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

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2006.10.19.
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$_2$Cl and stored in 4 °C

2.2 Nutrient analysis
   Segmented Flow Analyzer, Sanplus System

2.3 BSi extraction
   sequential chemical extraction (7 h, 2 M Na$_2$CO$_3$)

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: DELTApplus XP, Thermo Finnigan Corporation)
Fig. 2  An example of silica dissolution curve during extraction

0-1cm sediment layer at MM
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

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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  $\text{NH}_4^+$ and $\text{SiO}_3^{2-}$ 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

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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 $[\text{SiO}_3^{2-}]$ in sediment porewater among HM, MM, and LM cores during an annual year

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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 $[\text{NH}_4^+]$ in sediment porewater among HM, MM, and LM cores during an annual year
Thank You!