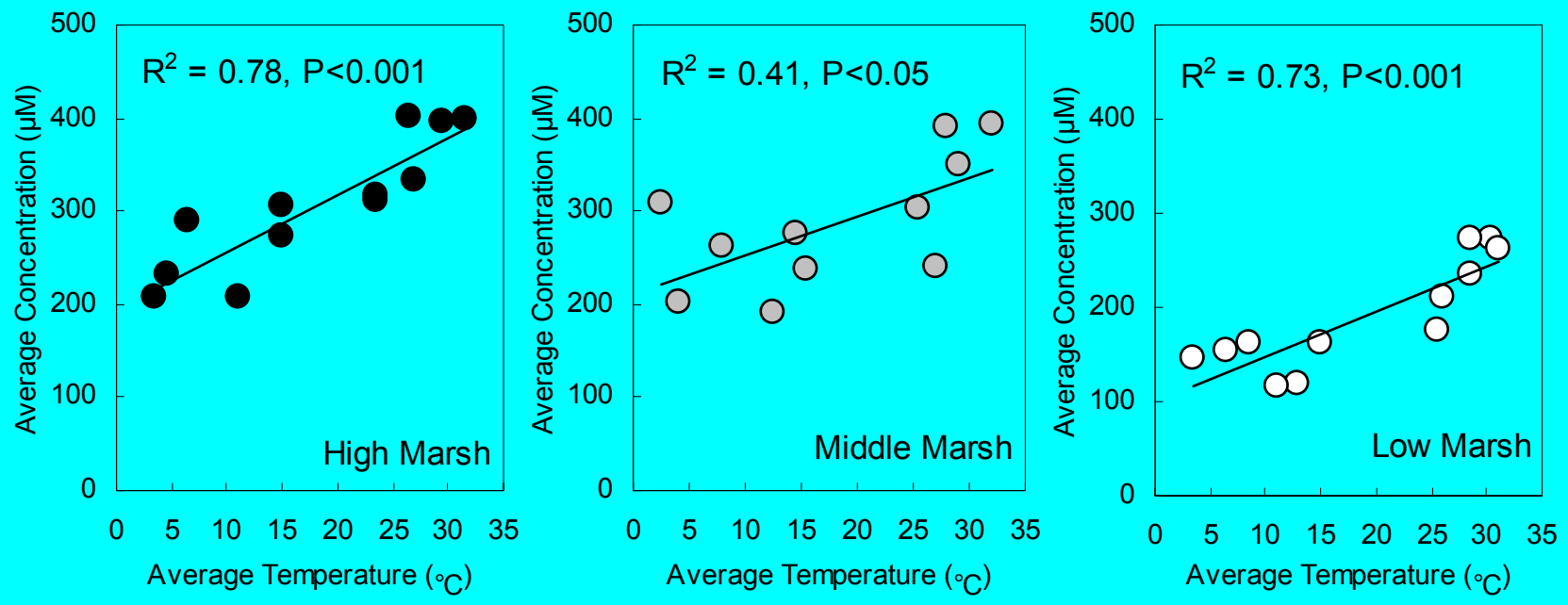

Fig. 13 Correlations between average [SiO_3^{2-}] in sediment porewater and sediment temperatures of the sampling day in HM, MM, and LM, respectively

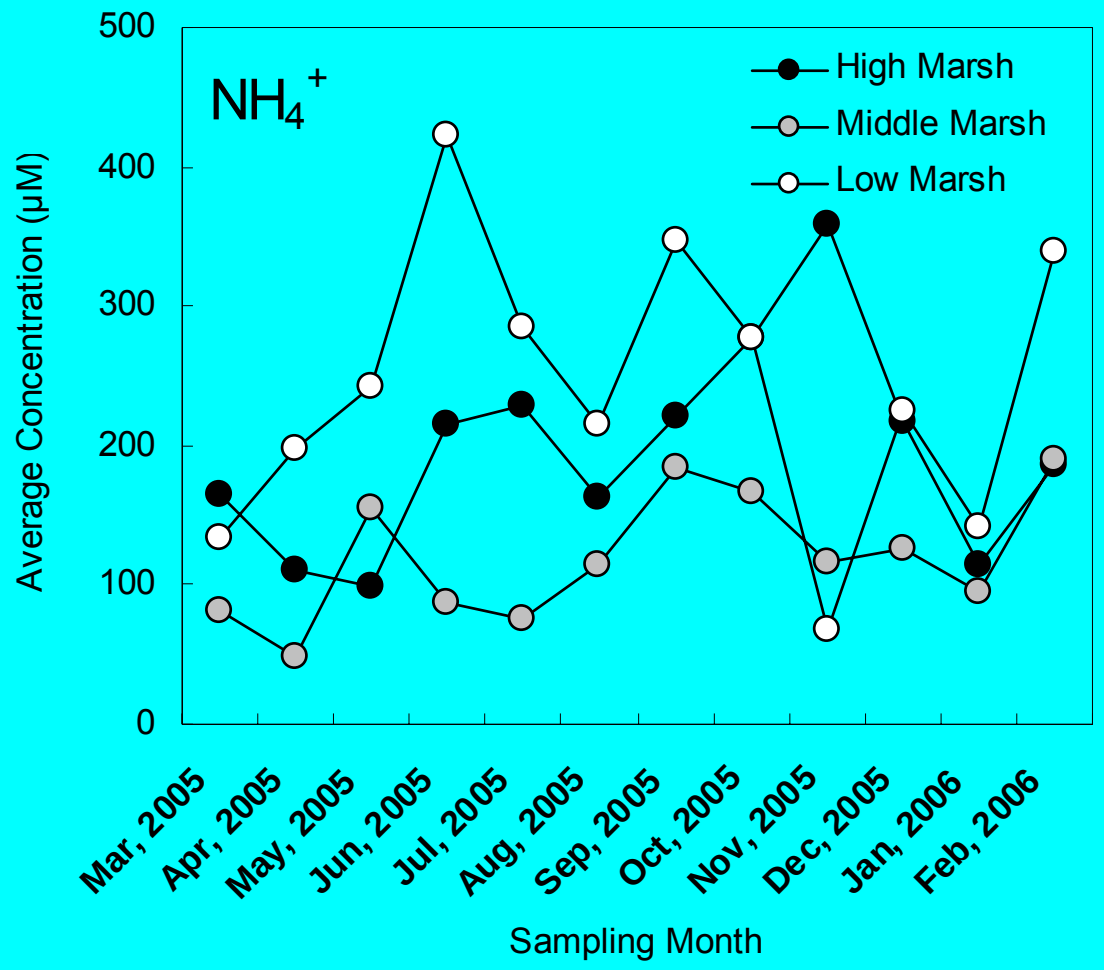

Fig. 14 Comparisons of average [NH_4^+] in sediment porewater among HM, MM, and LM cores during an annual year

Thank You!