

Table S1. Metatranscriptomic sequencing and mapped rates at Stn 1 in the southern East China Sea during the cruise conducted in July 2018.

<b>Samples<sup>a</sup></b>	<b>Raw reads (10<sup>6</sup>)</b>	<b>Quality control<sup>b</sup> (10<sup>6</sup>)</b>	<b>Mapped reads<sup>c</sup> (10<sup>6</sup>)</b>	<b>Mapping rate (%)</b>
<b>Jul 2018</b>				
<b>untreated_01</b>	4.6	4.33	1.76	40.5
<b>untreated_02</b>	4.7	4.45	1.59	35.7
<b>NH<sub>4</sub><sup>+</sup>_add_01</b>	4.9	4.54	1.48	32.6
<b>NH<sub>4</sub><sup>+</sup>_add_02</b>	4.7	4.39	1.87	42.7
<b>N-free_01</b>	4.7	4.37	1.32	30.2
<b>N-free_02</b>	6.2	5.37	2.23	41.5

a: Treatments: NH<sub>4</sub><sup>+</sup>\_add: ammonium addition; N\_free: nitrogen-free.

b: Reads after trimming adapters and removing rRNA.

c: Reads can be mapped to Tara MATOU unigenes.

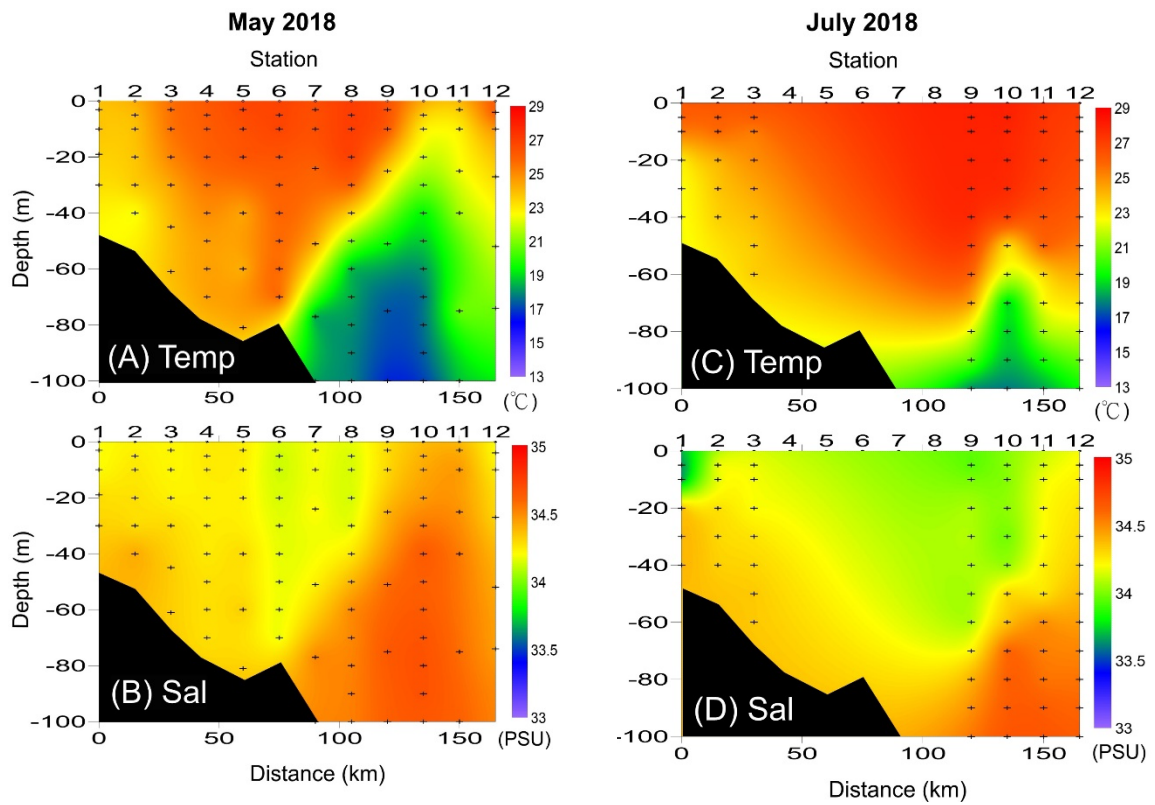


Fig. S1. Contour maps of the vertical distribution of temperature (A, C) and salinity (B, D) in the southern East China Sea during the cruises in May 2018 and July 2018.

