

## Distributions of nutrients and dissolved organic matter in the Chukchi and Beaufort Seas

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Seawater samples were collected over the Chukchi and Beaufort Seas during the ARA04B (25 August–1 September 2013) and ARA04C (7 September–28 September 2013) cruises aboard Korean icebreaker R/V Araon, and analyzed for nutrients, dissolved organic carbon (DOC) and dissolved organic nitrogen (DON). Nutrients (nitrate, phosphate, silicate) were depleted at the surface. The nutrients concentrations increased with increasing depth, with maxima centered at ~150 m depth within the halocline layer, then decreased with increasing depth below the maxima, indicating that the modified Pacific Waters dominate the upper halocline layer. The ratio of nitrate to phosphate in the Chukchi and Beaufort Seas showed that water of Pacific origin is depleted in nitrate with respect to phosphate. In addition,  $N^*$  values, which reflect only the net impact of  $N_2$  fixation, denitrification, and any other process that adds or remove nitrate with a N:P stoichiometry different than 16:1, showed negative values in upper halocline layer, whereas the  $N^*$  values in lower halocline layer was close to zero. These results suggest that the North Atlantic Ocean acts as a net source of fixed nitrogen while the North Pacific Ocean acts as a net sink, and that the Arctic Ocean plays a key role in balancing the global nitrogen cycle. Concentrations of DOC and DON ranged from 45–125  $\mu\text{M}$  and 3–17  $\mu\text{M}$ , respectively. The highest DOC and DON concentrations were observed in polar surface layer, suggesting that the large contribution of terrigenous dissolved organic matter (DOM) from Arctic rivers is responsible for the elevated concentrations of DOC and DON in this layer. While DOC showed a significant inverse relationship with salinity, a negative correlation between DON and salinity was weak, probably due to biological influence on DON.