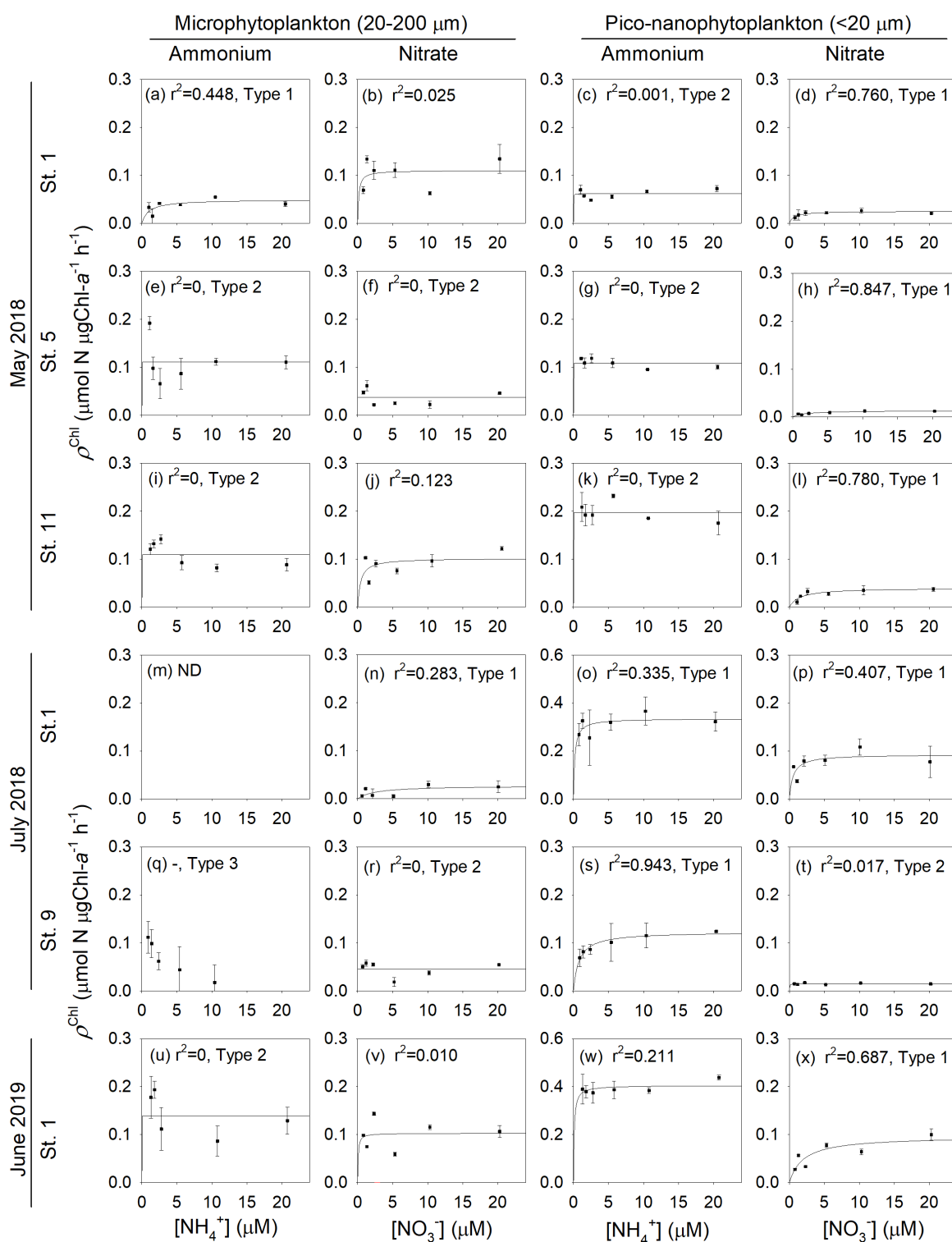


Fig. S2. The nitrogen uptake curves detected in the surface water of southern East China Sea during three research cruises conducted in May 2018, July 2018, and June 2019. Type 1: uptake curve fitting the Michaelis-Menten equation with  $r^2 > 0.25$ , Type 2: uptake curve with a constant uptake rate, Type 3, uptake curve of ammonium repression.

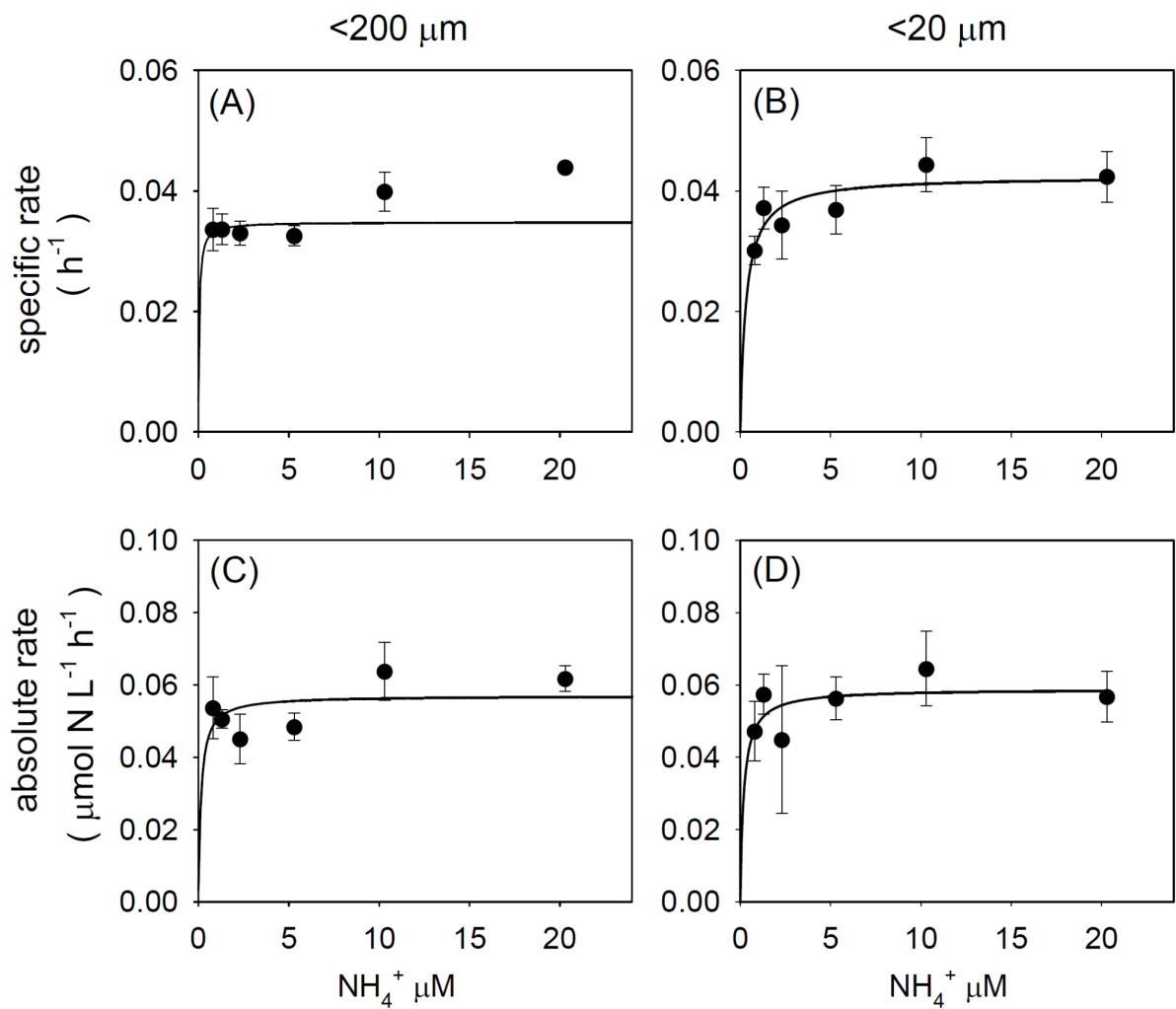


Fig. S3. Specific uptake rates (A, B) and absolute uptake rates (C, D) in samples from Stn 1 in July 2018, fractionated by size (<20  $\mu\text{m}$  and <200  $\mu\text{m}$ ).